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Editorial

The Recent Trends in Control, Communication and Computer Technology deals with the developments and practices adopted in various projects in different Engineering disciplines and specializations - Rock Dredging, Concrete Technology, Grid Computing, Electric Propulsion & the Stationary Plasma Thruster, Turbo charging, Ultra filtration, Nan filtration & Reverse Osmosis, FACTS Devices, Sensors, Advanced Materials for Aircraft and Helicopters, Data Communication and Network Protocol, Satellite Communication Systems, Optoelectronic Devices, Wireless Communication, Applications of CFD Techniques in Aero-propulsive Characterization of Missiles, Hazardous Waste Management, Liquid Fueled SCRAMJET Combustors, Armor Materials and Designs, Heat Transfer in Nuclear Reactors, Defense Electronics Systems, World Class Manufacturing, Value Engineering & Engineering Ethics. Traditionally, computing studies occupy two partitions i.e., Science and Engineering, separated by a line roughly at the computer architecture level. A more effective organization for Computer Science and Engineering requires an intrinsically interdisciplinary framework that combines academic and systems-oriented computing perspectives. Researchers have been developing such a framework, which re aggregates Computer Science and Computer Engineering, then repartitions the resulting single field into analysis and synthesis components. The framework is based on the notion that science is foremost about dissecting and understanding, and engineering is mostly about envisioning and building. The computer had a great effect on Communication we must examine the idea of modeling in a computer and with the aid of a computer. **Control, Communication and Computer Technology** runs together with hand in hand.

The computer had a great effect on Communication. We must examine the idea of modeling in a computer and with the aid of a computer. For modeling, we believe that computer is the basic Infrastructure to centralize communication. Any communication between people about the same concept is a common revelatory experience about informational models of that concept. Each model is a conceptual structure of abstractions formulated initially in the mind of one, and while communicating if it is different from those in the mind of other, there is no common model and no communication. Researchers are working on applying their wireless and mobile research to transportation, health care, education, collaboration and environmental sustainability. Projects already underway include safe and efficient road transportation, autonomous driving, wireless medical implants, mobile video delivery, multiparty wireless videoconferencing and energy harvesting.

The Conference sometimes is conducted in collaboration with other Institutions. IRNet encourages and invite proposals from institutes within India and abroad to join hands to promote research in various areas of discipline. These conferences have not only promoted the international exchange and co-operation, but have also won favorable comments from National and International participants, thus enabled IRNet to reach out to a Global network within three years time. The conference is first of its kind and gets granted with lot of blessings.

The conference designed to stimulate the young minds including Research Scholars, Academicians, and Practitioners to contribute their ideas, thoughts and nobility in these disciplines of Engineering.

I sincerely thank all the authors for their invaluable contribution to this conference. I am indebted towards the reviewers and Board of Editors for their generous gifts of time, energy and effort. It's my pleasure to welcome all the participants, delegates and organizer to this International Conference on behalf of IRNet family members. We in IRNet believe to make ***"RESEARCH COOL".*** I wish all success to the paper presenters. The papers qualifying the review process will be published in the forthcoming IOAJ journal.

Convenor :-

Rahul K Prasad
IRNet, India

PERFORMANCE EVALUATION OF E-COMMERCE WEB SITES IN INDIA

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Abstract: - The E-Commerce web sites are facing lots of problems today. Customers prefer traditional way to purchase the products and not from E-Commerce web sites. If we see the history of E-Commerce, then we get that E-Commerce is the purpose of Internet and the web to conduct business. The study address the quality and performance issues of E-Commerce that become hurdle in business activities. The E-Commerce global and Indian scenario on the basis of Internet Users World Statistics to show internet penetration worldwide and E-Commerce Users World Statistics to address the reasons why the people have not accepted E-Commerce in India, various quality and implementation issues of the web sites which are neglected to fulfill the requirements of thee customers, and suggested Total Quality Management (TQM) implementation as the best solution to sort out the issues.

Keywords: *E-Commerce; Performance; Web sites; Total Quality Management (TQM); Quality issues.*

1. INTRODUCTION:

Imagine a physical world where there are hundreds upon hundreds of branches of the same store. I have a branch in my neighborhood tailored to my needs, and you have a branch in your neighborhood tailored to yours. In the physical world this would be impossible; however, the movement toward E-Commerce (doing the work of commerce electronically), has produced business strategies that could never exist in the physical world.

E-Commerce is the purpose of Internet and the web to conduct business. If the companies need to shift from the old world of mass production where "standardized products, homogeneous markets, and long product life and development cycles were the rule" to the new world where "variety and customization supplant standardized products", building one product is simply not adequate anymore[2].

E-Commerce is having so many benefits. But it is having so many quality issues also. E-Commerce web sites are finding the solutions. We suggest Total Quality Management (TQM) as the solution.

TQM is defined as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization[1]. It is a customer driven philosophy wherein the stress is on customer delight. Its application to information technology, especially in E-Commerce, is a recent trend. TQM has a vast potential to generate the improvements in the process of E-Commerce. TQM focuses on meeting the needs of the customer. TQM is not inspection, but actually the prevention of defects. It involves everyone in the organization.

2. Global Scenario:

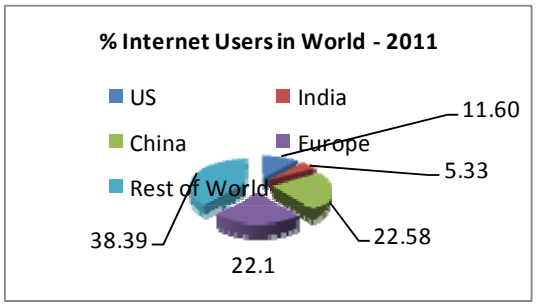
Internet Users World Statistics :-

Asia Vs. World Internet Usage AND Population Statistics.	US	Europe	Asia	Restof World
Population	31.32	81.64	387.97	188.65
Internet Users	24.50	50.07	101.68	47.66
Penetration%	78.20%	61.30%	26.20%	25.27%
Users %	11.60%	22.1	44.8	21.5

The success of the E-Commerce depends on the success of the internet[9]. Let's see the internet usage of the world population by IMRG Report[3] on the regional basis

(*Data for Population and Internet Users is in Crore)

India Vs. Asia Internet Usage AND Population Statistics on 31-12-2011[4].



So the percentage of the Indian internet users to the Asian internet users is 11.90% and if we compare this with the total world internet users then it is just 5.33%[4].

3. INDIAN SCENARIO:

In India, E-Commerce survey is done by IAMAI Report[11] which shows following results. Indian E-Commerce sales distribution of last five years.

1) Net Commerce Market Size from 2007 to 2011

(Figures in Crores. Percentages indicate share of the overall market size)

Year	Dec 2007	Dec 2008	Dec 2009	Dec 2010+	Dec 2011+
Total Market Size	8,146	14,030	19,688	31,598	46,520
Online Travel Industry	6,250 (77%)	10,500 (75%)	14,953 (76%)	25,258 (80%)	37,890 (81%)
Online Non-Travel Industry	1,896 (23%)	3,530 (25%)	4,735 (24%)	6,340 (20%)	8,630 (19%)
- eTailing	978	1,120	1,550	2,050	2,700
- Digital Downloads or Paid Content Subscription	238	290	435	680	1100
- Financial Services *		1,200	1,540	2,000	2,680
- Other Online Services (incl. Online Classifieds)	680	920	1,210	1,610	2,150

*: Financial Services were not calculated in the years prior to 2008. +: Estimated Figures

The figure on the IAMAI (Association of India) report, March 2011[11], clearly states that the online travel industry accounted for 81.45% of the total e-commerce market in India in 2011 and remaining 20% share is constituted of non-travel businesses such as e-Tailing (electronic retailing), digital download, paid content subscription, financial services, online classifieds[14], etc.

4. E-COMMERCE QUALITY ISSUES:

These values gives the clear cut picture that something is going wrong in the implementation process of E-Commerce in India. Why E-Commerce is not able to create importance in the mind of Indian people? Do they expect some quality issues to resolve to accept E-Commerce or something more than that?

In this section, we will discuss these quality issues based on some major types of E-Commerce.

Types of E-Commerce:

There are five basic types of E-Commerce:

1. B2C - Business to Consumer
2. B2B - Business to Business
3. C2C - Consumer to Consumer
4. B2E - Business to Employee
5. C2B – Consumer to Business

1. Business to Consumer (B2C)

B2C is the model taking businesses and consumers interaction. It is the indirect trade between the company and consumers. The basic concept of this model is to sell the product online to the consumers.
Example : Amazon.com

Quality Issues:

1.Information asymmetry :
Defraud money from customers without sending out goods, or the good quality is less than a pre-agreed standard[10].

2. Payment Issues:
Many time retailers force to pay first before delivery of the product because every time cash-on-delivery is not possible. So the complete risk shifts to customer.

3. Security Issues:
When customer provides his credit card information, this can become one of the risk to the customer because anybody can figure it out from his credit card number[7].

4. Privacy:
Collecting personal information through registration which is unnecessary for transaction and business[17].

5. Lack of Standard Checkout Process:
The customer always need to follow a new process to purchase different product from other e-commerce retailer, so it creates confusion to purchase the product.

6.Navigation:
The customer face difficulties to go through his actual choices on the homepage, just because the company has lot of promotions and products on the site.

7.Time of Delivery:
It would be nice to receive an item when customer plans – not just when the retailer plan to ship it and even the customer don't get the product on time also.

2. Business to Business (B2B)

B2B is the largest form of E-commerce[5]. This model defines that Buyer and seller are two different entities. It is similar to manufacturer issuing goods to the retailer or wholesaler.
Example: Dell computers.

Quality Issues:

1.Security and regulations :
Security aspects such as impact of hacker attacks, thefts of business information, dishonest transactions and conflicts makes companies skeptical on using e-marketplaces.

2.Strategic Change:
A change in a firm's business system can be an operational or a strategic process. A balance of both is necessary[18].

3.Lack of cooperation:
Many managers are quick to note the minor problems—even those with obvious causes became conflicts individuals[12] and the linked firms becomes uncooperative.

4.Competitive or defensive behaviors:
When B2B personnel detect costly problems, they often engage in competitive or defensive behaviors rather than taking a more collaborative or problem-solving stance[18].

5.Social conflicts:
Social problem we find exists entirely between individuals[12]. An example of such interpersonal problems is when two businesses having cultural and social norms.

6.Uncertainty:
Uncertainty is a parallel effect in that it generates irritation among B2B personnel and simultaneously raises the fear that major disasters lurk in the future.

3. Consumer to Consumer (C2C)

C2C Consumers are no longer totally reliant on corporations and are increasingly looking to conduct their own business transactions. It helps the online dealing of goods or services among people[16].

Example : eBay's auction service

Quality Issues:

1. C2C platform is likely to be misused:

Any C2C platform is likely to be misused. It is true that in the interest of Electronic Commerce, the C2C auction sites are not to be discouraged nor targeted by Police.

2. Taxation:

Tax authorities world over are examining the tax implications of e-commerce transactions and resolving mechanisms to tax such transactions[16].

3. Lack of regulatory framework:

The unrestricted flow of contents over the internet raise a big question about the confirmation of the quality of information.

4. Current law for "Network Service Providers":

The law of "Network Service Providers" is not in fully favor of getting good quality net services to the customers.

5. Security:

Hacking is still a major problem in C2C platform. When two customers comes through one website, both customers won't have faith on website for their security concern.

6. Lack of Due Diligence:

One of the strong point of the current law which requires "Due Diligence ie. making sure you get what you think you are paying for"[16].

4. Business to Employee (B2E)

B2E Portal is an interactive "self-service work environment". The service will offer direct access to a string of relevant tools and information, including workplace communication, training services, financial services, travel services, industry news, stock quotes, and e-commerce[19].

Quality Issues:

1. Narrow Mindset:

The success of B2E Portal is depend on the mindset that Employees are the customers [8] as well as the assets of the organization. But the companies don't give this amount of required freedom to the employees.

2. Absence of theme that employee is the first customer of business:

B2E portal is a starting point for everyone in the organization but, instead of having one look and feel, like an intranet, it could have up to 10,000 different "start pages" for each of the 10,000 employees.

3.Lack of importance of consistent updates with solutions:

The success factors the portal integration framework will couple usability considerations together with technology solutions to offer a set of more user centric options.

4.Absence of evaluation method to check the usage of employee portal:

When organization invest on B2E implementation[8], it thinks about the return on investments out of it and as there is no method evolve to measure the benefit in monitory terms.

5.Consumer to Business (C2B)

A consumer posts his project with a set budget online and within hours companies review the consumer's requirements and bid on the project. The consumer reviews the bids and selects the company that will complete the project.

Quality Issues:

1.Deficiencies in buying confirmation Process:

Billing is not straightforward without creating a company. For companies to pay individuals is not straightforward either.

1. 2.Diverse and complicated payments methods:

There are plenty of payment options create large number of complexity. This is comfortable for that companies only which are having the dealings based on their comfort.

2. 3.Varied languages, currencies and locations:

Governments always concern on the outflow of foreign currency. Social factors like influence of language and symbols used on site also creates impact on the site visit and purchase decision of the customer.

3. 4.High fees for low payments:

There are some options to pay the fee, but that are very expensive. For Example, Google Adsense Program pays Webmasters by sending them checks in dollars, incurring Shipping fees for Google and currency conversion fees for non-US users[7].

4. 5.Consumer's less knowledge of business:

Consumer marketers are still in the early stages of adjusting to the unprecedented complexity of a world with so many physical, online and traditional offline consumers.

Now whatever quality issues we have discussed based on the types of E-Commerce, we propose TQM (Total Quality Management) as the best solution to fulfill all basic needs to maintain the quality of every region of E-Commerce.

Now the next point is what is this TQM? What is the definition and use of it? And ultimately What are the quality issues defined in it which are the solutions for E-Commerce quality issues. Let's have a look -

5. Total Quality Management

Total Quality Management(TQM) is an enhancement to the traditional way of doing business. It is a proven technique to guarantee survival in world-class

completion. Only by changing the actions of management will the culture and actions of an entire organization by transformed[6].

TQM is for the most part common sense. Analyzing the three words, we have[1],

Total – Made up of the whole
Quality–Degree of excellence a product or service provides.
Management–Act. Art, or manner of handling, controlling, directing, etc.
Therefore, TQM is the art of managing the whole to achieve the excellence in E-Commerce which can be missed in the web sites. TQM defines both a philosophy and a set of guiding principles that represent the foundation of a continuously improving web sites. It is the application of quantitative methods and human resources to improve all the purposes. Within an organization and exceed customer needs now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach.

5.TQM Characteristics to fulfill the problems of E-Commerce Quality Issues:

1.Functionality: (The extent of the operational aspects of the website software and its fitness of use.)
The functionality characteristic allows to draw conclusions about how well software provides desired functions[13]. It can be used for assessing, controlling and predicting the extent to which the software product (or parts of it) in question satisfies functional requirements.

Functionality is having following sub-characteristics[1] :

1.1 Suitability :
The suitability allows to find how suitable the software is on the web site for a particular purpose. It measures attributes of web sites by which it is suitable to customer interaction and needs.
1.2 Accuracy :
The accuracy allows to find how well software achieves correct or agreeable results on web sites. It is very important to run the business as well as to increase the faith in customers by always providing correct data.
1.3 Interoperability:
The interoperability allows the business to find how well web site interacts with designated systems. It is the solution to provide variety different data for different types of requirements of the customer.
1.4 Security:
The security allows to draw conclusions about how secure software is. It measures attributes of web site that allow to conclude about its ability to prevent unauthorized access, whether accidental or deliberate, to programs or data.
1.5 Client Support:
The client support allows to draw conclusions about how well software adheres in compliance to application related standards, conventions, and regulations in laws and similar descriptions to support the customer regular needs.
1.6 Flexibility:
The flexibility allows to draw conclusions about how well web site provides required flexibility performance relative to amount of resources used to find the customer changing demands.

2. Usability :
The usability characteristic allows to draw conclusions about how well software can be understood, learned, used and liked by the developer. It can be used for assessing, controlling and predicting the extent to which the software product (or parts of it) in question satisfies usability requirements[13].

The Usability has following sub-characteristics :

2.1Understandability:
The understandability allows to draw conclusions about how well users can recognize the logical concepts and applicability of software. It correlates attributes of web site on the users' efforts for recognizing the logical concepts and applicability.
2.2 Learnability:
The learnability allows to learn the applications of web site. The basic of this concept is to solve small problems of the customers themselves by providing small guidelines.
2.3Operability:
The operability allows to get how well users can operate web site and comfortable with operating controls.
2.4Atractiveness:
Providing best quality is not sufficient unless and until that is purchased by the customers. The attractiveness allows to draw conclusions about how attractive web site is to the user.

3. Efficiency :

The efficiency characteristic allows to draw conclusions about how well web site provides required performance relative to amount of resources used. It can be used for assessing, controlling and predicting the extent to satisfies efficiency requirements.

The Efficiency has following sub-characteristics[1] :

3.1 Time Behavior:
The time behavior allows to conclude about the time behavior of the web site to get the information,

services or products on a right time to the users.

3.2 Resource Behavior:

The resource behavior correlates with the amount and time of resources used while performing its function to impact on the behavioral properties of the customer. It

3.3 Purchase Process Performance:

The purchase process performance relates for assessing, controlling and predicting the extent to which the web site product in purchase procedure with continuous improvement in performance.

3.4 Page Generation Speed:

The Page Generation Speed allows to measure attributes of web site on the user's minimum efforts to generate the required web pages with high speed.

4. Reliability (The extent of which the website remains available and working.)

The ability of a person or system to perform and maintain its functions in routine circumstances, as well as hostile or unexpected circumstances.

The Reliability has following sub-characteristics[20] :

4.1 Maturity:

The maturity allows to draw conclusions about how the web site is mature to the frequency of failure by faults and quality expectations in the web site.

4.2 Fault Tolerance:

The fault-tolerance is the ability to maintain a specified level of performance in case of web site faults or infringement of its specified interface and solve the problem itself.

4.3 Recoverability:

The recoverability allows to conclude on its ability to re-establish its level of performance and recover the data directly affected in case of a failure.

5. Maintainability:

Maintainability is the probability that an item will be retained in or restored to a specified condition within a given period of time, when the maintenance is performed in accordance with prescribed procedures and resources[20].

The Maintainability has following sub-characteristics :

5.1Analyzability:

The analyzability sub-characteristic allows to draw conclusions about how well web site can be analyzed. It correlates with metrics which measure attributes of web site that allow to conclude about the effort needed for diagnosis of deficiencies or causes of failures, or for identification of parts to be modified.

5.2 Changeability:

The changeability involves the crystallization of new possibilities like new policies, new behaviors, new patterns, new methodologies, new products or new market ideas, based on re-conceptualized patterns.

5.3 Stability:

The stability is about how stable web site is. It measures attributes of web site that allow to conclude about the risk of unexpected effects as result of modifications.

5.4 Testability:

The testability is about how well web site can test critical issues and to conclude about the effort needed for validating the web site and about the test coverage.

6. Portability:

The portability the portability of a web design is determined by the ease and cost of running it on or adapting it to a different platform than what is was originally designed for.

The Portability has following sub-characteristics :

6.1 Adaptability:

The adaptability is about how well web site can be adapted to environmental change. It allow to conclude about the amount of changes needed for the adaptation of web site to different specified environments.

6.2 Installability:

The installability is about how well web site can be installed in a designated environment. It allow to conclude about the effort needed to install the web site in a specified environment.

6.3 co-existence:

The co-existence is about how well web site can co-exist with other web site products in the same operational environment and allow to conclude about the dependencies, concurrency behavior, or side effects.

6.4 Replaceability:

The Replaceability is about how well web site can replace other web site or parts of it and allow to conclude about opportunity and effort using it instead of specified other web site in the environment of that web site.

6.Conclusion :

E-Commerce is considered an excellent alternative for companies to reach new customers for business. A business that is run over the Internet is like any other business when is comes to effective organization, product quality, customer satisfaction and employee relations issues. The efforts should start from finding out the quality norms in E-Commerce. TQM is the best solution to understand the problems and the way how to solve it.

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AUTOMATIC LEAK DETECTION AND NUMBERING SYSTEM FOR AUTOMOBILE INDUSTRY

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Abstract- Traditional testing of automobile engines for leaks—a critical step in auto assembly—requires immersing the engine into a water tub and then carefully observing any escaping air bubbles. If bubbles are seen to be coming out from tub, the engine is declared failed—it has a leak. For this test the operator has to wait for a specified duration and with extreme concentration. He then manually enters test results into his book for the ID of the engine tested and when, test outcome, etc. etc. In this paper we suggest an alternate method based on the automated application of air pressure as well as detection of leak, augmented by direct computer entry of the relevant data. This would raise reliability of the process while speeding up data logging and retrieval, significantly impacting throughput.

Keywords – *Automated testing, Bar code scanner, Data logging Software Engine testing, Leak detection.*

I. INTRODUCTION

Leak detection is a routine but critical quality test performed on an engine [1][2][3][4] before it is mounted onto the frame of a vehicle being built. However, the prevailing practice of conducting leak test manually [4] suffers several demerits, relies on human capability and consumes much of the factory's productive time. This paper investigates the effective application of appropriate automation to overcome many of these demerits that affect test reliability as well as productivity. Additionally, in most prevailing engine testing practices, counting and the entry of tested and failed engines data is manual—the test results go into a notebook, a medium not particularly easy to search and retrieve. This makes it operationally hard to find at what time and in what shift the operator tested a certain engine and to quickly assess, for instance, the proportion of engines found defective. Conventionally, in most factories, manual testing and data logging requires designating a separate person for the task. This study has developed a sophisticated test and data logging procedure that would significantly raise reliability and throughput of engine testing on the assembly line. It is automated and uses electronics and some programmed software. It cuts out the human operator while producing convenient, digitized, reliable and easily retrievable record of the engine leak testing step. This record would include engine identification, test results as well as operational productivity data.

II. DEPLOYMENT

This whole setup includes a conveyor belt, air pipe, a computer, a bar code scanner and a marking machine. Conveyer belt carry the engine on which the leak test is to conduct, as soon as the belt carry the engines on a defined position, an air pipe is placed at one of the point of engine and call it inlet point from where we are going to supply input (an engine has two point one is for inlet and one is for outlet, as per its standard architecture).Soon the air pipe is connected to the engine a predefined amount of air is supplied towards the engine; this air will traveled through the complete engines internal structure and comes out from the other point of engine say outlet point. This out coming air again measured with help of measuring instruments .If the amount of supplied air and out coming air is same then it is declare that the engine has passed the leak test. Otherwise the engine is declared faulty and sent back to the manufacturing unit for further inspection. After the test result the software initiate the marking machine which put a mark on tested engine and conveyor belt forward it further processing of the vehicle frame. As the engine is going on from the leak test at the same moment software programmed in visual basic keeps record of number of engines coming on conveyor belt, time of testing of engine, entry time of line man, identity of line man(employee code), time of shift number and time interval in milli second, test result. A small air compressor is used, for providing air along with sufficient pressure for testing purpose. As we have used compressed air as a media for leak test.

II.A. LEAK TEST MACHINE

To conduct, monitor and control the leak test, a leak test machine (LTC-602) which is PLC based developed by Innomatec®, which is an air to air leak detector used for leak tightness of parts on production line. To perform this it uses law of thermodynamics in its functioning. The Leak Test Computer Controlled Test System LTC-602 is a-state-of-the-art test machine for pressure differential and flow measurement systems. This machine provides a reliable testing from individual parts to complete machines that have been molded, blown, welded, glued, and screwed. It is the most modern embedded PC technology offer robust advantages for practical uses. The LTC-602 line of diagnostic machines includes standard and specialized measuring devices like pressure increase detectors and pressure decrease detectors, as well as single, multiple, and combination test devices from the above measuring procedures.

Below diagram depicts a front view of leak test machine.

Because of the following features it was found quite helpful in conducting leak test;

a. Windows-based software with menus.
b. Full graphic available from the daylight-proof TFT-Display.
c. Ports for SPS, printer networks.
d. Can be mounted with a hard drive and monitor.
e. Display and analysis of measured curve.
f. Extremely short test time.
g. Electric input/output for apparatus operations system.
h. Sets of parameters for 100 programs.
i. Remote maintenance possible.
j. Option for change of languages is available.
k. Save files and downloads with a memory stick.

The following figure depicts, the block diagram, in which the process cycle it happens while performing the leak test.

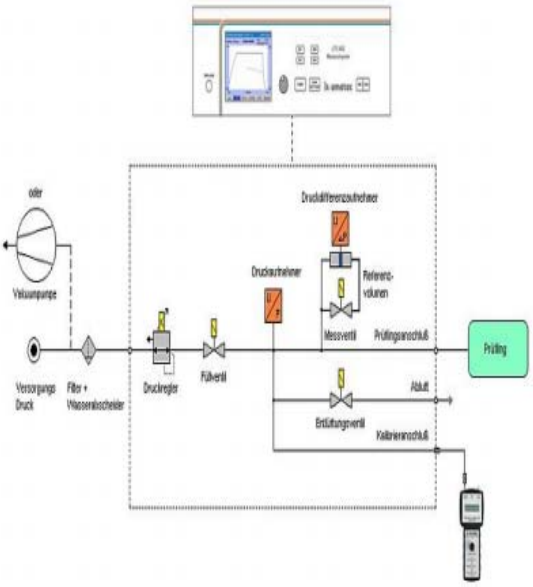

Fig. Block diagram of process cycle for leak test.

A differential transducer is positioned between the two parts measures the small pressure variations. A relative pressure transducer (piezo type) monitors the stability of the pressure supplied.

Operating Principle:- The principle of operation of leak test machine is based on thermodynamics [5][6] law of BOYLE-CHARLES:

P V = n R T

P: Test pressure

V: Test volume n: Number of moles

R: Constant of air T: Temperature

LTC-602 is an air/air leak detector used for leak tightness of parts. It uses law of thermodynamics mentioned above in its functioning the principle of detection is based on the measurement of a small differential pressure variation between parts pressurized.

II.B. TEST METHODS

There are two types of test methods

1. Direct Test Method
2. Indirect Test Method

A. Direct Test Method (Test by pressure decay):-

A differential transducer measures the pressure difference between pneumatically isolate test part and the reference parts.

B. Indirect Test Method (Test pressure rise):- The part to be tested is positioned in a leak proof to which the LTC 602 is pneumatically connected. The part is pressurized by an external source. Any rise in pressure inside the bell that is measured by the differential transducer.

TYPES OF TESTS:-

Test with reference

Test without reference

Test with central zero

1. Test with reference:-

In this method test part and reference part are identical and the pneumatically isolated. Connection between the parts instruments is symmetrical. The test with a reference part allows shorter cycle times due to a quicker stabilization of pressure.

2. Test without reference:-

In this method the testing variation between a test part and the capped off reference side this method is used when there is small volume is used.

3. Test with central zero:-

In this method testing of two parts is done at same time, one of the parts is connected to the test side and other to the reference side. The differential transducer measures the pressure decay from one part to other. The test with central zero allows a considerable time gain. The following stated time response cycle indicates the whole process graphically, right from clamping of air pipe to filling the air inside of engine. After that the whole process requires some time for stabilization, during the stabilization cycle rest of parameters related to air pressure, temperature etc are monitored. If all parameters are found to be correct then leak test starts. As soon as the test is complete, all the inside air is released from engine. Like this process completes.

Time response of leak test machine

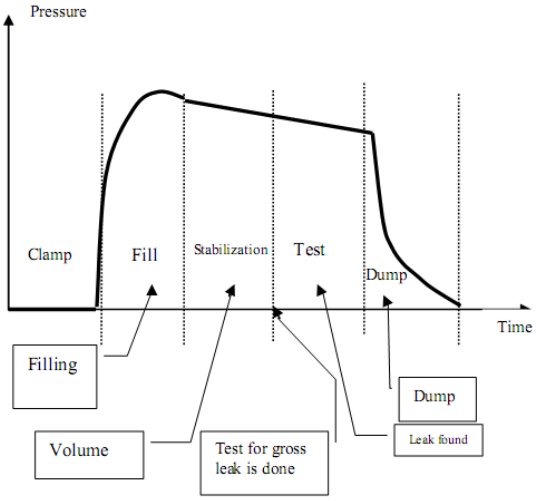

Fig. Process Cycle

II.C MARKING MACHINE

When the leak test machine delivers result i.e. the engine is passed or failed is stored in the data table of the software. The data table consists of date and time at which engine was tested as well as the engine prefix and engine result. We suggest the use of a marking machine. A marking machine is a small temporary marker placed on a moving rod which carries the marker towards the engine to put a mark (the marking symbol of any type as defined by user).Unfortunately if the test result is negative there is no need to use marking. Hence operator detects the faulty engine. In this project we have consider marking machine as the enhancement or future requirement of our project (we can defined a special symbol for passed engines and a different symbol for failed engines).

II.D. SCANNER

A scanner [7] reads the bar code sticker stickled onto engines for its identification. A wire free scanner with bluetooth connectivity is suggested. Particularly wire free scanner is suggested to avoid all kind of drawbacks of wired scanner like wire limits the moments of operator along with wear and tear of wires hurdles the process. A bar code reader which can scan 1D (as well as 3D) bar code from a distance having minimum range of 0.25 inches to maximum range of 45 feet. It can use single line for scanning. We propose a scanner which is able to perform single scan as well as multiple scanning, so that multi- connection availability is possible.

II.E. MSCOMM PORT

This is a port of computer. The MSComm control provides you with convenient access to your PC's serial ports. You can set the port number, baud rate, parity, and the number of data bits and stop bits and can open the port and send or eceive data. A PC's BIOS usually allows up to four serial ports, called COM1 through COM4, even though fewer may actually be installed, and this must be mirrored by the MSComm control. In addition, there can be only one instance of any of the ports at any given time, since two programs or devices cannot use the same port at the same ime. When using the MSCOMM control to send and receive serial data, it is best to use event driven communications. This method is more efficient than polling, as it uses less CPU time and will only initiate an action when input is received.

III. DATA LOGGING

Earlier procedure of leak testing uses a simple notebook which consists of manual entry of time of shift, employee identification, and predefined number of engine, time of testing and result of testing. For data logging of number of engines tested, number of attempts made etc for all these software is developed in Visual Basic® [8] [9][10]6.0.It share the systems data in terms of numeric data types. As VB is a event driven programming language. It produce result in excel sheet for a particular shift or for a date. This is convenient for the industrial application.

IV. PARALLEL PORT AND SERIAL PORT

A Parallel interface [11] is introduced in between desktop computer and marking machine and leak test machine. As soon as scanning of bar code is complete the programmed software makes leaks test machine on by sending signal on parallel port. Also if the test is successful then a signal to make marking machine on is sent on the different port of parallel interface. The result of leak test machine (passed or failed) is given to software via serial port [11].

V. CONCLUSION

By the advent of this process, production efficiency can be increased to a great extent. It takes 30 second for an engine testing, and because of the use of advanced and sophisticated equipments and software reliability can be guaranteed.

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OPTIMIZATION OF RADIATION PATTERN OF LINEAR ANTENNA ARRAY USING GENETIC ALGORITHM

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Abstract:-This paper discusses the deployment of Genetic algorithm optimization method for synthesis of uniform linear antenna array radiation pattern. The synthesis problem discussed is to find the weights of the antenna array elements that are optimum to provide the radiation pattern with minimum side lobe level. In this paper the Genetic algorithm solver from the optimization toolbox of MATLAB is used with adaptive feasible mutation rate other than simple genetic algorithm (SGA). This improves the performance greatly to achieve the maximum reduction in side lobe level with minimum function calls. This technique proved its effectiveness in improving the performance of the antenna array.

Index Terms:-*Adaptive beam forming, Side lobe level, Genetic algorithm, linear antenna array, Pattern synthesis, Array factor*

INTRODUCTION

In many communication systems, one is interested in point to point communication and for this, a highly directive beam of radiation is required. By arranging several dipoles (or other elementary radiators) in the form of an array, a directive beam of radiation can be obtained [1]. Consider a linear array of *n* isotropic elements of equal amplitude and separated by distance *d*. The total field *E* at a far field point P in the given direction φ is given by,

$$E = 1 + e^{j\psi} + e^{2j\psi} + e^{3j\psi} + \cdots + e^{(n-1)j\psi} \quad \ldots.1$$

Where Ψ is the total phase difference of the fields from adjacent sources. It is given by;

$$\psi = 2\pi\left(\frac{d}{\lambda}\right)\cos\phi + \alpha$$

Where α is the phase difference between excitation current of adjacent element of antenna array. The two main EO techniques for antenna array optimization i.e. GA and PSO.

Adaptive beam forming is a signal processing technique in which the electronically steerable antenna arrays are used to obtain maximum directivity towards signal of interest (SOI) and null formation towards signal of not interest (SNOI) i.e. instead of a single antenna the antenna array can provide improved performance virtually in wireless communication. The characteristics of the antenna array can be controlled by the geometry of the element and array excitation. But side lobe reduction in radiation pattern should be performed to avoid degradation of total power efficiency and the interference suppression must be done to improve the Signal to noise plus interference ratio (SINR) .Side lobe reduction and interference suppression can be obtained using the following techniques: 1) amplitude only control 2) phase only control 3) position only control and 4) complex weights (both amplitude and phase control). In this, complex weights technique is the most efficient technique because it has greater degrees of freedom for the solution space. On the other hand it is the most expensive to implement in practice.

Pattern synthesis is the process of choosing the antenna parameters to obtain desired radiation characteristics, such as the specific position of the nulls, the desired sidelobe level [4] and beam width of antenna pattern Today a lot of research on antenna array [2] – [11], is being carried out using various optimization techniques to solve electromagnetic problems due to their robustness and easy adaptivity. One among them is Genetic algorithm [14] . R.L.Haupt has done much research on electromagnetics and antenna arrays using Genetic Algorithm [13]-[17]. In this paper, it is assumed that the array is uniform, where all the antenna elements are identical and equally spaced. The design criterion here considered is to minimize the sidelobe level [7] at a fixed main beam width. Hence the synthesis problem is, finding the weights that are optimum to provide the radiation pattern with maximum reduction in the sidelobe level.

GENETIC ALGORITHM

Genetic algorithms (GAs) are becoming increasingly popular in electromagnetic applications. Originally developed by Holland popularized by Goldberg, they have been successfully applied to number of electromagnetic design problems such as array antennas, wire and patch antennas, antenna pattern synthesis, and electromagnetic filters. They are capable of solving design problems with a myriad of design parameters and multiple design goals. GAs is sophisticated ways of guessing the best answer to an optimization problem. They are particularly well suited to problems involving a number of mutually interacting design parameters and a poorly behaved solution space. Although traditional algorithms either perform an exhaustive search of all possible solutions or, based on some "best guess," follow a simulated performance curve to the closest optimum value, the GA begins with a random sampling of the entire solution space. Samples with the best performance are combined with other high-performance samples to

produce new sample locations, using the principles of biological genetics. The process of generating new sample locations based on the performance of previous samples
is continued, iteratively, until some convergence criterion is met. Occasionally, new sample locations are generated, at random, using the principles of genetic mutation.
In Genetic Algorithm reproductive cycle may be represented as shown below in Fig 1.
The important parameters of GA can be summarized as
1. Crossover type and crossover rate.
2. Mutation type and mutation rate.
3. Population size.
4. Selection procedure.
5. Number of generations.
They are defined as given below

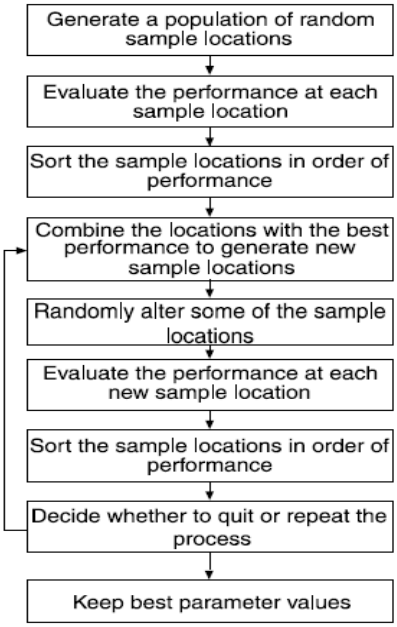

Fig 1: Flow diagram of genetic algorithm

UNIFORM LINEAR ANTENNA ARRAY

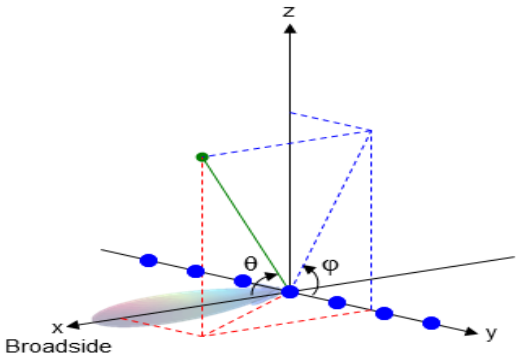

Fig. 2 Linear antenna array

In linear antenna array, all the antenna elements are arranged in a single line with equal spacing between them. In the antenna array synthesis and design it is often desired to achieve the minimum side lobe level (SLL) apart from the narrow beam and efficiency. In the process of formulation for the fitness function for minimizing the Side lobe level the antenna array[20][31], the array factor for N number of elements were considered and assumed that the elements of an array are spaced linearly and separated by $\lambda/2$ where λ is the wave length. The array factor for, N number of elements for the geometry shown in the Fig. 2 is given by the equ.(1)

$$AF = \sum_{n=1}^{N} E_n = \sum_{n=1}^{N} e^{jK_n} \quad \text{..... (2)}$$

Where $E_n = e^{jKn}$ and K= (nkdcosθ + βn) is the phase difference. βn is the phase angle. Final simplification of equation (2) is by conversion to phasor notation. Only the magnitude of the AF in any direction is important, the absolute phase has no bearing on the transmitted or received signal. Therefore, only the relative phases of the individual antenna signals are important in calculating the AF. Any signal component that is common to all of the antennas has no effect on the magnitude of the AF.

PROBLEM FORMULATION

Consider an array of antenna consisting of N number of elements. It is assumed that the antenna elements are symmetric about the center of the linear array. The far field array factor of this array with an even number of isotropic elements (2N) can be expressed as

$$AF(\theta) = 2 \sum_{n-1}^{N} a_n \cos(2\pi/\lambda \, d_n \sin\theta) \quad \text{..... (2)}$$

Where a_n is amplitude of amplitude of n^{th} element, θ is the angle from broadside and d_n is the distance between position of n^{th} element and array center .The main objective of this work is to find an appropriate set of required element amplitudes that achieves interference suppression with maximum side lobe level reduction and narrow main beam width. To find a set of values which produces the array pattern, the algorithm is used to minimize the following cost function

Fitness =F1 = $20*\log_{10}(F / \max(F))$

F = abs (H)
Where H is normalized field strength.

RESULTS AND DISCUSSION

The antenna model consists of 20 elements and equally spaced with d =0.5λ along the y-axis.. Only the voltage applied to the element is changed to find the optimum amplitude distribution, while the array geometry and elements remain constant. A

continuous GA with a population size 20 and a adaptive feasible mutation rate is run for a total of 100 generations unlike 500 generations as in [1] using MATLAB and the best result was found for each iteration. The cost function is the minimum side lobe level for the antenna pattern. Fig 3 shows that the antenna array with N = 8 elements has been normalized for a gain of 2.84dB along the angle 0° and the maximum relative side lobe level of -31.6 dB. Convergence starts from -13dB which is the optimized value of chebychev pattern for the RSLL
Fig 4 shows the optimized radiation pattern with relative Side lobe level of -28.47 dB with N=16 Fig 5 shows the optimized radiation pattern with relative Side lobe level of -28.59 dB with N=20 Changing the number of elements cause the contiguous GA to get different optimum weights. Among N=8, 16, 20, and 24, N=8 performed well and thus selected as optimized element number. In this the radiation pattern for N=8 minimum relative side lobe level of -31.6 dB below the main beam.. and reduced side lobe level of -24.8 dB for N=24 as shown in fig 6.

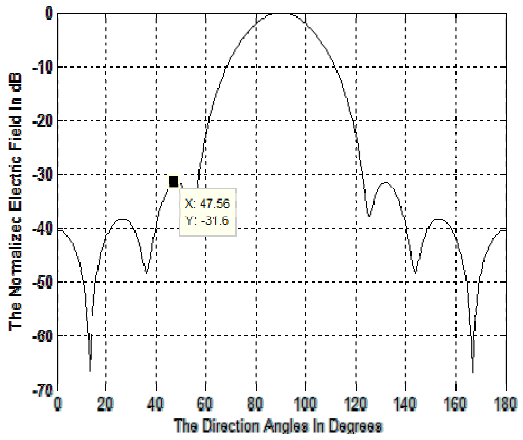

Fig. 3 Optimized radiation pattern with reduced side lobe level of -31.6 Db for N= 8 elements

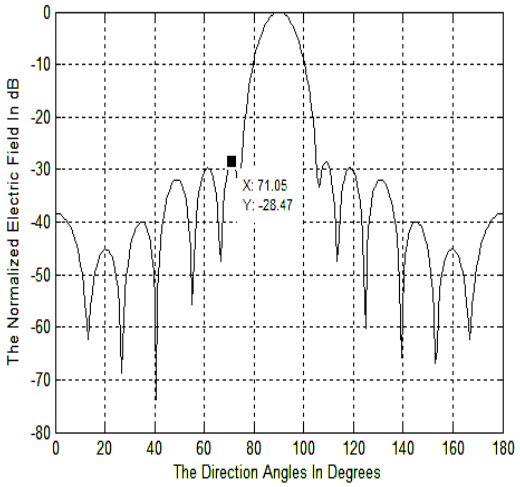

Fig 4. Optimized radiation pattern with reduced side lobe level of -25.28 Db for N= 16 elements

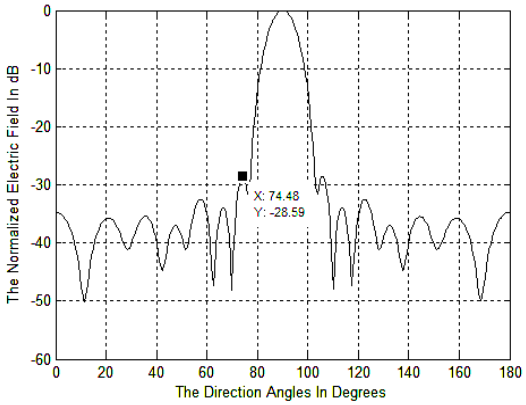

Fig 5. Optimized radiation pattern with reduced side lobe level of -28.59 Db for N= 20 elements

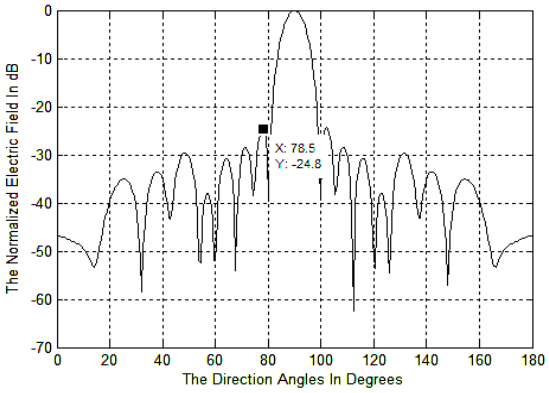

Fig 6. Optimized radiation pattern with reduced side lobe level of -24.8 Db for N= 24 elements

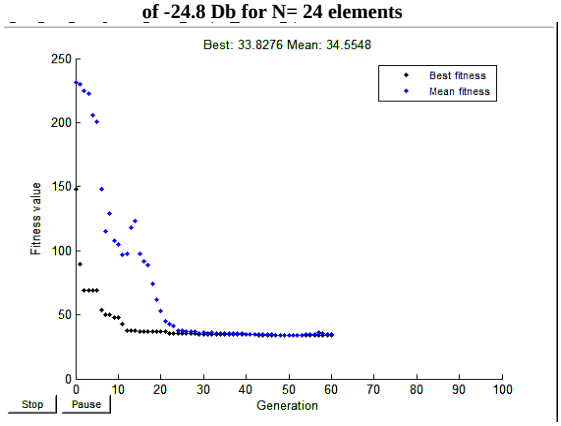

Table 1. Amplitude excitation values for N=8 elements

Wn	CURRENT AMPLITUDES
W1	0.2239
W2	0.1956
W3	0.5520
W4	0.3636
W5	0.5429
W6	0.2851
W7	0.2228
W8	0.827

The obtained costs are ranked from best to worst. The most among suitability criteria is to discard the bottom half and to keep the top half of the list. But in our program the selection criteria is to discard any chromosome that has relative side lobe level less than -20dB.

After this natural selection the chromosomes mate to produce offsprings. Mating takes place by pairing the surviving chromosome. Using adaptive feasible mutation rate better results are obtained as shown in table 2 as compared to results obtained by fixed mutation as in [1]..Adaptive feasible mutation rate gives minimum difference of -6 dB reduction in side lobe level as compared to fixed mutation rate as in [1]. Comparative results are shown in table 2.

Table 2. Comparison Table of previous and obtained results

NO OF ELEMENTS	PREVIOUS RESULTS AS IN [1] (SLL IN dB)	RESULTS OBTAINED
8	-21 dB	-31.6 dB
16	-19.3 dB	-28.47 dB
20	-18.7 dB	-28.59 dB
24	-14.97 dB	-24.8 dB

CONCLUSION

In this paper Genetic algorithm Solver in Optimization toolbox of MATLAB is used to obtain maximum reduction in side lobe level relative to the main beam on both sides of 0°. Genetic algorithm is an intellectual algorithm searches for the optimum element weight of the array antenna. This paper demonstrated the ways to apply Genetic algorithm by varying values of number of elements to optimize the array pattern. Adaptive feasible mutation with single point crossover showed the performance improvement by reducing the side lobe level below -20dB in most of the cases. The best result of -31.6dB is obtained for 8 elements in 60 generation of GA with best fitness value of 33.8276 and mean fitness value of 34.5548 but with a compromise in directivity proving that this method is efficient with much reduction in computation time and complexity.

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INDEXING FOR EFFICIENT SEARCH AND RETRIEVAL IN MULTI BIOMETRIC DATABASES

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Abstract - Biometric identification has emerged as a reliable means of controlling access to both physical and virtual spaces. In biometric identification systems, the identity associated with the input data is determined by comparing it against every entry in the database. In larger applications, response time and retrieval efficiency also become important in addition to accuracy. Matching process increase the response time of the system. One way to reduce the response time is by designing biometric templates that allow for rapid matching. In the proposed method, the input biometric data is first matched against a small set of reference images. An index code is constructed by computing match scores between a biometric image and a fixed set of reference images. These results suggest that indexing has the potential to substantially improve the response time of multimodal biometric systems without compromising the accuracy of identification.

Keywords*—Biometrics, feature extraction, image retrieval, Indexing.*

I. INTRODUCTION

In an increasingly digital world, reliable personal authentication is an important human computer interface activity. Biometrics such as fingerprints, face and voice verification are gaining industrial, government and citizen acceptance. The US-VISIT program uses biometric systems to enforce homeland and border security. Governments around the world are adopting biometric authentication to implement National ID and voter registration schemes. FBI maintains national criminal and civilian biometric databases for law enforcement. Searching a biometric database for an identity is usually done by comparing the probe image against every enrolled identity in the database and generating a ranked list of candidate identities [2]. The retrieval of a small number of candidate identities from a database based on the probe data is known as database filtering. At least two problems arise in large-scale biometric databases: (1) searching the database to retrieve an identity can be slow because the input data has to be compared (matched) against the biometric data of every identity in the database, and (2) The false accept error grows with the size of the database Therefore, filtering the database in order to reduce the number of potential candidates (i.e.,
identities) for matching is a desirable component of any large-scale biometric system. Filtering can be accomplished by using classification or indexing schemes. In a classification scheme, identities in the database are partitioned into several classes. Only the identities belonging to the same class as that of the probe image are retrieved during the search process for further comparison. This approach has two main limitations: 1) it assumes that each identity can be unambiguously assigned to a single class; and 2) the distribution of identities across classes may be uneven resulting in inefficient classification. Indexing scheme is to assign a unique index value to every identity in the database. However, the index value of the probe image may not be identical to that of the corresponding identity in the database because the process of biometric acquisition and processing is susceptible to noise. Therefore, indexing systems retrieve those identities whose indices are similar to the index value of the input data. The input image is matched only against the retrieved identities thereby reducing the identification time and, potentially, the identification error rate. An important advantage of indexing techniques is that they do not create "Boundaries" among the continuously distributed templates [1]. A method for indexing multimodal biometrics databases based on index codes generated by a biometric matcher. The index mechanism is executed separately for each modality and the result is combined into a final list of potential candidates. A modality specific index code is generated by matching an input image against these reference images, resulting is a set of match scores. During identification, the index code of the input image is compared to the index codes of the enrolled identities in order to find a set of potential matches. The index codes of multiple modalities are fused to improve the accuracy of indexing resulting in a robust and efficient indexing system. This approach relies on a matcher, which is an integral part of every automated biometric identification system. Because the generated index codes are compact and their (dis)similarity can be computed rapidly, the approach has low storage requirements and can improve the system response time even for small databases.

II. INDEXING CODES FOR MULTIMODAL DATABASE

There is a trade-off between the total number of retrieved candidates and the number of correctly retrieved candidates. Fusion scheme are useful for narrowing down the total number of retrieved candidates and increasing the number of correctly at retrieved candidates [3]. In this paper we use two fusion techniques that use the information from

multiple modalities in a complementary manner. Index codes are stored separately for each modality. General approach for indexing multimodal database is shown in fig1.

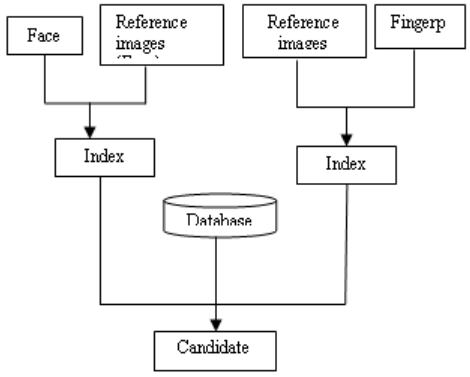

Fig 1. Indexing using two modalities

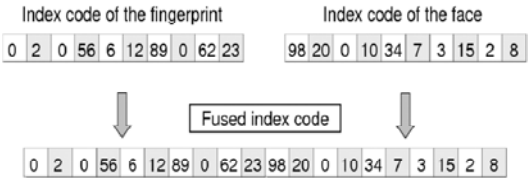

Fig 2. Fusion by concatenation of index codes

A. Concatenation Fusion Rule

Index code of the Fingerprint: P = { P1, P2,….,P_n }

Index code of the face: F = {f1,f2,….f_m }

Fused Index code: {P1, P2,….Pn,f1,f2,….fm}

The advantage of this fusion scheme is when number of reference images increases, the added diversity may decrease. The weakness of this fusion scheme is that poor indexing performance in one of the modalities can negatively affect the overall indexing performance since the two index codes are forcibly concatenated [4].

B. Union Fusion Rule

Candidate identified by the fingerprint modality: H_p

candidate id by the face modality: H_f

Final set of identities: H_p U H_f

This fusion scheme has the potential to eliminate errors in the candidate list introduced by individual modalities. Thus, the poor indexing performance of one modality will not affect the overall indexing performance. This fusion system fails only when all the modalities perform poorly. Fingerprint based Face based retrieval:

Hp = {Jim, Alex, Alice } Hf={Bob, Alice, Emma}

H_p U H_f

Final set of candidates: H= {Jim, Alex, Alice, Bob, Alice, Emma}

Fusion by Union of candidate list

C. Intersection of candidate lists

Similar to the union fusion scheme, here the final fused output is the intersection of the candidate lists of the individual modalities. This type of fusion can further reduce the size of the search space. However, to achieve such a reduction, the indexing performance of multiple modalities has to be comparable.

III. PROPOSE INDEXING METHODS

A. Indexing codes for a single modality

The correlation coefficient between index codes can be used to identify a potential list of candidates from the database. Index codes belonging to the same identity are expected to have a strong positive correlation. Index codes belonging to different identities are expected to be uncorrelated.

Algorithm for retrieving candidate identities.

Let S_x be the index code of the input image, S_y be the index code of an image y from the database, and T be a predefined threshold.

1. Compute Pearson's correlation coefficient between probe and all gallery index codes in the database
2. $p(Sx, Sy) = cov\frac{(Sx,Sy)}{[var(Sx)var(Sy)]1/2}$
3. Output those y for which p(x, y) > T.

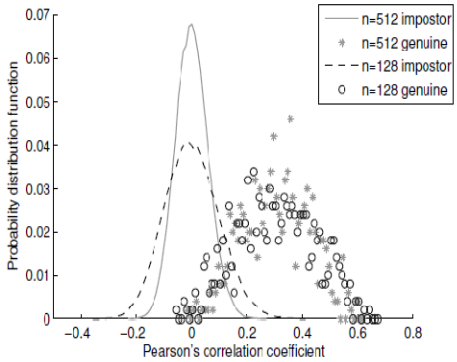

Fig3. Distribution of the correlation coefficients between index codes belonging to the same identity (genuine class) and different identities (impostor class). Increasing the dimensionality of the index codes (n) results in a better separation between the genuine and the impostor classes.

For multiple modalities, the index code are generated separately for each modality and combined during the retrieval process (fig. 1).

B. Computational Time

Using a large number of reference images can improve indexing performance; it also increases the computational requirements of the method. Increases in the speed of identification can be achieved only if the search space is substantially reduced and if the correlation coefficient between two index codes can be computed in a fraction of the time needed to match two biometric templates. Matching two templates is slower than computing the correlation coefficient between two vectors (codes).

$Lett_m$ -computation time for a single match operation
t_c -computation time for a single correlation coefficient
n -number of reference images
Speedup is achieved when the following inequality holds:

(size_database)* tm >[(size_database)*t_c] + [n *tm] + [num_candidate * t_m]

If n=256, t_c= tm/10and if the number of candidates to be retrieved is 50% of the database size, speedup will occur for databases of over 640subjects

C. Selecting reference images

Reference images can be selected from the database itself. The number of reference images and the degree of diversity among them are important consideration for good indexing performance. A large number of reference images should ensure better indexing performance but will also increases the computational time. They consider three different selection rules for ensuring good diversity.
1) The Max- Variation Rule – Select reference images with the largest variance of impostor match scores.

1) 2) The Max-Mean Rule – Select images whose imposter match score have a large mean value**.**

2) 3) The Min-correlation Rule – Select an optimal set of reference images by starting with the entire candidate pool, removing the image whose average correlation to other images in the set is the highest and repeating process until the desired number of reference images is obtained.

Algorithm for selecting n reference images: Max variation rule):

Let F = {f1, f2... fq} be the candidate pool of reference images, and s(x, y) be the match score between images x and y.

1. For each f_i, compute v_i = Var{s (f_i, f_j)}L_j =1,j6=i.
2. Let V be the list of sorted v_i values in descending order.
3. Use the images corresponding to the top n values in V as reference images.

IV. EXPERIMENTS

A. Databases

They perform experiments using 2024 frontal images from FERET database [10] and 1740 fingerprint images from the WVU database (West Virginia University). 256 reference images selected using the max variation rule. After removing the reference images from the database and reducing the size of the face database to that of the fingerprint database, a chimeric multimodal database consisting of 614 identities was created [2].

B. Indexing performance

The performance of indexing algorithm is commonly evaluated using the hit rate and penetration rate.

Hit rate = No. of correctly indexed probe
Total no. of probes (N)

The penetration rate denotes the average % of gallery entries that have to be retrieved based on the index scheme.

$$Penetration\ rate = \frac{1}{N}\sum_{i=1}^{u} \quad Li \div M$$

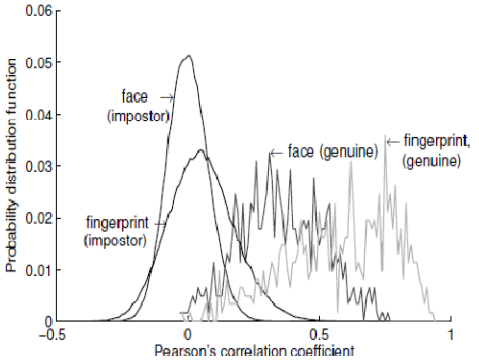

Fig 4. Distributions of correlation coefficients for the face and the fingerprint modality (n=256).

Where Li is no. of candidate in the candidate list of i^{th} input image and M is the no. of identities in the database. An effective indexing scheme will have a high and a low penetration rate. This indicated that the union and the concatenation fusion rules resulted in the best performance. The concatenation fusion rule achieved the best penetration rate (24%) at hit rate of 100%. In contrast, the performance rate of the union fusion rule is 27% at a 100% hit rate. These two fusion method achieved substantial reduction of the size of the search space compared to using single modality.

V. SUMMARY

The proposed scheme is capable of reducing the response time of biometric identification system. It is

universal and is applicable to any type of multibiometric system. Pearson's correlation co-efficient may not be the best choice since the correlation for small match scores is weak. Correlation through ranking or Kendall tau rank may provide better results. The union fusion rule achieved a 3 % penetration rate when 99 % of the input images were indexed correctly. The current investigating the cause for the increase in the penetration rate to 27% for the remaining 1% of the images in the database.

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TRANSLATION AND SYNTHESIS OF ENGLISH TO SANSKRIT NATURAL LANGUAGE (ETSTS)

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Abstract:- Due to lack of linguistic community, there are no wide work accomplish in Sanskrit translation while it is mother language by virtue of its importance in cultural heritage of India. The development of Machine Translation system for ancient language such as Sanskrit language is much more fascinating and challenging task. In the proposed algorithm we integrate traditional dictionary rule based approach for translation which translate source English sentence into target Sanskrit sentence. It has two models Text to Text Translator module and Text to speech synthesizer module. Due to morphological richness of Sanskrit language, this system uses morphological markings to identify Subject, Object, Verb, Preposition, Adjective, Adverb sentences. This paper presents English to Sanskrit approach for translating well-structured English sentences into well-structured Sanskrit sentences.

Keywords*-Natural language processing; Machine translation ;Rule based dictionary approach; Parser ; bilingual dictionary; Formant Synthesizer ; Translator*

I. INTRODUCTION

Machine Translation has been defined as the process that utilizes computer software to translate text from one natural language to another. This definition involves accounting for the grammatical structure of each language and using rules and grammars to transfer the grammatical structure of the source language (SL) into the target language (TL).Machine translation in Sanskrit is never an easy task because of structural vastness of its grammar but the grammar is well organized and least ambiguous compared to other natural language.

The module present concerns with the Machine Translation domain of Natural Language Processing. This area of Artificial Intelligence is very useful in providing people with a machine, which understands diverse languages spoken by common people. It presents the user of a computer system with an interface, with which he feels more comfortable.

In the proposed methodology, for translation we decode the meaning of the source input text in its entirety, the translator must interpret and analyze the text, a process that requires deep knowledge of the grammar, semantics, syntax, idioms, etc., of the source language and target language. The translator needs the same in-depth knowledge to re-encode the meaning in the target language. And for synthesizing we convert the generated text output which is in Sanskrit language into the waveform and gives the voice output. In this we use the dictionary rule based approach of machine translation for translator of English to Sanskrit and formant synthesis method for converting text into speech.

If we compare the grammar for both English and Sanskrit then English sentences are always in order of subject-verb-object format while Sanskrit has free word order. For e.g. the order of English sentence (ES) and its equivalent translation in Sanskrit sentence (SS) is given below.

ES: He read book (SVO)
SS: Saha pustkam pathati.(SOV)
OR
Pustkam Saha Pathati (OSV)
OR
Pathati Pustkam Saha

Thus Sanskrit sentence can be written using SVO, SOV and VOS order.

Speech is the primary means of communication between people. Speech synthesis, automatic generation of speech waveforms .Synthesis procedure consists of two main phases. The first one is text analysis, where the input text is transcribed into a phonetic or some other linguistic representation, and the second one is the generation of speech waveforms, where the acoustic output is produced from this phonetic and prosodic information. These two phases are usually called as high- and low-level synthesis.

This paper is organized as follows section II to presents the brief introduction of the related work for Sanskrit language translator and synthesizer .Section III gives the introduction about the approach of machine translation which is used. Section IV describes the system design and total working advantages and results. Explanation of the system with example has given in section V and finally the conclusion and summary will given in section VI.

II. RELATED WORK

R.M.K. Sinha and A. Jain had given a system overview of ANGLAHINDI, English to Hindi Machine Aided Translation System. In this paper, they present a glimpse of their effort in this direction of machine translation. Their work on machine translation started in early eighties when they proposed using Sanskrit as Interlingua for translation to and from different Indian languages. ANGLABHARTI is a rule-based Machine Aided Translation (MAT) system with source language as English and uses a pseudo-interlingua to cater to all Indian languages. ANGLAHINDI is a derivative of ANGLABHARTI. They have given a complete system overview [1]. Mr.Sandeep Warhade and Mr.Prakash R.Devale has describes the Phrase-Based Statistical Machine Translation Decoder. Their goal is

to improve the translation quality by enhancing the translation table and by preprocessing the source language text. They discuss the major design objective for the decoder, its performance relative to other statistical machine translation (SMT) decoders [2]. Mishara Vimal, Mishara RB. proposed Example Based approach of machine translation to translate English to Sanskrit language, this describes the various research efforts on Example based machine translation and shows the various approaches and problems of EBMT. They have given the comparison of the example based approach with the statistical and rule based approach of machine translation [3]. Khaled Shaalan had given the Rule-based Approach of machine translation for English to Arabic Natural Language Processing and the rule based tools for Arabic natural language [4]. R. Carlson, B. Granström, S. Hunnicut had described the module for multi language text to speech design. They have given the information about the speech synthesis [5].

III. APPROCHED USED

For translation generally there are three main approaches used as follows,

1. Rule based,
2. Statistical based,
3. Example Based

Rule Based method for machine translation is divided in to another three types,

1. Transfer based machine translation: - Type of machine translation based on idea of Interlingua and is currently one of the most widely used area. It is necessary to have an intermediate representation that captures the "meaning" of the original sentence in order to generate the correct translation.

2. Dictionary based machine translation: - Machine translation can use dictionary based approach, which means that the words will be translated as they are by a dictionary.

3. Interlingual based machine translation: - Machine translation can use dictionary based approach mean the text to be translated, is transformed into an Interlingual, i.e. source or target-language-independent representation. The target text e is then generated out of the Interlingua.

Rule based translation consists of

1. Process of analyzing input sentence of a source language syntactically and or semantically

2. Process of generating output sentence of a target language based on internal structure each process is controlled by the dictionary and the rules.

The strength of the rule based method is that the information can be obtained through introspection and analysis. The weakness of the rule based method is the accuracy of entire process is the product of the accuracies of each sub stage.

IV. THE PROCESS ENGINE

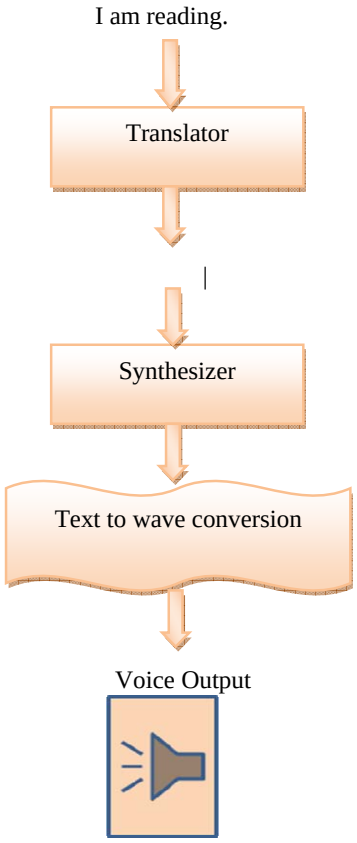

Figure 1.Process Engine

This process engine basically consist of two models as shown in following Fig 1,

1. Translator
2. Synthesizer

In this paper we consider dictionary rule based approach for translator and synthesizer. In dictionary based approach words are stored in Database dictionary and when we got input then English sentence are separated from sentence.

V. SYSYEM DESIGN

The careful analysis of this module and its possible solutions leads to the following design of the system. The main idea behind dictionary based Machine Translation is that input text sentence can be converted in to output sentence by carrying out the simplest possible parse ,replacing source word with the target language equivalents as specified in a bilingual dictionary, and then using grammar rules of target language re-arranging their order. The overall system is diagrammatically shown below in Fig.2, and following steps are involve in translation and Synthesizer of System,

1. Input process
2. Tokenization process
3. Morphological analysis process
4. Translator process

5. Parser generator and mapping process
6. WAVE GENERATION PROCESS

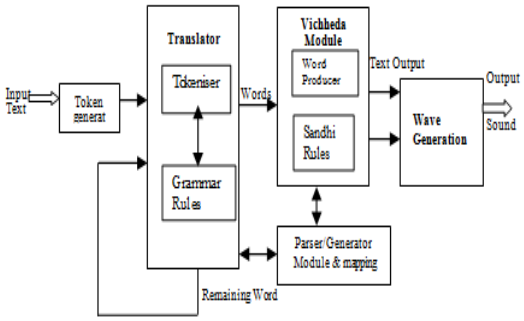

Figure 2. Overall system of Translator & Synthesize

A. Input process

This process is the first small step towards translation process. It takes sentence as input in a text box developed in a GUI within the software developed for the translation process.

B. Token generation process

This module splits the given sentence into chunks of strings delimited by spaces. These strings may be simple words or compound words coalesced by the rule of English Grammar. By applying the rules of English grammar assign appropriate category to words like (noun, verb, noun phrase etc.) Generate a parse tree using grammar rules of source language.

C. Vichheda Module process

The Vichheda module gets help from the set of transducers to identify words and forms words through the word generator. The word generator in turn takes the help of the sandhi rules module wherever necessary. The remaining string after the basic word is generated is sent back to the Vichheda module.

D. Morphological Analysis process

The lexicon or the database developed plays a very important role for Morphological analysis. As it searches through the lexicon to gather the information. This process takes the tokens as input and gathers grammatical information on that token.

E. Translator process

This module performs the actual translation. The input to this module is the parse. It also interacts with the parser/generator module to get the parse of each word. It then generates appropriate equivalents in English for the
morphological details of each word and ultimately presents
sentence in the correct order.

F. Parser /generator and mapping

This process checks whether the input sentence is grammatically correct or not. The information gathered from above mentioned process helps in analyzing the grammatical aspect of the sentence and on the basis of the rules the assessment is done. Mapping is done purely on the basis of the information passed from the morphological module. Parser Generator Module contains a set of transducers built for individual Sanskrit words and transforms strings to partial words, which are used by the Vichheda module and dictionary based approach. It also gives the parse of the words, which are used by the sentence former to give the output in a structurally correct sentence.

G. Wave generation

After getting the target text it converts into the wave and it plays using some output devices i.e speakers. Synthesized speech can be created by concatenating pieces of recorded speech that are stored in a database. Systems differ in the size of the stored speech units; a system that stores phones or diphones provides the largest output range, but may lack clarity

VI. EXAMPLE

Consider the Example,

ES: - He read book

SS: - Saha pustkam pathati

1: Token generator separates each word from sentence according to English grammar and it also consider the space between two words.

He read book

Token1 Token2 Token3

2: Syntax tree represent the syntactic structure of a sentence according to general grammar. In a tree, the interior nodes are labeled by non-terminals of the grammar, while the leaf nodes are labeled by terminals of the grammar. A program that produces such type of ordered tree is called a parser.

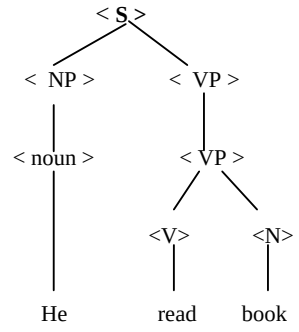

Figure 3. Tree generated in source language

3: After creating parse tree we get each word with proper tagging then find the meaning of each word in English dictionary and Sanskrit dictionary. If meaning of word is not available ic dictionary its gives error massage.

4: Considering grammar rules of Sanskrit language generate the Sanskrit sentence and after getting the proper output sentence it forward to next synthesizer module.

Target sentence: Saha pustkam Pathati

He -> Saha (Subject)
Book -> Pustkam (Object)
Read -> Pathati (Verb)

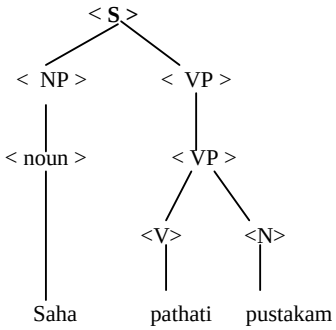

Figure 4. Tree generated in target language

5: After getting the target sentence, by applying techniques of synthesizing, convert sentence into waveform and gives the output in voice format.

VII. EXPERIMENTAL RESULTS

The objectives described for the ETSTS system above may be implemented using different approaches. We use here only one dictionary base approach. The separate lexicons for English sentence and Sanskrit sentence may be maintained in a database with morphological details stored in the form of logics in the programming language used. A bilingual dictionary will also have to be maintained in this case. Rules are formed for tokenization and parsing .Tokenization and parsing is implemented using java language.

Expected output screen after getting translation means convert the English sentence to Sanskrit sentence is given in Fig 5.

Expected output screen after synthesizer means convert the Sanskrit sentence into waveform and it play using output devices i.e. speakers is given in Fig 6.

VIII.CONCLUSION

The translation of sentences from English to Sanskrit is the main aim of the present paper. This may be implemented using different approaches, we use here only dictionary based approach To translate simple English texts involving the need for Tokenize, applying grammar rule create parse tree into corresponding appropriate sentences in Sanskrit. Designing the Computer based translator is possible using the natural language processing .Its followed the rule-based approach for translation. This work will very useful for the sharing the worldwide knowledge with Indian. Traditional approach for translation is just dictionary based which translate sentence by word-to-word comparison. In dictionary based approach of rule base method of MT is possible it required dictionaries of both the languages along with morphological databases of both the languages. Speech synthesis has been developed steadily over the last decades and it has been incorporated into several new applications. For most applications, the intelligibility and comprehensibility of synthetic speech have reached the acceptable level. Formant TTS voices are typically not as natural-sounding as concentrative TTS voices and we use formant approach synthesizer for this stage, but both provide capabilities that prerecorded audio cannot provide.

Figure 5. Expected output screen after translator

Figure 6. Expected output screen after synthesizer

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TEACHING TOOLS FOR MICROSTRIP PATCH ANTENNA DESIGN

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Abstract—This paper provides details on how to investigate a new method of teaching microstrip patch antenna design for undergraduate students by using MATLAB. This is achieved by designing a friendly graphical user interface (GUI) for microstrip patch antennas through which antenna parameters and radiation pattern can be determined. Effect of changes in basic parameter microstrip Patch Antenna on its Radiation Patter and other parameters can be determined by using GUI. Understanding the behavior of the Microstrip Patch Antenna and Design of it for different material with the use of the Graphical User Interface using MATLAB is better way of Analysis.

Keywords- *Graphical User Interface, Matlab, Rectangular Microstrip Patch Antenna & Circular Microstrip Patch Antenna.*

I. INTRODUCTION

Studying antennas and wave propagation phenomena using interactive graphics and animations becomes nowadays a fundamental tool for describing and understanding electromagnetic concepts. This aspect is strongly related with wave propagation, where the propagation properties of the waves or how to plot the radiation patterns of antennas are not so easy to understand for undergraduate students, due to simple, static, oral explanations. Currently, several products in which computer tools are used have been developed such as Ansoft Ensemble, IE3D, MWO (Microwave Office), SONNET, ADS (Agilent Advance Design System), COMSOL, MATLAB ,HFSS (High Frequency Structure Simulation) etc for modeling and simulation of complicated microwave and RF printed circuit, antennas, and other electronics component. Many of these softwares are commercially available at a very high cost or in the least, are proprietary.

MATLAB has become a ubiquitous math, data manipulation, signal processing, and graphics software package [1]. Engineers use its powerful functions for analysis and design in many areas including antenna design. MATLAB is general-purpose software, so many arcane applications, like antenna design, are done using special purpose commercial software. Although these packages can model very complex electromagnetic systems, they lack some of the powerful analysis tools in MATLAB. Using MATLAB to control these commercial electromagnetic solvers creates a powerful tool for design, analysis, and control. This paper provide the means of using MATLAB to provide a suitable application that calculates the main parameters of microstrip patch antenna, plots the radiation patterns and also determine the antenna performance characteristics through electromagnetic simulation. This is achieved via a GUI generated by the MATLAB that allow the user to modify, visualize and compare the whole process of the design whenever there is a need to fabricate the antenna.

Now a day, in wireless communication systems small and wide range antennas are essential which covers enough Circular polarizations, multiple frequency operation ability, circular polarizations, dual frequency operation, frequency agility, broad band width, feed line flexibility. Microstrip Patch antenna is most reliable with requirements so, it's as per its demand and applications analysis of it becomes essential for further development.

Rectangular and Circular patch antennas are the basic and most commonly used Microstrip Patch Antennas.

Here we are doing the design of a Microstrip patch antenna and we have to compare the different Characteristics of rectangular and circular patch antenna using MATLAB simulation software.

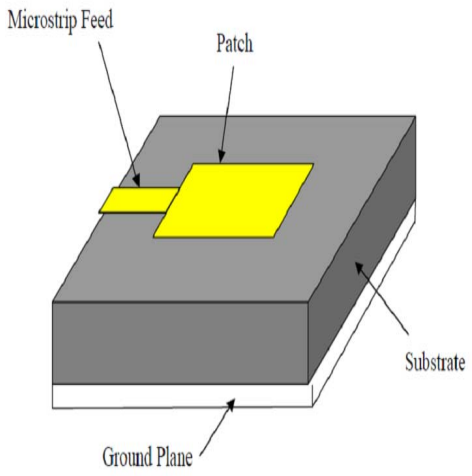

Figure 1. Basic Microstrip patch antenna

II. MICROSTRIP PATCH ANTENNA

Basic Structure of the Microstrip Patch is shown in Fig.2. In which different layers are illustrated like, Ground Plane, dielectric Substrate, patch with its height, width, length and all parameters The patch is generally made of conducting material such as copper or gold and can take any possible shape. On the dielectric substrate, the radiating patch and the feed lines Sare usually photo etched.

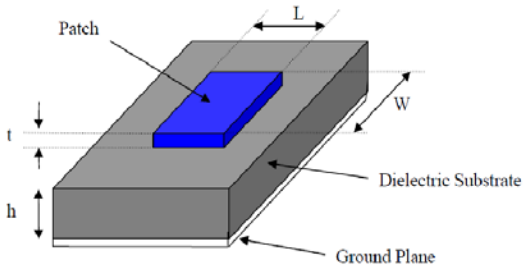

Figure 2. Microstrip Patch Antenna Structure

In order to simplify analysis and performance prediction, the patch is generally square, rectangular, circular, triangular, elliptical or some other common shape as shown in Fig 3

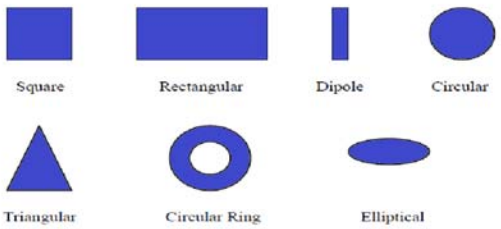

Figure 3. Different Shape of Microstrip Patch

Some of their principal advantages of Microstrip Patch Antenna discussed by [8] and Kumar are given below:

- Light weight and low volume.
- Low profile planar conFiguration which is reliable for any host surface.
- Fabrication cost is Low, so it can be manufactured in large quantities.
- Linear as well as Circular polarization are supported.
- Can be easily integrated with MICs.
- Capable of Multiple frequency Operations.
- Maintains mechanically robustness when mounted on surfaces.

Microstrip patch antennas suffer from a number of disadvantages. Some of their major disadvantages [9][10] are given below:

- Narrow bandwidth
- Low efficiency
- Low Gain
- Extraneous radiation from feeds and junctions
- Poor end fire radiator except tapered slot antennas
- Low power handling capacity.
- Surface wave excitation

A. Feed Techniques of Microstrip Antennas

For Microstrip patch antennas, there are verity of feeding techniques which can be classified by contacting and non-contacting Methods. In the contacting method, Microstrip Feed Line and Coaxial probe Feed Technique is covered. In the non-contacting scheme, Aperture Coupling and Proximity Coupling are included, in which electromagnetic field coupling is done to transfer power between the Microstrip line and the radiating patch.

TABLE I. COMPARING THE DIFFERENT FEED TECHNIQUES

Characteristics	microstrip line feed	coaxial feed	aperture coupled feed	proximity coupled feed
Spurious Feed Radiation	More	More	Less	Minimum
Reliability	Better	Poor due to Soldering	Good	Good
Ease of Fabrication	Easy	Soldering and Drilling Needed	Alignment Required	Alignment Required
Impedence Matching	Easy	Easy	Easy	Easy

III. DESIGN ANALYSIS OF MICROSTRIP PATCH ANTENNA

Microstrip patch antenna analysis can be done using three popular models: the transmission line model, cavity model and full wave model (Method of Moments- includes integral equations solution) [3]. The first model is the simplest of all and the less accurate [5]. The cavity model is more accurate, thus much complex compared to the transmission line model, and gives a good physical insight [6]. Full wave model is the most accurate and complex of all models and can analyze from single elements, to infinite antenna arrays, or arbitrary shaped elements. In this paper GUI is prepared in MATLAB using the transmission line model to calculate the dimensions and the cavity model to plot the radiation patterns for rectangular microstrip antenna. Alsosome perameters of circular microstrip patch antenna are analyzed using transmission line model.

A. Rectangular Patch antenna

Basic Design Equations of Rectangular Microstrip Patch Antenna are as under.

Effective Dielectric Constant can be given by:

$$\varepsilon_{reff} = \left[(\varepsilon_r + 1) / 2\right] + \left[(\varepsilon_r - 1)/2\right]\left[1 + 12\,(h / w)\right]^{-1/2} \quad (1)$$

Where, ε_{reff} = Effective dielectric Constant

ε_r = Dielectric Costant of the Substrate
h = Height of the Dielectric Substrate
w = Width of the Patch

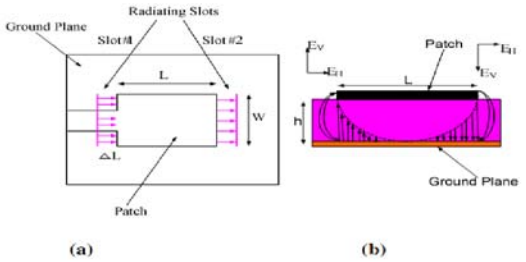

Figure 4. Top view and slde view of Rectangular Microstrip Patch Antenna

Two slots representation of Microstrip Patch Antenna is as shown in Fig. 4.

As shown in Figure slots are separated by distance L, when, the width of the structure has a maximum voltage and minimum current, then, it acts as an open ended circuit.

It is seen from Fig. 4, if we consider direction of the field opponents at edges then, they are opposite directions and thus out of phase, hence they cancel each other.

If the tangential components are in phase then the resulting fields combine to give maximum radiated field normal to the surface of the structure.

The fringing fields can behave like as radiating slots and electrically the patch of the Microstrip antenna. The Extended length of patch ΔL, is given empirically by [3] as:

$$\Delta L = 0.412\,h\,\frac{\left[\left(\varepsilon_{reff}+0.3\right)\left(\left(\frac{w}{h}\right)+0.264\right)\right]}{\left[\left(\varepsilon_{reff}-0.258\right)\left(\left(\frac{w}{h}\right)+0.8\right)\right]}$$

The actual length L of the patch is given as

$$L = \frac{\lambda_0}{2} - 2\Delta L$$

The Effective Length of the Patch Leff now Becomes

$$L_{eff} = L + 2\Delta L$$

For the Given resonant frequency f0, the effective length is given as

$$L_{eff} = \frac{c}{2 f_r \sqrt{\varepsilon_{reff}}} \quad (5)$$

For the effective radiation width of the patch W is given as

$$W = \frac{c}{\left[2 f_r \sqrt{\frac{[\varepsilon_r + 1]}{2}}\right]}$$

To determine the fields radiated by each slot, the total field is the sum of the two-element array with each element representing one of the slots.

For the microstrip antenna, the x-y plane (θ=90°, 0° ≤ ϕ ≤ 90° and 270° ≤ ϕ ≤ 360°) is the principal E-plane. For this plane, the expressions for the radiated fields is given by

$$E_\phi^t = +j\frac{k_0 hWV_0 e^{-jk_0 r}}{\pi r}\left\{\frac{\sin\left(\frac{k_0 h}{2}\cos\phi\right)}{\left(\frac{k_0 h}{2}\cos\phi\right)}\right\}\cos\left(\frac{k_0 L_{eff}}{2}\sin\phi\right) \quad (7)$$

The principal H-plane of the microstrip antenna is the x-z plane (ϕ =0°, 0° ≤ θ ≤180°), and the expressions for the radiated fields is given by

$$E_\phi^t = +j\frac{k_0 hWE_0 e^{-jk_0 r}}{\pi r}\left\{\sin\theta\frac{\sin\left(\frac{k_0 h}{2}\sin\theta\right)}{\left(\frac{k_0 h}{2}\sin\theta\right)}\frac{\sin\left(\frac{k_0 W}{2}\cos\theta\right)}{\left(\frac{k_0 W}{2}\cos\theta\right)}\right\} \quad (8)$$

The gain of the antenna is the quantity which describes the performance of the antenna or the capability to concentrate energy through a direction to give better picture of the radiation performance.it is given as

$$G = \eta \times D \quad (9)$$

Where, η = efficiency of the antenna,

D = Directvity

Circular patch antenna

Since the dimention of the patch is treated a circular loop, the actual radious of the patch is givenn by (Balanis,1982)

$$a = \frac{F}{\sqrt{\left\{1+\frac{2h}{\pi\varepsilon_r F}\left[\ln\left(\frac{\pi F}{2h}\right)+1.7726\right]\right\}}} \quad (10)$$

Where, $F = \frac{8.791\times10^9}{f_r\sqrt{\varepsilon_r}}$ (11)

Since the fringing makes the patch electrically larger, the effective radious of the patch is given by (Balanis,1982)[3].

$$a_e = a\sqrt{\left[\left(1+\frac{2h}{\pi a\varepsilon_r}\left[\ln\left(\frac{\pi a}{2h}\right)+1.7726\right]\right)\right]} \quad (12)$$

IV. ANTENNA DESIGN

In this paper utilization of the design equation of rectangular patch antenna and circular patch antenna is done for the preparation of the Graphical User Interface in MATLAB.GUI for the Rectangular patch antenna is as shown below.

In GUI resonant frequency (Fr), Input Impedance, Dielectric Thickness, Dielectric Constant is taken as input parameters.

As shown in Fig.5, antenna parameters are calculated using this GUI as well as the radiation pattern for given input is plotted on GUI.

In GUI "Help" option is added for the user, by which user can get the basic information about the Microstrip Antenna like:

- What is Antenna?
- What is Microstrip Patch Antenna?
- What is Advantages of Microstrip Patch Antenna?
- What is Disadvantages of Microstrip patch Antenna?...

Circular patch Antenna GUI is as shown as Fig. 6.

V. RESULATS

TABLE II. COMPARING THE RESULT FOR DIFFERENT MATERIAL

Input Parameter	Patch Material			
	Silicon	**RT/Duroid**	**GaAs**	**Indium**
Resonent Frequency (MHz)	30	30	30	30
Input Impedence (Ohm)	1000	1000	1000	1000
Dielectric thickness (h) (mm)	2	2	2	2
Dielectric Constant (ε_r)	11.8	2.2	12.9	12.4
Output Parameter	**Patch Material**			
	Silicon	**RT/Duroid**	**GaAs**	**Indium**
Length of Microstrip (mm)	1.416	3.3206	1.3535	1.3812
Width Of Microstrip (mm)	1.9764	3.9528	1.8966	1.9316
Effective Length (Mm)	0.1460	0.33	0.1397	0.1424
Width Of Feed Line (mm)	0.016210	0.025563	0.027428	0.0695
Inset Feed Point Y0 (mm)	0.4353	1.0084	0.4160	0.4245
Rediation Power (Mw)	8.5339	2.5005	1.1225	9.9517
Directivity (Db)	59.167	59.091	59.277	59.264
Charecteristic Impedence (Ohm)	69.900	92.620	68.882	69.326
VSWR	14.306	10.796	14.517	14.424

VI. DISCUSSION WITH FUTURE SCOPE

From the Equation of the Rectangular and Circular Microstrip patch Antenna manual calculation of all parameter is complex. By the use of the GUI this can be easy to calculate it. The Effect of the Changes in input parameter on radiation pattern can be easily analyzed by the use of GUI. As mentioned in results by changes in the material of the patch physical parameter of the Microstrip Patch is changes, this will be help designer to determine the antenna performance and make necessary adjustment before fabrication. As the same way all the parameter of circular microstrip patch antenna can be possible to analyze. Here GUI for the basic Parameter of circular microstrip patch antenna is also given (Fig.6).

VII.CONCLUSION

This work was aimed at designing a effective GUI for Rectangular and Circular Microstrip Patch Antenna. Alongside this, various parameters viz actual and effective length, width, radiation power, directivity, VSWR, which dictate the ultimate performance of the antenna were determined by simulation using a GUI developed in MATLAB. Deduction was made on results obtained for different substrate and it was discovered that GaAs is suitable for smaller antenna size for also higher frequency range.

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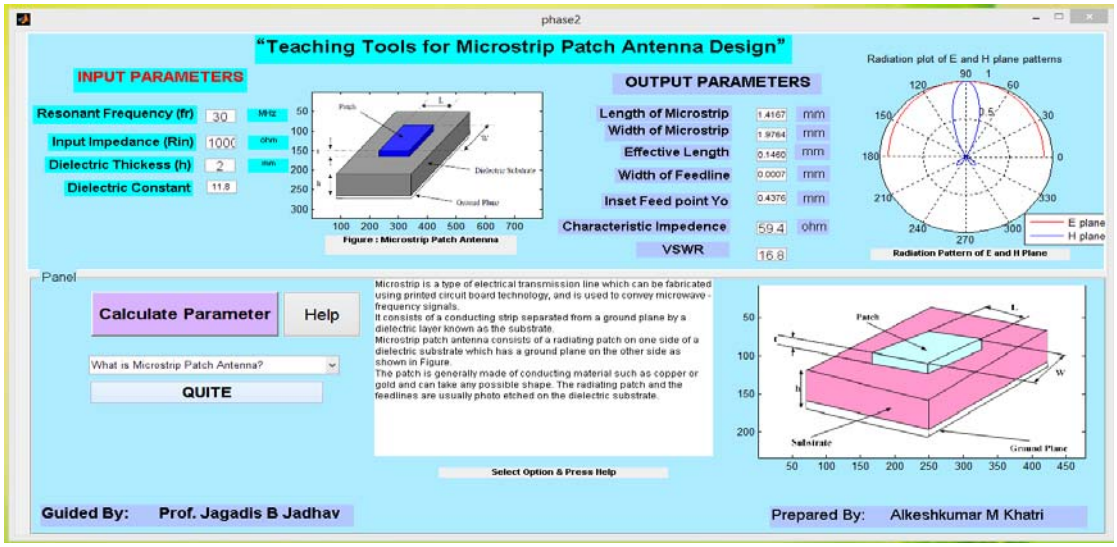

Figure 5. GUI front end for rectangular patch antenna

(Input fr = 30 MHz, Input Impedance 1000 ohm, Dielectric Thickness 2mm,Dielectric Constant 11.8 for Silicon)

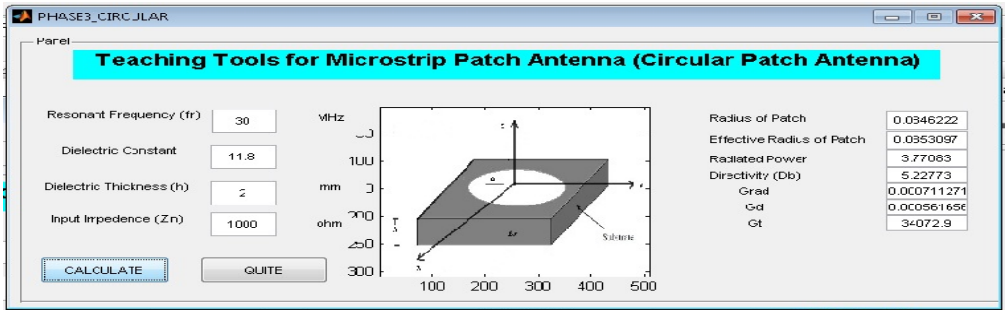

Figure 6. GUI front end of Circular Patch Antenna

DESIGNING AND EMBEDDING ELECTROCARDIOGRAM SYSTEM AND PULSE OXIMETER SYSTEM USING MIXED SIGNAL PROCESSOR

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Abstract—This work describes design and Implementation of Electrocardiogram system as well as pulse oximeter using MSP430. Since an embedded circuit board is lower in cost, smaller in size, and lower in power consumption than a PC. Removal of baseline wanders and power line interference in ECG signal is a classical problem. A new method is proposed to remove baseline wander and power line interference in ECG signal based on notch filter design, the paper proposes an overall design idea of portable ECG monitoring system based on MSP430 and implementation of system hardware and software. The paper also shows simulated results of removal of the base line interference and High frequency noise signal from the original ECG Signal. Pulse oximeters are ubiquitous in modern medicine to measures the percentage of oxygenated hemoglobin in a patient's blood by comparing the transmission characteristics of red and infrared light-emitting diode light through the patient's finger with a photoreceptor. This developed work (Hardware & Software) is of low cost with regards to traditional Medical Monitoring equipment appears as a great alternative to be used in the medium and low complexity medical assistance services. This system can realize the effective real-time diagnosis and monitoring.

Keywords-*component; formatting; style; styling; insert (key words)*

I. INTRODUCTION TO EECG SYSTEM

The development of economic and technology speeds up the rhythm of people's lives as well as aging of the population, which brings about an upward tendency of the incidence of cardiovascular. And the portable ECG monitor can prevent patients from random and sudden occurrence of cardiovascular disease in an effective and timely way.

Power line interference often severely corrupts electrocardiogram (ECG) signal. ECG has been used extensively for detection of heart disease, which records the electrical activity of the heart generated by the heart muscle. The ECG signal is weak biopotential signal, the ratio of signal noise of which is low. When the ECG signal is recorded, the cable linking the patients to the monitoring equipment is susceptible to 50Hz/60Hz power line interference, the frequency of which is very close to the high frequency component of the ECG signal and therefore is more difficult to filter out [2].

Traditional analysis of the electrocardiogram (ECG) consists of visual recognition of patterns associated with disease states. Newer techniques, such as signal averaging and spectral analysis, attempt to detect more subtle patterns. As higher frequencies and resolution are being used than needed for simple visual recognition, a higher quality of ECG signal is required. This has put new demands on signal acquisition systems (higher sampling rate and resolution) and signal conditioning filters. ECG signal conditioning is usually performed with analog filters. With the advent of the microprocessor these filters can be implemented digitally for real-time operation. Some of the required filters are low pass, base-line drift removal, and AC noise cancellation. To avoid ECG distortion, the filter needs to be linear phase.

The power line interference may severely corrupt an ECG recording. Removing the power line interference in ECG signal is usually the necessary preprocessing step to enhance the signal characteristics for diagnosis. An electrocardiogram is generated by a nerve impulse stimulus to a heart, whereby the current is diffused around the surface of the body surface. The current at the body surface will build on the voltage drop, which is a couple of μV to mV with an impulse variation [3].

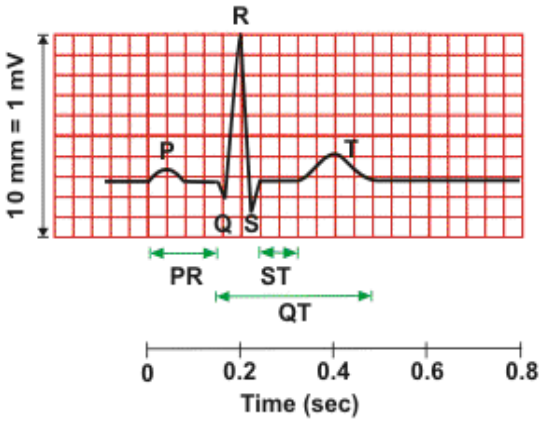

Figure 1: Typical ECG waveform

The high-pass filtering operation is intended to remove base-line wander of the ECG signal. The rejection of DC and very low-frequency components, has as a main role to remove the noise from body electrodes (and related electro-ckemial gdentiafs). This processing step must not also remove the significant low-frequency components of the ECG signal. The low cut-off frequency may be as high as the heart rate frequency without disturbing the waveform For example, when a bradycardia of 48 beats per minute is considered as the lowest heart rate

to be processed, then the lowest frequency component of the ECG spectrum is 0.8 Hz. For the lowest frequency component, usually designs are ~fclo ntrast to the American Heart Association (AHA) recommendations which state that frequency components above 0.05 Hz should not be removed. This, because these recommendations published in 1975 have been based on filter methods that introduce phase distortions above the heart frequency. For diagnostic ECG recordings, the high cut-off frequency must be 100 Hz. Because the power line interference frequency is within the ECG useful bandwidth, the 50 Hz rejection filter must be a very narrower filter [4].

The purpose of this paper is to present a method of designing portable ECG system for 3 channel ECG system and also present some results obtained from modeled ECG system with noisy and filtered signals.

II. INTRODUCTION TO PULSE OXIMETER SYSTEM

In modern medical practice, the blood oxygen level is considered one of the important vital signs of the body along with the more traditional ones, such as blood pressure, heart rate, body temperature, and breathing rate. Pulse oximeters provide early information on problems in the respiratory and circulatory systems. They are widely used in intensive care, operating rooms, emergency care, birth and delivery, neonatal and pediatric care, sleep studies, and in veterinary care.[7]

The most frequent use of pulse oximeters is in anesthesiology. Tissue oxygenation and, consequently, blood saturation are of extreme importance to anesthesiologists because they administer narcotics to the patient to suppress the central nervous system. This administration stops the patient's desire to breathe and places them in a state where they can no longer meet oxygen demands on their own. In addition, anesthesiologists administer muscle relaxants which stop the ability to breathe and permit airways to collapse. Thus, it is necessary to restore breathing through intubation and artificial respiration. In a sense, the anesthetist becomes the controller for the patient's respiratory system, and the blood oxygen level provides the best feedback variable.

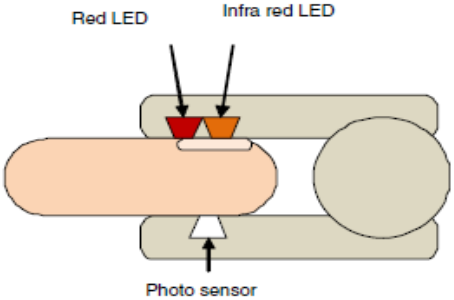

Figure 2: Pulse Oximeter Sensor

Apart from the aforementioned applications, there is a growing demand today for small, long-lasting, and cheap pulse oximeters suitable for many novel and exciting portable or wearable medical applications. For instance, home-care monitoring for elderly or chronically ill patients is gaining popularity as a continuous and flexible alternative to costly medical supervision in hospitals and nursing homes. Moreover, the military is seeking solutions to remotely monitor the health of soldiers in the battlefield by using light and durable sensor tags attached to their bodies.

Pulse Oximetry is the non-invasive measurement of the oxygen saturation (SaO_2). Oxygen saturation is defined as the measurement of the amount of oxygen dissolved in blood, based on the detection of Hemoglobin and Deoxyhemoglobin.

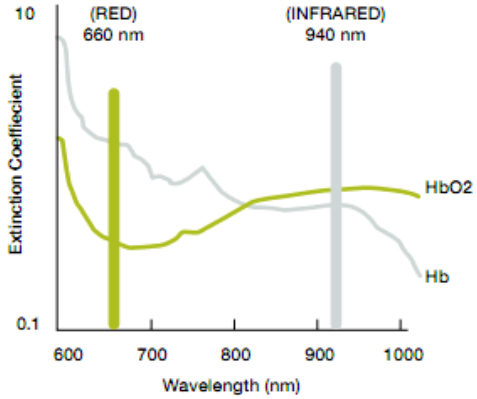

Figure 3: Hemoglobin light absorption graph

Two different light wavelengths are used to measure the actual Difference in the absorption spectra of HbO_2 and Hb. The bloodstream is affected by the concentration of HbO_2 and Hb, and their absorption coefficients are measured using two wavelengths 660 nm (red light spectra) and 940 nm (infrared light spectra). Deoxygenated and oxygenated hemoglobin absorb different wavelengths. Deoxygenated hemoglobin (Hb) has a higher absorption at 660 nm and oxygenated hemoglobin (HbO_2) has a higher absorption at 940 nm.

A photo-detector in the sensor perceives the non-absorbed light from the LEDs. This signal is inverted using an inverting Op-Amp and the result is a signal. This signal represents the light that has been absorbed by the finger and is divided in a DC component and an AC component. DC component represents the light absorption of the tissue, venous blood, and non-pulsatile arterial blood. The AC component represents the pulsatile arterial blood.

III. FILTERING METHODS FOR ECG

In diagnostic: ECG acquisition and processing systems, it acquires 3 standard electrocardiographic leads, and it is particularly important for the

preprocessing operations to conserve the original phase of the signals. Usually, pre-processing consist in amplification, low-pass (antialias) filtering, highpass filtering, and band-stop filtering for power line frequency (50 or 60 Hz).

All the digital filters implemented here, are finite impulse response [FIR] or integer coefficient filters, which shows linear phase characteristics. The target system for these filters is an over-sampling acquisition system, future adaptable: to signa-delta analogue to digital converters.

On the analogue frontend there is implemented an anti-alising filter, and a high-pass (first order) filter. For an ideal high-pass filtering (cutoff at 0.5 Hz) the required system dynamic range is settled by the maximum possible amplitude of the signal (10 mV) and the resolution imposed, for an acceptable ECG signal to be analyzed (5 μV). On these conditions the minimum dynamic range is approximately 70dB (Equally to the minimum attenuation in the stop-band of the digital filters) [7]. However, the f3lter is not ideal, and we shall consider a bigger minimum value for the dynamic range.

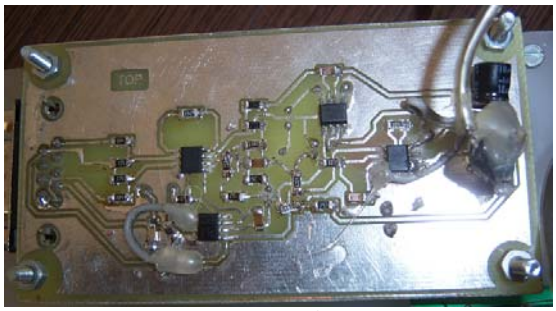

Figure 4: ECG Amplifier & Filter

The simplified method of designing integer coefficients digital filters, consist in number of placing evenly spaced zeros around the unit circle, in the z-plane. The detector was fitted-with a fixed gain amplifier stage and an analog antialias bandpass filter which attenuates the components of the measured signal outside the 0.05 - 40 Hz frequency band.

The ECG signals considered at this point are measured as discrete-time signals by an analog-to-digital converter (ADC) performing quantization with a resolution of 12 bits at a sampling frequency of 200 Hz.

Power-of-two coefficients filters lead to design constraints that make it difficult to achieve sharp cutoffs. However, since these filters can operate at higher speeds than traditional designs, they are often the best type of filter when using slow general-purpose microcontrollers. These filters also minimize the round-off and truncation errors by using bit-shifting and add-subtract instructions instead of floating-point multiplication instructions which makes the resulting programs less burdensome to implement.

When analyzing ECG signals at rest, the first difference may perhaps be an acceptable choice. The first difference, however, accentuates high-frequency noise which is inappropriate in situations with low signal-to-noise ratios as in the case of ambulatory monitoring. A new sequence was defined to get high-frequency noise whitened. The sampling rate can be reduced by a factor of M without aliasing if the original sampling rate was at least M times the Nyquist rate or if the bandwidth of the sequence is first reduced by a factor of M by discrete time filtering [5]

Decimating the measured ECG signal by a factor of 2 causes no aliasing. As a result, applying the first difference to the decimated sequence is comparable to apply the three point central difference to the originally measured signal.

IV. REMOVAL OF BASELINE WANDER & POWER LINE INTERFERENCE

The electrocardiogram (ECG) is a method of recording the electrical activity of the heart. ECG signal is non-stationary signal including valuable clinical information, but frequently this information is corrupted by noise. Two types of predominant sources of interference in ECG signals are the baseline wander and the 50Hz power line. Baseline wander is mainly caused by patient breathing, movement, bad electrodes and improper electrode site preparation etc; The frequency range of baseline wander is usually below 0.5Hz, which is similar as the frequency range of ST segments. The low frequency ST segments of ECG signals are strongly affected by the wandering that easily leads to false diagnosis. 50 Hz power line interference also often corrupt the ECG signals, which come from power lines to the measurement systems despite proper grounding, shielding and amplifier design. Eliminating the baseline wander and the power line interference in ECG signals are usually the necessary preprocessing step to enhance the signal characteristics for diagnosis. The frequency range of power line interference usually varies around 50Hz.

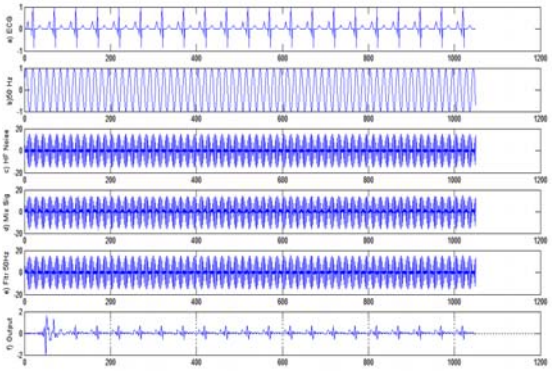

Figure 4: Simulated results: for Signal decomposition a) ECG signal b) 50Hz signal c) High frequency noise d) Mixed signal e) After applying 50 Hz notch filter e) Output.

Removal of the power line interference in ECG signal has been an important research area. In last decades many methods of removal of base line interference were proposed. They can be categorized into non-adaptive and adaptive filtering. Non-adaptive filter actually is a sharp notch filter which is a band-stop filter with a narrow stopband. It passes all frequencies except those in a stop band centered on a center frequency: 50/60Hz. The method is easy to implement at low cost. However it causes undesirable signal distortion due to the overlapping of signal and disturbance. [9]

The interferences are eliminated but the useful important frequency components of ECG signal are also removed. Its performance also depends on the frequency stability of the power line. Adaptive filtering was first proposed by Widrow. The method does not disturb the ECG frequency spectrum but it requires reference signal, the coefficients of the filter can be updated adaptively by tracking the statistical characteristics of the reference signal. The selections of the reference signal are important which control the performance of the adaptive filter.

V. ARCHITECTURE OF OUR PULSE OXIMETER

There are many theoretical principles that are fundamental to understand how we can use pulse oximetry in order to obtain a signal relevant to physiological function.

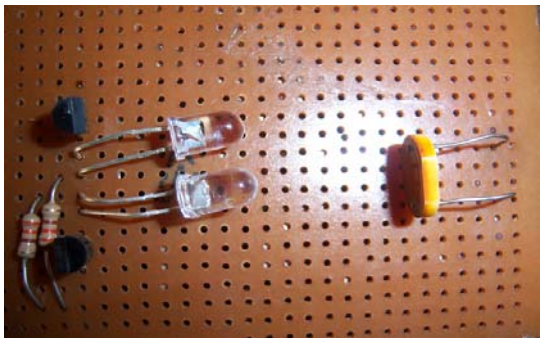

Figure 5: Implementation of Pulse Oximeter

Hemoglobin is the oxygen carrying molecule of the blood and blood consists of millions of these molecules. It can also exist in two forms: oxidized (or oxygenated) Hemoglobin denoted HbO_2 and reduced hemoglobin denoted Hb. Approximately 99% of oxygen is bound to hemoglobin in red blood cells. Oxygen saturation denoted SaO_2 refers to the ratio of oxygenated hemoglobin to the total concentration of hemoglobin,

SaO_2 [HbO_2] / [Total Concentration of hemoglobin] (1)

This SaO_2 is normally given as a percentage, and for a healthy individual is > 91% (on average however is around > 97%). Due to the optical properties of both HbO_2 and Hb at 500nm-1000nm it is possible to measure oxygen saturation. We do this by measuring transmitted light (through the tissue, normally finger or earlobe) at two different wavelengths. Making the assumption that the transmission of light through the arterial bed is influenced only by the relative concentrations of oxygenated and reduced hemoglobin and their absorption coefficients at the two wavelengths, light intensity will decrease logarithmically according to Beer–Lambert's law (for a more detailed description on Beer-Lambert's law refer to appendix B). Using these principles we can obtain an expression for the ratio of the intensity of light transmitted at two different wavelengths given by:

$$R = log_{10}(I_1) / log_{10}(I_2) \quad (2)$$

Where I_1 is the intensity of light at λ1 (wavelength 1) and I_2 is the intensity of light at λ2 (wavelength 2).

VI. ERXPERIMENTAL RESULTS

In this paper, a new method is proposed for removing baseline wander and power line interference in ECG signals Linear phase filtering is proposed for the removal of baseline wander and power-line frequency components in electrocardiograms. In order to reduce the large number of computations involved in the digital filtering that are necessary, the desired filter spectrum was defined periodically. Making use of the property that the spectrum period is 50 Hz, the spectrum can be realized with a considerably reduced number of impulse response coefficients.

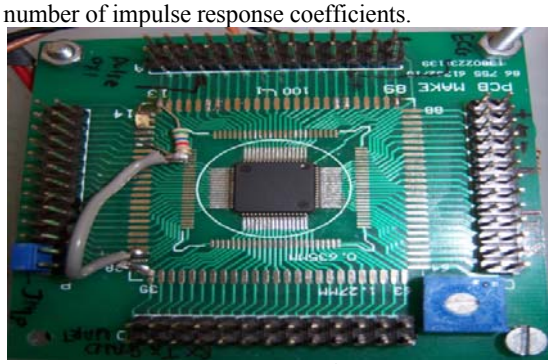

Figure 6: MSP430 Interface Board

To the verification of removal of noise from original ECG signal, another method has been developed for the implementation and analysis of different noise removal technique in ECG signal. The test for the simulation of ECG signal has been taken by adding different noises.

While designing this project, first of all the signals were measured at the initial stage of design before applying any differential amplifier or filter. From observations we can observe only QRS wave and that is also noisy. Output taken at the initial stage before amplification is shown in figure bellow. The signal is approximately 20mVp-p and is centered at

0V. In this picture the ECG signal is present with different inference added with the original signal.

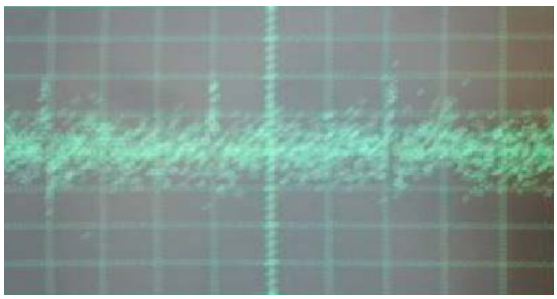

Figure 7: ECG Results Prior to Offset and Amplification stage

Above figure provides the signal at initial stage from observations we can observe only QRS wave and that is also noisy. The figure contains ECG signal with base line interference and also high frequency components.

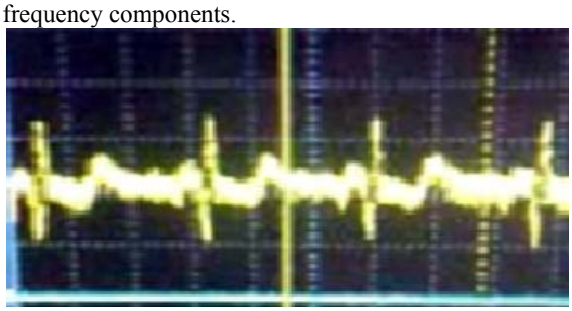

Figure 8: Experimental Results: ECG Signal

The design was successfully dissected into various modules. The integration of the individual modules was achieved successfully. The introduced method of ECC low-pass filtering and 50 Hz mains frequency noise gives good results. All the filters are integer coefficient filters, with a linear phase-frequency response.

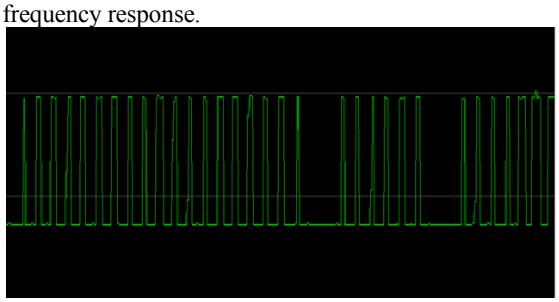

Figure 9: Experimental Results for pulse Oximeter

To calibrate our pulse oximeter, we placed each of these calibration fingers inside its probe, manually pressed the fingers as instructed, and measured the output current of our oximeter. After we calibrated the pulse oximeter, we measured the blood oxygen saturation of real subjects.

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A K-ANONYMITY CONFIDENTIALITY DEFENDING LOCALITY EXAMINING SCHEME FOR WIRELESS NETWORKS WITH JACK SECURE SYSTEM

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Abstract:-Anonymizing wireless networks permit users to access services confidentially with the help of a series of routers in order to conceal the IP address of the client from the server. As a result, administrators block all known exit nodes of anonymizing networks, denying anonymous access to misbehaving. To address this problem, servers can "blacklist" misbehaving users, by this means blocking users devoid of compromising their anonymity. Monitoring personal locations with a potentially untrusted server poses privacy threats to the monitored individuals; a privacy-preserving location monitoring system for wireless networks is adopted. Two in-network location anonymization algorithms are considered, namely, resource and quality-aware algorithms that intend to facilitate the system in order to offer high-quality position monitoring services for system users, while preserving personal location privacy. Both algorithms rely on the well established k-anonymity privacy concept, that is, a person is indistinguishable among k persons, to permit trusted wireless nodes to provide the aggregate location information of monitored persons. Each aggregate location is in a form of a monitored area A along with the number of monitored persons residing in A, where A contains at least k persons. The main aim behind use of resource-aware algorithm is to minimize computational cost and communication cost, while the quality-aware algorithm aims to maximize the accuracy of the aggregate locations by minimizing their monitored areas. To make use of the aggregate position information and to provide location monitoring services, a spatial histogram approach is used that estimates the distribution of the monitored persons based on the gathered aggregate position information. Then, the estimated distribution is used to provide position monitoring services through answering range queries.

Index Terms—*Wireless Networks, location privacy, position monitoring system, anonymous authentication, aggregate query processing, anonymous blacklisting, misbehaving users, spatial cloaking, threat monitoring, position anonymization.*

1. INTRODUCTION

The advance in wireless technologies has resulted in many new applications for military and/or civilian purposes [1]. Many cases of these applications rely on the information of personal locations, for example, surveillance and location systems. Unfortunately, monitoring personal locations with a potentially untrusted system poses privacy threats to the monitored individuals, because an adversary could neglect the location information gathered by the system to infer personal sensitive information [3], [4], [5], [6].

This paper proposes a confidentiality-defending position monitoring scheme for wireless networks in order to provide location monitoring services with the help of Jack secure system [2]. Our system relies on the well-established k-anonymity privacy concept, which requires each person is indistinguishable among k persons. In our system, each wireless node blurs its wireless range area into a cloaked area, in which at least k persons are residing. Each wireless node reports only aggregate location information, which is in a form of a cloaked area, A, along with the number of persons, N, located in A, where N >= k, to the server. It is very essential to note that the value of k achieves a trade-off between the strictness of confidentiality protection and the quality of monitoring services. A smaller k indicates less confidentiality protection, because a smaller cloaked area will be reported from the wireless node; hence better monitoring services. However, a larger k results in a larger cloaked area, which will reduce the quality of monitoring services, but it provides better confidentiality protection. Our system can avoid the confidentiality leakage by providing low-quality position monitoring services for small areas that the challenger could use to track users, while providing high-quality services for larger areas. The definition of a small area is relative to the required anonymity level, because our system provides better quality services for the same area if we relax the required anonymity level. Thus, the challenger cannot infer the number of persons currently residing in a small area from our system output with any reliability.

To preserve personal location privacy, we have used two in-network aggregate location anonymization algorithms, namely, resource and quality-aware algorithms [1]. Both algorithms require the wireless nodes to collaborate with each other to blur their wireless range areas into cloaked areas, such that each cloaked area contains at least k persons to constitute a k-anonymous cloaked area. The resource-aware algorithm aims to minimize communication and computational cost, while the quality-aware algorithm aims to minimize the size of the cloaked areas, in order to maximize the accuracy of the aggregate locations reported to the server. In the resource-aware algorithm, each wireless node finds an adequate number of persons, and then it uses a greedy approach to find a cloaked area. On the other hand, the quality-aware algorithm starts from a

cloaked area A, which is computed by the resource-aware algorithm. Then, A will be iteratively refined based on extra communication among the wireless nodes until its area reaches the minimal possible size. For both algorithms, the wireless node reports its cloaked area with the number of monitored persons in the area as an aggregate location to the server. For the purpose of security provision to the end user's system, the Jack secure system is used which is designed by Zi Lin and Nicholas Hopper in October 2012 and provides the following properties: backward unlink ability, subjective blacklisting, anonymous authentication, fast authentication speeds, rate-limited anonymous connections, and revocation audit ability. The Jack secure system [2] is the extra ordinary version of Nymble secure system where end users acquire an ordered collection of nymbles, a special type of pseudonym, to connect to websites. Without additional information, these nymbles are computationally very hard to link and hence using the stream of nymbles simulates anonymous access to services. Websites can blacklist users by obtaining a seed for a particular nymble, allowing them to link future nymbles from the same user, those used before the complaint remains unlinkable. Servers can therefore blacklist anonymous users without knowledge of their IP addresses while allowing behaving users to connect anonymously. Our system ensures that users are aware of their blacklist status before they present a nymble and disconnect immediately if they are blacklisted.

Although our system only knows the aggregate location information about the monitored persons, it can still provide monitoring services through answering aggregate queries, for example, "What is the number of persons in a convinced area?" To support these monitoring services, we are going to use a spatial histogram [1] that analyzes the gathered aggregate locations to estimate the distribution of the monitored persons in the system. The estimated distribution is used to answer aggregate queries.

The communication and computational cost of the resource-aware algorithm is lower than the quality-aware algorithm, while the quality-aware algorithm provides more accurate monitoring services (the average accuracy is about 90 percent) than the resource-aware algorithm (the average accuracy is about 75 percent). Both algorithms only reveal k-anonymous aggregate location information to the server, but they are suitable for different system settings. The resource-aware algorithm is suitable for the system, where the wireless nodes have scarce communication and computational resources, while the quality-aware algorithm is favorable for the system, where accuracy is the most important factor in monitoring services.

The rest of this paper is organized as follows: Our system model is discussed in Section 2. Section 3 presents the resource-aware and quality-aware location anonymization algorithms. Section 4 describes the experiment setting of our system. Section 5 highlights the features of the proposed system. The related work is mentioned in Section 6. Finally, Section 7 concludes the paper.

2. SYSTEM ARCHITECTURE

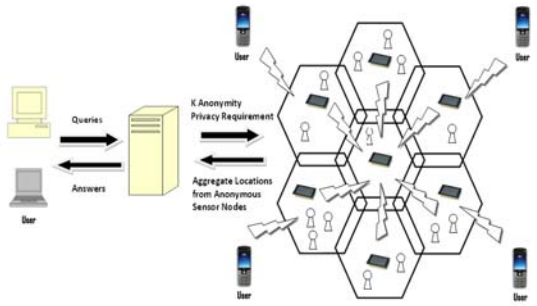

Fig. 1: The Architectural Model

Fig. 1 depicts the architecture of our system, where there are three major entities, wireless nodes, server, and system users. We will define the problem addressed by our system, and then describe the detail of each entity and the privacy model of our system.

2.1 Problem Definition

To develop a system for confidentiality preserving and position monitoring for wireless networks using location anonymization algorithms and Jack secure system.

2.2 Wireless nodes

There are various wireless nodes present in a trusted zone. The job of wireless nodes is to calculate moving objects in its own area. Wireless nodes are anonymous in nature. Wireless nodes communicate with the other wireless nodes inside the network to form a peer list by broadcasting a message. After a peer list wireless nodes forms a cloaked area in which there should be k no of objects present. The cloak area is the blurred area which can't b seen by other wireless nodes inside the network. That cloaked area is the final aggregate location which is provided to a user through a server.

2.3 Server

Server can be called as central node as every wireless node inside the network is connected to it. Server keeps information about all wireless nodes in the network. Server can be called as communication medium between user and trusted zone i.e. wireless nodes. User first sends a query to a server and then server passes it to wireless nodes.

2.4 Trusted Zone

Trusted zone consist of several nodes as mentioned earlier. This zone is called as trusted because the anonymous wireless nodes are present in

it. Anonymous nature of wireless nodes helps hiding from other wireless nodes inside the network.

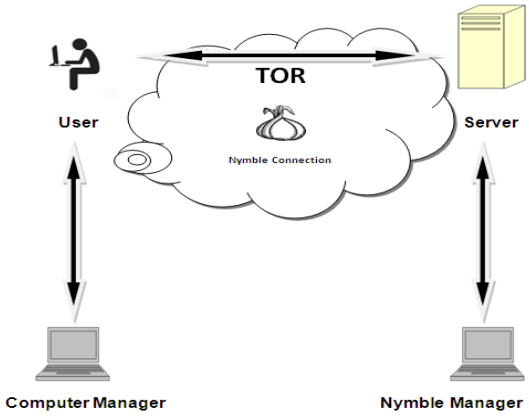

Fig. 2: The architecture of Jack secure system.

2.5 System Users

Authenticated administrators and users can issue range queries to our system through either the server or the wireless nodes, as depicted in Fig. 2. The server uses the spatial histogram to answer their queries.

2.6 Privacy Model

In our system, the wireless nodes constitute a trusted zone, where they behave as defined in the algorithm and communicate with each other through a secure network channel to avoid internal network attacks, [4], [7]. Our system also provides anonymous communication between the wireless nodes and the server by employing existing anonymous communication techniques [8], [9]. Thus given an aggregate location R, the server only knows that the sender of R is one of the wireless nodes within R. Furthermore, only authenticated administrators can change the k-anonymity level and the spatial histogram size. In emergency cases, the administrators can set the k-anonymity level to a small value to get more accurate aggregate locations from the wireless nodes, or even set it to zero to disable our algorithm to get the original readings from the wireless nodes, in order to get the best services from the system.

2.7 The Pseudonym Manager

The user must first contact the Pseudonym Manager (PM) [2] and demonstrate control over a resource; for IP-address blocking, the user must connect to the PM directly.

2.8 The Nymble Manager

After obtaining a pseudonym from the PM, the user connects to the Nymble Manager (NM) [2] through the anonymizing network, and requests nymbles for access to a particular server (such as Wikipedia). A user's requests to the NM are therefore pseudonymous, and nymbles are generated using the user's pseudonym and the server's identity. These nymbles are thus specific to a particular user-server pair.

2.9 Time

Nymble tickets are bound to specific time periods. While a user's access within a time period is tied to a single nymble ticket, the use of different nymble tickets across time periods grants the user anonymity between time periods. Smaller time periods provide users with higher rates of anonymous authentication, while longer time periods allow servers to rate-limit the number of misbehaviors from a particular user before he or she is blocked. The linkability window allows for dynamism since resources such as IP addresses can get reassigned and it is undesirable to blacklist such resources indefinitely, and it ensures forgiveness of misbehavior after a certain period of time.

2.10 Blacklisting a user

If a user misbehaves, the server may link any future connection from this user within the current linkability window. A user connects and misbehaves at a server during time period t within linkability window w. The server later detects this misbehavior and complains to the NM in time period tc of the same linkability window w. As part of the complaint, the server presents the nimble ticket of the misbehaving user and obtains the corresponding seed from the NM. The server is then able to link future connections by the user in time periods of the same linkability window w to the complaint. Therefore, once the server has complained about a user, that user is blacklisted for the rest of the day.

3. LOCATION ANONYMIZATION ALGORITHMS

To implement our system two algorithms are used:

3.1 Resource Aware Algorithm [1]

Basic idea of this algorithm is to find adequate number of persons in that network and accordingly finding a cloaked area which further referred as MBR(minimum bounded area).there are two steps in this algorithm :

3.1.1 Broadcast step

In this step, every wireless node in a network broadcasts a message to nearer wireless nodes. In this message it passes its id, its wireless range area and count of objects in its wireless area. In this way every wireless node forms its own peer-list. Also every wireless node checks for adequate number of objects in its wireless range area and accordingly it sends notification message to the nearer wireless nodes and follows the next step.

3.1.2 Cloaked area step:

The basic idea of this step is that each wireless node blurs its wireless range area into a cloaked area that includes at least k objects, in order to satisfy the k- anonymity privacy requirement. To minimize computational cost, this step uses a greedy approach to find a cloaked area based on the information stored in peer-list. For each wireless node m, m initializes a set S and then determines a score for each peer in its peer-list. The score is defined as a ratio of the object count of the peer to the distance between the peer and m. The score is calculated to select a set of peers from peer-list to S to form a cloaked area that includes at least k objects and has an area as small as possible. Then we repeatedly select the peer with the highest score from the peer-list to S until S contains at least k objects. Finally, m determines the cloaked area (Area) that is a minimum bounding rectangle (MBR) that covers the wireless range area of the wireless nodes in S, and the total number of objects in S (N).

3.1.3 The validation step:

This step is to avoid reporting aggregate locations with a containment relationship to the server. We do not allow the wireless nodes inside the network to report their aggregate locations with the containment relationship to the server, because combining these aggregate locations may pose privacy leakage.

function RESOURCEAWARE (Integer k, Node m, List R)
// Step 1: The broadcast step
Send a message with m's identity m.ID, wireless range area m.Area, and object Count m.Count to m's neighbor peers
if Receive a message from a peer p, i.e., (p:ID, p:Area, p:count)
then Add the message to *peer-list*
if m has found an adequate number of objects **then** Send a *notification* message to m's neighbors
end if
if Some m's neighbor has not found an adequate number of objects **then**
Forward the message to m's neighbors
end if
end if
// Step 2: The cloaked area step
S ←{m}
Compute a score for each peer in peer-list
Repeatedly select the peer with the highest score from peer-list to S until the total number of objects in S is at least k. Area a minimum bounding rectangle of the senor nodes in S N the total number of objects in S
// Step 3: The validation step
if No containment relationship with Area and R 2 R **then** Send (Area, N) to the peers within Area and the server **else if** m's wireless range area is contained by some R 2 R **then**
Randomly select a R'€ R such that R'. Area contains m's wireless range area
Send R' to the peers within R'. Area and the server
else
Send Area with a cloaked N to the peers within Area and the server
end if

3.*2 Quality Aware Algorithm [1]*

The quality-aware algorithm starts from a cloaked area A, which is computed by resource aware algorithm. Then A will be iteratively refined based on extra communication among the wireless nodes until its area reaches the minimal possible size. For both Resource as well as Quality aware algorithms, the wireless node inside the network reports its cloaked area with the number of monitored persons in the area as an aggregate location to the server.

3.2.1 Search space step:

Since a typical wireless network has a large number of wireless nodes, it is too costly for a wireless node m to gather the information of all the wireless nodes to compute its minimal cloaked area. To reduce communication and computational cost, m determines a search space, S, based on the input cloaked area computed by the resource-aware algorithm, such that the wireless nodes outside S cannot be part of the minimal cloaked area.

3.2.2 The minimal cloaked area step:

This step takes a set of peers residing in the search space, S, as an input and computes the minimal cloaked area for the wireless node m. In this step we propose two optimization techniques to reduce computational cost. The basic idea of the first optimization technique is that we do not need to examine all the combinations of the peers in S; instead, we only need to consider the combinations of at most four peers. Because at most two wireless nodes defines width of MBR and at most two wireless nodes defines height of MBR. Thus this optimization mainly reduces computational cost by reducing the number of MBR computations among the peers in S. The second optimization technique has two properties, lattice structure and monotonicity property. In a lattice structure, a data set that contains n items can generate 2_{n-1} item sets excluding a null set. We generate the lattice structure from the lowest level based on a simple generation rule. The monotonicity property of a function f indicates that if X is a subset of Y , then f(X) must not exceed f(Y). For our problem, the MBR of a set of wireless nodes S has the monotonicity property, because adding

wireless nodes to S must not decrease the area of the MBR of S or the number of objects within the MBR of S.

3.2.3 The validation step:

This step is to avoid reporting aggregate locations with a containment relationship to the server. We do not allow the wireless nodes to report their aggregate locations with the containment relationship to the server, because combining these aggregate locations may pose privacy leakage.

function QUALITYAWARE (Integer k, Node m, Set *init solution*, List R) *current min cloaked area init solution* ***// Step 1: The search space step***

Determine a search space S based on *init solution*
Collect the information of the peers located in S
// Step 2: The minimal cloaked area step
Add each peer located in S to C[1] as an item
Add m to each item-set in C[1] as the first item
for i = 1; i ≤4; i ++ **do**
for each item-set X = {a_1 ,……., a_{i+1} } C[i] **do**
if Area(MBR(X)) < Area(*current min cloaked area*) **then**
if N(MBR(X)) ≥ k **then**
current min cloaked area ← {X}
Remove X from C[i]
end if
else
Remove X from C[i]
end if
end for
if i < 4 **then**
for each itemset pair X={x_1 ,……, x_{i+1} }
Y ={y_i ,….., y_{i+1} } **do**
if x1 = y_1 ,…., x_i = y_i and $x_{i+1} \neq y_{i+1}$ then
Add an itemset {x_1 ,……, x_{i+1} , y_{i+1}} to C[i + 1]
end if
end for
end if
end for
Area ← a minimum bounding rectangle of *current min cloaked area*
N ← the total number of objects in *current min cloaked area*
// Step 3: The validation step
if No containment relationship with Area and R 2 R **then**
Send (Area, N) to the peers within Area and the server
else if m's wireless range area is contained by some R 2 R **then**
Randomly select a R'€ R such that R'.Area contains m's wireless range area
Send R' to the peers within R'.Area and the server
else Send Area with a cloaked N to the peers within Area and the server
end if

4. EXPERIMENTAL SETUP

The defined system can be implemented by using jdk 1.5/1.6 and above and users position is monitored by using J2ME which supports wireless toolkit which is Sun Java Wireless Toolkit 2.5.2 .Aggregate location of nodes can be shown with the help of maps.

5. FEATURES OF PROPOSED SYSTEM

5.1 Wireless Network Position Monitoring

The position monitoring system using wireless nodes, the wireless nodes report the exact location information of the monitored persons to the server; thus using wireless nodes immediately poses a major privacy breach.

5.2 Aggregate Location

The concept of aggregate location information, that is, a collection of location data relating to a group or category of persons from which individual identities have been removed.

5.3 Minimum Bounding Rectangle

We find the minimum bounding rectangle (MBR) of the wireless range area of wireless node. It is important to note that the wireless range area can be in any polygon or irregular shape.

6. RELATED WORK

Straightforward approaches for preserving user's location privacy include enforcing privacy policies to restrict the use of collected location information [10], [11] and anonymizing the stored data before any disclosure [12]. However, these approaches fail to prevent internal data thefts or inadvertent disclosure. Recently, location anonymization techniques have been widely used to anonymizing personal location information before any server gathers the location information, in order to preserve personal position privacy in location-based services. These techniques are based on one of the three concepts. 1) False locations. Instead of reporting the monitored object's exact location, the object reports n different locations, where only one of them is the object's actual location while the rest are false locations [13]. 2) Spatial cloaking. The spatial cloaking technique blurs a user's location into a cloaked spatial area that satisfy the user's specified privacy requirements [14], [15], [16], [17], [18], [19], [20], [21], [22], [23]. 3) Space transformation. This technique transforms the location information of queries and data into another space, where the spatial relationship among the query and data are encoded [24]. Among these three privacy concepts, only the spatial cloaking technique can be applied to our problem. The main reasons for this are that 1) the false location techniques cannot provide high-quality monitoring services due to a large amount of false location information, 2) the

space transformation techniques cannot provide privacy preserving monitoring services as it reveals the monitored object's exact location information to the query issuer, and 3) the spatial cloaking techniques can provide aggregate
location information to the server and balance a trade-off between privacy protection and the quality of services by tuning the specified privacy requirements, for example, k anonymity and minimum area privacy requirements [12], [22]. Thus, we take up the spatial cloaking technique to reserve the monitored object's location privacy in our location monitoring system.

IP-address blocking. By picking IP addresses as the resource for limiting the Sybil attack, our current implementation closely mimics IP-address blocking employed by Internet services. There are, however, some inherent limitations to using IP addresses as the scarce resource. If a user can obtain multiple addresses, she can circumvent both Jack-based and regular IP-address blocking.

7. CONCLUSION

In this paper, we propose a confidentiality-defending position monitoring system for wireless networks using Jack secure system. We adopt two in-network location anonymization algorithms, namely, resource-aware and quality-aware algorithms, that preserve personal location privacy, while enabling the system to provide location monitoring services. Both algorithms rely on the well- established k-anonymity privacy concept that requires a person is indistinguishable among k persons. In our system, wireless nodes execute location anonymization algorithms to provide k-anonymous aggregate locations, in which each aggregate location is a cloaked area A with the number of monitored objects, N, located in A, where N>= k, for the system. The resource-aware algorithm aims to minimize communication and computational cost, while the quality-aware algorithm aims to minimize the size of cloaked areas in order to generate more accurate aggregate locations. To provide position monitoring services based on the aggregate location information, we adopt a spatial histogram approach that analyzes the aggregate locations reported from the wireless nodes to estimate the distribution of the monitored objects. The estimated distribution is used to provide location monitoring services through answering range queries. Our system will definitely provide high-quality location monitoring services, while preserving the monitored object's location privacy as compared to the existing secure system for privacy preservation. We have used a comprehensive credential system called Jack, which can be used to add a layer of accountability to any publicly known anonymizing network. Servers can blacklist misbehaving users while maintaining their privacy, and we show how these properties can be attained in a way that is practical, efficient, and sensitive to the needs of both users and services.

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10. BIOGRAPHY

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PERFORMANCE OF SPACE-TIME BLOCK CODED MIMO SYSTEMS FOR RAYLEIGH FADING CHANNEL

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Abstract—Space–time block codes are a remarkable modulation scheme discovered recently for the multiple antenna wireless channels. Multiple transmit and receive antennas can be used in wireless systems to achieve high data rate communication. Recently, efficient space–time codes have been developed that utilize a large portion of the available capacity. These codes are designed under the assumption that the transmitter has no knowledge about the channel. Multi-antenna systems can be used for increased capacity or for increasing diversity order, but the cost paid for deriving these benefits is increased hardware complexity due to multiple antennas and the number of RF (Radio Frequency) chains. A well-known promising technique to reduce the hardware complexity is to use antenna selection for selecting a subset of available antennas that have stronger links compared to others. This paper deals with lower maximum-likelihood (ML)-decoding complexity, full-rate and full-diversity space-time block codes (STBCs), which also offer large coding gain, for the Single Input Multiple Output (SIMO) and Multiple Input Single Output (MISO) and Multiple Input Multiple Output (MIMO) systems. It is observed that the similar capacity of SIMO by using Maximum Ratio Combining (MRC) can be obtained by STBC for MISO, whereas it is envisioned that the combination of both can further enhance the capacity and coding gain. The channel model considered is the Rayleigh fading channel as it represents the most practical non-line of sight (N-LOS) channel. It is seen that the diversity order is maintained with antenna selection with little loss in channel capacity.

Keywords*- MIMO, Alamouti , STBC, Diversity, MRC.*

I. INTRODUCTION

Wireless communications has made a tremendous impact on the lifestyle of a human being. It is very difficult to survive without wireless in some form or the other. As compared to fixed wireless systems, today's wireless networks provide high-speed mobility (mobile users in fast vehicles) for voice as well as data traffic. Continuous exponential growths of Internet, Cellular Mobile and Multimedia Services in the near past are the drivi1ng forces for the increased demand of data rates in Wireless Communication Networks. The availability of limited spectrum on one side and ever increasing demand for increased data rates and quality of service (QoS) on the other side, follows the quest for spectrally efficient signaling techniques. Future wireless systems are expected to support variety of new services, which will demand extensively high data rates. Hence high data rate wireless communications, approaching 1 Gbps, is of great interest and the major focus of wireless research community is directed towards meeting gigabit transmission over wireless systems. MIMO technology is an attractive solution that offers substantial leverages in achieving gigabit wireless links a reality [1].

The key issues to be dealt in the design of wireless communication system are fading and interference. Conventional wireless system design treats fading and interference as nuisances as far as improving the reliability of air interface is concerned. Recently the designers' focus has shifted towards increasing spectral efficiency, where fading is viewed as opportunity to be exploited to design spectrally efficient systems. MIMO systems use multiple antennas at both ends of communication link and have shown considerable increase in spectral efficiency, suppress interference and improve the reliability of transmission [2-3]. Because of these features, MIMO systems have received a great attention of wireless research community in the last decade.

The use of multiple antennas with space-time processing has been considered to increase the capacity for high data rate wireless links. In open-loop systems where channel state information (CSI) is available only at the receiver, space-time block codes (STBC) are efficient methods to achieve a transmit diversity gain for the higher link performance [1]. In contrast, closed-loop systems can utilize knowledge of the channel at the transmitter to further improve the system performance. [4]

It is known that the effect of imperfect CSI (ICSI) at the receiver side results in a performance degradation of Alamouti's scheme. The effect of ICSI has also been analyzed in when Rayleigh fading is considered. However, analytical results for Alamouti's transmission schemes impaired by ICSI in Ricean fading channels are much scarcer [5].

The Alamouti code for two transmit antennas, due to its orthogonality property, allows a low-complexity ML-decoder. Hence, are said to be single-symbol decodable. Another bright aspect about these codes is that they have full transmit diversity for arbitrary complex constellations. This scheme led to the

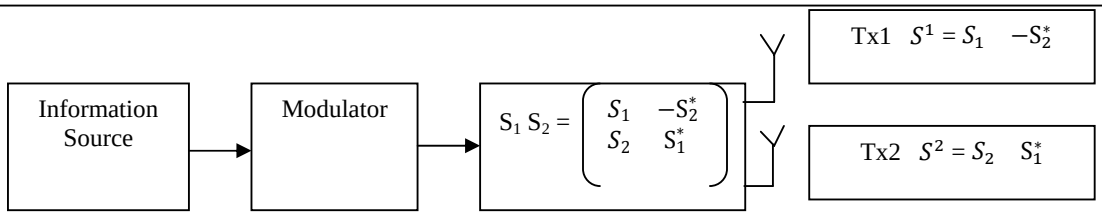

Figure 1. A block diagram of the Alamouti space-time encoder,

development of the generalized Complex Orthogonal Designs (CODs). These designs are famous for the simplified ML- decoding that they provide. They allow all the symbols to be decoupled from one another. Even when a wireless channel with high channel capacity is given, we still need to find good techniques to achieve high speed data transmission or high reliability. Multiple antenna techniques can be broadly classified into two categories: diversity techniques and spatial-multiplexing techniques. The diversity techniques intend to receive the same information - bearing signals in the multiple antennas or to transmit them from multiple antennas, thereby improving the transmission reliability. A basic idea of the diversity techniques is to convert Rayleigh fading wireless channel into more stable AWGN-like channel without any catastrophic signal fading.

II. SYSTEM MODEL

In MIMO system having number of RF chains at the transmitter and receiver equal to the number of antennas at the transmitter and receiver respectively, the incoming data is encoded by the space-time encoder and fed to serial to parallel converter to convert the input bit stream into N_T parallel streams. These N_T streams are transmitted from N_T transmit antennas simultaneously. The received signal vector is given by

$$Y = Hs + n \qquad (1)$$

Where H is $N_R \times N_T$ complex channel matrix representing the uncorrelated channel. The ijth entry of matrix H denoted by h_{ij} represents the channel fading coefficient from the ith transmit antenna to the jth receive antenna, x is $N_T \times 1$ column vector and n is $N_R \times 1$ column vector representing AWGN noise samples The entries of H are modeled as independent and identically distributed (i.i.d.) complex Gaussian random variables with zero mean and variance 0.5 per dimension and the elements of n are modeled as i.i.d. complex Gaussian random variables with zero mean and variance No/2 per dimension. Rayleigh distribution is the most representative of N-LOS wireless radio propagation and hence the MIMO channel capacity has been investigated for Rayleigh fading channel model. It is assumed that the CSI is known exactly at the receiver and not at the transmitter, and the channel fading coefficients remain constant over the entire frame and changes from one frame to another [1].Space Time Coding is one of the most effective diversity method uses to combat the effect of channel fading in wireless communication. One of the most effective methods in space time coding is the Alamouti Scheme. The ML receiver of the Alamouti code is so simple that it has led to be used in practice, but the symbol transmission rate of this code is one. (In this paper symbol transmission rate is defined as the ratio of the number of transmitted symbols to the number of time slots). In Alamouti the information bits are first modulated using M-Ary modulation scheme. The Encoder then takes a block of two modulated symbols S1 & S2 in each encoding operation and gives it to the transmit antenna according to the code matrix, in each encoding operation and gives it to the transmit antenna according to the code matrix, In matrix (2), the first column represents first transmission period and the second column represents the second transmission period. The first row corresponds to the

$$S^1 = S_1 \quad -S_2^* \qquad 3(a)$$

$$S^2 = S_2, \quad S_1^* \qquad 3(b)$$

symbol transmitted from first antenna and the second row corresponds to the symbol transmitted from the second antenna. During first symbol period, first antenna transmits S_1 and second antenna transmits S_2. During second symbol Period, first antenna transmits $-S_2^*$ and second antenna transmits S_1^* being the complex conjugate of S_1. This implies that we are transmitting both in space (across two antennas) and time (two transmission intervals). This is space-time coding. Looking at the equations (3), where S^1 is the information sequence from the first antenna and S^2 is the information sequence from the second antenna. A close examination of (3) reveals that the sequences are orthogonal (i.e. the inner product of S^1 and S^2 is zero). This inner product is given by,

$$S^1 S^2 = S^{1*} S^2 - S^{2*} S^1 = 0 \qquad (4)$$

If we assume one antenna at the receiver, the receiver signals are defined as follows, based on the scheme at Figure 2. At the receiver the signals after passing through the channel can be expressed as,

$$r_1 = h_1 S_1 + h_2 S_2 + n_1 \qquad (5\text{-a})$$

$$r_2 = -h_1 S_2^* + h_2 S_1^* + n_2 \qquad (5\text{-b})$$

The fading coefficients from antennas 1 and 2 are

defined by h1 and h2, respectively, at time t. where n1 and n2 are independent complex variables with zero mean and unit variance, representing additive white Gaussian noise samples at time t.

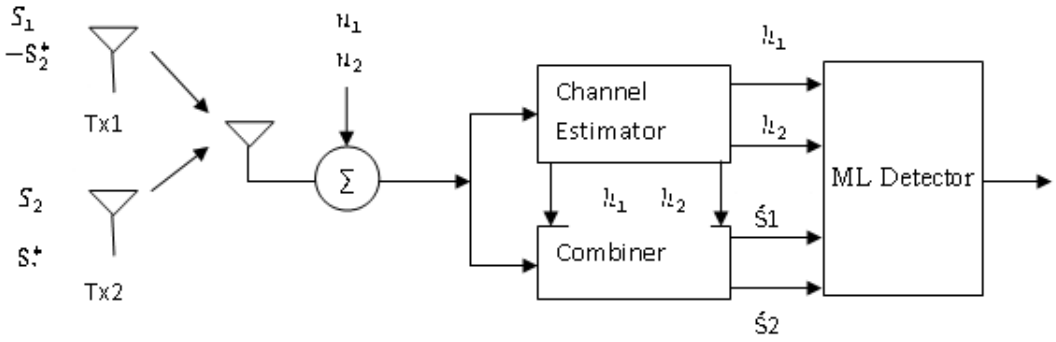

Fig 2. A block diagram of the Alamouti space-time Receiver,

III. SUMMARY OF ALAMOUTI'S SCHEME

Alamouti further extended this scheme to the case of two transmit antennas and MR receive antennas and showed that the scheme provided a diversity order of 2MR. Characteristics of this scheme include:

1) No feedback from receiver to transmitter is required for CSI to obtain full transmit diversity.
2) No feedback from receiver to transmitter is required for CSI to obtain full transmit diversity.
3) No bandwidth expansion (as redundancy is applied in space across multiple antennas, not in time or frequency). Low complexity decoders. It is observed that compared to SISO system, SIMO system which uses 1 transmitting antenna and 2 receiving antennas gives better performance as shown in Figure-3. It is further shown in the same figure that the same bit error rate is obtained at comparatively lower SNR values by using Alamouti STBC for MISO system which uses 2 transmitting and 1 receiving antenna with BPSK modulation for Rayleigh channel. This results shows that use of STBC for MISO gives similar results that of SIMO without knowing CSI at the transmitter side. Hence the receiver complexity of putting multiple antennas in SIMO can be avoided by using STBC based MISO techniques. It is further shown in Figure-4 that the combination of SIMO and MISO forming MIMO system which consists of 2 transmitting and 2 receiving antennas gives further improvement in bit error rate with STBC for Rayleigh channel. The Alamouti scheme is further applied to multiple transmitting antennas by increasing the number of transmitting antennas form N_T =2 to N_T =5. It is observed as shown in Figure-5 that if we go on increasing the number of transmitting antennas the further improvement is obtained in bit error rate with respect to received SNR. Further it puts some theoretical limit on increasing the number of transmitting antennas. The results are verified for QPSK system using STBC Alamouti for Rayleigh channel.

IV. CONCLUSION

The space time block codes are showing better improvements in MIMO system. In this paper we tried to implement maximum-likelihood -decoding echnique with full-rate and full-diversity space-time block codes (STBCs), which also offer large coding gain, for the Single Input Multiple Output (SIMO) and Multiple Input Single Output (MISO) and Multiple Input Multiple Output (MIMO) systems. Identical performance as MRC if the total radiated power is doubled from that used in MRC. This is because, if the transmit power is kept constant, this scheme suffers a 3-dB penalty in performance since the transmit power is divided in half across two transmit antennas. No need for complete redesign of existing systems to incorporate this diversity scheme. Hence, it is very popular as candidates for improving link quality based on dual transmit antenna techniques, without any drastic system modifications. This can be further extended for multiple transmitting antennas as well as perfect MIMO systems in combination and can results better performance compare to conventional SISO systems.

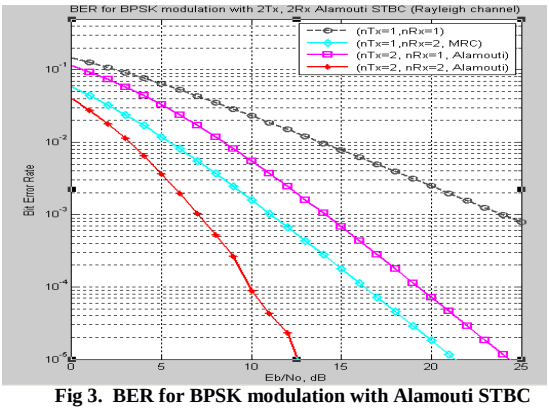

Fig 3. BER for BPSK modulation with Alamouti STBC with Rayleigh channel,

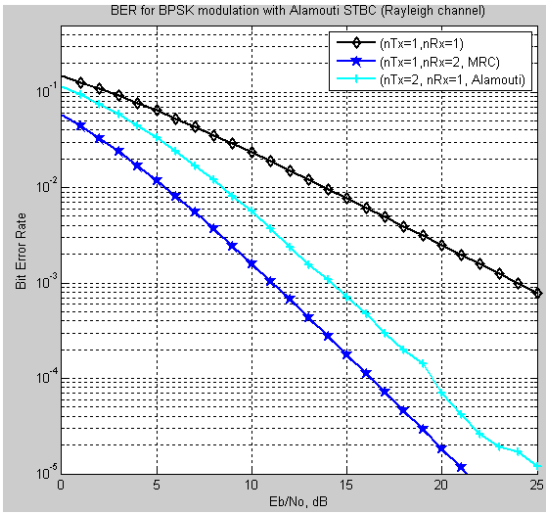

Figure 4. BER for BPSK modulation with 2Tx, 2 Rx Alamouti STBC with Rayleigh channel

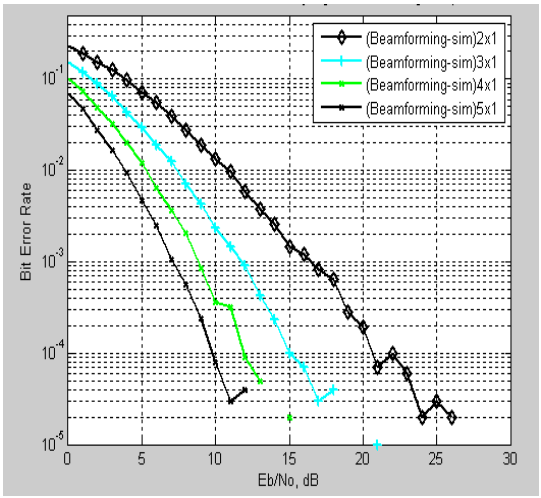

Figure 5. BER for QPSK modulation with 2Tx, 2Rx Alamouti STBC with Rayleigh channel

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NONDESTRUCTIVE RIPENESS DETECTION FOR BANANA USING NEURAL NETWORK

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Abstract— A Color is considered one of the most important parameters for defining quality of any food. Its measurement has always found necessary for food industry and food engineering research. This paper presents the implementation and application of image analysis and computer vision systems (CVS) for sorting and grading of Banana. Implementation involves a computer vision algorithm to predict the five ripening stages. Features obtained from banana image are given as input to back propagation (BP) network. The output of BP network is ripeness stage of given banana. Testing on various stages of sample bananas carried out, for which satisfied results obtained. A result obtained shows the feasibility and reliability of the implemented method for quick banana quality inspection.

Keywords*-Image Analysis, Computer Vision, Color, ripeness, neural network.*

I. INTRODUCTION

Bananas are the fifth most important agriculture commodity in world trade after cereals, sugar, coffee and cocoa. It is one of the most cultivated fruit crop in India. According to the Indian Horticulture database India share around 25% in world production. Banana growing states in India are Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh and Madhya Pradesh is available throughout the year.

For preserving a firm pulp, peel texture, good color, flavor and also to avoid from contusion, bananas are harvested at the matured green stage, at which they remain firm and green without significant changes in peel color, texture or composition (this depends on the temperature, humidity and harvesting period) such matured green harvested bananas are exported to consumer countries. At the consumer end, these fruits are kept in airtight warehouses with ethylene gas control system. The quality of ripening banana fruits could be controlled by ethylene treatment. Once ripening process of banana started, it is irreversible and involves various chemical changes, as well as changes in fruit texture and flavor.

The first observable sign of ripening is a color change from green to yellow. The ripening treatment of banana fruits is completely manual process and must be handle by trained labors. Ripeness is currently assessed visually by farmers, labors or consumers by comparing the color of the peel to standardized color charts that describe the seven or five ripening stages [2][7] and sometimes, by instrumental techniques [3]. Ripeness stage detection (on scale of five or scale of seven) is responsible for transfer of bananas from warehouse to market, which totally depends on experienced labors.

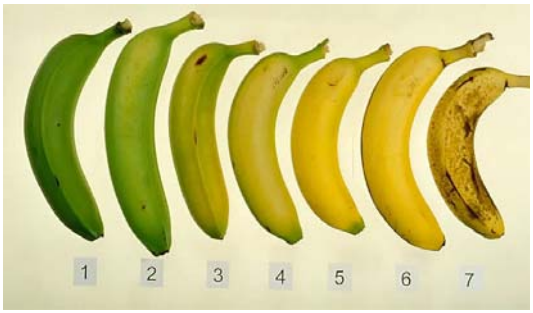


Figure 1. Banana ripeness scale.

However, this method does not provide any guarantee of uniformed ripening of banana fruits, because of its lacking of any monitoring system to detect the ripening quality of banana fruits.

Consumer considers peel color of Banana as first parameter to evaluate quality of Banana, and peel color also associated with specific tastes. In fact, peel color correlates well with physical and chemical changes that take place during the ripening of bananas, including pulp color, pH, conversion of starch into sugar and development of flavor. To evaluate the ripening quality of banana fruits during the ripening process, it is required to use non-destructive detecting method which predicts exact ripeness stage of fruit.

II. RELATED WORK

By calculating yellow percentage which is equal composition of Red and Green intensities with zero Blue intensity, and recognizing various color parameters like yellow, black and green, Nur Mustafa proposed classification of bananas using L*a*b* color space [11]. Hasnida Saad, developed a technique to classify the ripeness of bananas into three categories, which is unripe, ripe and overripe systematically based on their histogram RGB value components [12]. Color is the main indicator for fruit ripeness identification. It is hard to measure especially when ones can interpret the colors differently by just looking into them visually. The

most suitable color space must be chosen to determine the right color for the ripeness identification. HSV is proved to be a better choice because it has all the colors in the channel. Besides, it helps to choose colors which are similar to the eyes. Fatma Mohamad explored the use of Nearest Neighbor Distance for histogram-based fruit ripeness identification. HSV color space was chosen to explore its potential of colors. The most promising result came from Value which provides the highest value towards ripe or unripe category [13].

III. COLOR SPACE

A color model is a method by which color can specify, create and visualize. As humans, we may define a color by its attributes of brightness, hue and colorfulness. A computer may describe a color using the amounts of red, green and blue phosphor emission required to match a color. A printing press may produce a specific color in terms of the reflectance and absorbance of cyan, magenta, yellow and black inks on the printing paper.

There are several models used to describe the tri-stimulus color scheme: RGB, CMY (K), YIQ, and HSI. Each model was derived for specific purposes and has certain advantages over the others.

A. RGB Color Space

In this model, the primary colors are red, green, and blue. It is an additive model, in which colors are produced by adding components, with white having all colors present and black being the absence of any color. This is the model used for active displays such as television and computer screens. The RGB color model is one of widely used color models, as it is supported by commonly used tools related to color image, such as camera, scanner, etc. The RGB color model is an additive color model, which produces various colors by adding red, green, and blue light by different ways.

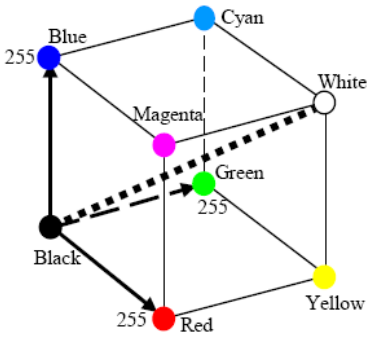


Figure 2. RGB Color Space

As shown in Fig.2, colors are represented in the RGB color model within a cubic volume defined by orthogonal Red, Green, and Blue axes. Black is at the origin of the coordinate system, and white is at the opposite corner of the cube. The diagonal connecting the black and white corners contains the range of neutral gray levels. It is very hard to extract hue and saturation information from the RGB color model.

B. HSI Color Space

Color can be qualitatively described using the terms hue, saturation, and intensity in the HSI color model. Hue and saturation of colors respond closely to the way humans perceive color, and thus this model is suited for interactive manipulation of color images where changes occur for each variable shift that corresponds to what the operator expects and hence this paper uses HSI color model for extraction of hue and saturation information of the surface color of banana.

The HSI color model represents colors within a double cone space, as illustrated in Fig.3. The vertical axis is intensity from 0 intensity level in the bottom to the full intensity in the top. On any horizontal slice through the model space, the hue varies around the slice, and the saturation increases radially outward from the central intensity axis. Intensity makes no contribution to the color [10].

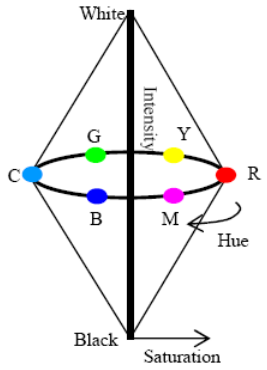


Figure 3. HSI Color Space

The image in RGB color model can be transferred in HSI color model by using following relations [8]:

$$I = (R + G + B)/3 \quad (1)$$

$$S = 1 - \frac{3}{R+G+B}\left[\min(R,G,B)\right] \quad (2)$$

$$H = \theta \rightarrow B \le G$$

$$H = 360^{0} - \theta \rightarrow B > G \quad (3)$$

$$\theta = \cos^{-1}\left\{\frac{\frac{1}{2}\left[(R-G)+(R-B)\right]}{\left[(R-G)^2+(R-G)(G-B)\right]^{\frac{1}{2}}}\right\} \quad (4)$$

IV. HISTOGRAM AND BACKGROUND SEPARATION

Banana image shown in Fig.4 can be represented by histogram shown in Fig.5, this represent whole property of input image and not only the surface color. In order to obtain sole surface color information background of input image must be separate out. Image Segmentation process is required to separate surface color information from background.

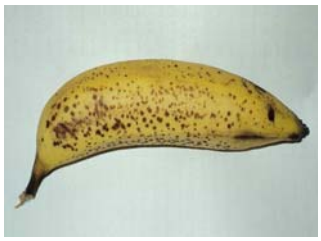
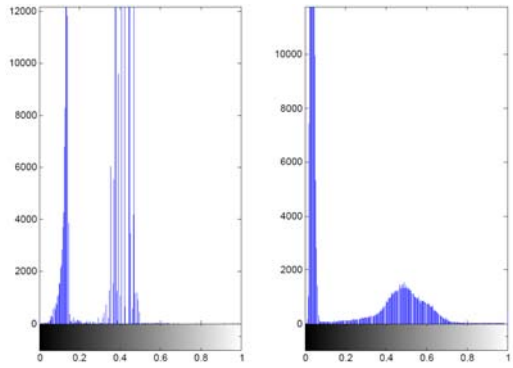


Figure 4. Banana Image

In computer vision, image segmentation is the important key of visual identification, and the segmentation result greatly affects the processes ahead. Color is one of important features used for image segmentation. For example, the color of the banana in the image in Fig. 4 is obvious difference from the background.



(a) Histogram of H (b) Histogram of S
Figure 5. Histogram of banana Image

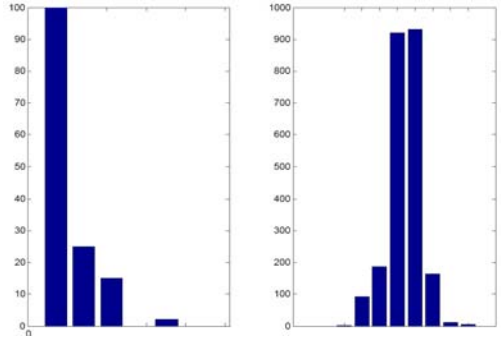
Figure 6. Background separated Banana Image

Also, as shown in Fig. 5, there is an obvious bimodal feature in the H histogram of the banana image in Fig. 4. Therefore, the banana and background is separated by setting a threshold of H. By setting the pixel values in the background being zero, the separating result of the image in Fig. 4 is obtained as shown in Fig. 6.

V. RIPENESS DETECTION

For ripeness detection using their peel surface color, a BP neural network is used in this paper. A BP neural network has a multi-layer architecture, with one input layer, one output layer, and one or more intermediate layers as shown in Fig. 8.

If the color histograms shown in Fig. 5 are used as it is as an input to BP network, then the number of neurons in the input layer becomes large, this increases processing complexity. Therefore, simplified color histograms are used. H and S both are divided into comparative less numbers of levels. Fig. 7 illustrates the simplified H and S histograms of the banana image itself. Hence, there are 16 neurons in the input layer of the back propagation network.



(a) Simplified histogram of H (b) Simplified histogram of S
Figure 7. Simplified histogram of banana

Although the ripeness scale consist of 7 grades, the classification of banana in all seven grades is very difficult task, as there will be much smaller difference in between grade 1 and 2, also in grade 4 and 5, hence for implementation purpose quality of banana fruit is divided into five levels. Binary values are used in the output of the BP network. For five quality levels five neurons are used in the output layer.

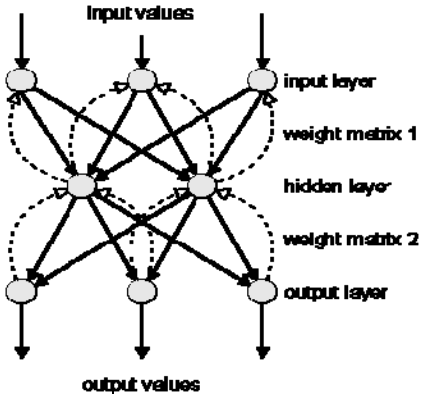


Figure 8. Back Propagation Neural Network

All above processes for ripeness detection can be represented by simple flow chart as shown in Fig. 9

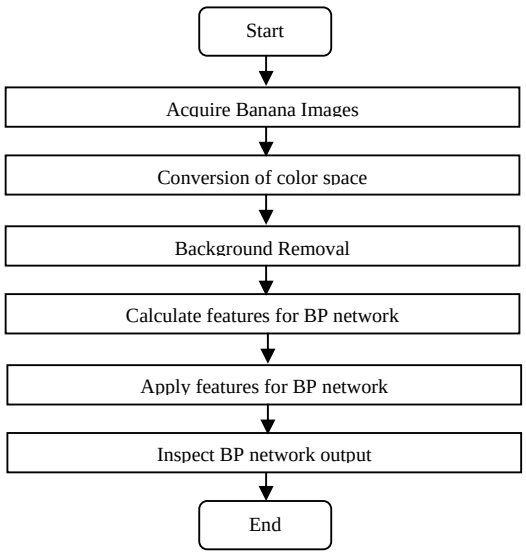


Figure 9. Flowchart

Results of ripeness stages of bananas are as shown in Table 1 for sample images shown in Fig. 10, where
G1 – complete green peel- Unripe
G2 – Green + Yellow peel
G3 – Yellow peel with green traces at both ends.
G4 – Perfectly ripe, uniform yellow, with no traces of green at ends.
G5 – Yellow peel with large brown spots.

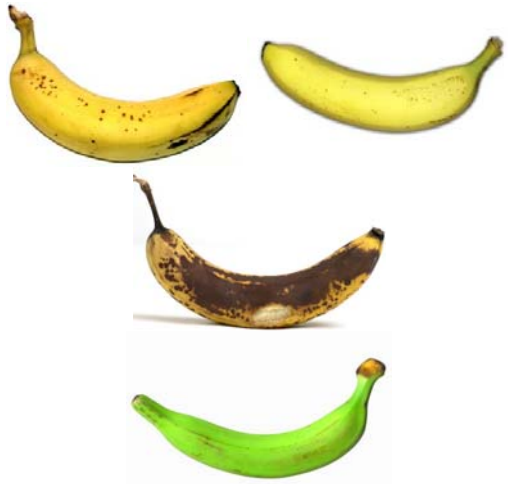


Table 1: Results obtained

Actual Quality	G1	G2	G3	G4	G5
No of image applied	8	7	13	16	12
Correctly graded	8	7	12	14	10

VI. CONCLUSION

The nondestructive ripeness detection of bananas using neural network has been tested successful. This system is tested for the inspection of total 5 stages of bananas. Quality inspection experiments of bananas are conducted to verify the implemented method with satisfied results. It is shown that the implemented method is feasible and reliable for banana ripeness detection.

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CROSS SITE SCRIPTING ATTACK DETECTING INTRUSION IN MULTI TIER WEB APPLICATION

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Abstract:- Internet services and applications have become an inextricable part of daily life, enabling communication and the management of personal information from anywhere. To accommodate this increase in application and data complexity, web services have moved to a multi tiered design wherein the web server runs the application front-end logic and data are outsourced to a database or file server. In this paper, we present Double Guard, an IDS system that models the network behavior of user sessions across both the front-end web server and the back-end database. By monitoring both web and subsequent database requests, we are able to ferret out attacks that independent IDS would not be able to identify. Furthermore, we quantify the limitations of any multitier IDS in terms of training sessions and functionality coverage. We implemented Double Guard using an Apache web server with MySQL and lightweight virtualization. We then collected and processed real-world traffic over a 15-day period of system deployment in both dynamic and static web applications. Finally, using Double Guard, we were able to expose a wide range of attacks with good percent accuracy.

Keywords: *Double Quard; IDS; Web Server; MYSQL.*

I. INTRODUCTION

WEB-DELIVERED services and applications have increased in both popularity and complexity over the past few years. Daily tasks, such as banking, travel, and social networking, are all done via the web. Such services typically employ a web server front end that runs the application user interface logic, as well as a back-end server that consists of a database or file server. Due to their ubiquitous use for personal and/or corporate data, web services have always been the target of attacks. These attacks have recently become more diverse, as attention has shifted from attacking the front end to exploiting vulnerabilities of the web applications [6], [5], [1] in order to corrupt the back-end database system [40] (e.g., SQL injection attacks [20], [43]). A plethora of Intrusion Detection Systems (IDSs) currently examine network packets individually within both the web server and the database system. However, there is very little work being performed on multi tiered Anomaly Detection (AD) systems that generate models of network behavior for both web and database network interactions. In such multi tiered architectures, the back-end database server is often protected behind a firewall while the web servers are remotely accessible over the Internet. Unfortunately, though they are protected from direct remote attacks, the back-end systems are susceptible to attacks that use web requests as a means to exploit the back end.

II. RELATED WORK

A network Intrusion Detection System can be classified into two types: anomaly detection and misuse detection. Anomaly detection first requires the IDS to define and characterize the correct and acceptable static form and dynamic behavior of the system, which can then be used to detect abnormal changes or anomalous behaviors [26], [48]. The boundary between acceptable and anomalous forms of stored code and data is precisely definable. Behavior models are built by performing a statistical analysis on historical data [31], [49], [25] or by using rule-based approaches to specify behavior patterns [39]. An anomaly detector then compares actual usage patterns against established models to identify abnormal events. Our detection approach belongs to anomaly detection, and we depend on a training phase to build the correct model. As some legitimate updates may cause model drift, there are a number of approaches [45] that are trying to solve this problem. Our detection may run into the same problem; in such a case, our model should be retrained for each shift. Intrusion alerts correlation [47] provides a collection of components that transform intrusion detection sensor alerts into succinct intrusion reports in order to reduce the number of replicated alerts, false positives, and non relevant positives. It also fuses the alerts from different levels describing a single attack, with the goal of producing a succinct overview of security-related activity on the network. It focuses primarily on abstracting the low-level sensor alerts and providing compound, logical, high-level alert events to the users. Double Guard differs from this type of approach that correlates alerts from independent IDSs. Rather, Double- Guard operates on multiple feeds of network traffic using a single ID that looks across sessions to produce an alert without correlating or summarizing the alerts produced by other independent IDSs. An IDS such as in [42] also uses temporal information to detect intrusions. Double Guard, however, does not correlate events on a time basis, which runs the risk of mistakenly considering independent but concurrent events as correlated events. Double Guard does not have such a limitation as it uses the container ID for each session to causally

map the related events, whether they be concurrent or not.

III. TAXONOMY OF INTRUSION DETECTION SYSTEMS

We introduce a taxonomy of intrusion detection systems that highlights the various aspects of Anomaly detection. WebSTAT, a STAT-based intrusion detection system that supports the modeling and detection of sophisticated attacks. Swaddler using rule-based approaches to specify behavior patterns of intrusion detection system. In correlation model (Intrusion alerts correlation) provides a collection of components that transform intrusion detection sensor alerts into succinct intrusion reports in order to reduce the number of replicated alerts, false positives, and non relevant positives. In Anomaly Intrusion Detection Systems they use data mining techniques to detect anomalous behavior so it also uses temporal information to detect intrusions. In some previous approaches, it has been detected intrusions or vulnerabilities by statically analyzing the source code or executables. CLAMP is architecture for preventing data leaks even in the presence of attacks. By isolating code at the web server layer and data at the database layer by users, CLAMP guarantees that a user's sensitive data can only be accessed by code running on behalf of different users.

Disadvantage of Existing System:

There is very little work being performed on multi tiered Anomaly Detection (AD) systems that generate models of network behavior for both web and database network interactions. In such multi tiered architectures, the back-end database server is often protected behind a firewall while the web servers are remotely accessible over the Internet. Unfortunately, though they are protected from direct remote attacks, the back-end systems are susceptible to attacks that use web requests as a means to exploit the back end. Within the current multithreaded web server architecture, it is not feasible to detect or profile such causal mapping between web server traffic and DB server traffic since traffic cannot be clearly attributed to user sessions.

An anomaly detector then compares actual usage patterns against established models to identify abnormal events. Our detection approach belongs to anomaly detection, and we depend on a training phase to build the correct model. As some legitimate updates may cause model drift, there are a number of approaches. We found that these IDSs cannot detect cases wherein normal traffic is used to attack the web server and the database server. Correlate events on a time basis, which runs the risk of mistakenly considering independent but concurrent events as correlated events. We found that certain types of attack utilize normal traffics and cannot be detected by either the web IDS or the database IDS. In such cases, there would be no alerts to correlate.

IV. PROPOSED SYSTEM

We present Double Guard, an IDS system that models the network behavior of user sessions across both the front-end web server and the back-end database. Our approach can create normality models of isolated user sessions that include both the web front-end (HTTP) and back-end (File or SQL) network transactions. To achieve this, we employ a lightweight virtualization technique to assign each user's web session to a dedicated container, an isolated virtual computing environment. We use the container ID to accurately associate the web request with the subsequent DB queries. Thus, Double Guard can build a causal mapping profile by taking both the web server and DB traffic into account. We have implemented our Double Guard container architecture using OpenVZ, and performance testing shows that it has reasonable performance overhead and is practical for most web applications.

Features

Double Guard differs from this type of approach that correlates alerts from independent IDSs. Rather, Double- Guard operates on multiple feeds of network traffic using single IDS that looks across sessions to produce an alert without correlating or summarizing the alerts produced by other independent IDSs. Double Guard, however, does not correlate events on a time basis, which runs the risk of mistakenly considering independent but concurrent events as correlated events. Double Guard does not have such a limitation as it uses the container ID for each session to causally map the related events, whether they are concurrent or not. In Double Guard, the new container-based web server architecture enables us to separate the different information flows by each session. Double Guard approach, which can utilize input validation as an additional defense. We have found that Double Guard can detect SQL injection attacks by taking the structures of web requests and database queries without looking into the values of input parameters (i.e., no input validation at the web server). Our Double Guard, we utilized the container ID to separate session traffic as a way of extracting and identifying causal relationships between web server requests and database query events. Double Guard focuses on modeling the mapping patterns between HTTP requests and DB queries to detect malicious user sessions. There are additional differences between these two in terms of requirements and focus. We present Double Guard, a system used to detect attacks in multi tiered web services. To Validating input is useful to detect or prevent SQL or Cross Site Scripting (XSS) injection attacks some previous approaches related to that new filter design that achieves both high performance and high precision by blocking scripts after HTML

parsing but before execution. Also Context-Sensitive String Evaluation (CSSE), method to detect and prevent injection attacks.

A.THREAT MODEL AND SYSTEM ARCHITECTURE

We initially set up our threat model to include our assumptions and the types of attacks we are aiming to protect against. We assume that both the web and the database servers are vulnerable. Attacks are network borne and come from the web clients; they can launch application layer attacks to compromise the web servers they are connecting to. The attackers can bypass the web server to directly attack the database server. We assume that the attacks can neither be detected nor prevented by the current web server IDS, those attackers may take over the web server after the attack, and that afterward they can obtain full control of the web server to launch subsequent attacks. For example, the attackers could modify the application logic of the web applications, eavesdrop or hijack other users' web requests, or intercept and modify the database queries to steal sensitive data beyond their privileges. On the other hand, at the database end, we assume that the database server will not be completely taken over by the attackers. Attackers may strike the database server through the web server or, more directly, by submitting SQL queries, they may obtain and pollute sensitive data within the database.

These assumptions are reasonable since, in most cases, the database server is not exposed to the public and is therefore difficult for attackers to completely take over. We assume no prior knowledge of the source code or the application logic of web services deployed on the web server. In addition, we are analyzing only network traffic that reaches the web server and database. We assume that no attack would occur during the training phase and model building.

B. Building the Normality Model

This container-based and session-separated web server architecture not only enhances the security performances but also provides us with the isolated information flows that are separated in each container session. It allows us to identify the mapping between the web server requests and the subsequent DB queries, and to utilize such a mapping model to detect abnormal behaviors on a session/client level. In typical three-tiered web server architecture, the web server receives HTTP requests from user clients and then issues SQL queries to the database server to retrieve and update data. These SQL queries are causally dependent on the web request hitting the web server. We want to model such causal mapping relationships of all legitimate traffic so as to detect abnormal/attack traffic.

In practice, we are unable to build such mapping under a classic three-tier setup. Although the web server can distinguish sessions from different clients, the SQL queries are mixed and all from the same web server. It is impossible for a database server to determine which SQL queries are the results of which web requests, much less to find out the relationship between them. Even if we knew the application logic of the web server and were to build a correct model, it would be impossible to use such a model to detect attacks within huge amounts of concurrent real traffic unless we had a mechanism to identify the pair of the HTTP request and SQL queries that are causally generated by the HTTP request. However, within our container-based web servers, it is a straightforward matter to identify the causal pairs of web requests and resulting SQL queries in a given session. Moreover, as traffic can easily be separated by session, it becomes possible for us to compare and analyze the request and queries across different sessions. Section 4 further discusses how to build the mapping by profiling session traffics.

To that end, we put sensors at both sides of the servers. At the web server, our sensors are deployed on the host system and cannot be attacked directly since only the virtualized containers are exposed to attackers. Our sensors will not be attacked at the database server either, as we assume that the attacker cannot completely take control of the database server. In fact, we assume that our sensors cannot be attacked and can always capture correct traffic information at both ends. Once we build the mapping model, it can be used to detect abnormal behaviors. Both the web request and the database queries within each session should be in accordance with the model. If there exists any request or query that violates the normality model within a session, then the session will be treated as a possible attack.

C. Testing for Static Websites

Once the normality model is generated, it can be employed for training and detection of abnormal behavior. During the testing phase, each session is compared to the normality model. We begin with each distinct web request in the session and, since each request will have only one mapping rule in the model, we simply compare the request with that rule. The testing phase algorithm is as follows:

1. If the rule for the request is Deterministic Mapping r ! Q (Q 6¼ ;), we test whether Q is a subset of a query set of the session. If so, this request is valid, and we mark the queries in Q. Otherwise, a violation is detected and considered to be abnormal, and the session will be marked as suspicious.
2. If the rule is Empty Query Set r ! ; then the request is not considered to be abnormal, and we do not mark any database queries. No intrusion will be reported.

3. For the remaining unmarked database queries, we check to see if they are in the set NMR. If so, we mark the query as such.
4. Any untested web request or unmarked database query is considered to be abnormal. If either exists within a session, then that session will be marked as suspicious.

In our implementation and experimenting of the static testing website, the mapping model contained the Deterministic Mappings and Empty Query Set patterns without the No Matched Request pattern. This is commonly the case for static websites. As expected, this is also demonstrated.

Modeling of Dynamic Patterns

In contrast to static web pages, dynamic web pages allow users to generate the same web query with different parameters. Additionally, dynamic pages often use POST rather than GET methods to commit user inputs. Based on the web server's application logic, different inputs would cause different database queries. For example, to post a comment to a blog article, the web server would first query the database to see the existing comments. If the user's comment differs from previous comments, then the web server would automatically generate a set of new queries to insert the new post into the back-end database. Otherwise, the web server would reject the input in order to prevent duplicated comments from being posted (i.e., no corresponding SQL query would be issued). In such cases, even assigning the same parameter values would cause different set of queries, depending on the previous state of the website. Likewise, this nondeterministic mapping case (i.e., one-to-many mapping) happens even after we normalize all parameter values to extract the structures of the web requests and queries. Since the mapping can appear differently in different cases, it becomes difficult to identify all of the one-to-many mapping patterns for each web request. Moreover, when different operations occasionally overlap at their possible query set, it becomes even harder for us to extract the one-to-many mapping for each operation by comparing matched requests and queries across the sessions.

V. ATTACKS IN PROPOSED SYSTEM

5.1. Privilege Escalation Attack

For Privilege Escalation Attacks, according to our previous discussion, the attacker visits the website as a normal user aiming to compromise the web server process or exploit vulnerabilities to bypass authentication. At that point, the attacker issues a set of privileged (e.g., admin-level) DB queries to retrieve sensitive information. We log and process both legitimate web requests and database queries in the session traffic, but there are no mappings among them. IDSs working at either end can hardly detect this attack since the traffic they capture appears to be legitimate. However, Double Guard separates the traffic by sessions. If it is a user session, then the requests and queries should all belong to normal users and match structurally. Using the mapping model that we created during the training phase, Double Guard can capture the unmatched cases.

This would allow the unauthorized user to access future, draft, or pending posts that are administrator-level information. According to our experimental results, Double Guard is able to identify this class of attacks because the captured administrative queries do not match any captured HTTP request. In addition, the crafted URLs also violate the mapping model of Double Guard, triggering an alert. In contrast, Snort fails to generate any alert upon this type of attack, as does GreenSQL. There are other privilege escalations vulnerabilities, such as the ones listed in NVD [2], [3], which prevent both a network IDS like Snort or a database IDS from detecting attacks against these vulnerabilities. However, by looking at the mapping relationship between web requests and database queries, Double Guard is effective at capturing such attacks.

5.2 Hijack Future Session Attack (Web server-Aimed Attack)

Out of the four classes of attacks we discuss, session hijacking is the most common, as there are many examples that exploit the vulnerabilities of Apache, IIS, PHP, ASP, and cgi, to name a few. Most of these attacks manipulate the HTTP requests to take over the web server. We first ran Nikto. As shown in our results, both Snort and Double Guard detected the malicious attempts from Nikto. As a second tool, we used Metasploit loaded with various HTTP based exploits. This time, Snort missed most of these attacks attempts, which indicates that Snort rules do not have such signatures. However, Double Guard was able to detect these attack sessions. Here, we point out that most of these attacks are unsuccessful, and Double Guard captured these attacks mainly because of the abnormal HTTP requests.

Double Guard can generate two classes of alerts. One class of alerts is generated by sessions whose traffic does not match the mapping model with abnormal database queries. The second class of alerts is triggered by sessions whose traffic violates the mapping model but only in regard to abnormal HTTP requests; there is no resulting database query. Most unsuccessful attacks, including 404 errors with no resulting database query, will trigger the second type of alerts. When the number of alerts becomes overwhelming, users can choose to filter the second type of alerts because it does not have any impact on the back-end database. Last, GreenSQL cannot detect these attacks. Double Guard is not designed to detect attacks that exploit vulnerabilities of the input validation of HTTP requests. We argue that, if there

is no DB query, this class of attacks cannot harm other sessions through the web server layer because of the isolation provided by the containers. However, XSS cannot be detected nor mitigated by Double Guard since the session hijacking does not take place at the isolated web server layer.

5.3 Injection Attack

Here, we describe how our approach can detect the SQL injection attacks. To illustrate with an example, we wrote a simple PHP login page that was vulnerable to SQL injection attack. We normalized the value of "admin" and "123456," and repeated the legitimate login process a few times during the training phase. The mapping model that was generated (S stands for a string value), where the LE ET AL.: DOUBLEGUARD: DETECTING INTRUSIONS IN MULTITIER WEB APPLICATIONS 523 Generalized HTTP request structure maps to the following SQL queries. After the training phase, note that the attacker was not required to know the user name and password because he/she could use an arbitrary username the password 1' or '1=1, which would be evaluated as true. The HTTP request from the SQL injection attacker would look like the second line in Fig. 16. The parameter shown in the box is the injected content. After normalizing all of the values in this HTTP request, we had the same HTTP request. However, the database queries we received (shown in box) do not match the deterministic mapping we obtained during our training phase. In another experiment, we used sqlmap [16] to attack the websites. This tool tried out all possible SQL injection combinations as a URL and generated numerous abnormal queries that were detected by Double Guard. GreenSQL was also effective at detecting these attacks, which shows its ability to detect SQL injection attacks. Regarding Snort, although it is possible to write user-defined rules to detect SQL injection attack attempts, our experiments did not result in Snort reporting any SQL injection alerts. SQL injection attacks can be mitigated by input validation. However, SQL injection can still be successful because attackers usually exploit the vulnerability of incorrect input validation implementation, often caused by inexperienced or careless programmers or imprecise input model definitions. We establish the mappings between HTTP requests and database queries, clearly defining which requests should trigger which queries. For an SQL injection attack to be successful, it must change the structure (or the semantics) of the query, which our approach can readily detect.

5.4 Direct DB Attack

If any attacker launches this type of attack, it will easily be identified by our approach. First of all, according to our mapping model, DB queries will not have any matching web requests during this type of attack. On the other hand, as this traffic will not go through any containers, it will be captured as it appears to differ from the legitimate traffic that goes through the containers. In our experiments, we generated queries and sent them to the databases without using the web server containers. Double Guard readily captured these queries. Snort and GreenSQL did not report alerts for this attack.

VI. CONCLUSION

This paper describes intrusion detection system that builds models of normal behavior for multi tiered web applications from both front-end web (HTTP) requests and back-end database (SQL) queries. Unlike previous approaches that correlated or summarized alerts generated by independent IDSs, Double Guard forms container-based IDS with multiple input streams to produce alerts. We have shown that such correlation of input streams provides a better characterization of the system for anomaly detection because the intrusion sensor has a more precise normality model that detects a wider range of threats. We achieved this by isolating the flow of information from each web server session with a lightweight virtualization. Furthermore, we are going to quantify the detection accuracy of our approach when we attempted to model static and dynamic web requests with the back-end file system and database queries. Double Guard was able to identify a wide range of attacks with minimal false positives.

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4G MAGIC COMMUNICATIONS

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Abstract:-The approaching 4G (fourth generation) mobile communication systems are projected to solve still-remaining problems of 3G (third generation) systems and to provide a wide variety of new services, from high-quality voice to high-definition video to high-data-rate wireless channels. The term 4G is used broadly to include several types of broadband wireless access communication systems, not only cellular telephone systems. One of the terms used to describe 4G is MAGIC—Mobile multimedia, anytime anywhere, Global mobility support, integrated wireless solution, and customized personal service. As a promise for the future, 4G systems, that is, cellular broadband wireless access systems have been attracting much interest in the mobile communication arena. The 4G systems not only will support the next generation of mobile service, but also will support the fixed wireless networks. This paper presents an overall vision of the 4G features, framework, and integration of mobile communication. The features of 4G systems might be summarized with one word—integration. The 4G systems are about seamlessly integrating terminals, networks, and applications to satisfy increasing user demands. The continuous expansion of mobile communication and wireless networks shows evidence of exceptional growth in the areas of mobile subscriber, wireless network access, mobile services, and applications.

I.SERVICE EVOLUTION

The evolution from 3G to 4G will be driven by services that offer better quality (e.g. video and sound) such as greater bandwidth, more sophistication in the association of a large quantity of information, and improved personalization. Convergence with other network (enterprise, fixed) services will be through high session data rate.

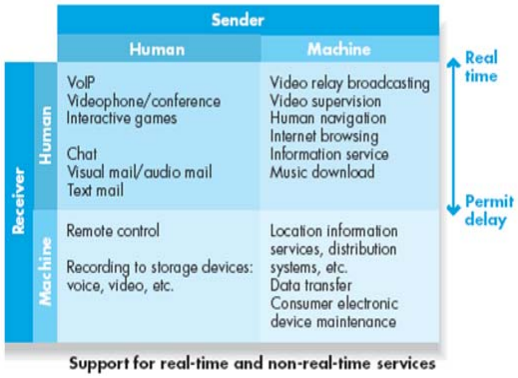

Figure 1: service evolution vision

Machine-to-machine transmission will involve two basic equipment types: sensors (which measure parameters) and tags (which are generally read/write equipment). It is expected that users will require high data rates, similar to those on fixed networks, for data and streaming applications. Mobile terminal usage (laptops, Personal digital assistants, handhelds) is expected to Grow rapidly as they become more users friendly.

Key infrastructure design requirements include: fast response, high session rate, high capacity, low user charges, rapid return on investment for operators, investment that is in line with the growth in demand, and simple autonomous terminals.

II.DIMENSIONING TARGETS:

A simple calculation illustrates the order of magnitude. The design target in terms of radio performance, to achieve scalable capacity from 50 to 500 bit/s/Hz/km(including capacity for indoor use), as shown in Figure 2. As a comparison,the expected best performance of 3G is around 10 bit/s/Hz/km2 using High Speed Downlink Packet Access (HSDPA),

Number of subscribers/km²	10000	10000
Peak usage	20 %	20 %
Spacial efficiency	30 %	20 %
Various efficiencies (e.g. MAC)	40 %	30 %
Average service rate (kbit/s)	128	1000
Required capacity (Gbit/s/km²)	2.13	33.33
Available bandwidth (MHz)	50	100
Required radio performances bit/s/Hz/km²	42.7	333.3

Figure 2: Dimensioning Examples

Multiple-Input Multiple-Output (MIMO), etc. No current technology is capable of such performance.

III. MULTI-TECHNOLOGY APPROACH

Many technologies are competing on the road to 4G, as can be seen in Figure 3. Three paths are possible, even if they are more or less specialized. The first is the 3G-centric path, in which Code Division Multiple Access (CDMA) will be progressively pushed to the point at which terminal manufacturers will give up. When this point is reached, another technology will be needed to realize the required increases in capacity and data rates.The second path is the radio LAN. In enterprises , voice may start to be carried by voice over wireless LAN(VoWLAN).

Reaching 200 Mbit/s (and more) the technology will have a lengthy task, with too many proprietary solutions . A third path is IEEE 802.16e and 802.20, which are simpler than 3G for the equivalent

performance. A core network evolution towards a broadband Next Generation Network (NGN) will facilitate the introduction of new access network technologies through standard access gateways, based on ETSI-TISPAN, ITU-T, 3GPP, China Communication Standards Association (CCSA) and other standards. How can an operator provide a

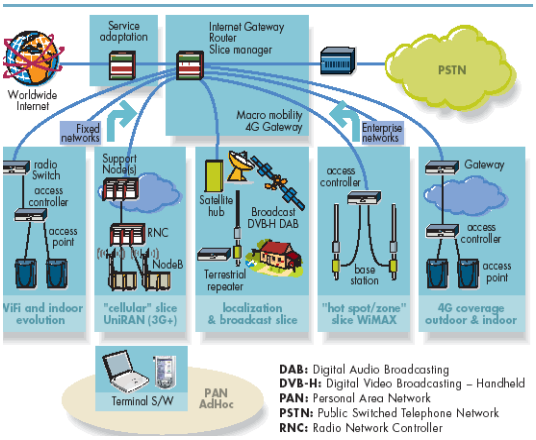

Figure 3: Multiple overlay architecture

large number of users with high session data rates using its existing infrastructure? At least two technologies are needed. The first (called "parent coverage") is dedicated to large coverage and real-time services. Legacy technologies, such as 2G/3G and their evolutions will be complemented by Wi-Fi and WiMAX. A second set of technologies is needed to increase capacity, and can be designed without any constraints on coverage continuity. This is known as Pico-cell coverage. Only the use of both technologies can achieve both targets (Figure 4). Handover between parent coverage and Pico cell coverage is different from a classical roaming process, but similar to classical handover. Parent coverage can also be used as a back-up when service delivery in the Pico cell becomes too difficult.

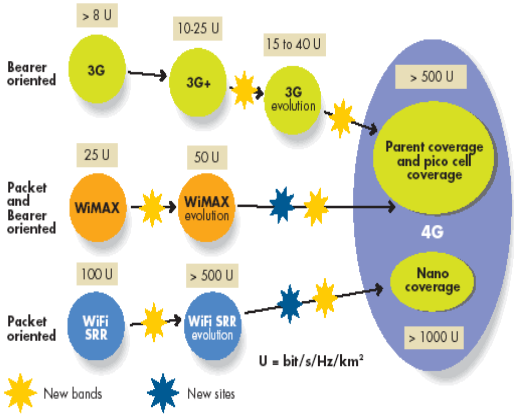

Figure 4: Coverage Performance

IV. TECHNOLOGY

OFDM

Orthogonal Frequency Division Multiplexing (OFDM) not only provides clear advantages for physical layer performance, but also a framework for improving layer 2 performance by proposing an additional degree of free-dom.

Using ODFM, it is possible to exploit the time domain, the space domain, the frequency domain and even the code domain to optimize radio channel usage.It ensures very robust transmission in multi-path environments with reduced receiver complexity. As shown in Figure 5, the signal is split into orthogonal subcarriers, on each of which the signal is "narrowband" (a few kHz) and therefore immune to multi-path effects, provided a guard interval is inserted between each OFDM symbol.OFDM also provides a frequency diversity gain, improving the physical layer performance.It is also compatible with other enhancement technologies, such as smart antennas and MIMO. OFDM modulation can also be employed as a multiple access technology (Orthogonal Frequency Division Multiple Access; OFDMA). In this case, each OFDM symbol can transmit information to/from several users using a different set of subcarriers (subchannels). This not only provides additional flexibility for resource allocation (increasing the capacity), but also enables cross-layer optimization of radio link usage.

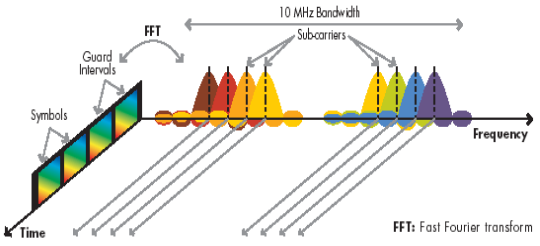

Figure 5: OFDM Principles

V. SOFTWARE DEFINED RADIO

Software Defined Radio (SDR) benefits from today's high processing power to develop multi-band, multi-standard base stations and terminals. Although in future the terminals will adapt the air interface to the available radio access technology, at present this is done by the infrastructure. Several infrastructure gains are expected from SDR. For example, to increase network capacity at a specific time (e.g. during a sports event), an operator will reconfigure its network adding several modems at a given Base Transceiver Station (BTS). SDR makes this reconfiguration easy. In the context of 4G systems, SDR will become an enabler for the aggregation of multi-standard pico/micro cells. For a manufacturer, this can be a powerful aid to providing multi-standard, multi-band equipment with reduced

development effort and costs through simultaneous multi-channel processing.

VI. MULTIPLE-INPUT MULTIPLE-OUTPUT

MIMO uses signal multiplexing between multiple transmitting antennas (space multiplex) and time or frequency. It is well suited to OFDM, as it is possible to process independent time symbols as soon as the OFDM waveform is correctly designed for the channel. This aspect of OFDM greatly simplifies processing. The signal transmitted by m antennas is received by n antennas. Processing of the received signals may deliver several performance improvements: range, quality of received signal and spectrum efficiency. In principle, MIMO is more efficient when many multiple path signals are received. The performance in cellular deployments is still subject to research and simulations (see Figure 6). However, it is generally admitted that the gain in spectrum efficiency is directly related to the minimum number of antennas in the link.

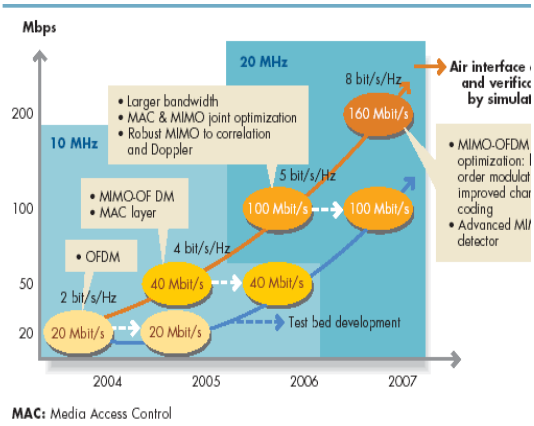

Figure 6:Alcatel test-bed performance

VII. INTERLAYER OPTIMIZATION

The most obvious interaction is the one between MIMO and the MAC layer. Other interactions have been identified (see Figure7).

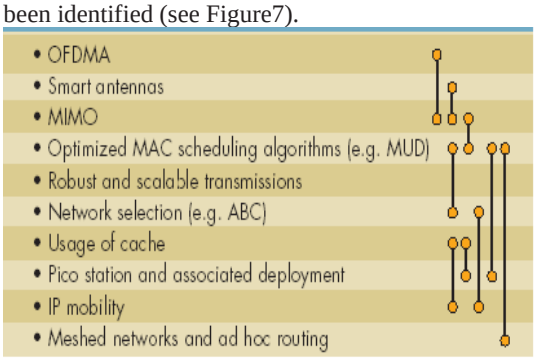

Figure 7 :Layer interaction and associated optimization

VIII. HANDOVER AND MOBILITY

Handover technologies based on mobile IP technology have been considered for data and voice. Mobile IP techniques are slow but can be accelerated with classical methods (hierarchical, fast mobile IP). These methods are applicable to data and probably to voice also. In single-frequency networks, it is necessary to reconsider the handover methods. Several techniques can be used when the carrier to interference ratio is negative (e.g. VSFOFDM, bit repetition), but the drawback of these techniques is capacity. In OFDM, the same alternative exists as in CDMA, which is to use macro-diversity. In the case of OFDM, MIMO allows macro-diversity processing with performance gains. However, the implementation of macro- diversity implies that MIMO processing is centralized and transmissions are synchronous. This is not as complex as in CDMA, but such a technique should only be used in situations where spectrum is very scarce.

IX. CACHING AND PICO CELLS

Memory in the network and terminals facilitates service delivery. In cellular systems, this extends the capabilities of the MAC scheduler, as it facilitates the delivery of real-time services. Resources can be assigned to data only when the radio conditions are favorable. This method can double the capacity of a classical cellular system. In pico cellular coverage, high data rate (non-real-time) services can be delivered even when reception/transmission is interrupted for a few seconds. Consequently, the coverage zone within which data can be received/transmitted can be designed with no constraints other than limiting interference. Data delivery is preferred in places where the bitrate is a maximum. Between these areas, the coverage is not used most of the time, creating an apparent discontinuity. In these areas, content is sent to the terminal cache at the high data rate and read at the service rate. Coverages are “discontinuous”. The advantage of coverage, especially when designed with caching technology, is high spectrum efficiency, high scalability (from 50 to 500 bit/s/Hz), high capacity and lower cost. A specific architecture is needed to introduce cache memory in the network..At the entrance of the access network, lines of cache at the destination of a terminal are built and stored. When the terminal enters an area in which a transfer is possible, it simply received between the terminal and the cache. A simple, robust and reliable protocol is used between the terminal and the cache for every service delivered in this type of coverage are Multimedia service delivery, service adaptation and robust transmission, Audio and video coding are scalable. For instance, a video flow can be split into three flows which can be transported

Independently.one base layer (30 kbit/s). which is a robust flow but of limited quality (e.g. 5 images/s), and two enhancement flows (50 kbit/s and 200 kbit/s). The first flow provides availability, the other two quality and definition. In a streaming situation, the terminal will have three caches. In Pico cellular coverage, the parent coverage establishes the service dialog and service start-up (with the base layer). As soon as the terminal enters Pico cell coverage, the terminal caches are filled, starting with the base cache.

Video (and audio) transmissions are currently transmitted without error and without packet loss. However, it is possible to allow error rates of about 10-5 /10-6 and a packet loss around 10-2 /10-3. Coded images still contain enough redundancy for error correction. It is possible to gain about 10 dB in transmission with a reasonable increase in complexity. Using the described technologies, multimedia transmission can provide a good quality user experience.

X. COVERAGE

Coverage is achieved by adding new technologies (possibly in overlay mode) and progressively enhancing density. Take a WiMAX deployment, for example: first the parent coverage is deployed; it is then made denser by adding discontinuous Pico cells, after which the Pico cell is made denser but still discontinuously. Finally the Pico cell coverage is made continuous either by using MIMO or by deploying another Pico cell Coverage in a different frequency band (see *Figure 8*). Parent coverage performance may

varyFrom 1 to 20 bit/s/Hz/km, Pico cell technology can achieve from 100 to 500 Bit/s/Hz/km depends on the complexity of the terminal hardware and software. These performances only refer to outdoor coverage; not all the issues associated with indoor coverage have yet been resolved. However, indoor coverage can be obtained by the following techniques.

• ***Direct penetration*:** this is only possible in low frequency bands (significantly Below 1 GHz) and requires an excess of power, which may raise significant Interference issues.

• ***Indoor short range radio:***connected to the fixed network.

• ***Connection via a relay***: to a Pico cellular access point.

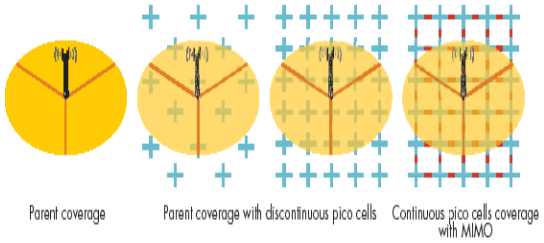

Figure 8: Deployment in dense traffic areas

XI. TRANSCEIVER

The structure of a 4G transceiver is similar to any other wideband wireless transceiver. Variances from a typical transceiver are mainly in the baseband processing. A multicarrier modulated signal appears to the RF/IF section of the transceiver as a broadband high PAVR signal. Base stations and mobiles are distinguished in that base stations transmit and receive/ decode more than one mobile, while a mobile is for a single user. A mobile may be a cell phone, a computer, or other personal communication device.The line between RF and baseband will be closer for a 4G system. Data will be converted from analog to digital or vice versa at high data rates to increase the flexibility of the system. Also, typical RF components such as power amplifiers and antennas will require sophisticated signal processing techniques to create the capabilities needed for broadband high data rate signals. **Figure 9** shows a typical RF/IF section for a transceiver. In the transmit path inphase and quadrature (I&Q) signals are upconverted to an IF, and then converted to RF and amplified for transmission. In the receive path the data is taken from the antenna at RF, filtered, amplified, and downconverted for baseband processing. The transceiver provides power control, timing and synchronization, and frequency information. When multicarrier modulation is used, frequency information is crucial. If the data is not synchronized properly the transceiver will not be able to decode it.

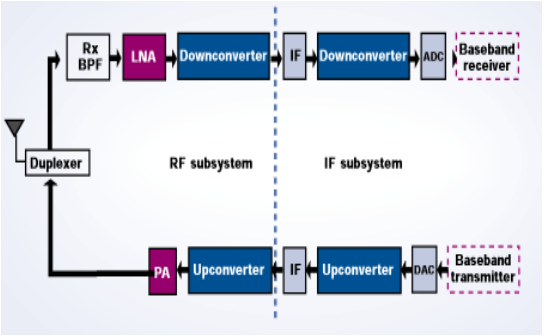

Figure 9 shows a typical RF/IF section for a transceiver.

XII. PROCESSING

Figure 10 shows a high-level block diagram of the transceiver baseband processing section. Given that 4G is based on a multicarrier technique, key baseband components for the transmitter and receiver are the FFT and its inverse (IFFT). In the transmit path the data is generated, coded, modulated, transformed,

cyclically extended, and then passed to the RF/IF section. In the receive path the cyclic extension is removed, the data is transformed, detected, and decoded. If the data is voice, it goes to a vocoder. The baseband subsystem will be implemented with a number of ICs, including digital signal processors (DSPs), microcontrollers, and ASICs. Software, an important part of the transceiver, implements the different algorithms, coding, and overall state machine of the transceiver. The base station could have numerous DSPs. For example, if smart antennas are used, each user needs access to a DSP to perform the needed adjustments to the antenna beam.

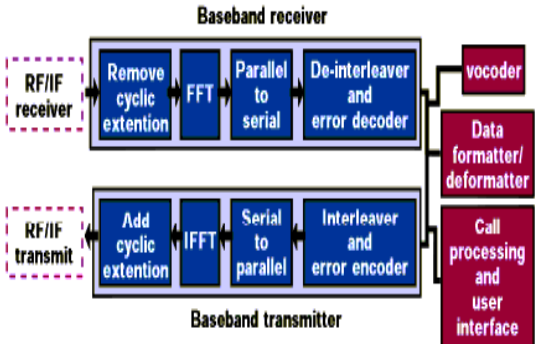

Figure 10 shows a high-level block diagram of the transceiver baseband processing

XIII. RECEIVER

4G will require an improved receiver section, compared to 3G, to achieve the desired performance in data rates and reliability of communication. As shown in **Equation 2**, Shannon's Theorem specifies the minimum required SNR for reliable communication:

$$SNR=2^{C/BW} \text{----------} (3)$$

where C is the channel capacity (which is the data rate), and BW is the bandwidth For 3G, using the 2-Mbps data rate in a 5-MHz bandwidth, the SNR is only 1.2 dB. In 4G, approximately 12-dB SNR is required for a 20-Mbps data rate in a 5-MHz bandwidth. This shows that for the increased data rates of 4G, the transceiver system must perform significantly better than 3G. The receiver front end provides a signal path from the antenna to the baseband processor. It consists of a bandpass filter, a low-noise amplifier (LNA), and a downconverter. De-pending on the type of receiver there could be two downconversions (as in a super-heterodyne receiver), where one downconversion converts the signal to an IF. The signal is then filtered and then downconverted to or near baseband to be sampled.The other configuration has one downconversion, as in a homodyne (zero IF or ZIF) receiver, where the data is converted directly to baseband.The challenge in the receiver design is to achieve the required sensitivity, intermodulation, and spurious rejection, while operating at low power.

XIV. BASEBAND PROCESSING

The error correction coding of 4G has not yet been proposed, however, it is known that 4G will provide different levels of QoS, including data rates and bit error rates. It is likely that a form of concatenated coding will also be used, and this could be a turbo code as used in 3G, or a combination of a block code and a convolutional code. This increases the complexity of the baseband processing in the receive section. 4G baseband signal-processing components will include ASICs, DSPs, microcontrollers, and FPGAs. Baseband processing techniques such as smart antennas and multi-user detection will be required to reduce interference.MCM is a baseband process. The subcarriers are created using IFFT in the transmitter, and FFT is used in the receiver to recover the data. A fast DSP is needed for parsing and processing the data. Multi-user detection (MUD) is used to eliminate the multiple access interference (MAI) present in CDMA systems.

XV. APPLICATIONS

CRISIS MANAGEMENT APPLICATION

In the event of natural disasters where the entire communications infrastructure is in disarray, restoring communications quickly is essential. With wideband wireless mobile communications, limited and even total communication capability(including Internet and video services) could be set up within hours instead of days or even weeks required at present for restoration of wire line communications.

TELEMEDICINE

A paramedic assisting a victim of a traffic accident in a remote location could access medical records (X-rays) and establish a video conference so that a remotely based surgeon could provide 'on-scene' assistance.

CONCLUSION

As the history of mobile communications shows, attempts have been made to reduce a number of technologies to a single global standard. Projected 4G systems offer this promise of a standard that can be embraced worldwide through its key concept of integration. Future wireless networks will need to support diverse IP multimedia applications to allow sharing of resources among multiple users. There must be a low complexity of implementation and an efficient means of negotiation between the end users and the wireless infrastructure. The fourth generation promises to fulfill the goal of PCC (personal computing and communication)—a vision that affordably provides high data rates everywhere over a wireless network.

The provision of megabit/s data rates to thousands of radio and mobile terminals per square kilometer presents several challenges. Some key technologies permit the progressive introduction of such networks without jeopardizing existing investment. Disruptive technologies are needed to achieve high capacity at low cost, but it can still be done in a progressive manner. The key enablers are:

• Sufficient spectrum, with associated sharing mechanisms.
• Coverage with two technologies: parent (2G, 3G, and WiMAX) for real-time delivery, and discontinuous Pico cell for high data rate delivery.
• Caching technology in the network and terminals.
• OFDM and MIMO.
• IP mobility.
• Multi-technology distributed architecture.
• Fixed-mobile convergence (for indoor service).
• Network selection mechanisms.

Many other features, such as robust transmission and cross-layer optimization, will contribute to optimizing the performance, which can reach between 100 and 500 bit/s/Hz/km2. The distributed, full IP architecture can deployed using two main products: base stations and the associated controllers. Terminal complexity depends on the number of technologies they can work with. The minimum number of technologies is two: one for the radio coverage and one for short range use (e.g. PANs). However, the presence of legacy networks will increase this to six or seven.

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ANALYSIS ON META SEARCH ENGINE

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Abstract: - Why search with one search engine when you can search with them all-or at least several?
Genuine problem for users in daily use of internet when they search information they face lots of difficulty because of rapid expanding of Information Resources. Traditional search engines can't deal very well for that we believe Meta Search Engines can satisfy the demand of individuation and intellective results while users search information. In this paper we focus on search engines, differences between most successful search engines, meta-search engines algorithm and working with its implementation.

Keywords:- *Federated Search Engines, Meta search engine, web search engines, multiple search engines, search engines.*

INTRODUCTION

With the development of INTERNET and advanced Technologies, peoples are using INTERNET has been a main location where they acquire resources and exchange information. And it's the people most interested things that how to find information from the web. The amount of information now on the Internet can be overwhelming. One way of finding information on the Internet is to use a search engine. The ubiquity of the Internet and Web has led to the emergency of several Web search engines with varying capabilities. These search engines index Web sites, images, Usenet news groups, content-based directories, and news sources with the goal of producing search results that are most relevant to user queries. However, only a small number of web users actually know how to utilize the true power of Web search engines. In order to address this problem, search engines have started providing access to their services via various interfaces. For example, Google has made its index available to other developers through a Web services interface Today's there are many kinds of search Engines and Meta search Engine ,such as byte search, metacrawler, lxquick etc is a technology having a good prospect because its advantages of search engines and simplifies Users work. On the Other hand, Agent Technology is becoming more in demand because of years of development. And its fits well for INTERNET development involves with special characters like autonomy, sociality, reactivity and proactiveness. New technology that is very well for the evolution of present search engine technology. The paper is proposed architecture of Meta search engine, and also explains the idea, work principle and work mechanism of each co-related module. Search engines play a pivotal role in the process of retrieving information from the Web. When the user gives a Query, as a response, a Search engine returns a list of relevant results ranked in order. As a human, it is the tendency of the user to use top-down approach of the list displayed by the Search Engine and examines one Result at a time, until the required information is found. However, while search engines are definitely good for certain search tasks like finding the home page of an organization. They may be less effective for satisfying broad or ambiguous queries. The results on different subtopics or meanings of a query will be mixed together in the list, thus implying that the user may have to sift through a large number of irrelevant items to locate those of interest. On the other hand, there is no way to exactly figure out what is relevant to the user give that the queries are usually very short and their interpretation is inherently ambiguous in the absence of a context. An Effective and alternate approach to the information retrieval on the Web in recent years is by using the Meta Search Engine (MSE), instead of simply a Search. It is a web search engine that was owned by Microsoft. Bing was unveiled by Microsoft CEO Steve Ballmer on May 28, 2009 at the All Things Digital conference in San Diego.

Search Engines

First off, it's crucial to know that when a person performs a web search, he's actually not searching the web but the search engine's index of the web. Due to speed, costs, and capabilities, it is plain not possible to search through all the web pages every time a user clicks 'search' on an engine [Sherman &Price, 2001. A general search query procedure can be summarized in four steps:

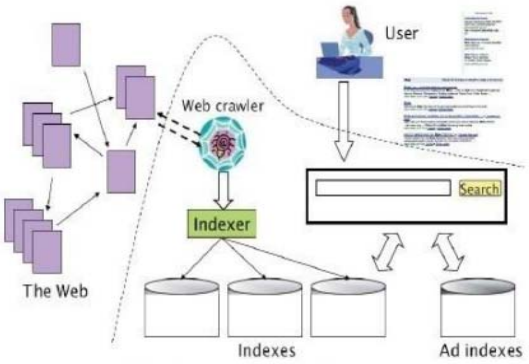

fig.1 Component of Meta Search Engine

(1) A web user submits a query by typing a term, words or phrases in the search box.

(2) Regarding the query, search engine looks through all the pages that it keeps in its Database.
(3) Search engine sorts out the relevant web pages
(4) Results are listed on the Search Engine Results Page (SERP) in an order, beginning with the most relevant results. The whole search process usually only lasts a fraction of a second, but what's behind a Search engine's function is more complex as it seems.

Different types of Search Engines
Ask is a Search Engine, which is also known as Ask Jeeves. It is basically designed to answer the user's Queries in the mode of Q&A and is proved to be a focused search engine. Ask was developed in 1996 by Garrett Gruener and David Warthen in Berkeley, California. Originally, the software was developed and implemented by Gray Chevsky.

Bing is a Search Engine, which was formerly known as Live Search, Windows Live Search, and MSN Search. It is a web search engine (advertised as a "decision engine") that was owned by

Microsoft. Bing was unveiled by Microsoft CEO Steve Ballmer on May 28, 2009 at the All Things Digital conference in San Diego. It went fully online on June 3, 2009, with a preview version released on June 1, 2009. Notable changes include the listing of search suggestions as queries are entered and a list of related searches (called "Explorer pane") based on semantic technology from Power set that Microsoft purchased in
2008.
Google Search or Google Web Search is a web search engine owned by Google Inc. and is the most used search engine on the Web. Google receives several hundred million queries each day through its various services. The main purpose of Google Search is to hunt for text in WebPages, as opposed to other data, such as with Google Image Search. Google search was originally developed by Larry Page and Sergey Brin in 1997. Google Search provides at least 22 special features beyond the original word-search capability. These include synonyms, weather forecasts, time zones, stock quotes, maps, earthquake data, movie show times, airports, home listings, and sports scores

Yahoo! Search is a web search engine, owned by Yahoo! Inc. till December 2009, the 2nd largest search engine on the web by query volume, at 6.42%, after its competitor Google at 85.35% and before Baidu at 3.67%, according to Net Applications. Originally, Yahoo! Search started as a web directory of other websites, organized in a hierarchy, as opposed to a searchable index of pages. In the late 1990s, Yahoo! evolved into a full-fledged portal with a search interface and, by 2007,a limited version of selection-based search Yahoo!Search, originally referred to as Yahoo! provided Search interface, would send queries to a searchable index of pages supplemented with its directory of sites.
Comparison of Google, Yahoo, Bing
After the previous introduction to the three searchengines, they will be examined in detail and compared on the basis of selected factors. All the points of comparison will be summed up at a glance. There are some factors thanks to which several search engines stand out. While many points can be focused on, in the following research, three main aspects of search engines should be analyzed: The database size, the actuality, the capabilities, and the technology of the results of search engines.These characterizations are thought to be core values for evaluating search engines.

1. Database Size is the number of the web has such a tremendous growth that it cannot be counted. The exact number of web pages that is indexed in search engines is not known either. However, there are some estimations of the database size of each search engine. Nevertheless, the size of the database does not tell about the quality of a search engine. Due to duplicates and spam, search engines should not
index the entire web.

2. Capabilities
Search engines enable the web searcher to enter
some simple keywords for a query, but also functions to narrow the search and receive more
precise results, such as the basic and advanced search. However, even though they can contribute to a web searcher's success in finding his information, they are either not used or even known by many people.
3, Technology
Concerning technology of search engines, two
aspects will be examined: The speed and the ranking for relevant results.Challenges Posed by Search Engines (SEs) Challenges in the capability of search engines are also a big issue. With the options of powerful features and additional search functions, they are trying to help the users to search more precisely and therefore, make it easier to them to get the desired information. The problem is, most people don't take advantage of the offered tools, but instead, they just type a few keywords for a query. Thus, search engines have to find a way how to improve basic queries so that they can provide users successful research at the same time. Using a Search Engine (SE), an index is searched rather than the entire Web. An index is created and maintained by automated web searching by programs commonly known as spiders.

Search Engine Comparison table			
	Google	Yahoo!	Bing
database			
Index Size	Rank1 (>12bn pages includes deeb web)	Rank 2 (>9bn pages deep web)	Rank3 (>0.9 bn pages deep web)
Crawler name	Googlebot	Yahooslurp	MSNbot
capability			
search operators advanced search	-Boolean operators -46 languages	-Boolean operators -32 languages	-Boolean operators -42 languages
Technology			
speed	Shown for every query	Not exactly	Not exactly
Ranking	Page rank, hypertext	Keywords, Click popularity	Automated emphasis keywords

Plain search engines prove to be very effective for certain types of search tasks, such as retrieving of a particular URL and transactional queries (where the user is interested in some Web-mediated activity). However, Search Engines can't address informational queries, where the user has information that needs to be satisfied. A Meta Search Engine overcomes the above by virtue of sending the user's query to a set of search engines, collects the data from them displays only the relevant records by using clustering algorithm Meta Search Engines Meta-search engines, also known as multiple search engines, metasearchers, or metacrawlers, are special search tools that present the results by accessing multiple search engines and web directories. This way, they allow users to quickly receive combined results that are merged in one place at once. Thus, web users neither need to type the query several times nor have to access every single search engine by themselves. This job will be done for the users by meta-search engines, which might additionally suggest engines that the user had not considered before. By performing a search query, meta-search engines transmit the typed terms simultaneously to multiple individual search engines. Multi-search engines don't do the crawling or maintain their own database like single search engines, but usually filter the results they found instead. Based on a specific algorithm, they eliminate duplicates and rank the results from their sources into a list. The list of collection will be displayed on the SERP, very similar to the search engines' results page, that Relies on the indices of other search engines [Sherman & Price, 2001; Clay & Esparza, 2009]. There are also some meta-search engines that don't use an algorithm, but presents the resulted information of the sources. Meta-search engines differ from each other in the selection and quantity of search engines and in the presentation of results [Mohamed, 2004].

Why use a Multi-search engine?

At the time of updating (February 2003) there are at least 150,000 different search engines available which cover both general and specific subjects, or which search specific elements of the Internet such as Web pages or Usenet. While some of these are particularly effective and sophisticated none of them are entirely comprehensive. They may only use a small database from which to create your set of results (Yahoo for example only indexes a very small proportion of the 3 billion pages indexed by Google), or they may not be updated particularly. Their spider programs may not be very fast, which means that their currency might not be a real reflection of the state of play on the Internet. Consequently, even if you have a favorite search engine, or even several of them, to ensure anything like a comprehensive search you may need to use several of them before you are satisfied that you have found everything you require on a particular topic. A Multi-search engine may save you the trouble of going to a variety of different sites in order to run your search, or it may suggest a search engine which you had not considered, or perhaps did not even know about!

How do Multi-search engines work?

From the explorations that I have undertaken, there appear to be 3 different approaches which are in operation at the moment:

A straightforward list of different search engines

Searches which take place one after another.

Searches which take place simultaneously Each of these has their own advantages and disadvantages, so let's examine them in a little more detail.

(a)A straightforward list of different search

engines These work by simply copying the appropriate URL for the CGI script onto the web page. This is not particularly difficult to do and the user then simply inputs the appropriate search term(s) into the dialogue box and submits the search. This is then run by the search engine in particular and the user is presented with a list of results in exactly the same way that they would if they had gone to visit that particular site directly. The advantage of this approach is simply that you can reduce the amount of time you spend going from one site to another in order to complete your search. It might also suggest other search engines for you which you had not considered using before. It is almost impossible to keep up with the entire different search engines which are available, and if someone is happy to do this on your behalf, it makes sense to take advantage of it. However, the disadvantage of this approach is that, strictly

speaking, these sites are (in my opinion) misleading the user. They are not offering a multi-search engine, but have simply collated the work of others onto a new home page. That's not to say there is anything intrinsically wrong with this, and the Webmaster will have had to have done a reasonable amount of work

to set the page up, but its really nothing more than a slightly more sophisticated list of links. These are by far the most common sites offering a multi-search facility and examples of sites which take this approach are: Find-It at http://www.itools.com/search/

(b)Searches which take place one after another.

This is much closer to the concept of a multi-search engine. A site of this nature will usually have a single entry line where you input the search just as you would with a single search engine interface. You may then have the opportunity of deciding which search engines you the search to run under (usually from a list given in a check-box type situation) and the multi-search engine then transmits the search simultaneously to all of the search engines you have indicated Once the search has been run, the results will be displayed on the screen for you in a list, commonly separated into the results as provided by the different search engines. However, the main disadvantage of this type of approach is that before the list can be generated on the screen all the different search engines have to have sent their results back to the multi-search engine site. Consequently the speed of the search is dictated by the speed of the slowest search engine. An example of this type of search engine can be found at Dogpile at www.dogpile.com

(C)Searches which take place simultaneously

This type of search engine is very similar to the previous approach, the main difference being that searches do not have to wait until each search engine has completed its work - as soon as results are available from one search engine, they are displayed on the screen for you to view. The result is therefore that much faster, and while you are down through the list of hits, others are being added to the page even as you view. An example of the multi-search engines which take this approach are: Ixquick at http://www.ixquick.com/

Benefits of Meta Search Engines

A metasearch engine represents the combination of multiple search engines where in it exhibits a better performance than any search engine the advantages of metasearch engines are that the results can be sorted by different attributes such as host, keyword, date, etc; which can be more informative than the output of a single search engine. We observe the following benefits from metasearch engine Large data base: As a metasearch engine represents fusion to which more search engines with overlapping data bases are added, user can retrieve more amount of information. Depending on the fusion scheme a document appearing in only one data base may not be as likely to be retrieved by the metasearch engine as a document appearing in all of the data bases. A search engine's performance is normally measured with precision and recall. Improved recall: Recall is defined as the ratio of retrieved relevant documents to the total relevant documents. Intrinsically a Meta Search engine uses data fusion scheme, it provides a better and improved recall. Indeed it is observed that different systems retrieve different documents. In one data set each of 61 search engines retrieved 1000 documents for each of 50 queues. An average intersection between pairs of systems on each query is only 238 documents, that different systems are returning many a documents. But it is found out that to achieve higher recall via fusion, it is necessary that the input systems retrieve not just different documents, but they provide different relevant documents.

Improved Precision: Precision is clearly understood as the ratio of retrieved relevant documents to retrieved documents. It was proved that the odds of a document being relevant increases monotonically with the number of search engines that retrieve it. There is also another argument that an "Unequal Overlap Property" holds in ranked list fusion. Different retrieval algorithms retrieve many of the same relevant documents, but different irrelevant documents, and if it is true any fusion technique that more heavily weighs common documents should improve precision, but it may likely harms recall as rear relevant documents are de-emphasized.

More consistent in Performance: Reliable behavior is considered to be another important and desirable quality of a search engine. It was proved that the same search engine often response to the same query very differently over time, which may be due to the evolution of the data base [15]. Even with a fixed data base it is observed that each search engine will have its strengths and weakness, performing well on some queries and poorly on others.

Modular Architected: While designing a search engine, one is faced with many different sources of information about each document. Word frequencies, Phrase frequencies, textual structure within a document, hyper link structure between documents etc.

Focused Ranking Algorithms: Effective Meta search engines may yield unexpected benefits and this may lead towards designing of focused algorithms for ranking documents that can take advantage of novel, highly specific information sources within document. These focused ranking algorithms are not expected to function well in isolation, but they can improve the search engines Performance when combined with other ranking algorithms.

Different types of Meta Search Engines

WebCrawler is a metasearch engine that blends the top search results from Google, Yahoo, Bing Search WebCrawler was the first Web search engine to provide full text search [1]. It went live on April 20, 1994 and was created by Brian Pinkerton at the University of Washington. It was bought by America Online on June 1, 1995 and sold to Excite on April 1,

1997. WebCrawler was acquired by Info Space in 2001 after Excite, (which was then called Excite@Home), went bankrupt. InfoSpace also owns and operates the metasearch engines Dogpile, MetaCrawler and Excite.

Metacrawler is a metasearch engine that blends the top web search results from Google, Yahoo!, Bing (formerly Live Search), Ask.com, About.com, MIVA, Look Smart and other popular search engines. MetaCrawler also provides users the option to search for images, video, news, yellow pages and white pages. It used to provide the option to search for audio. MetaCrawler is a registered trademark of InfoSpace, Inc. MetaCrawler was originally developed in 1994 at the University of Washington by then graduate student Erik Selberg and Professor Oren Etzioni as Selberg's Ph.D.

Dogpile is a meta-searcher which fetches results from leading search engines, including the three analyzed before, among which users are allowed to make a selection for their individual search. It belongs to one of the most popular meta-search engines and won the Best meta-search engine 2003. In 2006 and 2007,it was ranked highest in customer satisfaction by J.D. Powers and Associates, a global marketing information firm.

Brainboost is a metasearch engine designed to provide specific answers to questions asked in natural language. Currently it only supports English. The Brainboost engine uses machine learning and natural language processing. Traditional engines return the links to the pages that appear most relevant. Additionally the results page may include a summary of the page. The user then needs to download the pages and read them to see if the answer to this question exists. Brainboost however, generates a number of different queries that it submits to traditional search engines, downloads several hundred pages returned by the search engines, reads the pages and isolates the answers in the text of these pages, and ranks the different answers based on its Answer Rank algorithm.

Architecture of Meta Search Engine

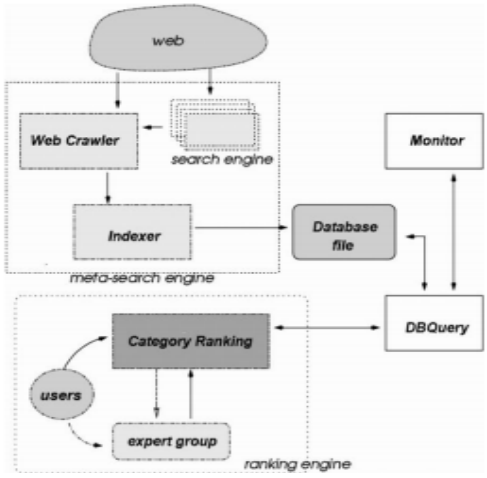

Fig.2 Architecture

CONCLUSION

One of the objectives of this paper was to understand the search engines usability and significance. As could be seen throughout this paper, search engines are popular and successful, because they are convenient, not only in the common web user's perspective for finding information, but also from the web designer's point of view for their level of awareness and business purposes. This paper presented a comprehensive survey and understanding of various Meta Search Engines. It is understood that Meta Search Engine exhibits superior performance than any Search Engine and its performance also depends on various factors like recall and precision.

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MULTI BIOMETRIC TEMPLATE SECURITY: A NOVEL APPROACH

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Abstract:-A lot of challenges are commonly encountered by uni modal biometric systems like noise in sensed data, non universality, lack of flexibility, upper bound on identification accuracy, spoof attacks etc. Multi biometric systems are employed to overcome these problems. Along with these advantages that multi biometric systems provide, there are a lot of challenges too like template security and fusion complexity etc that need to be taken care of while designing multi biometric systems. This paper focuses on the problem of template security in multi biometric systems. Here a secure multimodal biometric system is proposed using three biometric traits face, palm print and fingerprint. In the work discussed here, firstly image fusion is performed using wavelets to combine three biometric traits. Then features are extracted using key point detection algorithm SIFT, and finally encryption and decryption algorithms are used to secure the template which was generated by using SIFT on the fused images of face, fingerprint and palm print.

Keywords *– Biometric Systems, Encryption, Template security, Multi-biometric systems.*

I. INTRODUCTION

Biometrics is defined as the science of identifying or verifying individuals based on their unique physiological or behavioral characteristics. Examples of human traits used for biometric recognition include fingerprints, hand geometry, palm print, speech, face, gait, retina, iris, and handwritten signature [1]. There are five major components in a generic biometric authentication system, namely, sensor, feature extractor, template database, matcher, and decision module [2]. Sensor is the interface between the user and the authentication system and its function is to scan the biometric trait of the user. Feature extraction module processes the scanned biometric data to extract the salient information (feature set) that is useful in distinguishing between different users. The template database could be geographically distributed and contain millions of records. The matcher module is usually an executable program, which accepts two biometric feature sets XT and XQ (from template and query, respectively) as inputs, and outputs a match score (S) indicating the similarity between the two sets. Finally, the decision module makes the identity decision and initiates a response to the query. Many attacks are possible on various points of a biometric system. Anil K. Jain et al. discussed these attacks in detail [2]. One of the most potentially damaging attacks on a biometric system is against the biometric templates stored in the system database. Attacks on the template can lead to the following three vulnerabilities.

i. A template can be replaced by an impostor's template to gain unauthorized access.
ii. A physical spoof can be created from the template to gain unauthorized access to the system (as well as other systems which use the same biometric trait).
iii. The stolen template can be replayed to the matcher to gain unauthorized access. A potential abuse of biometric identifiers is cross-matching or function creep where the biometric identifiers are used for purposes other than the intended purpose.

So it is important to protect the template in biometric applications. Passwords and PIN have the property that if they are compromised, the system administrator can issue a new one to the user. It is desirable to have the same property of revocability or cancel ability with biometric templates [2]. An ideal biometric template protection scheme should possess the following four properties [3]:

i. *Diversity*: The secure template must not allow cross matching across databases, thereby ensuring the user's privacy.
ii. *Revocability*: It should be straightforward to revoke a compromised template and reissue a new one based on the same biometric data.
iii. *Security*: It must be computationally hard to obtain the original biometric template from the secure template. This property prevents an adversary from creating a physical spoof of the biometric trait from a stolen template.
iv. *Performance*: The biometric template protection scheme should not degrade the recognition performance (FAR and FRR) of the biometric system.

So, whenever a new approach is proposed to template security in biometric systems, these four features must be addressed.

A lot of challenges are commonly encountered by biometric systems like noise in sensed data, non universality, lack of flexibility, upper bound on identification accuracy, spoof attacks etc. Multi biometric systems are employed to overcome these problems. Along with the benefits of multi biometric systems over unibiometric systems, there are a lot of

challenges in designing a multi biometric system like fusion complexity, heterogeneity of information sources, varied discriminative ability [4], security of multiple templates [5] etc.

This paper tries to give the most appropriate security solutions related to template security in multi biometric systems. A brief introduction about biometrics; biometric system security threats; template security and multi biometric systems in section I. Section II discusses the methodology used for the proposed scheme. Enrolment phase, identification phase, flow design, encryption and decryption process for the proposed scheme are described in detail in section III. Section IV presents the results obtained and the work is concluded in section V.

II. METHODOLOGY

This paper proposes a scheme for securing multiple templates of a user as a single entity. A single multi biometric template is derived from the individual face, palm print and fingerprint images and is secured using an encryption algorithm. The steps are listed below:

1. To produce more secure and reliable system, three images for face, fingerprint and palm print of one person each of size 256×256 are considered.
2. These images are fused using wavelets to form a single image.
3. Fused image is normalized using histogram equalization and features are extracted from the normalized image using SIFT.
4. Encryption Algorithm is applied to securely save the extracted features as a template.

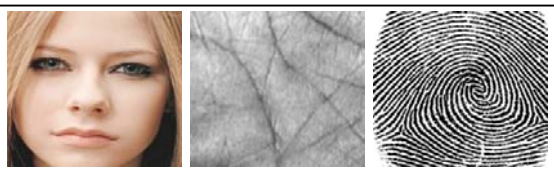
The proposed technique is discussed in detail in next section.

III. PROPOSED TECHNIQUE FOR MULTIBIOMETRIC TEMPLATE SECURITY

This section discusses the proposed technique for multibiometric template security. This technique secures multiple templates of a user as a single entity. It consists of two phases: Enrolment Phase and Identification Phase; these two phases are discussed below:

A. Enrolment Phase

Step 1: First step is to take three images of size 256×256. One set of images taken are shown in figures 6.1(a), (b) and (c). Region of interest from face, palm print and fingerprint images are cropped



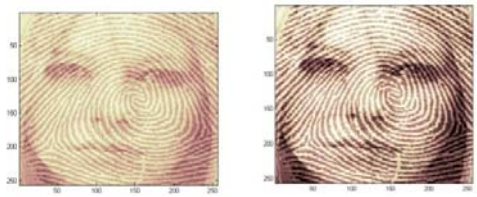
(a) (b) (c)

Figure 1: One set of face, palm print and fingerprint images taken as input

Step 2: In the second step the three images are fused using wavelets. The principle of image fusion using wavelets is to merge the wavelet decompositions [6] of the two original images using fusion methods applied to approximations coefficients and details coefficients. The two images must be of the same size and are supposed to be associated with indexed images on a common color map. Three images are fused by applying this method twice. The final image which comes after combining face, palm print and fingerprint is shown in figure 2(a).

Step 3: As shown in figure 2(a), image obtained after the fusion of face, palm print and fingerprint, is not clear. For making this fused image more visible, more contrasting and more suitable for feature extraction, image will be normalized by applying histogram equalization. In the later steps when key points are calculated, it is observed
that the normalized image gives greater number of key points. Normalized image is shown in figure 2(b).

Step 4: Next step is to extract the features from the normalized fused image. SIFT [7] is applied on the image obtained in previous step to find the key points. In this case, 2813 key points are found by the SIFT which are shown in figure 3. SIFT produces two matrices for the key points that it is able to find, first is descriptor matrix and second is location matrix. A single key point descriptor is a 128 dimensional vector which describes a key point that is found. The reason for this high dimension is that each key point descriptor contains a lot of information about the point it describes. As the number of key points found in the case discussed are 2813. So a 2813×128 descriptor matrix is produced. Key points found are shown in figure 3.



(a) (b)

Figure 2: Fused image before (a) and after (b) normalization.

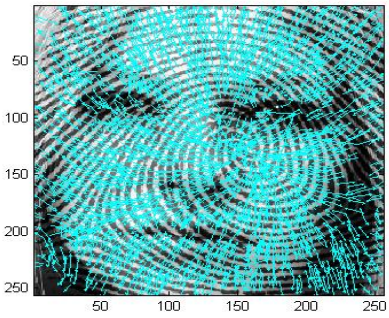


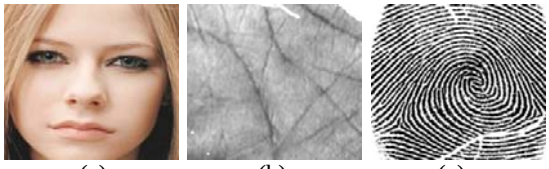
Figure 3: 2813 Key points detected by SIFT for the fused and normalized image.

Step 5: Last step is to secure the descriptor and location matrices generated by the SIFT algorithm by using the proposed encryption algorithm. The resulting matrices give a secure template. Even if this template is compromised by an attacker, it will not be possible for the attacker to generate the original fingerprint, palm print and face images. The proposed encryption and decryption algorithms are described in subsections C and D.

B. Identification Phase

Step 1: Take three query images of face, palm print and fingerprint each of size 256×256. The query images taken in the example discussed here are shown in figure 4.

Step 2: These three images are fused and then normalized to obtain an image which is ready for feature extraction.



(a) (b) (c)

Figure 4: Face, palm print and fingerprint query images.

Step 3: Next step is to apply SIFT algorithm on the normalized and fused query images to obtain the descriptor and location matrices. In the present case SIFT is able to find 2744 key points from the fused and normalized query image.

Step 4: Apply the decryption algorithm as explained in the subsection D to get back the template matrices in the form in which we can match them with the query matrices.

Step5: In the final step matching is performed, using the SIFT matching function to find the number of matched key points. A match is accepted only if its distance is less than distance ratio times the distance to the second closest match. In the example discussed here, distance ratio taken was 0.6 and a total of 2385 key points were matched.

C. Encryption Algorithm

Step 1: Choose a Secret Key S. Any number could be selected as a secret key, as long as it could be accommodated in the double integer range. This secret key chosen determines the dependence of our encrypted matrix on secret key or on the determinant.

Step 2: Select the matrix M which is to be encrypted. This could be either the descriptor matrix or the location matrix generated after applying the SIFT algorithm on the fused image of three biometric traits.

Step 3: Make a square matrix P of the selected matrix M. The square matrix is obtained by selecting the lower number from the number of rows or number of columns. Let us consider an example where there are p rows and q columns and p>q. In this case, number of columns is greater than the number of rows, so in generating the square matrix the first q rows of the original matrix will be taken along with q columns.

Step 4: Find the determinant D of the square matrix P.

$$D = \text{Determinant } (P)$$

Step 5: Find $W = \sqrt{D + S}$

Step 6: Update the element at the i^{th} row and j^{th} column of the matrix M as:

$$M(i, j) = M(i, j) + W + i + j$$

Step 7: After updating all the elements, the encrypted matrix M is generated.

D. Decryption Algorithm

In decryption algorithm all the steps applied in the encryption algorithm are now applied in the reverse order. This algorithm takes an encrypted matrix M, query matrix Q and secret key as an input.

Step 1: Select the same secret key S that was used during the encryption.

Step 2: Select the matrix that is to be decrypted M. This could be either the descriptor template matrix or the location template matrix.

Step 3: Make square matrix P of the query matrix Q by same process that was used during the encryption algorithm

.

Step 4: Compute the determinant D of the square matrix P

$$D = \text{Determinant } (P)$$

Step 5: Compute $W = \sqrt{D + S}$

Step 6: Update the element at the i^{th} row and j^{th} column of the matrix M as:

$$M(i, j) = M(i, j) - W - i - j$$

Step 7: After updating all the elements the decrypted matrix in M is obtained.

E. Flowchart for proposed multi biometric system

Figure 5 shows flow design of the system. In the first step, face fingerprint and palm print images are given as an input, next step is fusion of images using wavelets, then SIFT features are extracted from fused image and finally template is stored in the database after applying encryption algorithm.

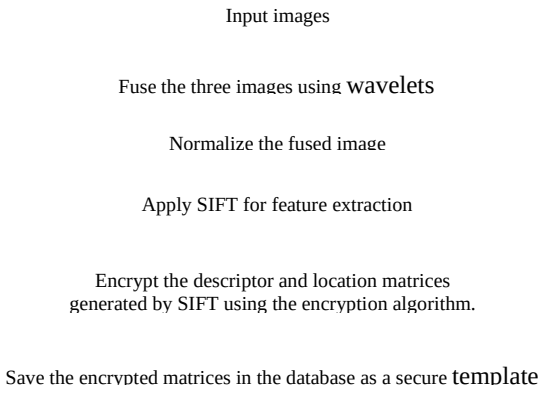


Figure 5: Flow design for the system

IV. RESULTS

A. Results and Observations

For getting the results, images of face, palm and fingerprint of 90 persons are matched with those stored in the database. The results obtained at different values of threshold are shown in table 1.

TABLE 1. RESULT S OBTAINEED FOR VARYING VALUES OF THRESHOLD

Threshold	False Positives	True Positives	True Negatives	False Negatives
0.5	6	49	35	1
0.55	4	49	37	1
0.6	2	49	39	1
0.65	1	49	39	1
0.7	0	48	40	2
0.75	0	47	40	3
0.8	0	45	40	5
0.85	0	33	40	17
0.9	0	16	40	34

Figure 6 shows the graph for the results of table 1. It is clear from the plot that as the threshold is increased, false positives decreased while false negatives were constant until 0.65 but increased rapidly after that. So, considering this plot in mind, the results at threshold value of 0.65, for which false positives and false negatives are minimum, are calculated.

As per the results from the table1 the values of False Accept Rate, False Reject Rate and Genuine Accept Rate are:

$$FAR = 1/90 = 0.011 = 1.1\%$$

$$FRR = 1/90 = 0.011 = 1.1\%$$

$$GAR = 88/90 = 0.977 = 97.7\%$$

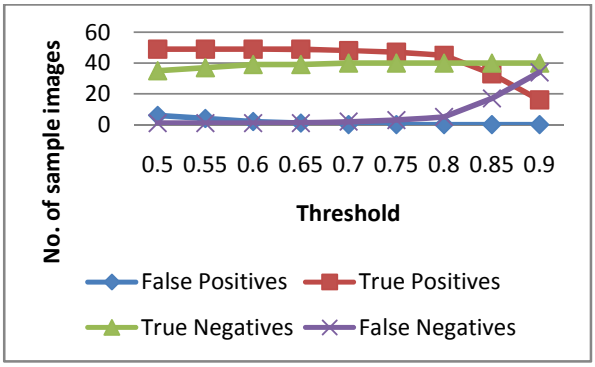


Figure 6: Dependence of results on threshold value

B. Accuracy, Precision, Sensitivity and Specificity

Accuracy is the proportion of true results (both true positives and true negatives) in the population. It is a parameter of the test.

So, from table 1

$$\text{Accuracy} = \frac{49+39}{49+1+39+1} = 0.9777$$

Or Accuracy = 97.7%

Precision is defined as the proportion of the true positives against all the positive results (both true positives and false positives)

So, from table 1

$$\text{Preciesion} = \frac{49}{49+1} = 0.98$$

Or Precision = 98%

Sensitivity relates to the test's ability to identify positive results.

So, from table 1

$$\text{Sensitivity} = \frac{49}{49+1} = 0.98$$

Or Sensitivity = 98%

Specificity relates to the ability of the test to identify negative results.If a test has high specificity, a positive result from the test means a high probability of the presence of disease.

So, from table 1

$$\text{Specificity} = \frac{39}{39+1} = 0.975$$

Or Specificity = 97.5%

TABLE 2 RESULT S OBTAINEED

		True	False	
Test Outcome	Positive	49	1	->Positive Predictive Value
	Negative	1	39	->Negative Predictive Value
		Sensitivity (0.98)	Specificity (0.975)	Accuracy(0.977)

C. Dependence of key points generated on normalization

Histogram equalization is used for normalizing the image that was obtained after fusion. The key points or features were extracted from this normalized image instead of the raw fused image. This is because a normalized image generates more number of key points than a raw image. This helps in making the system more accurate. The comparison between number of key points generated for various images with and without normalization is shown in the figure 7. The plot shows clearly that normalized images produce greater number of keypoints than raw images and hence justifies the use of normalization.

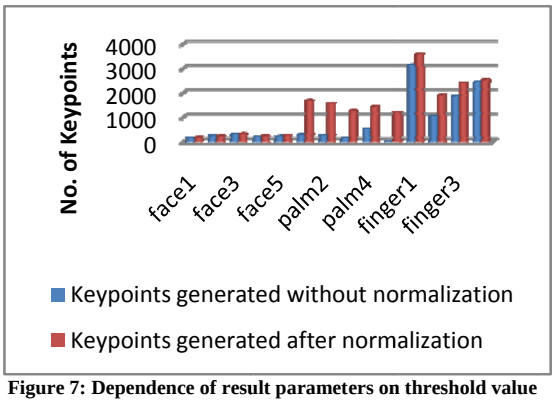


Figure 7: Dependence of result parameters on threshold value

V. DISCUSSION AND CONCLUSIONS

The work discussed here proposes an approach for template protection in multi biometric systems, using three biometric traits fingerprint, face and palm print. As it is evident from the results, this system provides better recognition accuracy than biometric systems which use a single biometric trait. The reason for this better accuracy is that using the SIFT algorithm, key points generated by the fused image of three traits are much greater in number than generated by an image of a single biometric trait. Along with this increased accuracy it also provides a greater security for the template and makes it almost impossible for the attacker to get any useful information from the template. This increased security is because of following three levels of complexity that are provided in this system:

1. A Fused image template image is difficult to compromise than a single image.
2. Further, key points are generated from the fused image using SIFT, instead of storing the fused image as it is, adding to the security of the system.
3. Finally, the key points are encrypted using the encryption algorithm before being stored in the database, thus making the system extremely secure and work of an attacker extremely hard.

Further security can be enhanced by regularly changing the key (S) used in the encryption algorithm.

Further it could be extended for n biometric traits which will provide more security and reliability to the system. As the value of n is increased, the security of system also keeps on increasing. This system could be combined with neural networks to further improve the GAR by adjusting the threshold value by training the system according to the requirements and environment where application is employed.

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DESIGN OF CARRY SELECT ADDER USING BINARY TO EXCESS ONE CONVERTER

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Abstract:- This paper presents a modified design of Area-Efficient Low power Carry Select Adder (CSLA) Circuit. In digital adders, the speed of addition is limited by the time required to transmit a carry through the adder. Carry select adder circuit is known to be a fastest adder among the conventional adder. This new design of Carry Select Adder is implemented by using single ripple carry adder and one binary to excess one converter instead of using dual ripple carry adders to reduce the area and power but with a little bit of speed penalty. The results analysis shows that the modified CSLA structure is better than the conventional carry select adder.

Index terms: *Area-efficient, Low power, CSLA, Binary to excess one converter, Multiplexer.*

I. INTRODUCTION

Area and power reduction in data path logic systems are the main area of research in VLSI system design. High-speed addition and multiplication has always been a fundamental requirement of high-performance processors and systems. In digital adders, the speed of addition is limited by the time required to propagate a carry through the adder. The sum for each bit position in an elementary adder is generated sequentially only after the previous bit position has been summed and a carry propagated into the next position. The major speed limitation in any adder is in the production of carries and many authors have considered the addition problem.

The CSLA is used in many computational systems to moderate the problem of carry propagation delay by independently generating multiple carries and then select a carry to generate the sum. However, the CSLA is not area efficient because it uses multiple pairs of Ripple Carry Adders (RCA) to generate partial sum and carry by considering carry input and then the final sum and carry are selected by the multiplexers (mux). To overcome above problem, the basic idea of the proposed work is by using n-bit binary to excess-1 code converters (BEC) to improve the speed of addition. This logic can be implemented with any type of adder to further improve the speed. Using Binary to Excess-1 Converter (BEC) instead of RCA in the regular CSLA we can achieve lower area and power consumption. The main advantage of this BEC logic comes from the lesser number of logic gates than the Full Adder (FA) structure.

II. DELAY AND AREA EVALUATION OF THE BASIC ADDER BLOCKS

The AND, OR, and Inverter (AOI) implementation of an XOR gate is shown in Figure 1. The gates between the dotted lines are performing the operations in parallel and the numeric representation of each gate indicates the delay contributed by that gate. The delay and area evaluation methodology considers all gates to be made up of AND, OR, and Inverter, each having delay equal to 1 unit and area equal to 1 unit. We then add up the number of gates in the longest path of a logic block that contributes to the maximum delay. The area evaluation is done by counting the total number of AOI gates required for each logic block.

Based on this approach, the CSLA adder blocks of 2:1 mux, Half Adder (HA), and FA are evaluated and listed in Table I.

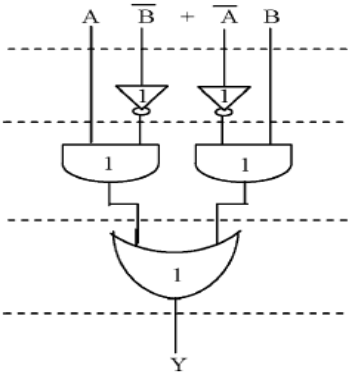


Figure 1. Delay and Area evaluation of an XOR gate.

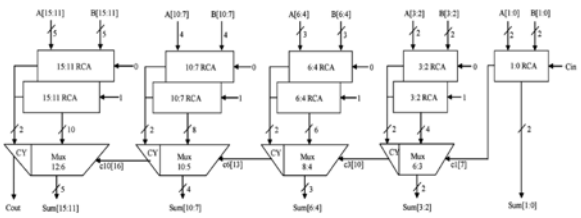


Table 1

Delay And Area Evaluation of the Basic Blocks of CSLA

Basic Blocks	Delay	Area
XOR	3	5
2:1 MUX	3	4
Half Adder	3	6
Full Adder	6	13

III. BASIC STRUCTURE OF BEC LOGIC

The basic work is to use Binary to Excess-1 Converter (BEC) instead of RCA with Cin=1 in the regular CSLA to achieve lower area and power consumption. The main advantage of this BEC logic comes from the lesser number of logic gates than the n-bit Full Adder (FA) structure As stated above the main idea of this work is to use BEC instead of the RCA with Cin=1 in order to reduce the area and power consumption of the regular CSLA. To replace the n-bit RCA, an n+1-bit BEC is required. A structure and the function table of a 4-bit BEC are shown in Figure.2 and Table .2, respectively.

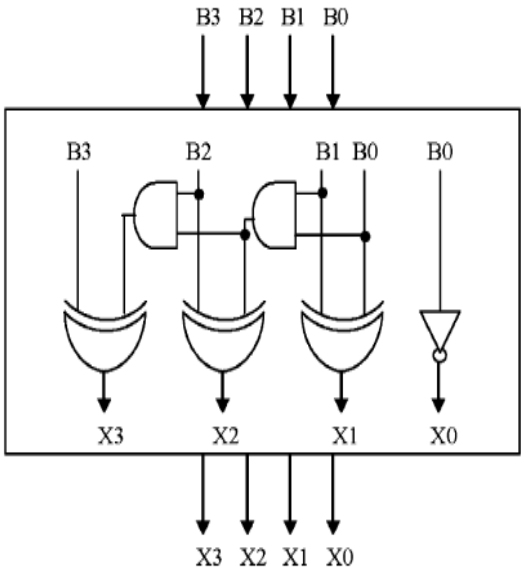


Figure 2: 4-Bit BEC

The Boolean expressions of the 4-bit BEC are

X0 = ~B0 (1)
X1 = B0^B1 (2)
X2 = B2^ (B0 & B1) (3)
X3 = B3^ (B0 & B1 & B2) (4)

Table.2 Function table of the 4-bit BEC

B[3:0]	X[3:0]
0000	0001
0001	0010
|	|
	|
|	|
1110	|
1111	1111
	0000

IV. BASIC STRUCTURE OF REGULAR 16-BIT CSLA

The structure of the 16-b regular SQRT CSLA is shown in Figure 3. It has five groups of different size RCA. The steps leading to the evaluation are as follows.

1) The group2 has two sets of 2-b RCA. Based on the consideration of delay values of Table I, the arrival time of selection input c1[time (t)=7]of 6:3 mux is earlier than s3[t=8]and later than s2[t = 6] Thus, sum3[t = 11] is summation of s3 and mux [t=3] and sum2[t=10] is summation of c1 and mux.

2) Except for group2, the arrival time of mux selection input is always greater than the arrival time of data outputs from the RCA's.Thus, the delay of group3 to group5 is determined, respectively as follows:

{c6, sum[6:4]} = c3[t=10]+mux (5)
{c10, sum[10:7]} = c6[t=13]+mux (6)
{cout, sum[15:11]}=c10[t=16]+mux. (7)

3) The one set of 2-b RCA in group2 has 2 FA for Cin=1 and the other set has 1 FA and 1 HA for Cin=0. Based on the area count of Table I, the total number of gate counts in group2 is determined as follows:

Gate Count = 57 (FA+HA+MUX) (8)
FA=39(3*13) (9)
HA=6(1*6) (10)
MUX=12(3*4) (11)

4) Similarly, the estimated maximum delay and area of the other groups in the regular SQRT CSLA are evaluated and listed in Table 3.

Table 3

Group	Delay	Area
2	11	57
3	13	87
4	16	117
5	19	147

V.DELAY AND AREA EVALUATION OF MODIFIED CSLA

The structure of the proposed 16-b SQRT CSLA using BEC for RCA with Cin=1 to optimize the area and power is shown in Fig. 4. We again split the structure into five groups. The steps leading to the evaluation are given here.

1) The group2 has one 2-b RCA which has 1 FA and 1 HA for Cin=0. Instead of another 2-b RCA with Cin=1 a 3-b BEC is used which adds one to the output from 2-b RCA. Based on the consideration of delay values of Table I, the arrival time of selection input c1[time(t)=7] of 6:3 mux is earlier than the s3[t=9] and c3[t=10] and later than the s2[t=4]. Thus, the sum3 and final c3 (output from mux) are depending on s3and mux and partial c3 (input to mux) and mux, respectively. The sum2 depends on c1 and mux.

2) For the remaining group's the arrival time of mux selection input is always greater than the arrival time of data inputs from the BEC's. Thus, the delay of the remaining groups depends on the arrival time of mux selection input and the mux delay.

3) The area count of group2 is determined as follows:

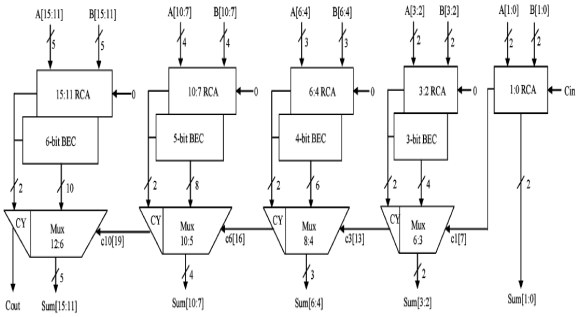
Gate count =43(FA+HA+MUX+BEC) (12)
FA= 13(1*13) (13)
HA=6(1*6) (14)
AND=NOT=1 (15)
XOR=10(2*5) (16)
MUX=12(3*4) (17)

4) Similarly, the estimated maximum delay and area of the other groups of the modified SQRT CSLA are evaluated and listed in Table 4.

Table 4

Group	Delay	Area
2	13	43
3	16	61
4	19	84
5	22	107

Comparing Tables 3and 4, it is clear that the proposed modified CSLA saves 113 gate areas than the regular CSLA, with only 11 increases in gate delays.



VI. SIMULATIONS AND EXPERIMENTAL RESULTS

The proposed solutions have been designed using Xilinx. The area-efficient carry select adder can also achieve an outstanding performance in power consumption. Power consumption can be greatly saved in our proposed area-efficient carry select adder because we only need one XOR gate and one INV gate in each summation operation as well as one AND gate and one OR gate in each carry-out operation after logic simplification and sharing partial circuit. Because of hardware sharing, we can also significantly reduce the occurring chance of glitch. Besides, the improvement of power consumption can be more obvious as the input bit number increases.

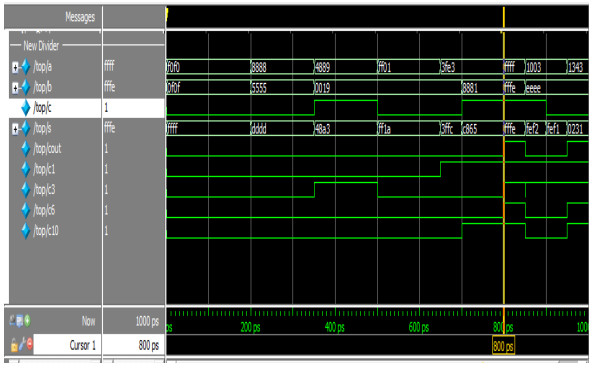


Fig 3. Simulated Results

The conventional carry select adder performs better in terms of speed. The delay of our proposed design increases lightly because of logic circuit sharing sacrifices the length of parallel path.

However, the proposed area-efficient carry select adder retains partial parallel computation architecture as the conventional carry select adder design; the delay increment of the proposed design is similar to that in the conventional design as the input bit number increases. We also simulated the delay performance in the proposed area-efficient adder and conventional carry select adder with 4, 8, 16, and 32-bit respectively.

VII. CONCLUSION

A simple approach is proposed in this paper to reduce the area and power of SQRT CSLA architecture. The reduced number of gates of this work offers the great advantage in the reduction of area and also the total power. The compared results show that the modified SQRT CSLA has a slightly larger delay (only3.76%), but the area and power of the 128-bit modified SQRT CSLA are significantly reduced by 17.4% and 15.4% respectively. The power-delay product and also the area-delay product of the proposed design show a decrease for 16, 32,64 and 128-bit sizes which indicates the success of the method and not a mere tradeoff of delay for power and area. The modified CSLA architecture is therefore, low area, low power, simple and efficient for VLSI hardware implementation.

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CONGESTION CONTROL IN MANET WITH HIGH SECURITY

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Abstract:-Mobile ad hoc network is wireless network of mobile nodes, with no centralized management and control. Network congestion has a severe impact on the throughput, routing and lifespan, etc. of a network. Congestion & security issues in mesh networks are the problems which have been addressed by many researches. Network based congestion avoidance which involves managing the queues in the network devices is an integral part of any network. Most of the mobile networks use Droptail queue management where packets are dropped on queue overflow which is global synchronization problem. Especially in MANETs, packet loss results in increased overhead in terms of energy wasted to forward a packet which was dropped, additional energy required to retransmit this packet.

Active Queue Management (AQM) [1] has been a solution to the global synchronization [2] problem in wired networks. However, if AQM is to be deployed in MANETs, it should be lightweight, proactive and easy to implement as mobile networks are resource constrained in terms of memory, processing power and battery life. This paper presents a new algorithm to avoid congestion and involve security using a queue threshold and packet count mechanism in conjunction with inclusion of passphrase, which are calculated on individual nodes and therefore they do not impose any bandwidth issues.

We design a simple and efficient hop-by-hop congestion control mechanism which relies on local information available at nodes to detect congestion and modifies 802.11e channel access parameters to adjust the MAC transmission rate of congested flows to a value that removes the congestion. We use simulations to show that it results in significant performance gain while maintaining the fairness properties of the underlying MAC. This research is focusing on considering both the security of the network and congestion control.

Keywords: *manet, DSDV, queue threshold, passphrase, ADHOC network, wireless routing.*

1. INTRODUCTION

Wireless Ad Hoc network, with shared wireless channel to transmit messages, faces complicated wireless transmission environment, which will bring in a series of new problems, especially with routing, congestion being one of the problems. Generally speaking, for wireless Ad Hoc network, the calculation of the congestion control of one certain link should not just be based on the congestion of the link itself, instead, it should respond according to the general congestion message that interrupts the link. Therefore, to solve the routing congestion which might come up with the Ad Hoc network, the following issues should be taken into consideration: ① the intrinsic properties of wireless multiple-hop links; ② the time varying of network topology; ③ dynamic end users. [1]

More and more advancements in wireless communication technologies and availability of less expensive, small, portable computing devices led to mobile computing and its applications. A "mobile ad hoc network" (MANET) [3] consists of mobile nodes connected by wireless links. The union of which forms an arbitrary graph. The nodes are free to move randomly thus, the network's topology may change rapidly and unpredictably. [2]

During the last few years Wireless mesh networking has become increasingly ubiquitous and the preferred mechanism to provide coverage to campuses, small towns, etc. In Wireless mesh networks a subset of the wireless nodes are connected to the wired backbone and provide connectivity to the other nodes in the network through multi hopping over the wireless links. As a natural extension to WLANs, the medium access mechanism of choice for these networks is the CSMA/CA based IEEE 802.11 distributed MAC protocol.

While IEEE 802.11 MAC protocol was designed for and provides a reasonable performance in a single hop network, it results in severe performance degradation in a multi-hop setting. In a single hop 802.11 network, all nodes contend for the channel with equal opportunity and act as greedy as possible to increase their one hop throughput which directly results in increase of the network aggregate throughput. In a multi-hop network, however, the greedy behavior of the nodes may result in service degradation as the packets transmitted by a source might not reach their final destination due to network congestion. In a congested network packets might be dropped in an intermediate node. Such a behavior will result in waste of the system resources used to deliver the packets to the intermediate node.

A congestion control scheme insures that the nodes place only as many packets on the wireless channel as can be delivered to the final destination. End-to-end schemes like TCP are the preferred solution in the Internet due to their scalability characteristics. In a wireless mesh network, however, a hop-by-hop congestion control scheme can be more appropriate as such a network does not have the scalability problems

of the large-scale Internet. A layer 2 hop-by-hop solution reacts more quickly to congestion and is effective regardless of the traffic type.

The idea of Ad Hoc Networking is gaining popularity with the recent proliferation of mobile computers like laptops and palmtops. Minimal configuration, absence of infrastructure and quick deployment make Ad Hoc Networks convenient for emergency operations. Since host mobility causes frequent and unpredictable topological changes, the formation and maintenance of Ad Hoc Network is not only a challenging task and also it is different from the wired networks.

Ad Hoc Routing Protocols are classified into Proactive and Reactive type. Proactive routing protocols use the periodic update of information to know about the current topology while the reactive routing protocols create a route to a destination on demand basis. Few of the proactive protocols are DSDV [5], WRP [6], DBF [7] etc. while DSR [8], AODV [9], ABR [10] are few examples of reactive protocols. Even though no protocol is superior to the other, but the previous studies indicate that in general reactive protocols exhibit better performance than proactive protocols. [4]

This paper proposes a new algorithm to control congestion and security both in MANET by the use of queue threshold levels on each node along with a passphrase added on each node to involve the authentication based communication. For implementation NS2 simulator is being used with DSDV protocol for routing.

Rest of this paper is organized as follows:

Section 2 describes the DSDV protocol along with various ADHOC networks. Section 3 deals with proposed algorithm and section 4 shows the results generated from simulations.

2. EXISTING SYSTEM

2.1 Wireless local area network (WLAN)

A wireless local area network (WLAN) links two or more devices using some wireless distribution method (typically spread-spectrum or OFDM radio), and usually providing a connection through an access point to the wider internet. This gives users the mobility to move around within a local coverage area and still be connected to the network.

A wireless LAN is based on a cellular architecture where the system is subdivided into cells, where each cell (called Base Service Set or BSS*) is controlled by a Base station (called Access point or AP).

2.2 Wireless Mesh Network (WMN)

WMNs, generally described, consist of two types of nodes: mesh routers and mesh clients. The difference between a conventional router and a mesh router, apart from the mesh functionality, is that the latter can achieve the same coverage with lower transmission power through multi-hop communications. As regards to mesh clients, they also have necessary mesh functions and can thus behave as a router. On the other hand, gateway or bridge functions do not exist in these nodes. Additionally, mesh clients have only one wireless interface.

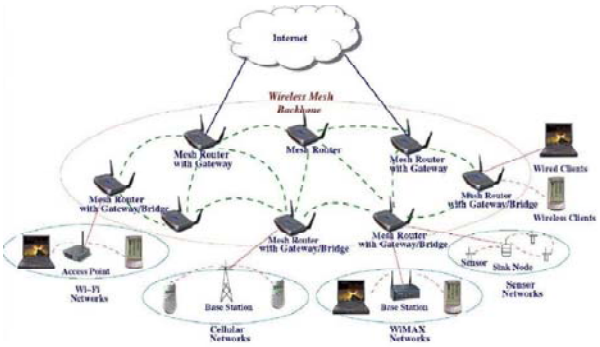

Figure 1: Infrastructure/backbone WMNs.

3. HCF CONTENTION-BASED CHANNEL ACCESS (EDCA)

The EDCA mechanism provides differentiated, distributed access to the WM for STAs using eight different UPs. The EDCA mechanism defines four access categories (ACs) that provide support for the delivery of traffic with UPs at the STAs. The AC is derived from the UPs. For each AC, an enhanced variant of the DCF, called an enhanced distributed channel access function (EDCAF), contends for TXOPs using a set of EDCA parameters from the EDCA Parameter Set element or from the default values for the parameters when no EDCA Parameter Set element is received from the AP of the BSS with which the STA is associated, where

a) The parameters used by the EDCAF to control its operation are defined by MIB attribute table at the AP and by MIB attribute table at the non-AP STA.

b) The minimum specified idle duration time is not the constant value (DIFS) as defined for DCF, but is a distinct value assigned either by a management entity or by an AP.

Wireless Networks has multiple security requirements as there are multiple ways security can be compromised on such networks.

1. Transport Security
2. Data Forwarding Security
3. Routing Security
4. Access Security

Due to the changes of the topology of WMN, the mesh network is vulnerable to attack in all kinds of way. Although the frame of WMN system originates from WLAN and Ad Hoc network, and also many program have been proposed on the WLAN and Ad Hoc Security, the structure of the different characteristics

derivative more security issues. Recently, the main security technologies of WLAN are access control, authentication, encryption, data integrity and non-repudiation, etc. WEP (wired equivalent privacy), WPA (Wi-Fi protected access) and 802.11i are the major protocol standards. Combined security mechanisms in WLAN and Ad Hoc, aiming at the security threats network and security issues faced in practice various researches have been proposed.

A few existing security mechanisms are:

1. Message Protection
2. Secure Forwarding Mechanism
3. Secure Routing
4. The Mechanism of Node Authentication
5. Network Monitoring and Intrusion Detection etc.

Congestion Control

Although IEEE 802.11 wireless mesh networks (WMNs) provide low-cost extension of wireless Internet access coverage, the wide adoption of WMNs is limited due to the bandwidth scarcity. One of the important mechanisms to fully utilize the scarce bandwidth is congestion control. Especially, congestion detection, a module of congestion control, plays an essential role since the source rates should be adapted according to the detected network congestion. Due to the various dynamics of IEEE 802.11 WMNs, wireless congestion control mechanisms usually use complicated combination of various metrics, such as channel-idle time, interface queue length and average linklayer retransmission in intermediate nodes. However, this metric combination requires the sophisticated design of congestion control mechanism and eventually leads to the optimization difficulty. Thus, we propose a simple-yet-effective congestion detection metric, CORE (COngestion Residual timE). CORE measures the expected time of congestion-loss occurrence on the interface queue between IP and MAC layers. We obtain CORE by measuring the residual queue length and the slope of the queue length and then refining them with signal processing schemes (e.g., triangular moving average and linear regression).

Moreover CORE provides over-generated rate information that is essential to the congestion control mechanisms. By taking a series of experiments, we verify that CORE accurately predicts the time of congestion-loss occurrence as well as the over-generated rate.

3. PROPOSED ALGORITHM

In this research a new algorithm has been proposed, which will use a queue management technique along with secured communication over the MANET. It will work as follows:

1: Every Node will keep a new variable to maintain the queue status and will inform about it to its previous nodes (downstream nodes).

2: Every downstream node will use this variable to decide whether to send more packets to its upstream nodes or not.

3: If the status of the upstream nodes goes worst due to congestion in the network, originator of the traffic will slow down to avoid congestion.

4: Security of the communication will be based on authentication technique i.e. every node will keep the security variable to decide whether the upstream node is trustworthy or not and will communicate with it if the upstream node is 100% trustworthy.

5: Security involvement is done on the basis of a local database technique which will be updated dynamically using a TIMER, by evaluating the security status of the upstream node. This is done by using an authentication algorithm based on a pass phrase which will be distributed initially before communication starts. If a node has a pass phrase then it will be able to communicate over the network.

6: Both the pass phrase and queue status will be updated by every node to its downstream nodes.

7: Pass Phrase will be string involving some common characters and some unique characters for every node.

4. RESULTS & DISCUSSION

All Existing work focused on one of the techniques either congestion control or security issues in MANET. This work proposes a dual mechanism which is dynamically detecting both security threats and possible congestion on the network. For this a local database mechanism is being proposed which will keep the details of the neighbors and will allow communication on the nodes which are both secured and congestion free. This will increase the memory head on the node but will reduce the chances of data theft and congestion.

Congestion:

Queue is used by the author in base paper to measure congestion on interface basis for the time taken to in occurrence of congestion.

In this proposed algorithm, we are introducing a threshold point to find the queue status and starts specifying to the downstream nodes to slowdown/stop sending data to it when threshold is reached.

Security:

For security existing algorithms has been studied and analyzed by the author to find the better security implementation.

In this algorithm, we are keeping track of malicious nodes using a local database which will eliminate

security threats completely from the system, as no malicious nodes will get the data from the neighbors.

Results:

The proposed algorithm will have high security and congestion control mechanism; we will be providing graphical outputs for throughput, packet loss ratio and delay for representing my results in comparison with the existing systems i.e. without my algorithm applied.

Comparison with Existing: All existing algorithm either provide congestion control or security mechanism and study there comparison is performed with their similar systems. We are proposing a mixed algorithm and expecting to get better or moderate level performance of the system with high security.

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YARN DIAMETER MEASUREMENT USING IMAGE PROCESSING

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Abstract: - Yarn quality depends upon its certain physical properties like yarn strength, unevenness, heaviness and geometrical parameters like diameter. This paper presents the different methods used for yarn diameter measurement. The traditional method used for yarn diameter measurement is rod method and travelling microscope method. The electronic methods used for yarn diameter measurement are optical and capacitive sensor method. These methods are based on sensor characteristics for measurement of yarn unevenness and yarn irregularity and differ in the principle of measuring yarn diameter and the logic of evaluation of yarn irregularity. So the survey shows that using image processing technique to measure the yarn diameter measurement may lead to achieve precise results than that of the traditional and existing electronic methods.

Key Words*- yarn, strength, unevenness, heaviness, optical sensor, capacitive sensor, image processing.*

I. INTRODUCTION

The correct and accurate evaluation of yarn is a subject of major importance to the textile industry, as the final fabric quality directly depends on the yarn quality. The most important unit of the textile industry is the quality analysis and control of yarn and fabric quality. Besides,it is observed that nearly 10% of industrial expenditure occurs in the quality control of fabrics.It is a well known fact that the quality of a fabric is tied to the non-uniformity of fabric properties. Fabric property is dependent on yarn quality. Yarn quality depends upon its certain physical properties like yarn strength, unevenness, heaviness and geometrical parameters like diameter. The yarn configuration example is shown in figure 1.

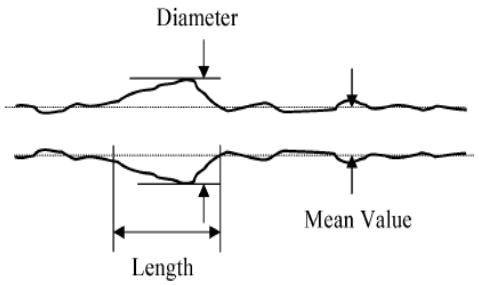

Fig.1. Yarn configuration example

The variation in the linear mass of textile yarns is a key quality parameter in the textile industry. Yarn irregularities are generally classified as follows [1]:

• Thick places–where the local linear yarn mass is well above the average value (normally by at least 35%).

• Thin places–where the local linear yarn mass is well below the average value (normally by at least – 30%).

• Neps–for especially large local linear mass increases (at least 100%).

Yarn diameter is one of the important fabric parameter which decides the properties viz. cover factor, porosity, thickness, air permeability etc [2]. There are traditionally two methods used for yarn diameter measurement viz. rod method and traveling microscope method. Also the electronic methods for the same purpose are optical and capacitive sensor method. These methods are based on sensor characteristics for measurement of yarn unevenness and yarn irregularity. These instruments differ in the principle of measuring yarn diameter and the logic of evaluation of yarn irregularity. But the results obtained by these methods are not precise as they are prone to errors due temperature variation, pressure variation and humidity. An alternative to these methods is yarn diameter measurement using image processing algorithms.

The methods for the yarn diameter measurement are shown in fig.2.

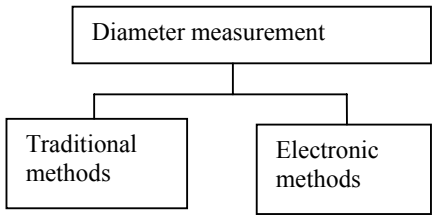

Fig.2. Types of yarn diameter measurement methods

This paper presents a survey of important types of diameter measurement methods such as traditional and electronic methods. The traditional method are composed of rod method and travelling microscope method proposed by, J.E.Booth, B.P.Saville et al[7],[8].The electronic methods are composed by using optical and capacitive sensor methods; yarn properties measurement by Jana voborova et al.; automatic yarn characterization system by V.H.Carvahlo et al.; comparative study of yarn diameter measurement using optical and capacitive sensors by V.H.Carvalho et al.; yarn diameter measurement using coherent optical signal processing

by V.H.Carvalho et al. The rest of the paper is structured as follows. Section II describes theory on diameter measurement using traditional and electronic methods .Proposed work is presented in section III. Finally conclusion is drawn in section IV.

II. THEORY ON DIAMETER MEASUREMENT TYPES

A. Traditional methods

Traditional methods of yarn diameter measurement are most popular and robust. The methods have been investigated in very early days at the time where no electronic methods have raised up.Traditional methods works for all types of yarn such as cotton, polyester, shefon etc.

These methods are even also used at some industries and institute levels. The types of traditional methods are discussed below.

a. Rod Method

In rod method yarn is wound on the glass rod of known diameter. Care is taken so that no yarn turn overlaps each other. Then the diameter is calculated by dividing the length of yarn covered by total number of turns and is given by [9],

$$D = L_{yr} / N \qquad (1)$$

Where, D = diameter of yarn,

L_{yr} = Length of yarn turn,

N =number of turns of yarn

b. Travelling Microscope Method

In this method the yarn is kept under the travelling microscope. The microscope has vernier caliper for measurement of yarn diameter. After yarn image is magnified and focused, the reference of microscope is adjusted on the first edge of the yarn along the diameter and corresponding reading of caliper scale is noted as d_1. Next the microscope reference is adjusted to second edge of the yarn along the diameter and again the caliper reading is noted as d_2. In such manner successive readings are taken. The diameter is then calculated by obtaining the difference between d_1 and d_2 [10].

$$D = d_1 - d_2 \qquad (2)$$

B. Electronic Methods

The electronic methods are most widely used now days for detecting yarn irregularities, hairiness and yarn diameter.

a. Optical Sensor

A coherent optical sensor technique is used by Vitor H. Carvalho et al to quantify yarn irregularities associated with diameter variations which are linearly correlated with yarn mass variations . Moreover, a diameter characterization was performed under real-world conditions for three types of yarns and a correlation with capacitive measurements is also presented.

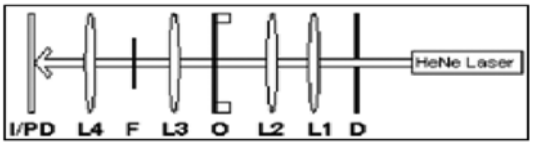

Fig3.Optical setup for yarn diameter measurement

The optical setup is shown in figure 3. The setup consists of light source (HeNe laser),diaphragm D, two plano-convex lenses L1 and L2 with focal lengths of 60 mm, object holder O, Lens L3 for a spatial Fourier transform of the light transmitted through the object plane , focal plane (F), and the final lens L4 to control the size of the image. The results obtained have been verified using image analysis controlled by the final lens L4 with a focal length of 60 mm.

Three 100% cotton yarns with different linear masses of 49.17, 62.00, and 295 g/km were analyzed. To ensure a 1 mm analysis, a window aperture, in the photodiode, with an area of 1mm*4mm , was built. However, as the optical hardware produced a reduction of 44% in the image plane, a 1 mm high window in the image plan corresponds to an effective height of 1mm / 0.66=1.52mm in the object plane. A 4 mm wide window was used, to allow for a possible oscillation of the sample yarn. However, the yarn position was very stable, and it can be said that a high percentage of samples were acquired in the center of the laser beam where the window was placed, allowing reliable measurements (laser zone with high linearity). They have acquired 6000 samples in steps of 1 mm for each yarn. The value for calibration corresponding to the signal without yarn was 2.63 V. Moreover, as this method does not rely on the coherence property of the light source, it could be generalized to other different sources, as a conventional incoherent light source as a LED [3].

In the paper presented by Filomena O Soares et al have used an optical sensor to perform yarn analysis based on an absolute measurement principle [algebraic difference between the quantity of light received without yarn and that received with yarn for each analyzed sample. (fig.4).

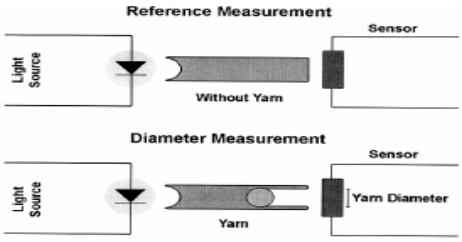

Fig.4 Diameter measurement principle using optical sensor

A coherent light source such as laser or laser diode is used. They have used the same optical setup for diameter measurement as discussed above. The hardware is produced to obtain a voltage signal related to the yarn diameter.

It is observed that the laser light, which is blocked by the yarn produces black shadows in the image plane .So they have considered the image without yarn as a reference (no blocked regions), and subtracting the image with yarn is obtained, which depends on its diameter. The hairiness shadows are removed with the help of low pass spatial filter. A cotton yarn of 295gm/km is used for 1mm samples [4].

b) Capacitive sensors

A capacitive sensors/testers are used for the purpose to measure yarn mass and yarn diameter .The analysis has made for a cotton yarn within a linear mass of 295 g/Km by Vitor H. Carvalho et al. A system uses capacitive testers along with optical signal processing for to eliminate hairiness while measuring diameter .A sensor allow 1-4 mm yarn mass measurement. Figure 5 shows the principle used for diameter measurement.

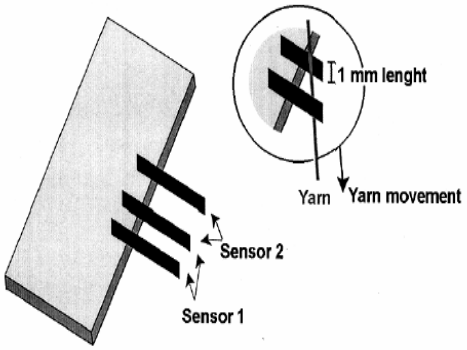

Fig.5. diameter measurement principle using capacitive sensor

Parallel plate capacitive sensors are formed by using two electrodes of cross section area S, separated by a distance d. The capacitance obtained depends on the plates section, their distance and dielectric susceptibility of material between the plates. A relationship has established between the capacity and the yarn mass, as the dielectric susceptibility between plates (yarn) will vary, depending on the yarn composition and diameter. The capacitance variation ids converted into a voltage signal and amplified. The capacitance has measured by using the equation:

$$C = \epsilon 0\ \epsilon r\ S/d \qquad (3)$$

Equation (3) shows that if the dielectric constant (ϵr) is changed , the capacity also changes. This phenomenon occurs when the yarn is inserted between two the plates. Then a relationship is established between capacity and yarn mass. However the use of capacitive sensors has some drawbacks. They are very sensitive to humidity levels, causing some troubles as the dielectric constant of humid is inferior to the dry air .This situation happens frequently and results in a varying voltage level of the sensor in the absence of yarn between the plates, depending on the local humidity.To overcome this problem an integrated amplification circuit is used to auto correct the capacitive sensor.[4]

The system developed by Vitor Carvalho et al. evaluates a capacitive tester which uses 1mm parallel plate capacitive sensor for yarn mass as well as diameter measurement. The system is named as Yarn System Quality (YSQ) which uses an integrated circuit to assure higher robustness to variation in temperature, air humidity, and pressure.

The sensor capacitance variation is converted into a voltage signal and then amplified. A second order low pass filter attenuates high frequency interference that may come from an internal oscillator and the other external noise. The signal output is then acquired by the data acquisition board and monitored in PC , using LabVIEW software application.

The YSQ apparatus ensures precise measurement of yarn mass, diameter as well as the accurate periodic error correction. The YSQ characteristics will increase the quality of the yarn produced, which results in a superior production efficiency. The most important advantage of this system is its compactness [1].

III. PROPOSED WORK

For the proposed yarn diameter measurement system the images of cotton yarn sample will be captured by means of high resolution camera. These images are then subjected to preprocessing operations viz. filtering by median filter, Wiener filter etc[11]. For the image analysis Morphological operations/ FFT may be performed to find the object of interest in the image after removing yarn protrusions.

After finding the region corresponding to object of interest i.e. yarn region, an appropriate algorithm such as blob analysis could be applied to measure yarn diameter in terms of pixels.The computed diameter can then be compared with the yarn database for finding the accuracy of yarn diameter obtained by the proposed image processing algorithm. Further this algorithm can be extended to detect yarn defects such as thin and thick places.

IV. CONCLUSION

Yarn diameter is an important determinant of many fabric parameters and properties. In this paper we have reviewed different types of methods which are used for yarn diameter measurement. There are many established techniques and instruments to measure and analyze yarn irregularity, diameter and

variability. They are based on different principles governing the measurement methods and using different types of sensors. The evaluation of data is also different. They are accurate in performing the function efficiently in their own domain.

However, the two techniques could not be considered equal or absolutely equivalent, as an absolute mass measurement requires always a capacitive measurement due to the different yarn geometrics and material density used. But it is found that with the diameter measurement it is possible to determine the irregularity intervals of a given yarn. Moreover, by adjusting the optical imaging system, yarn sections with a length inferior to 1mm could easily be sampled, enabling measurements with a higher resolution.

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DETECTION OF QRS USING WAVELET PACKET TRANSFORM

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Abstract:- ECG is made up of P, QRS, T wave. Intervals and amplitudes of these waves give the information related to cardiac disease. This paper contains automatic ECG signal analysis using wavelet packet transform. The first step is QRS point detection in ECG signal. Then squaring, window integration and frame creation of each QRS complex. Then calculate set on point and set off point from each QRS complex. Then find time interval of each QRS complex. The database has been collected from MIT-BIH arrhythmia database. The results of QRS complexes is compared with MIT-BIH arrhythmia database and decides the patient has which cardiac disease. Here these results are fed to neural network to classify each QRS complex and decides the patient is normal or arrhythmic.

Keywords:-*QRS detection, ECG analysis, R wave* **.**

I. INTRODUCTION

In daily routine each person becomes so busy that he can't get sufficient time for regular heart check-up. Heart disease checking on computer by ECG analysis becomes popular. The graphical representation of electrical voltages generated during cardiac activity is known as ECG (Electro Cardio Graph). It shows the rhythemic electrical depolarization and repolarization of the atria and ventricles. One cardiac cycle of ECG is shown in fig.1. ECG signal, its shape, time interval and amplitude gives more information about the actual status of heart. The ECG signal consist of P wave, QRS complex , T wave. These are the important weapons for diagnosis of cardiac disease[1].In wavelet packet transform, there are several frequency bands. These are suitable for the signals with changing frequencies according to the change of the time along with the property fro elimination.

This paper shows automatic ECG analysis using wavelet packet transform along with signal squaring, window integration, frame creating to cover each cycle of ECG signal. It helps to calculate set on points, set off points, time intervals within QRS complexes, T waves and P waves. Feature extraction of ECG signal is also important task for almost all automated ECG analysis algorithm. Feature extraction of ECG signal, contain many characteristic point. With the help of these characteristic points, we can detect wheather patient has cardiac problem or not[9].

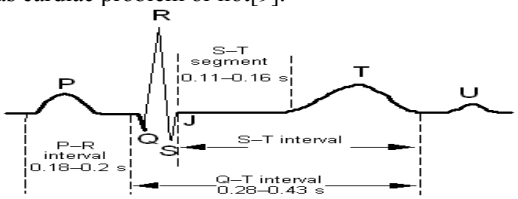


figure.1 The fiducial points on a typical ECG provide diagnostic information such as the QRS width, for evaluating the pacing and conduction phases of the heart.

II. PROBLEMS WITH PREVIOUS METHODS:

Again bandpass filtering and temporal filtering of the signals are used for R wave detection. Here threshold value is calculated. From that threshold value number of R waves are detected[8]. This method is very tedious, time consuming and has large calculation. At the end it checks only number of R waves. To overcome this problem, number of QRS are detected to check cardiac disease. The selection of bandwidth of the filter is not simple decision[3,4]. A number of techniques have been attempted to use wavelets for QRS complex detection to remove some drawbacks[11-14]. Here our procedure using Rbio3.1 algorithm is used.

III. THEORIES

A. Wavelet packet transformation

With the help of wavelet packet transform , signal is divided into two parts- Lower frequency and higher frequency. Low frequency part is again divided into lower and higher frequency section. Wavelet packet transform of signal f(x) is as shown in equation (1), (2)[9].

$$\varphi_{j+1}^{2p}(t) = \sum_{n=-\infty}^{\infty} h[n]\, \varphi_j^p(t - 2^j n) \text{ ---------(1)}$$

$$\varphi_{j+1}^{2p+1}(t) = \sum_{n=-\infty}^{\infty} g[n]\, \varphi_j^p(t-2^j n) \text{ ----------(2)}$$

$$h[n] = < \varphi_{j+1}^{2p}(u)\,,\, \varphi_j^p(u-2^j n) > \text{ ----------(3)}$$

$$h[n] = < \varphi_{j+1}^{2p+1}(u)\,,\, \varphi_j^p(u-2^j n) > \text{ ----------(4)}$$

where $\varphi(t)$ is wavelet packet with scale of j tree of p branch and p is and binary within the range

$$0 \le p \le (2^j - 1)$$

h[n] is a set of Wavelet packet low-pass filter coefficients as shown in (3)

g[n] is a set of Wavelet packet high-pass filter coefficients as shown in (4)

By using wavelet packet transform, binary tree decomposition is shown as follows[9].

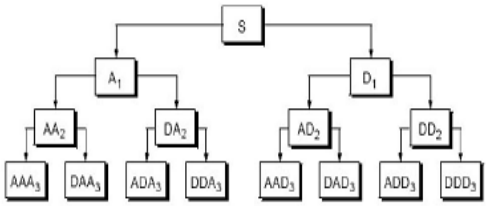


figure.2 Binary Tree Decomposition of Wavelet Packet Transform

B. Selection of wavelet filter co-efficients

ECG signal looks like a sine wave. It has positive and negative peaks. From this signal we detect QRS. QRS signal has highest slope and has a characteristic shape. Here Spline wavelet is used because this wavelet has symmetrical function like QRS. The higher order of Spline wavelet results in sharper frequency response. In this paper, for edge detection, quadratic Spline wavelet is used. This wavelet family can be used for edge detection of signal and images, and it's results are compared with cany edge detection. Cany edge detection is the best edge detection without using artificial neural network.

C. Detection of QRS complex

Fig.3[9]shows steps for detection of QRS complex for number of ECG signals. Initially take ECG data. It is decomposed by wavelet packet transform. Then squaring of the signal is done by following equation. $Y(n)= [x(n)]^2$

Lmin is the first crossing point between squaring signal and modulus of signal. This is onset point of QRS . Second crossing point between squaring signal and modulus of signal. This is offset point of QRS . This is shown in fig.2[9]

Window integration and frame creation is done after squaring signal. It is shown in fig.5[9] Frame covers each QRS of ECG signal. In frame creation, baseline parallel to x axis moves through window. If baseline is less than sinal, frame will cover signal. Then increase frame in both sides by 10ms to cover onset and offset of QRS.

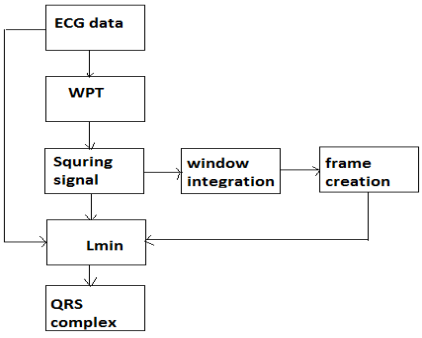


Figure.3 Steps for ECG Analysis to Detect Parameters within Each ECG Wave

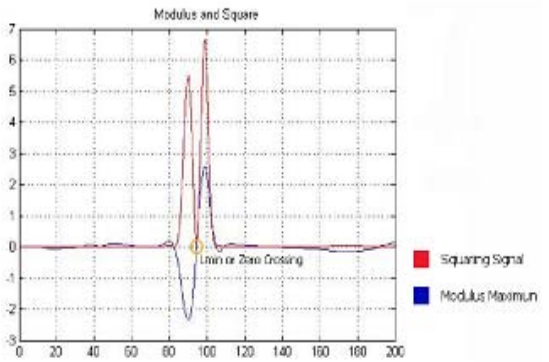


figure.4 Pairs of Modulus Maximum and the the Modulus Maximum After Squaring.

Position of R wave, onset and offset point is same as position of Lmin, frame respectively. Then compare result of QRS with frame and Lmin of each ECG record which is taken from database. Therefore starting and ending point of frame gives Q and S wave by comparing with iso electric line. It is shown in fig. 6.[9] Similarly procedure to find T and P waves is same as QRS wave. Only difference is that wavelet packet transform is decomposed at 4th scale of lower frequency part.

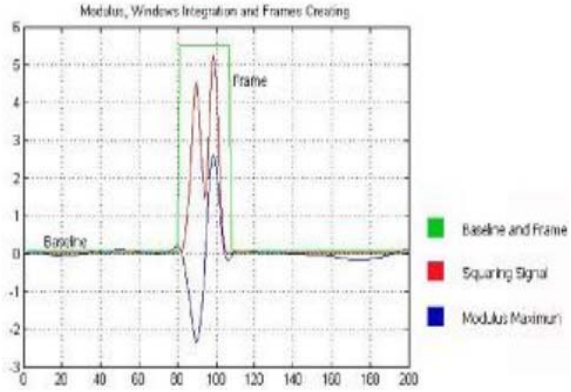


Figure.5 Pairs of Modulus Maximum after passing Window Integration and Frame Creating.

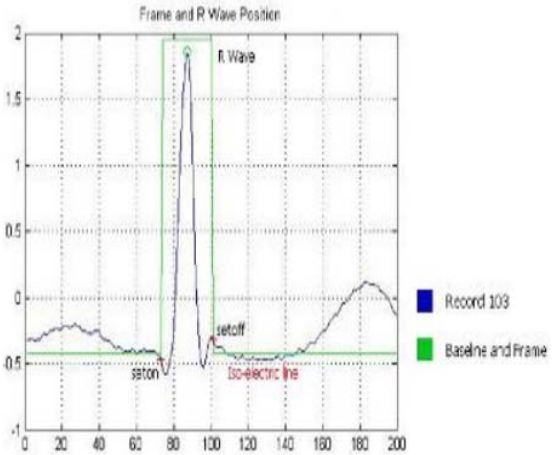


Figure. 6 Position of R wave along with the onset and offset of signal frame.

IV. RESULT

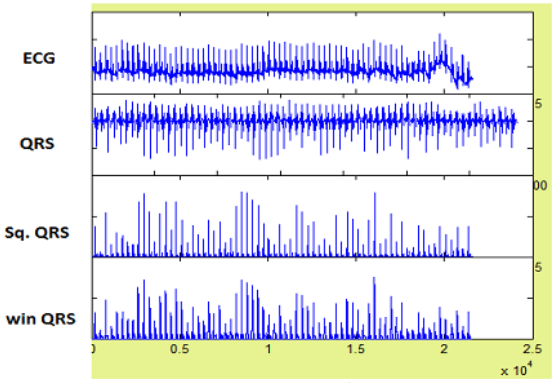
Signal	Algorithm	Bpm
100	Rbio3.1	76
101	Rbio3.1	78
102	Rbio3.1	91
103	Rbio3.1	118
104	Rbio3.1	78
105	Rbio3.1	85
111	Rbio3.1	169

Table1

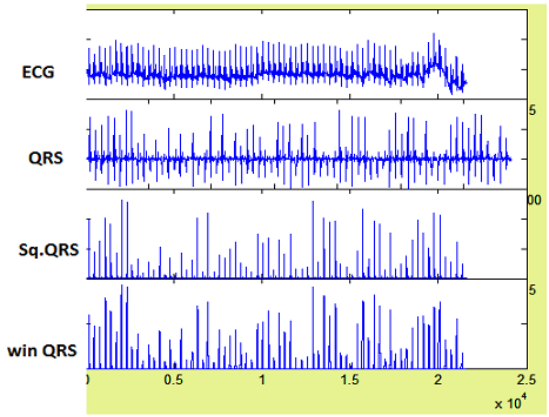
Signal	Algorithm	Bpm
100	Daubechies	74
101	Daubechies	68
102	Daubechies	73
103	Daubechies	70
104	Daubechies	107
105	Daubechies	78
111	Daubechies	71

Table2 bpm- beats per minute.

In one minute Rbio3.1 calculates 76 beats. It shows that number of QRS detected is 76 for signal 100. This algorithm checks more number of QRS than Daubechies and number of samples are precisely checked. While in Daubechies , 74 bpm. This indicate accuracy of Rbio3.1 is more than Daubechies.



Result of Rbio3.1



Result of Daubechis

V. CONCLUSION

This method analyses each QRS from ECG signal. It can not predict result from starting and ending data from previous set of ECG rhythm. Here separate calculation has done for each cycle of ECG. Depending on beats per minute, disease will be checked. Following
result shows for signal 111 by using above two algorithm. By using Rbio3.1 , it shows supraventricular tachycardia and by using Daubechies shows Bundle branch block.

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FINGERPRINT RECOGNITION USING MINUTIA MATCHING AND WAVELET TRANSFORM

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Abstract— Fingerprint recognition is one of the widely used biometric system. The fingerprint possess two main types of features: global features that form a special pattern in the central region of the fingerprint while local features or minutiae details that form ridge and furrow structure. In this paper we represent a comparison between two approaches used for feature extraction in fingerprint recognition. The first approach is using minutia extraction and minutia matching and the second approach is using HAAR wavelet transform. The experimental results show that the wavelet based approach is more efficient and achieves a much better matching performance.

Keywords- *Minutia, wavelet.*

I. INTRODUCTION

Fingerprint recognition is the most important and challenging area in Digital Image processing field. It is the most widely used biometrics method for security purpose. Fig.1 shows the fingerprint image.

Fig1.Fingerprint Image

The strength of the matching algorithm depends on the strength of the extracted features [2].The various approaches for fingerprint matching are-Correlation based, Minutiae based (local features), ridge feature based and image based(do matching based on global features.)The theme of this paper is to compare the two different strategies of a feature extraction. In first strategy, the features are extracted using minutia based approach while in the second approach, the wavelet transformation is applied on the image.

II. PROPOSED METHODOLOGY

A.Minutia Based Approach:

Fingerprint features can be categorized as global and local. Global features are ridge orientation, ridge spacing, core and delta while minutiae are the local features which are extracted by identifying the discontinuities found in ridges [2]. A fingerprint is having a sequence of ridges and valleys. The ridges are the dark lines and valleys (furrows) are the spaces in between them. This method represents the fingerprint by its local features by its terminations and bifurcations. The termination is nothing but the ridge endings while the bifurcation is one where the ridge becomes discontinuous. Fig.2 shows the ridge endings and bifurcations [2].

Fig.2 Ridge endings and bifurcations

In minutia based approach, the fingerprint is represented by the two minutiae parameters-1) x and y coordinate of the minutia point 2)minutia orientation(θ).The overall system flow for this is as shown in fig.3.

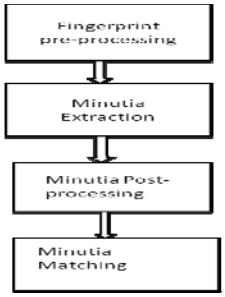

Fig.3 System Flow

The fingerprint pre-processing steps involve binarization and thinning.

Binarization: In this step, the fingerprint image is converted into binary data. The 8-bit Gray fingerprint image is transformed into a 1-bit image with 1-value for furrows and 0- value for ridges.

Thinning: Thinning is the process of reducing the thickness of each line patterns to just a single pixel width. The redundant pixels of ridges are eliminated till the ridges are just one pixel wide .

Fig.4 shows the binarized and thinned fingerprint image.

Fig.4 Binarized and thinned fingerprint image

Minutia Extraction:

In this the fingerprint is represented by its local features- terminations and bifurcations. In general for each 3x3 window, if the central pixel is 1 and has exactly 3 one-value neighbor, then that is termed as a bifurcation. If the central pixel is 1 and has only 1 one-value neighbor, then that is taken as termination.

The concept of inter-ridge width (D) is used which refers to the average distance between two neighboring ridges for minutia extraction. A row of the thinned ridge image is scanned first and all pixels in the row are sum up whose value is one. Then after dividing the row length with the above summation we got D. For more accuracy row scan is done upon several other rows and columns. At last the final D is obtained by averaging all the inter-ridge widths [1].Fig.5 shows the fingerprint image with the extracted minutiae points.

Fig.5 Extracted Minutia points

Minutia Post-processing:

Post-processing step involves the false minutia removal method. Due to the different types of noise present in the fingerprint images, a large number of false minutiae are discovered among the extracted minutiae obtained from the thinned image. This affects the accuracy of matching. Therefore to get accurate results, false minutia must be removed. We applied the special method for the false minutia removal [5].

1) If the distance between one bifurcation and one termination of the same ridge is less than D then remove both of them. D is the average inter-ridge width representing the average distance between two parallel neighboring ridges.

2) If the distance between two bifurcations of the same ridge is less than D, remove the two bifurcations (m2, m3, m8, m10, m11 cases).

3) If the distance between two terminations is less than D and no any other termination is located between the two terminations also their directions are coincident with a small angle variation, then the two terminations are regarded as false minutia derived from a broken ridge and are removed (case m4, m5, m6).

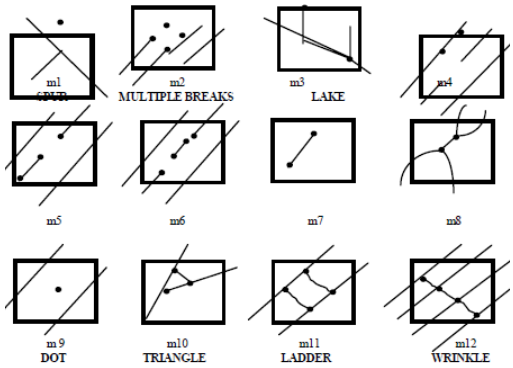

Fig.6 False minutia structures

Minutia Matching:

The matching algorithm determines whether the two minutia sets of the two fingerprint images are from the same finger or not. Alignment based method is used for matching.

This minutia based method requires number of pre-processing steps and hence requires lots of time to extract the minutiae for matching and also has low computational efficiency [3]. This method is basically well suited for 1-many matching. It does not give better results to poor quality images. The people with few number of minutiae details cannot use this system effectively. Hence the second method used in this paper is wavelet based.

B.Wavelet Based Approach:

This method uses wavelet transform. Wavelet transform (WT) can be seen as a transformation that maps the signal to a multi-resolution representation. The fingerprint patterns are matched based on their wavelet domain features which are directly extracted from the grayscale fingerprint image without pre-processing i.e .image enhancement, thinning and minutiae extraction [3]. This method has high computational efficiency and very fast. We have used Haar wavelet for this approach. Haar Wavelets (the shortest) are good for edge detection and reconstructing binary pulses.

Haar wavelet performs an average and difference on pair of values and then shifts over by two values and calculates another average and difference on next pair.

Our method of feature extraction is applied as follows:

1. Detect the reference point (core point) in the fingerprint image.

2. Crop from the fingerprint image in rectangular region centered in the reference point and located inside the fingerprint pattern. In the following we will use the name central sub image for this rectangular region.

3. Compute the wavelet decomposition on the image and find out the wavelet features. Fig.7 shows the wavelet feature extraction using decomposition method.

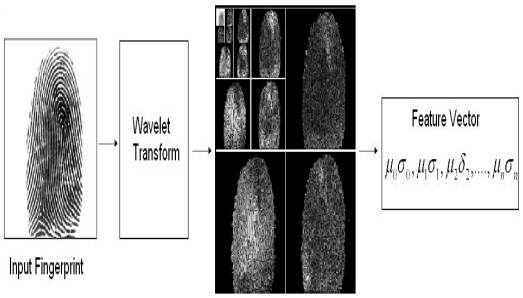

Fig.7 Wavelet feature extraction

In the matching process wavelet statistical features of input (query) fingerprint are matched against wavelet features of template fingerprint stored in feature library using hamming distance [3]. The input fingerprint is compared with all the fingerprints stored in feature library and minimum of all distances is found. This minimum distance corresponds to wavelet Matching Score of the input image which is further used in calculating final matching score[3].

III.EXPERIMENTAL RESULTS

For fingerprint matching system, we have used database from Fingerprint Verification Competition (FVC) 2002. For minutia based approach, we have used 10 fingerprint images of 5 persons(two fingerprints of each person) as it requires very good quality images. For wavelet based approach, we have used 45 fingerprint images of 9 persons (five fingerprints of each person) as it does not require the pre-processing steps. The performance can be evaluated on the basis results are found out on the basis of. False Rejection Rate.

False Rejection Rate (FRR)- A genuine individual is mistakenly recognized as an imposter indivisual and this error rate is called the false rejection rate.

$$FRR = \frac{\text{Number of valid inputs rejected}}{\text{Total number of input images}}$$

Method	Number of input fingerprints	FRR (%)	Accuracy (%)
Minutia Based Approach	**10**	**40%**	**60%**
Wavelet Based Approach	**45**	**24.44%**	**75%**

The experimental results show that the wavelet based approach gives mare accuracy and better performance than minutia based approach.

IV. FUTURE SCOPE AND CONCLUSIONS

The minutia based algorithm gives rich information but due to different problems like number of pre-processing steps, poor quality input images, wet fingers and image distortion, the minutiae extraction is a difficult task. Further these algorithm show very poor performance, if poor quality. The wavelet based approach does not need the pre-processing steps and it also saves the time. The features are extracted directly from the gray scale fingerprint image without preprocessing The wavelet features exhibit valuable properties for matching difficult patterns. We can utilize both the approaches together in order to increase the efficiency. So in future, we can use the hybrid combination of both the approaches.

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ANALYSIS OF PUBLIC KEY CRYPTOGRAPHIC SYSTEMS RSA AND MD5 FOR INFORMATION SECURITY

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Abstract:- Information Security is very important issue in data communication over the public network. In many business sectors secure and efficient data transfer is necessary. To ensure the security to the applications of business, Governments, military, financial institutions, hospitals, and private businesses collect an arrangement of confidential information about their employees, customers, products, research, and financial status. Encryption has come up as a solution, and plays an important role in information security system. This security mechanism uses some algorithms to mix up data into unreadable text which can be only being decoded or decrypted by party those hold the associated key. The RSA cryptosystem is a public-key cryptosystem. It offers encryption and digital signatures. In this paper, we achieve knowledge and performance about RSA and Hash algorithm like MD5 against other algorithms and we create Trust store and key store file which will be used in the java secure socket extension to provide secured transaction between the client and server.

Keywords:-*Encryption, Decryption, Public key infrastructure, public key encryption, RSA and MD5.*

1. INTRODUCTION

Public Key Infrastructure (PKI) is a set of policies and procedures to create a secure information exchange. Encryption is the most effective process to reach data and information security. The translation of data and information into a secret code. The secret key or password is used to read encrypted information and that also enables to decrypt it. Unencrypted data is called plaintext; encrypted data is referred to as cipher text. RSA is one of the oldest and most widely used public key cryptographic systems. It was the first algorithm known to be suitable for signing as well as encryption, and one of the first great advances in public key cryptography. RSA is still widely used in electronic commerce protocols, and is believed to be secure given sufficiently long keys. With the vast increase in technological convenience and freedoms, responsive personal information and business data is more vulnerable to fake behavior than ever before. Information passed from one electronic device to another can be easy to catch, alter and duplicate. In fact, transmissions of many communications technologies are currently unsecured, such as cellular phone activation, pager-to-pager communications and other wireless messaging applications. With the rapidly increasing business and consumer approval of these technologies, however, developers have begun seeking strong and efficient security solutions to protect the responsive information transmitted by the new class of computing and communications devices. The means to this end is a science called cryptography, which provides the basic functions necessary to secure an electronic transaction. For the purposes of information security, there are two basic types of cryptographic systems (commonly known as cryptosystems): symmetric key and public key. In Symmetric keys encryption or secret key encryption, only one key is used to encrypt and decrypt data. In Asymmetric keys, two keys are used; private and public keys. Public key is used for encryption and private key is used for decryption (e.g. RSA). Public key encryption is biased on mathematical function, computationally intensive and is not very efficient for small mobile devices. In Hash Function no any types of keys are used for encryption, it is also called message digests and one-way encryption. Instead, a fixed-length hash value is computed based upon the plaintext that makes it impossible for either the contents or length of the plaintext to be recovered

Hash algorithms are typically used to provide a *digital fingerprint* of a file's contents often used to ensure that the file has not been altered by an intruder or virus. Hash functions are also commonly employed by many operating systems to encrypt passwords. Hash functions, then, provide a measure of the integrity of a file.

I. DES Algorithm

Data Encryption Standard (DES) is the most common Symmetric key cryptography. DES was designed by IBM in the 1970s and adopted by the National Bureau of Standards (NBS) [now the National Institute for Standards and Technology (NIST)] in 1977 for commercial and unclassified government applications. DES is a block-cipher employing a 56-bit key that operates on 64-bit blocks. DES has a complex set of rules and transformations that were designed specifically to yield fast hardware implementations and slow software implementations, although this latter point is becoming less significant today since the speed of computer processors is several orders of magnitude faster today than twenty years ago.

II. AES Algorithm

The Advanced Encryption Standard (AES) is an encryption algorithm for securing sensitive but unclassified material. AES uses 10, 12, or 14 rounds. The key size that can be 128,192 or 256 bits depends on the number of rounds. AES uses several rounds in which each round is made of several stages. To

provide security AES uses types of transformation. Substitution, permutation, mixing and key adding each round of AES except the last uses the four transformations.

III. RSA Algorithm

The RSA cryptosystem is a public-key cryptosystem. It offers encryption and digital signatures (authentication). It was developed Ronald Rivest, Adi Shamir, and Leonard Adleman in 1977. The security of the RSA system is based on the hard problem of factoring a large integer. RSA today is used in hundreds of software products and can be used for key exchange, digital signatures, or encryption of small blocks of data. RSA uses a variable size encryption block and a variable size key. The key pair is derived from a very large number, n, that is the product of two prime numbers chosen according to special rules. Since it was introduced in 1977, RSA has been widely used for establishing secure communication channels and for authentication the identity of service provider over insecure communication medium. In the authentication scheme, the server implements public key authentication with client by signing a unique message from the client with its private key, thus creating what is called a digital signature. The signature is then returned to the client, which verifies it using the server's known public key. The advantage of RSA algorithm is that it uses Public Key encryption. In this type of encryption text will be encrypted with someone's Public Key (which everyone knows about). However, only the person it is intended for can read it, by using their private key (which only they know about). Attempting to use the Public Key to decrypt the message would not work. RSA can also be used to "sign" a message, meaning that the recipient can verify that it was sent by the person they think it was sent by. The primary advantage of public-key cryptography is increased security and convenience, private keys never need to be transmitted or revealed to anyone

RSA Key generation

RSA public and private key pair can be generated by the following procedure.

Choose two random prime numbers p and q such that the bit length of p is approximately equal to the bit length of q.

Compute n such that n = p * q.

Compute φ(n) such that φ(n) = (p-1)* (q-1).

Choose a random integer e, e < φ(n) and
gcd (e, φ(n)) =1 then compute the integer d,

such that e*d = 1 mod φ(n).

(n, e) is the public key, and d is the private key.

Encryption

In this case, Anne wants to encrypt a message m and send it to Bobby:

- Anne creates the ciphertext *c*: $c = m^e \bmod n$, where *e* and *n* are Bobby's public key.
- Anne sends *c* to Bobby.
- To decrypt the ciphertext *c*, Bobby use his private key *d* to find the plaintext m: $m = c^d \bmod n$.
- Since only Bobby knows *d*, only Bobby can decrypt and read this message.

Digital signature

In this case, Anne wants to send a message *m* to Bobby in such a way that Bobby is assured the message is from Alice:

- Anne creates a digital signature *s* that: $s = m^d \bmod n$, where *d* and *n* are Alan's private key.
- Anne sends *m* and *s* to Bobby.
- Bobby, received the message (*m*) and signature (*s*), decrypts the signature with Anne's public key (*n*, *e*) to recover the message (*m*), as $m = s^e \bmod n$.

Bobby compares the result to the message gets by decrypted the signature (*s*) and the original message (*m*). If they are exactly equal, the signature has been successfully verified and Bobby can be sure the message that comes from Anne. If they are not equal, then the message is not originated by Anne or was altered, and he rejects the message.

The features of a digital signature are smart cards, software, public and private keys. Digital signature features protect the privacy of documents through language and signature encryption. The keys are surety that only the intended persons have access to documents. The digital signature's secure features make digital documents legally binding.

IV.HASHFUNCTION

A hash function is a function that takes a relatively random amount of input and produces an output of fixed size. The properties of some hash functions can be used to greatly increase the security of a system administrator's network; when implemented correctly they can verify the integrity and source of a file, network packet, or any arbitrary data.

The standard hash function serves as a basis for the discussion of Cryptographic Hash Functions. There are several hash functions currently in use today,

including MD5 and SHA1. By examining the history and security available in each function, the user can determine which algorithm is best suited for their application.

Hash functions are mathematical computations that take in a relatively random amount of data as input and produce an output of fixed size. The output is always the same when given the same input. The inputs to a hash function are typically called messages, and the outputs are often referred to as message digests.

V. MD5 – MESSAGE DIGEST ALGORITHM

MD5 stands for "Message Digest 5" because it is the fifth revision of a message digest algorithm devised by R.L. Rivest of RSA Laboratories. The early revisions of this algorithm were published prior to 1989, and the most recent revision of the algorithm was published in 1991. It has an arbitrary input length and produces a 128-bit digest (Rivest). Although weaknesses have been found in the algorithm, there has never been a published collision.

MD5 is an improved version of the MD4 algorithm. The authentication algorithm computes a digest of the entire data of the message, used for authentication. Typically, the message digest is registered with a trusted third-party, or encrypted via other means. The digest is used by the receiver to verify the contents of a message. It can also be used to encrypt the contents of a message, via a second pass over the data by another algorithm. MD5 requires that both the sender and receiver compute the digest of the entire body of a message. MD5 is used for authentication in a number of protocols. It is also included as an encapsulation mechanism in SIPP, IPv6, and IPv4**.**

OVERVIEW OF THE MD5 ALGORITHM

MD5 is a block-chained digest algorithm, computed over the data in phases of 512-byte blocks organized as little-endian 32-bit words (Figure.1). The first block is processed with an initial seed, resulting in a digest that becomes the seed for the next block. When the last block is computed, its digest is the digest for the entire stream. This chained seeding prohibits parallel processing of the blocks.

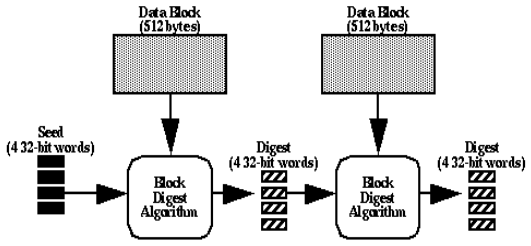

Figure.1 MD5 block-chained digest algorithm.

Each 512-byte block is digested in 4 phases. Each phase consists of 16 basic steps, for a total of 64 basic steps. Each step updates one word of a 4-word accumulated digest, using the entire intermediate digest as well as block data and constants. In general, each basic step depends on the output of the prior step, defeating simple parallelization of the steps. The basic structure of the steps is shown below (<<< denotes *rotate*). The accumulated digest is denoted by {A, B, C, D}, as in RFC-1321 [6].

A =B+((A+ F(B,C,D) + X[i++] + k1)<<<k2)
D =A+((D+ F(A,B,C) + X[i++] + k1)<<<k2)
C =D+((C+ F(D,A,B) + X[i++] + k1)<<<k2)
B =C+((B+ F(C,D,A) + X[i++] + k1)<<<k2)

There are 16 steps based on each of 4 logical functions; 4 based on F are shown here. The constants k1 and k2 are not necessarily identical in basic steps, and are not relevant to this analysis. The logical functions (^ denotes *xor*) are:

F(x, y, z) = (((x) & (y)) | ((~x) & (z)))
G(x, y, z) = (((x) & (z)) | ((y) & (~z)))
H(x, y, z) = ((x) ^ (y) ^ (z))
I(x, y, z) = ((y) ^ ((x) | (~z)))

The steps have optimization limitations, due to the mathematical properties of the operations used:

- additions can be reordered by commutative laws,
- rotate does not distribute over addition, and
- addition does not distribute over rotation or logical

MD5 is useful because you can compare and store these small hashes much more easily than the entire original sequences. In cryptography, one-way hashes are used to verify something without necessarily giving away the original information. eg, unix stores hashes of passwords instead of the passwords themselves. when a user enters their password, the system computes the hash of it and compares it to the hashes listed in /etc/passwd. Since you can't run the hash function in reverse, the system knows that the password you entered is the right one. the crypt that unix uses doesn't really reduce the size but is a similar idea. Hashes and digests like MD5 are an integral part of digital signatures.

2. TRUST STORE AND KEY STORE FILE

Trust store and Key store file will be used in the JSSE (Java secure socket extension) to provide secured transaction between the client and server. The key tool command is used to create the key store file which contains the public/private keys and then using key store, Create a trust store file which contains only public keys. In this article, Let us learn how to create

Trust store and Key store file using 5 easy steps given below,

- Generate a private key in key store file
- Verify the newly created key store file
- Export the certificate
- Import the certificate in to the trust store file
- Verify the newly created trust store file

Step 1 - Generate a private key in keystore file
Java Keytool stores the keys and certificates in the keystore file. For "Windows" user, the Keytool command should be executed in the Java bin directory.

Command
keytool -genkeypair -alias certificatekey -keyalg RSA -validity 7 -keystore keystore.jks

Once the preceding command is executed, you will be asked for the password.

Step 2 – Verify the newly created keystore file
Let us verify the newly created keystore.jks file using the following command,

Command
keytool -list -v -keystore keystore.jks

Step 3 – Export the certificate
In this step, Either a self signed certificate or a commercial certificate from "Verisign" or other certificate authority should be exported. in this step see how to export a self signed certificate.
The preceding self signed certificate should be stored in a file named "selfsignedcert.cer" and then execute the following command,

Comma keytool -export -alias certificatekey -keystore keystore.jks -rfc -file selfsignedcert.cer

After executing the above command, you will be asked for the password, Give the same password as a previous step.

Step 4 – Import the certificate in to the truststore file
Let us import the certificate by executing the below command,

Command

keytool -import -alias certificatekey -file selfsignedcert.cer -keystore truststore.jks

After executing the preceding command, give the same password as a previous step.

Step 5 – Verify the newly created trust store file
In step5, verify the newly created trust store file by executing the following command,

keytool -list -v -keystore truststore.jks

Commands for generating keys

1. keytool -genkey -alias testsender -keystore testkeystore.ks -keyalg RSA
2. keytool -genkey -alias testrecv -keystore testkeystore.ks -keyalg RSA

3. PROPOSED METHODOLOGY

1. Encrypt the data using a Symmetric Key(call Symmetric-Encrypt)
2. Encrypt the Symmetric key using the Receivers public key
3. Store a public key in the set of public key.
4. Create a Message Digest of the data to be transmitted
5. Sign the message to be transmitted using digital signature
6. Send the data over to an unsecured channel
7. Validate the Signature using certificate authority

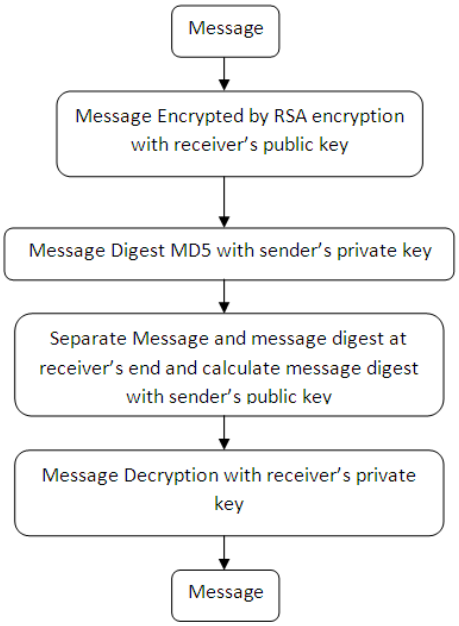

Figure. 2 Steps for PKI Encryption Decryption

8. Decrypt the message using Receivers public key from the set of key to get the Symmetric Key. (Call Import-key & Test Key pair)

9. Decrypt the data using the Symmetric Key

10. Compute Message-Digest of data + Signed message

11. Validate if the Message Digest of the Decrypted Text matches the Message Digest of the Original Message

Symmetric-Encrypt

1. Generate a DES key (specify the Key size during this phase)
2. Create the Cipher
3. To Encrypt : Initialize the Cipher for Encryption
4. To Decrypt : Initialize the Cipher for Decryption

Import-key

1. Receive a certificate
2. Validate the certificate
3. Provide a authorize key to user

Test-Key-Pair

1. Receive a key from import key
2. Test the key against the user
3. If true
4. Return
5. Else
6. False

4. CONCLUSION

The properties of cryptographic hash functions have many applications in the area of computer security, and programs built on top of cryptographic hash functions have the ability to help a system administrator detect changes of valuable data on his or her network. They also are able to prove the originator of messages in a system. These concepts are particularly relevant in the growing online world, where every message sent across the wire can be worth money, and every file on a server is a valuable resource. The major advantage of public key systems is that they can provide digital signature that can not be reject and private key never need to be transmitted or publicized to anyone. MD5 have a greater collision risk and faster to compute 128 bits digest than SHA. MD5 is also used to verify the authenticity of a piece of data without having to actually encrypt the data. From these advantages we used RSA algorithm with MD5 for securing any type of confidential data from information. By using digital signature, digital certificates and message digest, all are components of public key infrastructure.

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UNDERSTANDING OF CUSTOMER PROFILING AND SEGMENTATION USING CLUSTERING

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Abstract:-In any industry, the first step to finding and creating profitable customers is determining what drives profitability. This leads to better prospecting and more successful customer relationship management. Any company can segment and profile their customer base to uncover those profit drivers using the knowledge of their customers, products, and markets. Or they can use data-driven techniques to find natural clusters in their customer or prospect base. Whatever the method, the process will lead to knowledge and understanding that is critical to maintaining a competitive edge. Analyzing consumer behavior is a costly implementation of sophisticated information technology, which requires detailed planning and business knowledge for successful adoption. The current trend on consumer behavior analysis has been recognized on the business problem rather than on the information technology

I. INTRODUCTION:

Many enterprises have gathered significant numbers of large databases. The database marketing technique uses modern data analysis methods to acquire new customers and apply to develop new business strategies and opportunities. Unlike most data summaries are usually a summary of the data, data mining involves the automated analysis of data to produce useful knowledge in a highly summarized form[2]. Data mining thus is very useful in market segmentation, customer profiling, risk analysis, and other applications. Data mining can also produce rules and models that are useful in replicating or generalizing decisions that can be applied to determine marketing strategies. Economic theory has established that there are a large number of customers with a small income and a small number of customers with a large income. However, instead of targeting all prospects equally or providing the same incentive offers to all customers,

What is the importance of understanding customers? Studies show that many companies operate for years— pumping out offers for products and services— without a clue of what their best customer looks like. For every company in every industry, this is the most important first step to profitable marketing. Similar to modeling, before a company begins any profiling or segmentation project, it is important to establish their objective. This is crucial because it will affect the way in which to approach the task. The objective can be explained by reviewing the definitions of *profiling* and *segmentation*[3].

Profiling is exactly what it implies: the act of using data to describe or *profile* a group of customers or prospects. It can be performed on an entire database or distinct sections of the database. The distinct sections are known as segments. Typically they are mutually exclusive, which means no one can be a member of more than one segment.

Segmentation is the act of splitting a database into distinct sections or segments. There are two basic approaches to segmentation: market driven and data driven. Market-driven approaches allow managers to use characteristics that they determine to be important drivers of their business. In other words, they preselect the characteristics that define the segments. This is why defining the objective is so critical. The ultimate plans for using the segments will determine the best method for creating them. On the other hand, data- driven approaches use techniques such as cluster analysis or factor analysis to find homogenous groups. This might be useful if companies are working with data about which they have little knowledge[1].

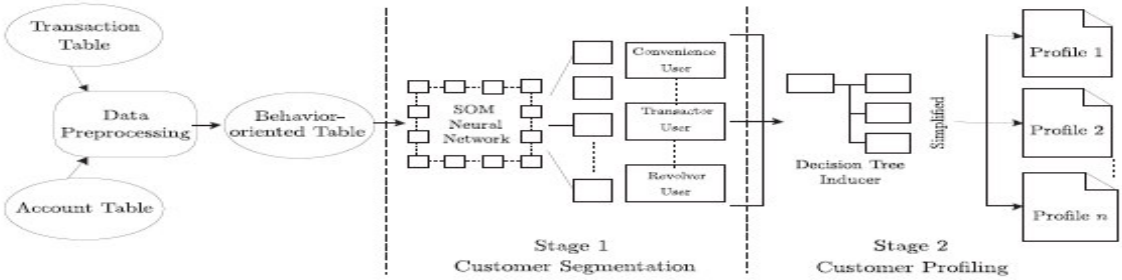

Figure 1. The two-stage framework of consumer behavior analysis.

Enterprises can select only those customers who meet certain profitability criteria based on their individual needs or consumer behaviors[13]. Therefore, assuming that consumer behavior follows a similar pattern seems reasonable. For a bank, most existing data mining approaches were discovered rules[1,27] and predicted personal bankruptcy[12,10, 30] in a bank database. Hadden et al.[17] review literature for the development of a customer churn management platform. As shown in figure 1, a two-stage framework of consumer behavior analysis was established to predict profitable customer based on demographic characteristics and previous consumer behavior[22].

II.RELATED WORKS:

Customer segmentation based on customer value Customer value has been studied under the name of LTV (Life Time Value), CLV (Customer Lifetime Value), CE (Customer Equity) and Customer Profitability[4]. The previous researches define LTV as the sum of the revenues gained from company's customers over the lifetime of transactions after the deduction of the total cost of attracting, selling, and servicing customers, taking into account the time value of money (Dwyer, 1997; Hoekstra and Huizingh, 1999; Jain and Singh, 2002)[5].

Customer segmentation methods using LTV can be classified into three categories: (1) segmentation by using only LTV values, (2) segmentation by using LTV components and (3) segmentation by considering both LTV values and other information. In the first method, the list of customers' LTV is sorted in descending order. The list is divided by its percentile. In this case, we segment customer list by only LTV, however, other information like socio- demographic information or transaction analysis may be used together for a better marketing practice. For instance, after segmenting a highly profitable customer group, a firm may recommend popular products to the targeted group at a discounted price. Fig. 2 briefly depicts the concept of segmentation using only LTV[6]. The second method performs segmentation by considering components used in LTV calculation. Hwang, Jung, and Such (2004) considered three factors: current value, potential value, and customer loyalty to calculate LTV and present the method to segment the three factors for customer segmentation. Fig. 3shows segmentation using factors in calculating LTV. The last method is to segment the customer list with LTV value and other managerial information. In this case, LTV is an axis of the segment in n-dimensional segment space and other information, such as socio-demographic information and transaction history become another axis[7]. This approach is more meaningful for segmenting the customer list than the first method. Fig. 4 shows a segmented customer list with LTV value and other managerial information.

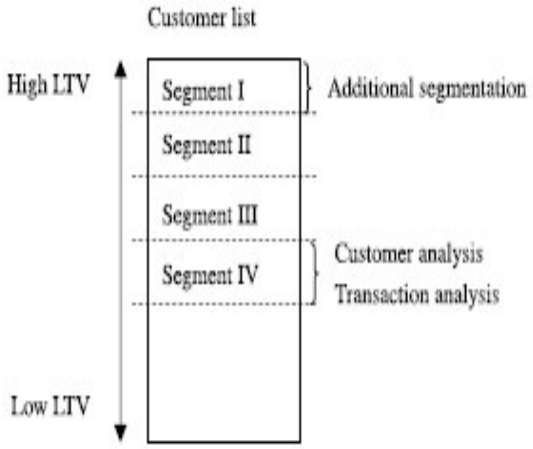

Fig. 2. Customer segmentation using LTV.

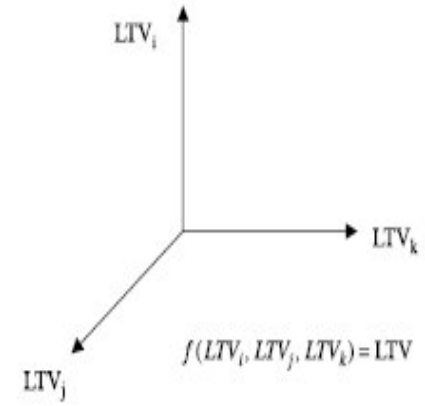

Fig. 3. Customer segmentation using LTV components.

Most discussions on the marketing literature and textbooks describe behavioral segmentation in terms of usage volume such as heavy users, medium users, and light users (Kotler, 1997) or brand-buying behavior such as brand loyals, other brand loyals, and brand switchers (Rossiter and Percy, 1997).

Customer profitability can serve as another important basis for behavioral segmentation because of the central importance of profits (Mulhern, 1999). Several segments may be formed by using customer profitability[8]. For instance, themost profitable segment consisting of the highest-profit customers should be retained through loyalty and retention program. Another possible segment is the most unprofitable customer group who generatemore costs than profit. This segment

is arguable since unprofitable customers seem to have no worthy of marketing efforts[9]. Verhoef and Donkers (2001) used two dimensions, current value and potential value, to segment the customers of an insurance company. In this study, we use three dimension, current value, potential value and customer loyalty, to consider the customer defection[26]. The current value becomes a measure of customers' past profitability, potential value becomes a measure of the possibilities of additional sales and the customer loyalty can be a measure of customer retention. After calculating three customer values, we perform customer segmentation by using the values[25].

III. AN EXISTING FRAMEWORK FOR BUILDING MANAGERIAL STRATEGIES BASED ON CUSTOMER VALUE:

A framework for building managerial strategies based on customer value is organized into three phases. Phase I explains the preparation steps to be conducted before defining the customer value and setting up marketing strategies. In phase II, we evaluate the customer value from three viewpoints— current value, potential value and customer loyalty. After segmenting the customer base with three viewpoints, a segment analysis is performed according to the segmentation results. Phase III analyzes the characteristics of each segment according to current value, the potential value, and the customer loyalty and this part presents the procedure of building strategies based on these three customer values[10]

Segmentation based on customer value: The raw data of this study consists of 6-month service data of a wireless communication company in Korea[29]. The data can be categorized roughly into two types, socio-demographic information and usage information of wireless service. This dataset is composed of 200 data fields and 16,384 records of customers. 101 data fields were left to work with after unessential data fields were eliminated[11]. The mean value for continuous values and the mode value for class variables substituted for missing values[28]. In addition, we divided the entire dataset at the ratio of 70-to-30, training set and validation set, respectively. We used the same method of calculating customer values—current value, potential value, and customer loyalty—suggested by the previous study (Hwang, Jung, and Suh, 2004).

We calculate the current value as the average amount of service charge asked to pay for a customer, minus the average charge in arrears for a customer, regarding 6 months for calculation[27]. Current Value = (Average amount asked to pay for a customer - Cumulative amount in arrears for the Customer/*t*otal period of use)[24]

Calculating potential value: As mentioned before, it is important to consider cross selling and up-selling as well to calculate customer value (Kim and Kim, 1999). We define here potential value of customers as expected profits that can be obtained from a certain customer when a customer uses the additional services of a wireless communication company. The following is the equation to evaluate potential values[23].

$$\text{Potential value}_i = \sum_{j=1}^{n} \text{prob}_{ij} \times \text{profit}_{ij}$$

Probij is the probability that customer i will use the service j among n-optional services. Profitij means the profit that a company can receive from the customer i who uses the optional service j. In other words, the equation above means expected profits from a particular customer who uses optional services provided by a wireless communication company[30]. The expected profits will become potential value we need to evaluate. Profitij means the expected value
when a company provides a customer with a certain optional service. We calculated it by subtracting the cost of each optional service from the charge of each optional service. The charge and cost of each optional service is given by the telecommunication company. Potential values can represent a measure of additional sales opportunity. It can be used to recommend optional services to customers[12]

Customer loyalty: Customer loyalty can be defined as the index that customers would like to remain as customers of a company.
Customer LoyaltyZ1KChurn rate
Churn describes the number or percentage of regular customers who abandon a relationship with a service provider. Customer loyalty can be a measure of customer retention[13]. The previous studies on customer value have not treated the churn rate yet, limiting themselves to predict the future profit change of customers with the past profit history. The effective evaluation of customer value, however, should comprehend the leaving probability of each customer. Fig.
5 shows the procedure of calculating an invidual churn rate[14]. Therefore, this paper measures the leaving probability for each customer to calculate the churn rate, using data mining techniques. Like the process to calculate the

Probij, we take several models (decision tree, neural network and logistic regression) and then select an optimal model among them based on the result of a comparative test with the Misclassification rate or the lift chart method.

IV PROPOSED WORK:

Input – number of clusters k and data set D containing n objects. Output – A set of k clusters
1) From D, randomly generate k points as the initial cluster centres.
2) Assign each object to a cluster to which the object is the most similar, based on the cluster mean value and the object value.
3) Re-compute mean of each cluster from the objects in it and update the cluster means.
4) Repeat steps 2 and 3 till there is no change in clusters

V. CONCLUSION:

A successful profiling and segmentation process demands that a company should define its business objectives[18]. At the start of any segmentation process, management should agree on and clearly state their goals using language that reflects targeting and measurement. Business objectives can be (1) new account, sales, or usage driven; (2) new product
driven; (3) profitability driven; or (4) product or service positioning driven. Furthermore types of data could include survey, geo-demographic overlays, and transactional behavior. Data must be relevant to the business objectives[20]. The process involves reviewing all data to determine only the necessary elements because collecting and analyzing data on all customers or prospects is very time-consuming and expensive. The segmentation process means selecting a method that is appropriate for the situation. There are three segmentation methods that could be employed: predefined segmentation, statistical segmentation, or hybrid segmentation[21]. The predefined segmentation method allows the analyst to create the segment definitions based on prior experience and analysis. In this case, the data is known, the work involves a limited number of variables, and a limited number of segments are determined. The appropriate segments will be defined and selected based on the business objective and the knowledge of the customer base[22].

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INDUSTRIAL PROCESS PARAMETER (TEMPERATURE) MONITOR USING ETHERNET

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Abstract:- In today's world networking is important part of industrial automation in controlling and monitoring of industrial process parameters. To provide this automation we propose a system which uses ARM controller with Ethernet controller ENC 28J60. As most of industrial devices does not have network interface capability so ENC 28J60 will provide interface capability. In industries there are several parameters which must be monitor and control. In this paper we are focus more on Sensor selection to sense the particular parameter and there selection criterion, because correct selected sensor will receive correct data in efficient manner. ENC 28J60 is another important part of this system which is used as Ethernet network interface for any controller equipped with SPI. It will satisfy the all specifications if IEEE 802.3, also it have MAC and PHY modules, it will provide faster data transfer using internal DMA. By using RJ 45 connector we can connect a microcontroller to a required MBPS network. To access the ENC 28J60 we have to configure the register and memory this design basically consist of SPI communication module, processor module and Ethernet interface module. This system has high performance and offers widest range of features viz flexibility, reliability, durability when compared with conventional and old solution to control.

Keywords- *ENC 28J60, SPI , Ethernet, ARM.*

INTRODUCTION

Monitoring and controlling of industrial process parameter is complete system in which sensors sre used to collect the data from the actual industrial environment. This actual environment may be the boiler or chemical tank or nuclear reactor or furnance etc whose temperature we have to monitor and control over the ethernet. The accuracy of data collection is depends will be vary with type of process control, in case of nucleare reactor the accuracy should be high, where as in case of furnance less acuuracy can be accepted.If we need to connect more serial devices at a time with high data rate at a time which make the data processing some what dificult due to which system performance is poor. Another important factor is distance between sensor and host device, as the distance is increases as the length of wire is increases, which increase the drop. The solution for this problem is that embedded system replace previous control method based on microcontroller with ARM processor based embedded ethernet interface system is designed. In which host system carry out one communication at a time which reduses its load.

HARDWARE IMPLEMENTATION:

The hardware mainly consist of

1. Sensor
2. ADC
3. Processor
4. Ethernet controller
5. Interfacing
6. RJ 45
7. PC
8. LCD

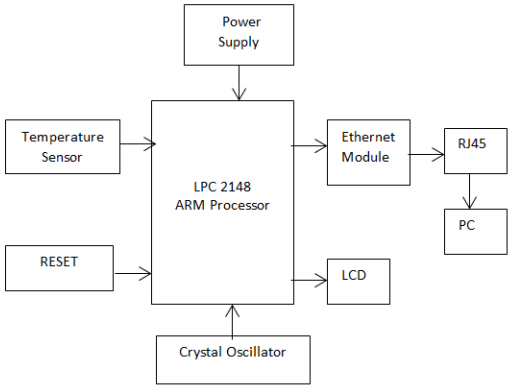


Fig 1. System Block diagram

1. SENSOR

Sensors are used to collect the data. It is the device which converts the one form of energy in to another form. It is used to sense verious parameters like Teperature, Pressure, Force, Flow, Light etc. Sensor are of verious types depending on there working and depending on there change in parameter with referance to measured variable.

-Sensor whose resistance is changes with measured variable.

-Sensor which produces voltage with measured variable.

-Sensor whose electrical output is changes with measured

variable.

-Thermister for measurment of temprature.

-Photoresister for light measurment.

-Strain guage for mechanical strain measurment.

1.1 Sensor selection parameters: To select the sensor for the measurment of perticular variable we have see its perticular parameters.

1.1.1 Maximum operating temperature: is the maximum body temperature at which the thermistor will operate for an extended period of time with acceptable stability of its characteristics. This temperature is the result of internal or external heating, or both, and should not exceed the maximum value specified.

1.1.2 Maximum power rating: maximum power rating of a thermistor is the maximum power which a thermistor will dissipate for an extended period of time with acceptable stability of its characteristics.

1.13 .Dissipation constant: It is the ratio, (in milliwatts per degree C) at a specified ambient temperature, of a change in power dissipation in a thermistor to the resultant body temperature change.

1.1.4 Thermal time constant: It is the time required for a Sensor to change 63.2% of the total difference between its initial and final body temperature when subjected to a step function

1.1.5 Resistance-temperature characteristic: It is the relationship between the zero-power resistance of a Sensor and its body temperature.

1.1.6 Temperature-wattage characteristic: It is the relationship at a specified ambient temperature between the Sensor temperature and the applied steady state wattage.

1.1.7 Current-time characteristic: It is the relationship at a specified ambient temperature between the current through a Sensor and time, upon application or interruption of voltage to it.

1.1.8 Stability: It is the ability of a Sensor to retain specified characteristics after being subjected to designated environmental or electrical test conditions.

1.1.9 ***Interchangeability***: It refers to how closely a sensing element follows its nominal resistance versus temperature curve.

1.1.10 Repeatability: The degrees to which two successive readings of a temperature sensor agree refer to its "repeatability". That is, a sensors ability to repeat the same behavior under the same conditions for any given temperature, even though it has been used and exposed to different temperatures, refers to its repeatability (e.g. its ability to remain stable over many heating and cooling cycles).

1.1.11 Corrosion and Contamination: Corrosion is the process by which the metal element wire converts from its pure form to a more complex compound or metal oxide, which will tend to increase the resistance of the pure metal. As the corrosion works through the surface of the metal, it reduces the cross-sectional area of the conductor raising the resistance of the element independent of any temperature change. This makes the choice of a noble metal like platinum an important one for helping to inhibit corrosion.

1.1.12 Shock and Vibration: Prolonged mechanical shock and vibration can alter RTD readings and even drive intermittent or complete failure. These effects are additional contributors to sensor drift and reduced stability in RTD measurement systems. Most industrial RTD elements are fully supported by a bobbin and packing material that stands up well to extreme shock and vibration.

1.1.13 Insulation Resistance: If the sensing elements and leads are not completely insulated from the case or sheath of the RTD, then the case can form a parallel resistance path or shunt across the element that will lower its apparent reading. Most industrial RTD elements will have insulation resistances on the order of 100MΩ or more, making this error contribution negligible.

1.1.14Lead Wire Resistance: RTDs generally use copper leads bonded to the platinum element. These leads normally connect close to the element and close to each other (so that both junctions will be at same temperature), in order to prevent Seebeck voltages from also affecting the measurement. However, the resistance of the copper leads can still negatively affect the measurement, in particular where the RTD element is a long distance from the measuring instrument, or where a two wire RTD sensor is used.

1.1.15 Self Heating: Heat energy is generated while applying current to excite the RTD element in order to measure its signal.

1.1.16 Response Time or Time Constant: The time constant of an RTD refers to the speed with which its element changes resistance in response to a change in contact temperature.

1.2 SENSOR TYPES

The main temperature sensors are

1.2.1 Thermister.

1.2.2 RTD.

1.2.3 Thermocouple.

1.2.1 Thermister: It is nothing but the temperature dependant resister. In which the resistance of sensor is changes in predictive way with change in temperture . It classified in two broad categories

NTC: In which resistance of sensor is decreases with increase in temperature.

PTC: In which resistance of sensor is increase with increase in temperature.

So in short thermister is thermaly sensitive resister that exhibits a change in electrical resistance with change in temperature. This change in resistance is measured by can be measured by passing dc current through it and measuring drop across it.

1.2.2 RESISTANCE TEMPRATURE DETECTOR (RTD) It's resistance is linearly increases with

increase with increase in in temperature. It is available in 2-wire, 3- wire and 4- wire. A 2- wire RTD in which signal is affected by the distance between sensor and host system. Where as in other two losses are compensated. RTD is metal base temperature sensor, as we know that metal resiatance is will increase with increase in temperature. That's why RTD can be manufactured from different metal to satisfy the different requirment of temperature ranges to be measured. One of the important parameter of RTD is temperature coefficient of resistance.

$$TCR = \frac{\left[\frac{\text{Resistance at } 100^{\circ}C - \text{Resistance at } 0^{\circ}C}{100}\right]}{\text{Resistance at } 0^{\circ}C} \quad ---1$$

So sensors made from different metal having its own advantages and disadvantages, Copper has the most linear change in resistance for a given temperature change. But coppers low resistance makes it difficult to measure small changes in temperature.

Table I: Comparison of Temperature sensors

Attribute	Thermocouple	RTD	Thermistor
Cost	Low	High	Low
Temperature Range	Very wide -350°F +3200°F	Wide -400°F +1200°F	Short to medium -100°F +500°F
Interchange ability	Good	Excellent	Poor to fair
Long-term Stability	Poor to fair	Good	Poor
Accuracy	Medium	High	Medium
Repeatability	Poor to fair	Excellent	Fair to good
Sensitivity (output)	Low	Medium	Very high
Response	Medium to fast	Medium	Medium to fast
Linearity	Fair	Good	Poor
Self Heating	No	Very low to low	High
Point (end) Sensitive	Excellent	Fair	Good
Lead Effect	High	Medium	Low

Nickel is not a very stable material its resistance is varies from band to band of temperature. But its advantage is that it is much less expensive than Platinum but the process which are used to stabilize the nickel are makes it expensive than Platinum.

Platinum has reasonably high resistance and good temperature Coefficient and mostly it does not react with contaminant gases in air and extremely stable from band to band temperature variation.

1.2.3 THERMOCOUPLE

It having two dissimilar metal wires joined at hot junction, as temperature varies a signal is measured at cold junction. It is available in J-type and K-type Thermocouple. Its advantages are Low cost, small size, wider temperature range and having faster response time than RTD, but its disadvantages are it is less linear and less accurate than RTD and sensitive to electrical noise.

Following table shows the comparison between all temperature sensors type which helps to select the particular sensor depending on our requirement.[8]

2.0 ANALOG TO DIGITAL CONVERTOR (ADC)

The output of some sensor is analog but today's world is dealing with digital only so it is necessary to convert the analog signal in to digital for that we are using ADC. This ADC will act as bridge between outside analog world and digital world of controller. The reference voltage for LPC 2148 is 3.3V and if ADC is set to maximum 10-bit data (ie 0 to 1023). For 0.0 V would return o, 3.3V (or higher) returns 1023, and 1.65V would returns ~512. Some important features are resolution of ADC, response time of ADC, mode of working, and method of conversion. Regarding ADC has n-bit resolution where n is 8, 12, 16 or even 24 bits. The higher resolution provides low step size. A step size is smallest change that can be recognized by the ADC. For 8-bit ADC it has resolution of 8-bits, the range is divided in to 2^8=256 steps (from 0-255)[5]

$$\text{Step size} = \frac{Vcc}{2^n - 1} \quad ---2$$

Where Vcc is the reference voltage. For following table Vcc=5V.

n-bit	Number of steps	Step size (mV)
8	2^8=256	5/255=19.61
10	2^10=1024	5/1023=4.89
16	2^16=65536	5/65535=0.076

Table II: for n-bit, step size and steps

3.0 PROCESSER:

As a processer we are using LPC 2148 because of following features. It is 32 bit ARM 7 TDMI

microcontoller with 40 KB of on chip flash static RAM, 512KB of on chip flash memory, it has In system programming Using on chip boot loader. Software 400ms of full chip erase and 256 bytes of programming in 1ms. For interfacing of sensor it has 10-bit ADC with 14 analog input and conversion time as low as 2.44us per channel. The conversion rate can be increase up to 400K samples per second By setting the ADC's serial registers. So most of the data processing is done by ADC hardware so limited software is required for design other tasks. The LPc 2148 can communicate with serial communication through SPI and trasnmit the data to the host computer through ethernet interface . The ARM is the heart of the system as it has high speed of execution and powerfull information processing capability due to pipelined structure. Also it has a capability of multi parameter execution and multi level moniroring. The networking capability of ARM makes it suitable for wide veriety of networking appication. The RISC architecture and large memory space made us to choose this processor.

So analog data gathered from sensor are given to ADC of LPC 2148 where this data is processed and given to the PC and LCD for monotoring. So selection of proper sensor and smart processor will greatly optimize the system performance.[6]

4.0 ETHERNET CONTROLLER:

The concept of embedded ethernet is nothing but the microcontroller is able to communicate with the network. As now a day's microcontroller is widely used in the industrial field, as most of the devices used in industries are not able to transmit the data over the network. This system mainly consist of SPI communication module, Control module and ethernet module. Because this ethernet module is possible to monitor and control the parameters form longer distance.

The ENC 28J60 is Ethernet controller which is designed to serve as an ethernet network interface for any controller equiped with SPI. It has an internal DMA module for fast data throughput and hardware assisted IP checksum calculations. It incorporates a number of packet filtering schemes to limit the number of incoming packets and provides a data rate of 10MBPS The MAC module implements IEEE 802.3 compliant MAC logic. the PHY module encodes and decodes data obtained from the twisted pair interface. ENC 28J60 is microchip technology that introduces 28 pin stand alone ethernet controller. Tall other ethernet controllers available in market are more than 80 pins so 28 pins ENC 28J60 will provide good functionality and simplicity.It mainly consist of

4.1 SPI interface: It serves as a primary controller and act as communication channel between ENC28J60.

4.2 Control register: Are used to control and monitor the ENC28J60.

4.3 Dual port RAM buffer: It acts as an arbiter to control the access to RAM buffer, when requirement is made from DMA to transmit and receive the blocks.

4.4Bus interface: It interprets data and commands received via SPI

4.5 MAC module: It implements IEEE 802.3 compliant MAC logic.

4.6 PHY module: It encodes and decodes data obtained from the twisted pair.

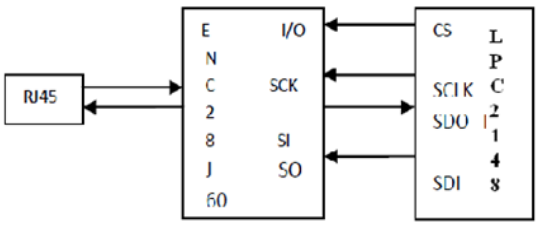
The controller communicates with Ethernet controller via its ADC lines, to initialize the chip, Poll it for packet status and send/receive the data.[3,7]

5.0 INTERFACING

Interfacing is use to provide proper communication between microcontroller and external device. Communication may be parallel or serial

5.1 SERIAL PERIPHERAL INTERFACE

The serial communication is performed by means of two pins that are SI and SO as shown in Figure. SCLK provides clock synchronization and CS is the chip select. This communication technique can be implemented between processor and peripherals that have SPI interface. Serial Peripheral Interface Bus is a synchronous serial date link standard where communication is performed in master/slave mode and master device initiates the data frame. This is a full duplex mode of point to point communication. The serial clock, SCLK generated by the master device is used by the slave also. The SS which is the Slave Select signal should in active low state for the slave to have communication with master. This is a four wire communication as shown in Figure 7. The SDO or Serial Data Output signal send by the master and after receiving the clock pulse, the slave device responds back with SDI or Serial Data Input signal.



When SPI protocol is used between the two controllers, the Ethernet Controller generates the data frame and acts as the master while the Arm processor acts as the slave device. This communication mode is apt if there is only a single master and slave device and suitable for high data rate and achieves a data speed of up to 10 Mbps. Simple hardware interfacing and low power requirements are some of the features of this communication protocol.[7]

6.0 REGISTERED JACK 45 (RJ45)

A standered LAN cable can be connected using RJ 45 connector. It is 8P8C (8 Position 8 Connector) modular connector commonly used to terminate twisted and multiconductor flat cable. These connectors are commonly used for Ethernet over twisted pair. It is used to improve the signal anti-interferance capability.[7]

RESULT

The objective of this system is to monotor and control the industrial process parameter on real time basis using Ethernet. ENC 28J60 Embedded Ethernet Controller for the remote control within LAN has played a very good role This system has advantages that is has small size, Realiability, and low power consumption.

CONCLUSION

This is low cost method for monitoring and controlling the industrial parameter like temperature remotly 100(RTD) is better because it is suitable for all industrial application from -200 C to 600 C ,It is acurate, less expensiveand easy to use. Its output is relativly large changed with temperature as copmare with thermocouple. The ARM can communicate with PC using serial port using RS 232, It support online supervision and control using not only private LAN but also using Public network. By using embedded hardware and software we can control the require industrial parameter and industrial automation using Ethernet with high accuracy. If we select the proper sensor depending on the range of temprature measure or industrial environment, we can increase the sensitivity of this system. From sensor section available sensor type PT.

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PREDICTION OF SALES FORECASTING BY USING 4CAST XL AN ANN TOOL

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Abstract:-The Collaborative Planning, Forecasting and Replenishment (CPFR) is an application of Supply Chain Management concept in the retailing. In this paper, the collaborative forecasting process between retailers and manufacturers which is the core of CPFR is mainly discussed. In 4castxl the data is trained by using three algorithms that is back propagation neural network, conjugate gradient neural network and genetic optimization neural network the result obtained by these three method shows forecasting accuracy. Finally, the formulation results showed the effectiveness of this combination-forecasting model.

Keywords- *CPFR, ANN, BPNN, GONN, CGNN.*

INTRODUCTION

Globalize economy development has changed the market competition ways. Market competition between individual enterprises has changed into competition between supply chains. The supply chain management (SCM), which includes management activities applied throughout the entire supply chain, abstracted more and more attention from industries and academics. Collaborative Planning, Forecasting and Replenishment (CPFR) which is an application of SCM concepts in the retailing is a web-based tool to coordinate the supply chain management activities between retailers and manufacturers. CPFR concerns the collaboration where two or more parties in the supply chain jointly plan a number of promotional activities and work out synchronized forecasts, on the basis of which the production and replenishment processes are determined. CPFR has been adopted and implemented by many world-renowned retailers and manufacturers, such as Wal-Mart, Proctor & Gamble, etc. The first CPFR project was piloted by Wal-Mart with its suppliers in 1995. The results of two-year project showed that CPFR could simultaneously reduce Inv entory levels and increase sales for both retailers and suppliers. Since its original application was initiated, CPFR has had many successful applications in North America and Europe. Facing to the fierce competition from their western counterparts who entered into Chinese market especially after China joined the WTO (World Trade Organization), Chinese local retailers are paying more and more attention to the collaboration between supply chain partners in order to sustain competitiveness in global market. Chinese retailers is adapting CPFR tool into Chinese market conditions. The collaborative forecasting plays an important part in CPFR implementation procedure. In this paper, we briefly review the CPFR concept and its implementation process. And then, the collaborative forecasting process which is the core part of CPFR will be mainly discussed. As the basis of the implementation of CPFR, the collaborative forecasting process is the cornerstone to the success of CPFR projects. The collaborative forecasting process of CPFR requires a solid forecasting approach. The combination-forecasting method can combines forecasting models from different parties to smooth coordination in the supply chain and reduce forecasting discrepancies. So, the combination-forecasting method is applied for CPFR collaborative forecasting modeling with improved forecasting accuracy and supply chain collaboration.[9]

1.0 CPFR COLLABORATIVE FORECASTING PROCESS

CPFR is an application of SCM concepts in the retailing, which focuses on collaboration between retailers and suppliers. CPFR, which was proposed by VICS (Voluntary Inter-industry Commerce Standards Association) in 1995, provides retailers and suppliers with a framework for sharing key supply chain information and coordination plans. Under CPFR, supply chain partners form a consensus forecast, either by working collaboratively or by first developing their own individual forecasts, which are then used to create a consensus forecast. This coordination and information sharing allows retailers and suppliers to optimize their supply chain activities. Dirk Seifert, a professor at Harvard Business School and the University of Massachusetts, defined CPFR as “an initiative among all participants in the supply chain, intended to improve the relationships among them through jointly managed planning processes and shared information.

Whole CPFR procedure is divided into collaborated plan, forecasting and replenishment phases. The key of collaboration utilizing CPFR becomes the jointed demand forecast between retailers and manufacturers, which is then used to synchronize replenishment and production plans throughout the entire supply chain. The collaborative forecasting process is the cornerstone of the success of CPFR implementation. The collaborative forecasting process of CPFR gives a guarantee for precise demand by implementing the jointed

forecasting process inside the corporation and among the supplying chain of partners. The accuracy and collaboration are very important to evaluate a good CPFR forecasting process. The accuracy of collaborative forecasting can be determined by establishment of discrepancies standards and discrepancies handling. The forecasting discrepancies may be causes by inaccuracy of the data for forecasting or differences of the forecasting models used by different partners. The inaccuracy of the data for forecasting may be produced from inaccurate and un-timely sale data and the un-timely communication for changes caused by demands, such as alteration of advertisement plan, products promotion plan and alteration. The accuracy of data for forecasting can be improved through CPFR collaborative forecasting process among partners. In this paper, we will focus on the discussion of the ways to reduce discrepancies caused by forecasting models differences. A combination estimate models is proposed to reduce this kind of discrepancy in order to improve the accuracy and collaboration in CPFR implementation. The retailers and manufacturers in the supply chain have different forecasting knowledge and resources. So they will use different forecasting model and forecasting cycles in the forecasting process. The forecasting cycles of retailer may be several weeks or even one quarter due to numerous varieties of sale item. However, the manufacturers may forecast much accurate because their forecasting cycle might be one week due to fewer products varieties and more complex forecasting models using. The discrepancy of forecasting results between retailers and manufacturers might reach to 3 times of the lower forecasting results. In order to collaboratively forecast among CPFR partners, a jointed forecasting model which can combine forecasting models from different parties should be used. The combination of the complex forecasting model and professional forecasting knowledge owned by manufacturers and timely sales data and market information sourced from retailer will guarantee the forecasting accuracy and effective supply chain collaboration.

The collaborative forecasting between retailers and manufacturers in the supply chain requires a solid forecasting approach. And also, the accurate and up-to-date forecasts can help to avoid unnecessary discrepancies and allow the partners in the supply chain to focus on core issues identified. The simple average forecasting method is an easy way for forecasting in the CPFR collaborative forecasting process. However, the slightly more complex forecasting method can guarantee higher forecasting accuracy. In this paper, a combination-forecasting method which tries to combine the forecasting approaches used by retailers and manufacturers is modeled for more accurate and effective collaborative forecasting in CPFR process. There are three reasons why combination-forecasting method is applied for CPFR collaborative forecasting process between retailers and manufactures in the supply chain. The first reason is that combination-forecasting method can jointly utilize different forecasting models from different partners to smooth coordination in the supply chain and reduce forecasting discrepancies. The different interests of retailers and manufactures in the supply chain produce the discrepancies between their forecasting results. For example, retailers might concern more about sales loss caused by goods shortage, while manufacturers may concern more about overstock cost caused by surplus stock and transportation cost caused by goods returning. It is impossible to accept only one party's forecast result, or just abandon one party's forecast model. A jointed forecasting model is needed to combine both parties' considerations. The second reason is that the combination-forecasting method can make use of resources from both retailers and manufacturers in the supply chain to obtain more accurate forecasting results and achieve coordination between partners in the supply chain. The retailers and manufacturers in the supply chain who have different knowledge and experience on forecasting utilize different method and data for forecasting. Combination with various forecasting resources can help to improve forecasting accuracy. The last reason is that combination-forecasting method can be used for not only functional product forecast but also seasonal product forecasting, which is suitable for various products forecasting in the supply chain. The functional product demand whose changes are located in the narrow limits can be considered as stationary or first-order stationary sequence in combination forecasting. The seasonal product demand trend can also be integrated to meet the requirement of combination forecasting.[9]

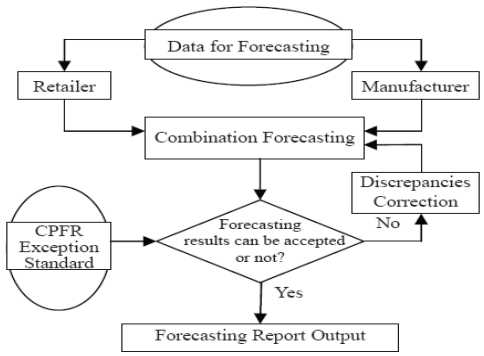


Fig 1. CPFR Collaborative forecasting flowchart

1.1 NINE STEP IN CPFR PROCESS

The CPFR process model contains nine steps:

1. Develop front-end agreement: the parties involved establish the guidelines and rules for the collaborative relationship.
2. Create joint business plan: the parties involved create a business plan that takes into account their individual corporate strategies and defined category roles, objectives and tactics.

3. Create sales forecast: retailer point-of-sales data, causal information and information on planned events are used by one party to create an initial sales forecast, this forecast is then communicated to the other party and used as a baseline for the creation of an order forecast.
4. Identify exceptions for sales forecast: items that fall outside the sales forecast constraints set in the front-end agreement are identified.
5. Resolve / collaborate on exception items: the parties negotiate and produce an adjusted forecast.
6. Create order forecast: point-of-sales data, causal information and inventory strategies are combined to generate a specific order forecast that supports the shared sales forecasts and joint business plan.
7. Identify exceptions for order forecast: items that fall outside the order forecast constraints set jointly by the parties involved are identified.
8. Resolve / collaborate on exception items: the parties negotiate (if necessary) to produce an adjusted order forecast.
9. Order generation: the order forecast is translated into a firm order by one of the parties involved.[1]

2.0 COLLABORATIVE FORECASTING.

In recent years, the concept of inter-company collaboration, especially in the area of planning and forecasting, has received significant attention. By developing processes that make it possible to adjust plans and forecasts in a collaborative fashion. Collaborative forecasting makes it possible to take advantage of the expertise of all, or at least several, supply chain members. One benefit that is suggested to follow from this is a reduced reliance on historical records. (Helms et al., 2000) Time series methods that build on historical data can forecast changes that follow continuous or recurring patterns, but cannot accurately forecast the impact of events, such as price changes, that happen irregularly (Bowersox and Closs, 1996, p. 233; Mentzer and Schroeter, 1994). Through collaborative forecasting, a company or department can get access to better information on important demand drivers, such as promotions. This makes it possible to complement time series forecasting either with regression analysis, which examines the relationship between sales and other variables, such as advertising, or with subjective forecasting, which relies on expert opinion (Jain, 2000; Mentzer and Schroeter, 1994). Furthermore, working based on one shared forecast reduces the problems related to what Mentzer et al. call the "islands of analysis" phenomenon, where different groups, departments or companies develop their own forecasts independently of each other according to their own specific needs, and risk ending up acting based on conflicting plans (Helms et al., 2000; Mentzer et al., 1997).[1]

3.0 FORECASTING BY USING 4CAST XL AN ANN TOOL

3.1 STEPS IN 4CAST XL

Step 1: Preparing Data

The input data to neural network is not always hard physical measurements. Scaling the data sometimes is needed so that the neural network can learn better.

Step 2: Building the architecture of the neural network model.

Step 3: Training the network model

Select the Initialize new weights. rows of value for the weights will be generated

Step 4: Retraining the Network Model. Here we do not need to rebuilt the whole network again. Make sure you have select the sheet that contain the training data as the active sheet before execute the step below.

Step 5: Re-Build the Neural Network Model.

Step 6: Testing

Step 7: Predicting

3.2 PREDICTION BY USING BACK PROPAGATION NEURAL NETWORK (BPNN).

Calculation of MSE, Root MSE, Mean absolute error, % error of back propagation neural network**.**

$$E_T = Y_T - F_T$$

Where $-E_T$ is Forecast Error at Period T

Y_T is Actual Value

F_T is forecast for Period T

Mean Absolute Error = $\frac{\sum_{T=1}^{n} E_T}{n}$ = 0.28498

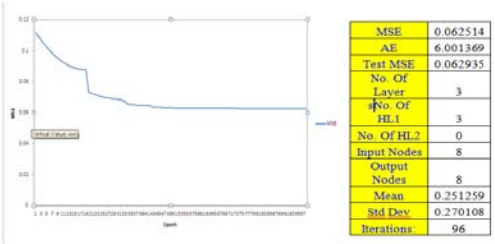
Mean Absolute % Error = $\frac{\sum_{T=1}^{n} E_T}{\sum_{T=1}^{n} Y_T}$ = 1.24%

MSE using 4cast XL= 0.062514

Root MSE = $\sqrt{MSE}$ = 0.250028

Forecast Skill = $\frac{1-MSE_{Forecast}}{MSE_{Ref}}$ = 937.486

Where MSE_{Ref} is 0.001



MSE	0.062514
AE	6.001369
Test MSE	0.062935
No. Of Layer	3
No. Of HL1	3
No. Of HL2	0
Input Nodes	8
Output Nodes	8
Mean	0.251259
Std Dev	0.270108
Iterations	96

Table1: MSE CHART & TEST MSE BY USING BACK PRAPOGATION NEURAL NETWORK.

3.3 PREDICTION BY USING CONJUGATE GRADIENT NEURAL NETWORK (CGNN).

Calculation of MSE, Root MSE, Mean absolute error, % error of conjugate gradient neural network.

$E_T = Y_T - F_T$

Where -E_T is Forecast Error at Period T

Y_T is Actual Value

F_T is forecast for Period T

Mean Absolute Error = $\frac{\sum_{T=1}^{n} E_T}{n}$ = 0.49614

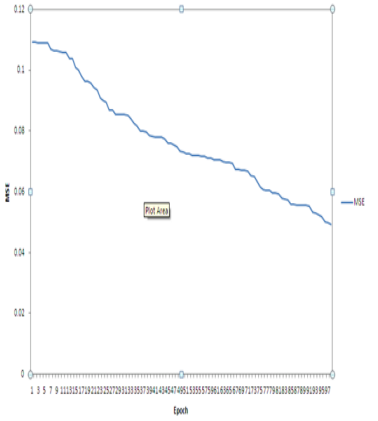
Mean Absolute % Error = $\frac{\sum_{T=1}^{n} E_T}{\sum_{T=1}^{n} Y_T}$ = 2.17%

MSE using 4cast XL= 0.04915

Root MSE = $\sqrt{MSE}$ = 0.221698

Forecast Skill = $\frac{1-MSE_{Forecast}}{MSE_{Ref}}$ = 950.85

Where MSE_{Ref} is 0.001



MSE	0.04915
AE	4.737606
Test MSE	0.04935
No. Of Layer	3
No. Of HL1	3
No. Of HL2	0
Input Nodes	8
Output Nodes	8
Mean	0.251259
Std Dev	0.270108
Iterations:	96

TABLE 2 : MSE CHART & TEST MSE BY USING CONJUGATE GRADIENT NEURAL NETWORK.

3.4 PREDICTION BY USING GENETIC OPTIMIZATION NEURAL NETWORK (GONN).

Calculation of MSE, Root MSE, Mean absolute error, % error of Genetic optimization neural network**.**

$E_T = Y_T - F_T$

Where -E_T is Forecast Error at Period T

Y_T is Actual Value

F_T is forecast for Period T

Mean Absolute Error = $\frac{\sum_{T=1}^{n} E_T}{n}$ = 0.51767

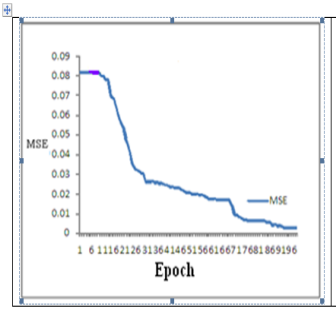
Mean Absolute % Error = $\frac{\sum_{T=1}^{n} E_T}{\sum_{T=1}^{n} Y_T}$ = 2.26%

MSE using 4cast XL= 0.002539

Root MSE = $\sqrt{MSE}$ = 0.050388

Forecast Skill = $\frac{1-MSE_{Forecast}}{MSE_{Ref}}$ = 997.461

Where MSE_{Ref} is 0.001



MSE	0.002539
AE	0.243721
Test MSE	0.002539
No. Of Layer	3
No. Of HL1	3
No. Of HL2	0
Input Nodes	8
Output Nodes	8
Mean	0.251259
Std Dev	0.270108
Iterations:	96

TABLE 3 : MSE CHART & TEST MSE BY USING CONJUGATE GRADIENT NEURAL NETWORK.

RESULT

Sl.NO	Forecasting methods	MSE	Root MSE	Mean absolute error	Mean absolute % error	Forecast skill
1	back propagation neural network	0.062514	0.250028	0.28498	1.24%	937.486
2	conjugate gradient neural network	0.04915	0.221698	0.49614	2.17%	950.85
3	Genetic optimization neural network	0.002539	0.050388	0.51767	2.26%	997.461

Table 4 : MSE & Mean absolute error , % error of forecasting methods.

From above table it has been observed that using back propagation neural network the difference between MSE & test MSE is lower but the actual error is not less than one. For 96 epoch & the predicted results obtained by back propagation neural network & Conjugate gradient neural network are not satisfied for 96 epoch value.But for the same epoch value using Genetic optimization neural network the difference between MSE & test MSE is very low & for good modeling the MSE value to be below or close to 0.001 but here it is 0.002912, and the predicted result obtained by genetic optimization neural network are also satisfactory which are tabulated in table no.4 So, this can be consider as a good modeling & suitable to be used as a forecasting model in real life scenario. We can use the current model as the difference between test MSE & MSE is negligible.

CONCLUSION

The aim of this paper has been to show the possibility of using the neural networks for predictions of daily need product. Results show that, in most of the cases, the network produces results parallel to the market demands therefore this can be used as an alternative way in these systems. The test mean square error value in back propagation neural network is 0.062935, Conjugate gradient neural network is 0.04935 & Genetic optimization neural network is 0.002412 which is show on the network output sheet. & it has been observed that the test MSE is very low

in the genetic optimization neural network as compare to other two training methods, the MSE is 0.002912 & actual error is 0.279525.

The general rule in 4castxl is the test MSE & MSE should not have the bigger difference & actual error should be less than 1. This can be considering good modeling & suitable to be used as a forecasting model in a real life scenario.

Here out of the three training algorithm Genetic optimization neural network is most suitable for the prediction as the actual error is less than 1. & the predicted result is tabulated in the table no. 16 show the satisfactory output.

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ANALYSIS OF SPACE VECTOR PULSE WIDTH MODULATION TECHNIQUE (FOR PQ IMPROVEMENT IN MULTIPHASE POWER SYSTEM)

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Abstract— With the application of multilevel inverter in the highvoltage and large power occasion in recent years, its modulation strategy has become a topic of research in the field of power electronics. Common modulation strategies such as Step Wave modulation, Specific Harmonic Elimination modulation, Carrier PWM modulation, Space Vector modulation are summarized in this paper. Multilevel inverters have the high voltage capability with voltage limited devices, high efficiency, low harmonic distortion, good electromagnetic compatibility. Multiphase machines have high reliability, high efficiency, and low torque ripple with low per-phase power rating. Multilevel multiphase technology combines the benefits of multilevel converters and multiphase machines. Nevertheless, new modulation techniques must be developed to take advantage of multilevel multiphase converters. This paper describes a simple space vector pulse width algorithm for multilevel multiphase inverter.

Keywords- *Space vector pulse width modulation (SVPWM), Multiphase System, Modulation Techniques.*

I. INTRODUCTION

With the development of power devices and relative theories in many years, the theory and material foundation for the application of multilevel converter have been developed [1].There are a lot of various products widely used in the high voltage and large power cases, such as variable frequency speed (VVVF), active power filter devices (APF), HVDC systems and reactive power compensation of power system, etc. [1]. Multilevel converters have been extensively studied in a wide variety of applications. Industrial applications of multilevel inverters include induction machine drives, regenerative rectifiers, interface of renewable energy sources to the utility grid and static synchronous compensators [2].The initial attempt to integrate a multilevel inverter with a multiphase machine carried out in demonstrated the advantages of combining both technologies [4]. The waveform quality, switching losses, voltage utilization are some of the principal indicators for estimating its modulation strategy. SVPWM technique has been studied deeply for multilevel inverters due to its performance benefits when compared to other modulation strategies. The SVPWM technique represents the reference voltage and the switching states of the converter in a state space [3].

II. COMPARISON OF VARIOUS MODULATION TECHNIQUES

A. Step Wave Modulation

Step wave modulation is a simple method by using the staircase waveform to approach the sine wave, which is a comparatively visual way [16]. In this method, the duration time of each level can be selected in order to eliminate some low-order harmonics, while the more the voltage level has, the better spectral characteristics can be gained. The advantages of this strategy are easy hardware implementation, minimum switching frequency and little switching loss [5]. However, this method would bring a few low-order harmonic components into the output waveform, which makes the wave quality poor [7]. On the other hand, it is difficult to achieve the dynamic adjustment on the output waveform, which means it is not able to build an effective closed-loop control.

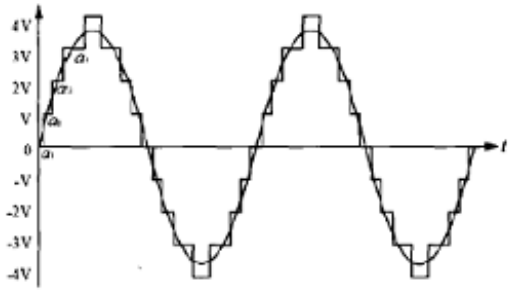

Fig.1. 9-level step wave modulation scheme

B. Carrier PWM Modulation

The carrier PWM modulation strategy for multilevel inverter is the spread application of two-level carrier SPWM technology into the multilevel field [5]. Its basic theory is as below: in order to get a sine voltage waveform with a pre-set frequency, SPWM is realized by comparing a sine control signal at that frequency with a triangular wave, whose crossing points are used to make sure the switch change-over moments (Fig.2). So it is also called as ―Triangle Carrier Method‖ [5]. For the multilevel carrier PWM modulation, if the level number of the converter is N, it requires N-1 carriers.

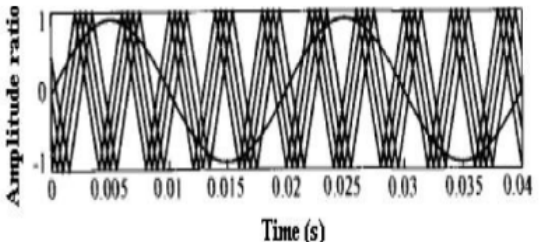

Fig.2. Sine modulation wave and triangle carrier waves

The multilevel carrier modulation can change a lot due to the various control freedom degrees. On the hand of the carrier wave, the degree of freedom includes the carrier

wave type, amplitude, frequency, phases, offset and phase relationship between carriers [5]. On the hand of the modulation wave, the degree of freedom also includes modulation wave type, amplitude, frequency, whether containing the superposition of zero-sequence component or not, and the phase relationship of multiphase system between modulation waves [10]. Besides that, there are some other degrees of freedom such as the phase between the carrier and modulation wave. By choosing these different freedom degrees, it can generate various methods for the specific topology and implementation of specific objects control.

C. Space Vector Modulation

Space vector modulation has been widely studied and applied because of its advantages such as wide range of linear modulation, high DC voltage utilization, little storage space, simple structure, convenient control, easy realization and so on.Like the two-level SVM, multilevel SVM is a vector-based synthesis modulation method [11]. Take a three-phase three-level structure for example; the output voltage of each phase has three kinds of status: P, 0, or N, so the total output of three-phase has 27 kinds of status. Its space vector scheme is shown in Fig.3. In 27 kinds of status, there are 3 zero-vectors, 24 non-zero vectors (including 6 vectors whose spatial location are overlapped). So totally there are 19 independent space vectors, which are called the―Basic Vectors‖ [8].

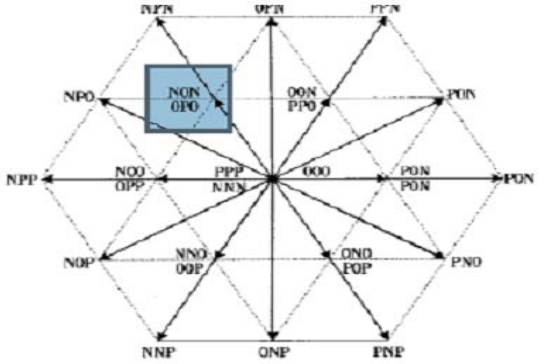

Fig.3. 3-level SVPWM algorithm vector scheme

SVM algorithm usually consists of four steps:

1. Projecting the reference vector into the selected coordinate system;
2. Taking the integer value of the projector component;
3. Identifying the neighboring vector and calculating the operation ratio;
4. Mapping the switch status

For an m-level inverter, the number of the switching status is m3 and the number of the basic vector is 3m (m-1) +1. The calculation work of the conventional SVM algorithm will increase dramatically with the increase of level number, as well as the algorithm complexity [8]

III. ADVANTAGES OF MULTIPHASE OVER THREE PHASE

Most of the variable-speed electric drives use three phase machines. Nevertheless, since variable-speed ac drives include a power electronic converter, the number of machine phases can be higher than three [4]. The major advantages of using a multiphase machine instead of a standard three-phase one are as follows:

1) improved reliability and increased fault tolerance and greater efficiency
2) higher torque density and reduced torque pulsations;
3) lower per phase power handling requirements and improved noise characteristics [6], [13].

IV. APPLICATIONS OF MULTIPHASE SYSTEMS

Some recent applications of multiphase systems include high torque low-speed brushless machines applied to electric vehicles propulsion, permanent-magnet motor drives for ship propulsion, permanent-magnet motors with low torque pulsation, and series-connected two-motor rives with a single inverter supply [6], [4],[9].

V. SPACE-VECTOR PWM IMPLEMENTATION

Pulse width modulation is a general technique for realizing a space voltage reference via an inverter. The duration of the gating pulses controls the frequency and magnitude of the inverter output voltage. Space vector pulse width modulation (SVPWM) is a PWM technique that uses space-vectors to generate these gating durations [10]. Section IV-A reviews three-phase SVPWM. In Section IV-B, a new general algorithm is proposed; which extends present three-phase SVPWM to n–phase SVPWM [11].

A. Three-Phase Space-Vector PWM

Three-phase SVPWM increases the dc bus utilization compared to PWM based on sine-triangle comparison. By injecting the third harmonic into the reference voltage signal, the fundamental of the phase voltage can be increased. SVPWM is implemented by averaging the time spent in adjacent switching states [14]. The drawback of this algorithm is the need for trigonometric calculations. This method can be simplified [15] by adding a voltage offset to the phase voltages. The addition of this offset centres the three voltage reference signals about the dc axis, implicitly adding the third harmonic, and allowing the three signals to be increased. The operation requires only addition and multiplication operations [3], [10].

B. Extension of Three-Phase SVPWM to n-Phase SVPWM

For a -phase system, the nth harmonic signal can be injected by adding to the voltage reference. The offset signal is

$$V_{n,offset} = \max\left[\frac{V_1}{V_{dc}} \cdots \frac{V_n}{V_{dc}}\right] - \min\left[\frac{V_1}{V_{dc}} - \frac{V_n}{V_{dc}}\right]$$

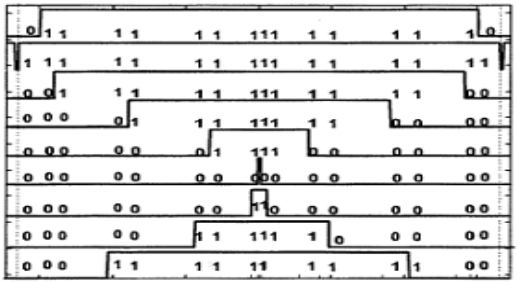

Fig. 4. Space vector PWM realization of the vector 1.0ej30o

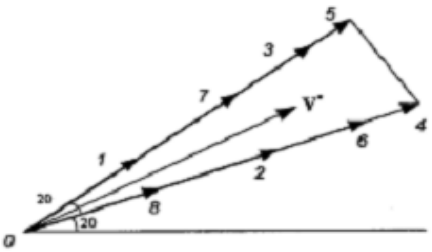

Fig.5. Vector sequence for realization of the voltage space-vector1.0ej30o

Realizing a voltage space-vector by applying this algorithm to a nine-phase inverter results in the switching states shown in Fig. 4. Also shown in the figure are the nine upper gating pulses. The switching states generated by this algorithm are exclusively from the four subsets described in the topic extension of 3 phases to n-phase [10]. Apparent in Fig. 4 is that only one switch changes state at a time. Fig. 5 shows the switching state sequence for half a sampling period in terms of corresponding space-vectors. The switching times {t0t1t2t3t4t5t6t7} of Fig. 4 can be determined by solving

$$V\frac{|V_{1,8max}|}{V_{total}} = k[\left(t_8 + t_1 e^{j\frac{\pi}{9}}\right)] \quad (1)$$

$$V\frac{|V_{2,7max}|}{V_{total}} = k[(t_2 + t_7 e^{j\frac{\pi}{9}})] \quad (2)$$

$$V\frac{|V_{3,6max}|}{V_{total}} = k[\left(t_6 + t_3 e^{j\frac{\pi}{9}}\right)] \quad (3)$$

$$V\frac{|V_{4,5max}|}{V_{total}} = k[(t_4 + t_5 e^{j\frac{\pi}{9}})] \quad (4)$$

$$t_0 + t_1 + t_8 + t_2 + t_7 + t_3 + t_6 + t_4 + t_5 = \frac{1}{2f_s} \quad (5)$$

$$V_{total} = (|V_{1,8max}| + |V_{2,7max}| + |V_{3,6max}| + |V_{4,5max}| \quad (6)$$

$$k = \frac{1}{3} 2f_s \frac{2}{9}(2\cos(20^0) + 1)V_{dc} \quad (7)$$

Where reference voltage of fig.5. can be constructed from the vectors which are proportional to the vectors of V{4,5max},V{1,8max},V{2,7max}and V{3,6max}

$$V = 2f_s\left[|V_{1,8max}|(t_1 e^{j\frac{\pi}{9}} + t_8 e^{j0}) + |V_{2,7max}|\left(t_3 e^{j\frac{\pi}{9}} + t_6 e^{j0}\right) + |V_{3,6max}|\left(t_7 e^{j\frac{\pi}{9}} + t_2 e^{j0}\right) + |V_{4,5max}|(t_5 e^{j\frac{\pi}{9}} + t_4 e^{j0})\right] \quad (8)$$

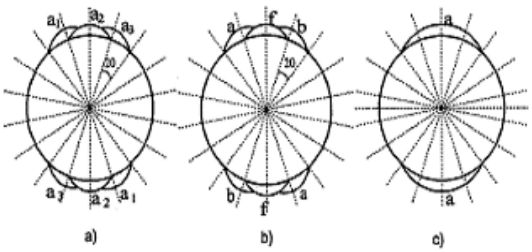

Fig. 6(a) Windings of a 3/9 phase machine in three-phase operation.

(b) Nine-phase operation.

(c) Windings of a conventional three-phase machine Each of the windings in the nine-phase configuration has one third of the turns per phase of the windings in the three-phase configuration, hence the term 1/3 in eq. We define as equivalent systems those that produce equal peak air-gap flux density for the same voltage Fig. 6(a) and (b) illustrate the placement of windings for a machine designed to operate as either a nine-phase or three-phase one. Fig 6(c) shows the winding configuration of a conventional three-phase machine with the same number of turns. The resultant winding distribution factor for one phase in Fig. 6(a) will be less than that of Fig. 6(c). Therefore, the resulting voltage space-vectors have lower magnitude [12]. For a conventional three-phase machine, the six possible non zero voltage space-vectors have a magnitude of /3Vdc, while for the three-phase machine of Fig. 6(a), the voltage vectors have a magnitude of:.

$$\frac{2}{9}.(2\cos(20^0) + 1)Vdc \approx \frac{2Vdc}{\pi} \quad (9)$$

We define the modulation index as the ratio of the fundamental of the output voltage V1 to the dc input voltage

$$m = \frac{V_1}{V_{dc}} \quad (10)$$

When SVPWM is applied to the conventional three-phase machine of Fig. 6(c), the maximum possible modulation index is

$$m_{3\emptyset max} = .577 \quad (11)$$

This is approximately an increase in fundamental of 15.4% compared to three phase sine-triangle PWM, which has a maximum possible modulation index of 0.5. For the winding distribution as in Fig. 6(a)., the maximum possible modulation is

$$m_{3\emptyset max} = \frac{\sqrt{3}}{\pi} \approx .551 \quad (12)$$

When the same machine is operated in nine-phase SVPWM, the maximum index is

$$m_{9\emptyset} max \approx 0.506 \quad (13)$$

This is an increase in fundamental of approximately 1.5% compared to nine phase sine-triangle PWM [10], [12].

VI. SIMULATION RESULTS

In a boost converter, there is a voltage source V which is variable in nature is connected to a IGBT with a inductor in series. With the help of pulse generator, decide pulse width in such a way that a desired output voltage is obtained .As per decided pulse width the IGBT gets short circuited and inductor gets charged for the remaining time. Now the voltage source and inductor together acts a new voltage source with a different voltage level.

THREE PHASE MULTILEVEL INVERTER USING SPACE VECTOR PWM

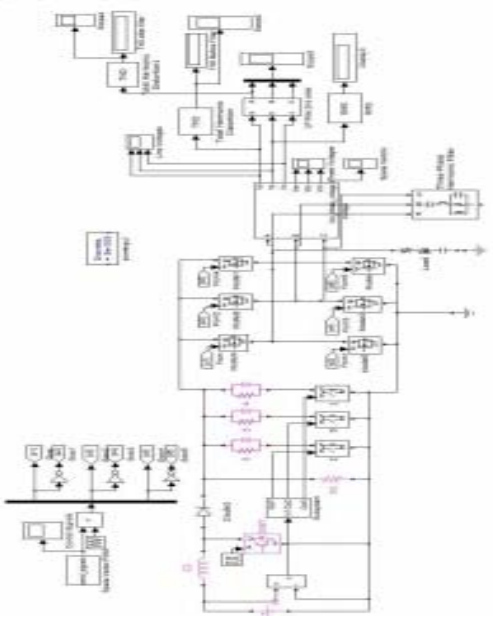

Fig.7. MATLAB Simulation of 3-Phase inverter using SVPWM

RESULTS OF 3-PHASE INVERTER USING SVPWM

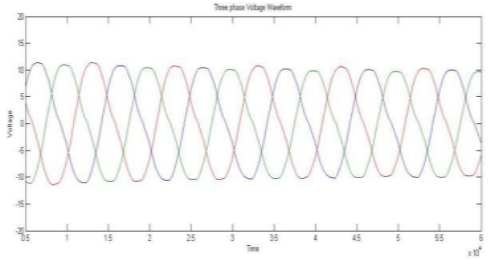

Fig.8. Voltage Waveform of 3 phase inverter with SVPWM

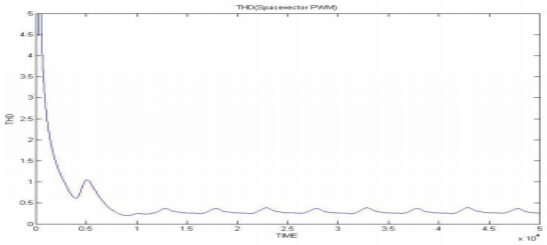

Fig.9. THD Waveform using space vector PWM

VII. CONCLUSION

It is observed that Space vector modulation has been widely studied and applied because of its advantages such as wide range of linear modulation, high DC voltage utilization, little storage space, simple structure, convenient control, easy realization and so on and multiphase finds a greater application in industrial applications because of its wide advantages over three phase and state vector can be implemented for its use in 3-phase which can be extended for n-phase.Simulation results indicates that space vector can be used in multiphase system and THD obtained is within prescribed limit.

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LOW POWER ON SYSTEM-LEVEL USE OF BIST FOR PROGRAMMABLE INPUT/OUTPUT BUFFERS IN FPGAS

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Abstract:- We describe a Built-In Self-Test (BIST) approach that was developed for the programmable Input/ Output (I/O) buffers in Field Programmable Gate Arrays (FPGAs). This paper proposes a low power Linear Feedback Shift Register (LFSR) for Test Pattern Generation (TPG) technique with reducing power dissipation during testing. The correlations between the consecutive patterns are higher during normal mode than during testing. The proposed approach uses the concept of reducing the transitions in the test pattern generated by conventional LFSR. The transition is reduced by increasing the correlation between the successive bits .The simulation result show that the interrupt controller benchmark circuit's testing power is reduced by 46%with respect to the power consumed during the testing carried by conventional LFSR.

Keywords*-LFSR, Optimization, LowPower, TestPattrens*

I.INTRODUCTION

The main challenging areas in VLSI are performance, cost, testing, area, reliability and power. The demand for portable computing devices and communications system are increasing rapidly. These applications require low power dissipation for VLSI circuits. The power dissipation during test mode is 200% more than in normal mode [1]. Hence it is important aspect to optimize power during testing. Power optimization is one of the main challenges.

There are various factors that affect the cost of chip like packaging, application, testing etc. In VLSI, according to thumb rule 5000 of the total integrated circuits cost is due to testing. During testing two key challenges are

- Cost of testing that can't be scaled.
- Engineering effort for generating test vectors increases as complexity of circuit increases

Based on 1997 SIA data, the upper curve shows the fabrication cost of transistor and lower curve shows the testing cost of transistor. Figure 1 shows that the fabrication cost transistor decreases over the decades according to Moore's law but the testing cost as constant.[2]

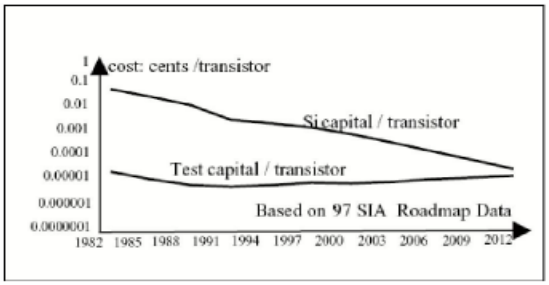

Figure 1: Fabrication cost versus testing cost

There are main two sources of power dissipation in digital circuits; these are static and dynamic power dissipation. Static power dissipation is mainly due to leakage current and its contribution to total power dissipation is very small. Dynamic power dissipation is due to switching i.e. the power consumed due to short circuit current flow and charging of load capacitances is given by equation:

where Vdd is supply voltage, E(sw) is the average number of output transitions per 1/fclk, fclk is the clock frequency and CL is the physical capacitance at the output of the gate. Dynamic power dissipation contributed to total power dissipation. From the above equation the dynamic power depends on three parameters: Supply voltage, Clock frequency, switching activity. To reduces the dynamic power dissipation by using first two parameter only at the expense of circuit performance. But power reduction using the switching activity doesn't degrade the performance of the circuit.
Power dissipation during the testing is one of most important issue [12]. There are several reasons for this power increased in test mode.

- To test large circuit, circuits are partitioned to save the test time but this parallel testing results in excessive energy and power dissipation.
- Due to the lack of at-speed equipment availability, delay is introduced in the circuit during testing. This cause power dissipation.
- In the successive functional input vectors applied to a given circuits in normal made have a significant correlation, while the correlation between consecutive test patterns can be very low. This can cause large switching activity in the circuits during test than that during its normal operation. Power dissipation in CMOS circuits is proportional to switching activity, this

excessive switching activity during test may be responsible for cost, reliability, performance verification, autonomy and technology related problems.

During testing large power is dissipated than in the normal mode. This is due to lack of correlation between the mode. This is due to lack of correlation between the successive test patterns generated by ATPG (for external testing) or LESR (for BIST) and this large power dissipation cases following effects:

- The increased power may be responsible for cost, reliability performance verification, autonomy and technology related problems low power dissipation during test application is thus becoming n equally important figure of merit in to day's VLSI Circuits design and is expected to become one of the major objectives in the near future.
- High power and ground noise caused by high switching during testing are serious problem where the supply connects are poor. Thus excessive noise can change the logic state of the circuit lines leading good dies to fail the test and hence loss of yield.
- As the circuit is designed in the deep sub micron (DSM) technology, this uses small supply voltages and hence this reduces the use of special cooling equipment to remove the excessive heat during test.
- Low power testing is done at at-speed. But in other testing techniques, circuits are added to lower the frequency of circuit during test.

For complex circuits, hierarchical approach is used. The advantage of hierarchical approach is that every block is tested separately. Test input is given to each block and output is observed and verified. DFT (Design For Testability) is the action of placing features in a chip design process to enhance the ability to generate vectors, achieve a measured quality level or reduce cost of testing. The conventional DFT approaches use scan and BIST.

In this paper a modified low power LFSR are used in which the number of transitions of test pattern are reduced testing. The remainder paper is organized as follows: Section 2 describes the previous work while section 3 presents the proposed work. Section 4 describes the simulation results and conclusions.

II.PRIORWORK

There has been limited prior work in the area of testing I/O cells in, or applicable to, FPGAs [2][6]-[10]. In [2], a system- level BIST architecture is presented for the I/O cells of Atmel FPGAs. The overall BIST approach was similar to that used for configurable logic resources in the FPGA core [11]. The BIST architecture in [2] consists of a single TPG implemented in configurable logic blocks (CLBs) sourcing test vectors to the I/O cells under test. A single TPG was implemented under the assumption that internal FPGA resources had already been tested and found to be fault-free. The I/O cells under test are identically configured with bidirectional I/O buffers such that the output responses are sent back into the FPGA internal resources. However, for in-system testing, this requires that all external devices be tri-stated during testing.The output responses of the I/O cells are monitored by CLBs configured as comparison-based output response analyzers (ORAs). While presenting a general architecture applicable to any FPGA or configurable SoC with an FPGA core and bidirectional I/O buffers, [2] implemented 25 BIST configurations applicable to the Atmel AT94K SoC and AT40K FPGA families only.

In[6], we presented a BIST approach for the programmable logic in the I/O cells of Xilinx Virtex-4 and Virtex-5 FPGAs. An important difference between the I/O tile BIST architecture in [6] and other prior work is in the configuration of the I/O tiles under test. Prior approaches relied on bidirectional I/O buffers to provide the return path for test patterns exiting the output logic and returning to the ORAs via input logic [2][9][10]. But the reliance on bidirectionally configured I/O buffers severely limits the applicability of this type of BIST for in-system testing. With every I/O buffer configured in the path of the logic under test, the previous approaches required that all connecting devices be tri-stated during in-system testing. Connecting passive devices, such as termination resistors or light emitting diodes (LEDs), introduce another problem since these devices cannot be disconnected or tristated during in system tests. For example, we have observed that, at certain BIST clock frequencies, LEDs connected to I/O buffers under test caused the comparison ORAs to erroneously report failures for otherwise fault-free I/O tiles. These failures were observed at frequencies as low as 325 kHz, which is unacceptable for an at-speed test of the logic resources. As a result, the generality of the BIST is compromised. Fortunately, the I/O tiles in Virtex-4 and Virtex-5 FPGAs include dedicated routing from the OLOGIC to the ILOGIC that bypasses the I/O buffer [4][5]. Using this feedback routing instead of the I/O buffer means that no signals from the FPGA under test can reach, and therefore be influenced by, external devices during testing of programmable logic in the I/O tile. Furthermore, bypassing the I/O buffer does
not sacrifice fault coverage in the I/O tile logic resources. With the I/O buffers removed from all tests for logic resources, these tests may be applied

without concern for the external test environment, thus making our approach applicable to all levels of FPGA testing. The remainder of this paper discusses the implementation and system application of standalone BIST configurations developed for the I/O buffers that are independent of the tests for the additional programmable logic resources in the I/O tiles.

III. I/O BUFFER BIST

The basic concept of the BIST architecture, illustrated in Fig. 2, is to configure I/O buffers as bidirectional buffers to allow test patterns produced by multiple identically configured test pattern generators (TPGs) to be applied to output buffers while providing a return path through input buffers leading to the core of the FPGA. The output response of each I/O buffer under test is then compared to the output responses of other identically configured I/O buffers under test by circular comparison-based ORAs, illustrated in Fig. 3, to detect mismatches in output responses of I/O buffers due to faults. The ORA contents can be retrieved via partial configuration memory red back at the end of the BIST sequence such that the faulty I/O buffers can be determined using a diagnostic algorithm developed for the circular comparison-based BIST approach [7]. When diagnosis of faults is not required, a single-bit pass result is available, as described in [6]. The TPGs and ORAs are constructed from the programmable logic resources in the core of the FPGA during off-line testing and are replaced by the intended system function during normal online operation. Hence, there is no area or performance penalty to the normal system function.

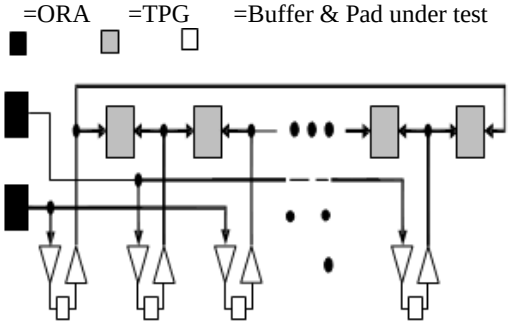

Figure 2. General I/O BIST architecture.

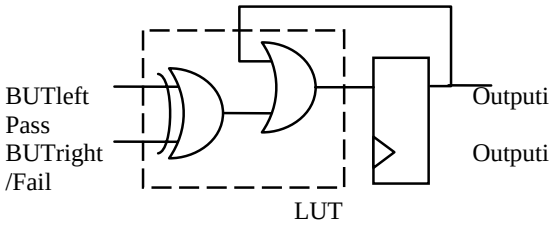

Figure 3. Comparison-based output response analyzer

One TPG is configured for each of the I/O buffers under test. The TPGs, which are 2-bit counters, apply exhaustive test patterns to all of the I/O buffers under test, which each have two inputs (T and O), as illustrated in Fig. 4. By applying the 2-bit count pattern for an additional clock cycle, both inputs are tested for 0-to-1 and 1-to-0 transitions.

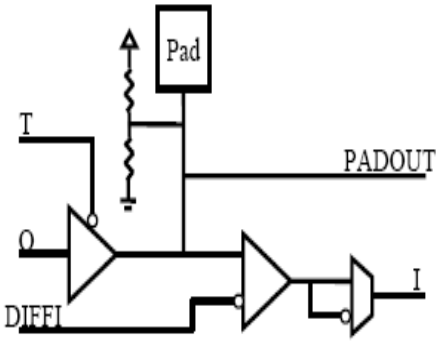

Figure 4. Virtex-5 programmable I/O buffer.

In Virtex-4 and Virtex-5 devices, each I/O tile includes two programmable bidirectional I/O buffers. Each buffer supports a wide variety of I/O standards and has programmable drive strength, slew rate, and on-chip termination with digitally controlled impedance (DCI) matching. A programmable pull - up, pull-down, keeper circuit is also included. The supported single-ended I/O standards include LVCMOS, LVTTL, HSTL, SSTL, GTL, and PCI [4][5]. Differential I/O standards are supported by grouping the two I/O buffers in an I/O tile and utilizing the DIFFI input (Fig 4.) of the input buffer and PADOUT connection to the DIFFI input of the adjacent input buffer. Supported differential I/O standards include LVDS, HT, LVPECL, BLVDS, differential HSTL, and SSTL [4][5]. A simplified model of the bidirectional buffer is shown in Fig. 4. In Virtex-5, 40 I/O buffers are grouped in an I/O bank (32 I/O buffers in Virtex-4). The output drive voltage, V_{CCO}, is supplied via a dedicated pin for each I/O bank. Therefore, all I/O buffers in an I/O bank must share the same output drive source voltage [4][5]. For single-ended I/O standards with a differential input buffer that requires a reference voltage, two pins in each I/O bank are configured as V_{ref} inputs.

Printed circuit board (PCB) traces are typically terminated with resistors to match the impedance of the receiver or driver to that of the trace. The I/O buffers in Xilinx Virtex-4 and Virtex-5 FPGAs allow for on chip termination of traces using a DCI circuit (included with each I/O bank). DCI adjusts the input termination of the receiver or output impedance of the driver to equal an external reference resistance [4][5]. Two reference resistors are required per I/O bank, and are connected to two reference pins in each I/O bank. Note that theses two

pins may not operate as regular I/O when any I/O buffer in the bank is configured with DCI. The architectures and operation of the controlled impedance driver and controlled impedance input termination circuits are described in detail for Virtex-4 in [4] and Virtex-5 in [5].

Multiple configurations of the I/O buffers are required to test all of the modes of operation of the I/O buffers. Our BIST configurations are divided into four categories: single-ended I/O standards without a voltage reference, single-ended I/O standards with a voltage reference, DCI enabled I/O standards without a voltage reference, and DCI enabled I/O standards with a voltage reference. For testing purposes, all of the I/O buffers in an I/O bank are identically configured. When external references voltages or reference resistors are required, the reference pins in each I/O bank are not configured for test, and the appropriate voltage or resistance is supplied at the reference pin. Additionally, the appropriate output drive voltage, V_{CCO}, is supplied on a per-bank basis. For manufacture testing, all I/O buffers in the device are identically configured and the appropriate reference voltages and/or reference resistances for the configured I/O standard are supplied via the testing apparatus. For in-system testing of the I/O buffers, the reference voltages and/or reference termination resistors are supplied by the system, and I/O buffers are tested on a per-bank basis in the system mode of operation only. All configurations of the I/O buffers in Virtex-4 devices that are testable under the current scheme are shown in Table II at theend of the paper. Note that I/O standards not supporting a bidirectional mode of operation cannot be tested because, without a bidirectional buffer, there is no return path for signals driven by an output buffer to the ORAs in the FPGA fabric.

IV. CONCLUSIONS

A BIST approach for the programmable I/O buffers in FPGAs was presented that is applicable at all levels of testing. Results of the actual implementation of the approach in systems with FPGAs were discussed, and the provided examples give an indication of the sensitivity of the I/O buffer BIST approach to external system loading effects. As a result of this sensitivity, we currently test I/O cell logic resources associated with SDR, DDR, and SERDES modes of operation using internal loopback capabilities in the Xilinx Virtex-4 and Virtex-5 I/O cells to avoid the affects of external system loading such that all I/O cell logic can be tested at a fixed clock frequency. Only the logic and configuration options (including I/O standards) associated with the buffers are tested using the bidirectional buffer modes of operation. It should be noted that Boundary Scan EXTEST cannot be used to test the LED connections illustrated in Fig. 5 without the assistance of an external mechanism to monitor the illumination state of the LEDs. Yet, this BIST approach could possibly be used to determine if the LEDs are illuminated based on the pass/fail characteristics of the test configuration without visual monitoring. In addition, other attributes of the system application could potentially be tested such as capacitive and resistive loading by grouping I/O buffers for testing at different BIST clock frequencies.

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OBSERVATIONS ON INFORMATION SYSTEM AND ERP SYSTEM SUCCESS MODELS: A REVIEW LITERATURE REPORT

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Abstract:- The evaluation of effectiveness of Information System (IS) or Enterprise Resource Planning (ERP) is an important and challenging task at any organization. There have been many cases of failure in implementing ERP systems in the past, so it is critical to identify and understand the factors that largely determine the success or failure of ERP system in an organization. The goal of the IS or ERP systems success model is to better plan, implement and evaluate ERP projects and help senior managers to make better decisions when considering ERP systems in their organization. In this paper authors have reviewed the existing literatures, published in various journals and conference proceedings on IS and ERP success measurement. The purpose of this paper is to provide a useful base to researchers who are interested in understanding various IS success and models as well as ERP success models.

Keywords-*ERP, IS success Model, ERP Success Model.*

I. INTRODUCTION

Enterprise Resource Planning (ERP) is a system for the seamless integration of all the information flowing through the company such as finances, accounting, human resources, supply chain, and customer information (Yang Jyh-Bin *et.al.*, 2007). As the trend of the globalization of business, many companies tended into the multinational business model. As the growing of the level of organization and scale with business needs, it leads to the growing of needs of integration and controlling of enterprise resources, business process and information systems. In this global competition, enterprises must make the best business resources on the configuration, which can help them to continue to survive and develop. Enterprise resource planning (ERP) is a powerful management system providing the best business resources information (Xu Lan, 2012).However, limited literature has concentrated on evaluating success of an ERP system. Although it is very important to evaluate the success of ERP implementation projects since a lot of financial and human resources are invested. Information systems (IS) success is one of the most widely used dependent variables in information systems research. Not surprisingly, much attention has been given to how best to measure it (Chien Shih-Wen *et.al.*2007). The research work is an endeavour to represent various success models for ERP system success measurement and to look at the dimensions and sub dimensions to measure ERP system success.

II. RESEARCH OBJECTIVE

Objectives of this research work are

1. To describe the need of IS or ERP system.
2. To define the success of IS or ERP system.
3. To elaborate the Importance of measurement of IS or ERP Success.
4. To illustrate various ERP success models.

III. WHY IS OR ERP IS NEEDED FOR AN ORGANIZATION

IS or ERP is needed for an organization to enhance profitability, to increase sales, to reduce procurement cost. Such system is necessary for healthy operations; it integrates the systems across the functional departments in a company as well as across the enterprise as a whole, provides better customer service, introduces latest technologies, and avoids data redundancy. The system provides strength to compete in the market; it accepts manufacturing challenges and develops specific business methods and processes.

The question may be answered by deferent ERP system users as shown in below figure:

Fig.1- Need of ERP system for an Organization (Seksin Cheevirot 2006)

IV. DEFINING SUCCESS OF IS OR ERP SYSTEM

Success is a dependent variable of the reached quality level. If the quality of the ERP- system running is poor, the success will be also poor in most cases. According to the ISO 9000-2005 standard, the quality of something can be determined by

comparing a set of inherent characteristics with a set of requirements. If those inherent characteristics meet all the defined requirements, high or excellent quality is achieved. If those characteristics do not meet all defined requirements, a low or poor level of quality is achieved. By linking quality to requirements, ISO 9000 argues that the quality of something cannot be established in a vacuum and quality is always relative to a set of requirements (Praxiom Research Group Limited, 1997). The success or failure of ERP systems is relative and must be measured in relation to the expectations of the organisation that implements the system (Curlee and Tonn, 1987).A lot of research has been focused on defining factors and measures that should capture the characteristics of an ERP system but such factors might not capture the intangible or indirect value generated by the according system (Ding and Straub, 2007). It is reasonably easy to evaluate tangible implementation costs, e.g. software license, hardware, consultancy, and training, but other intangible costs are much more difficult to measure and evaluate the success of ERP(Hedman and Borell, 2005).

Success cannot be defined as completing the project to replace the old systems on schedule and on budget because completing the project on time and on budget is necessary, but not sufficient. Success must be defined as achieving the return on investment (ROI) on which the implementation is based. The ROI is the goal the organization must keep in mind in every step in the project. Achieve the return and the implementation can be called a success. (Doug Howardell, CPIM, PMP, member of the ACA Group Published November, 2011). A fair measure of ERP system success might be implementation of the system to the point where company employees are using its features and functions as part of their day-to-day activities and achievement of a return-on-investment (ROI) that justifies the cost of the system project.

The best measure of ERP success is the following:

Installation success: Install the system, complete the setup, convert input data, and install sufficient hardware to provide convenient access.

Complete the implementation: Define and document system functionality in the context of how it will support operations. Train the users. Start operations using the system.

Functions to improve operations to the extent that real return is achieved: Cost reductions, revenue improvements, lower inventory, shorter lead-time, better customer service, etc. sufficient to generate a provable return-on-investment sufficient to justify the cost and effort expended.

V. IMPORTANCE OF MEASUREMENT OF IS OR ERP SUCCESS

ERP projects are complex which influence main internal and external operations of companies. There are different research approaches which try to develop models for ERP success measurement. There are not only benefits that can be achieved from an ERP system, there is already evidence of failure in projects related to ERP implementations which are found in the literature (Davenport, 1998). An investment in ERP system represents a significant commitment of resources and it has a dramatic effect on all operational aspects of a business (Nicolau, 2004). ERP implementation projects are very different from most other types of projects such as building construction, network installation, etc. The key difference is that there are no precise industry standards, legislated codes, or published performance benchmarks against which success can be quantitatively measured. This lack of benchmarks and measurement techniques has created an environment in which ERP projects are declared a success or failure based on arbitrary criteria, individual perceptions, partisan motivations, or other subjective factors.

If the organization wants to measure the success of ERP program; they need to properly identify the targets to be achieved and the constituents who will be affected. Then assess whether the targets were achieved and decide how to monitor and measure the level of achievement attained against pre-defined targets.

VI. SUCCESS MEASUREMENT APPROACHES

In the following section, some models for success measurement are listed and explained. It is an overview of the existing approaches.

A. The DeLone McLean (D&M) I/S Success Model

The most referred to model for success measurement in the field of IS is the DeLone and McLean (DeLone and McLean 1992, DeLone and McLean, 2002, DeLone and McLean, 2003) model which moved to a user centred approach when trying to judge overall IS success. The DeLone and McLean model consists of six interdependent measurements of success. System quality, information quality, use, user satisfaction, individual impact and organizational impact are the main measurement dimensions.

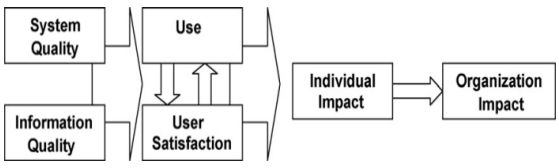

Fig.2. D&M IS success model, DeLone and McLean

B. Updated D&M IS success model

In 2003 DeLone and McLean published a reformulated IS-success model which offered the addition of service quality and the collapsing of individual impact and organizational impact on net benefits (DeLone and McLean, 2002). The 'use' was replaced by 'Intention to use', which is an attitude, whereas 'use' is behaviour; this new part of the model may resolve some of the process versus causal concerns that Seddon (1997) raised. But attitudes, and their links with behaviour are difficult to measure and many researchers may choose to keep 'use' but with a more extensive understanding of it. The new model shows that 'use' must precede 'user satisfaction' in a process sense, but positive experience with "use" will lead to greater 'user satisfaction' in a causal sense. That's the reason why increased 'user satisfaction' will lead to increased 'intention to use,' and, thus, 'use.' As a result, 'net benefits' will occur. The lack of positive benefits can lead to decreased use and possible discontinuance of the system or of the whole IS department itself (DeLone and McLean, 2003).The new construct 'Net benefits' is the collapsing of Individual and Organizational Impact which were mentioned in the original model of 1992. This was necessary to make wider the impact of the information system also depending on the context in which the model was used (DeLone and McLean, 2003).

Fig.3. Updated D&M IS success model (DeLone and McLean 2003)

C. The Gable et al. model

Gable et al. (2003) made an exploratory inventory survey which was used for model building. They built a model which was used for enterprise system success measurement approaches – the "A Priori Model". The "A Priori Model" was using five constructs and forty-two sub-constructs. The aim of the test of the "A Priori model" originally showed that the ERP success depends on the size of the organization (Myers et al.,1997).

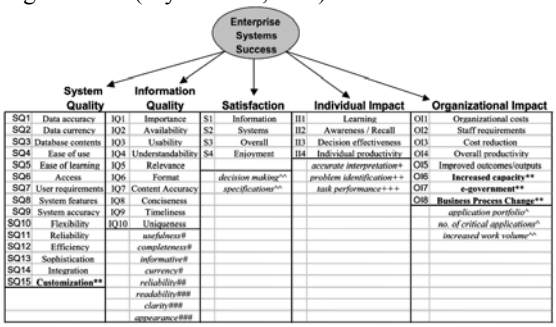

Fig.4. The A Priori Model

D. The Revised Gable et al. model

Figure 8 depicts the revised model. It has the four quadrants—(1) individual impact, (2) organizational impact, (3) information quality, and (4) system quality—representing four distinct but related dimensions of the multidimensional phenomenon: enterprise systems success. When evaluating an enterprise system, measures of these dimensions represent a snapshot of the organization's experience of the enterprise system at a point in time. The impact dimensions are an assessment of benefits that have followed (or not) from the system. The quality dimensions reflect future potential. Together, these four dimensions reflect an ostensibly complete view of the enterprise system—an overarching measure of enterprise systems success. The revised model for ES success deviates from the traditional DeLone and McLean model in the following ways: (1) it depicts a measurement model and does not purport a causal/process model of success, (2) it omits the use construct, (3) satisfaction is treated as an overall measure of success, rather than as a dimension of success, (4) new measures were added to reflect the contemporary IS context and organizational characteristics, and (5) it includes additional measures to search a more holistic organizational impacts construct.

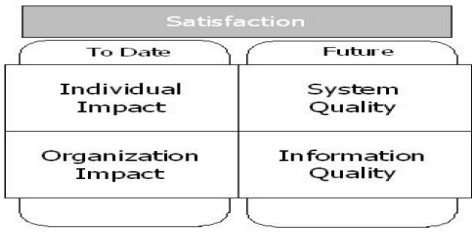

Fig.5. The Revised Model (Gable et al., 2003)

E. The extended ERP Systems Success measurement model

Ifinedo (2006) extended the dimensions of success proposed by Gable et al. (2003) because of the growing body of knowledge in this research field. The author found through literature review and interviews that ERP systems success measurement models might be limited because 2 important dimensions may not be considered. One new dimension which was added to the model was the Vendor/Consultant Quality because the result of empirical evidence revealed that firms tend to associate the role and quality of the providers of their software with its overall success of the organization (Ifinedo, 2005, Ifinedo and Nahar, 2006). ERP-projects are very complex and take a lot of time, that's why competent partners are needed. A know-how transfer and mixture between internal and external staff is necessary to manage it. Vendor / consultant quality measures the influence of external quality on the ERP-systems success. Vendor and consultant are grouped together because they represent an external source in the model.

Infinedo (2006) argued that the client will be in a better position to use the acquired software efficiently and effectively in achieving organizational goals when an arrangement between externals and the implementing firm exists. When this is the case, success with the software increases. Typical measures for this dimension are technical support provided, relationship with the organization or credibility and reliability.

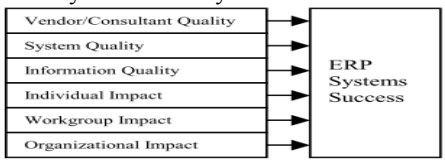

Fig.6. The Extended ERP Systems Success Measurement Model

F. Balanced Scorecard Approaches

The management of ERP Software consists of two main tasks-the implementation and the use of this comprehensive software afterwards (Rosemann and Wiese, 1999). The intention of the Balanced Scorecard is the supplementation of traditional financial measures with three additional perspectives – the customer perspective, the internal business process perspective and the learning and growth perspective (Kaplan and Norton, 1997). The Balanced Scorecard (BSC) can be used for evaluation of these tasks and afterwards for the strategic planning of the future development of the system based on the evaluation results (Rosemann and Wiese, 1999, Martinsons et al., 1999).

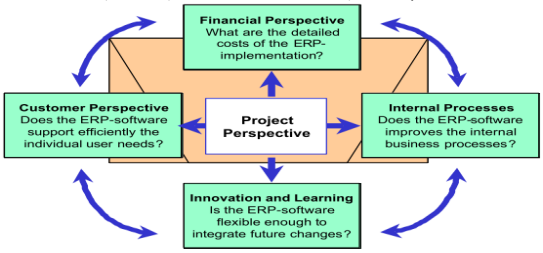

Fig.7. The ERP implementation Balanced Scorecard

For the purpose of using the Balanced Scorecard to control the running of ERP software, the four standard perspectives of the original model have to be adjusted to the specific object of an ERP system.

G. Task-Technology Fit (TTF) construct as an indicator of ERP success

The Task-technology fit (TTF) theory has the main clear statement that IT is more likely to have a positive impact on individual performance and can be used if the capabilities of the IT match the tasks that the user must perform. It measures the acceptance with the 3 main influence factors: task, ERP (technology) and user. These 3 factors are influencing the acceptance of the system. ERP is viewed as a tool used by individuals carrying out their tasks. Tasks are the actions carried out to transform inputs into outputs. That means, for example, input is an order of a customer and output is the delivery of the specific article. Users use the technology to support them in performing of their tasks. Task-technology fit measures the degree to which a technology supports an individual in performing his or her portfolio of tasks (Goodhue, 1995). The framework describes the match between the functionality provided by the ERP package, the tasks undertaken by the users of that package, and the skills and attitudes of the individual users. In the TTF ERP Success Model of Smyth (2001) TTF, perceived usefulness and user satisfaction are shown as the three constructs that are the most important indicators of ERP success.

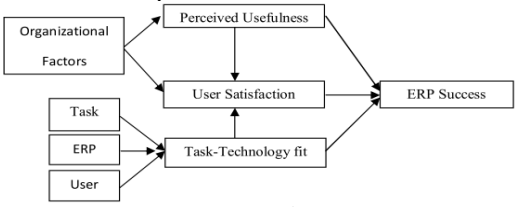

Fig.8.ERP success model from Smyth (2001)

In this model poor TTF would contribute to a low level of User Satisfaction, while poor TTF and low user satisfaction each would contribute to the lack of success of the ERP package.

H. Revised IS success model

Chien Shih-Wen et.al. (2007) have taken DeLone and McLean model (D&M) IS success model with the six i.e. success quality, information quality, information use, user satisfaction, individual impact and organizational impact, as a base model and have proposed a revised IS success model as shown below.

Fig.9. Revised ERP success model (Chien Shih-Wen et.al. 2007)

VII. CONCLUSION

Evaluation of success is a difficult approach and it only makes sense if the result of an evaluation is used as a basis for actions which can result in an improvement of the systems performance. The literature review reflects that each ERP system success measurement model has their limitation and every model has their pros and cons. All the models have their own field of application. Although as per literature review D&M IS Success Model is the largely accepted model for IS success measurement. The models have a specific approach, thus which model is suitable or which one is not suitable for a particular organization and it cannot be suggested. There are different possible criteria which can be used to distinguish one model from another model. No model can be used as a generalized ERP success

model. Authors are trying to establish or suggest a suitable model to evaluate ERP success. Although ERP companies make a generalized package for all enterprises but after an in-depth study of all the success models we have reached to the conclusion that the ERP Company should provide industry specific packages. This article gives an insight to those organizations which are seeking to implement ERP system or implementing the ERP system.

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