DATA MINING AND REPORTING IN HEALTHCARE

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ABSTRACT

The amount of raw data stored in corporate databases is exploding. Trillions of bytes of healthcare data is available and needs to be processed and stored. In healthcare data mining is becoming increasingly popular. The use of data mining in medical diagnosis is becoming very common and has been used widely in diagnosis of cancer, tumors, hepatitis, diabetes and cardiovascular diseases etc. The main aim of this paper is to build, an predictive system which analyses certain parameters and predicts whether a person is at risk for diabetes and cardiovascular diseases using naïve bayes algorithm. The system helps to control and diagnose of disease, by regularly monitoring the risk factors for each person.

Keywords: BMI, Data Mining, Diabetes, Naive Bayes

I. INTRODUCTION

Data mining has been used intensively and extensively by many organizations. Data mining applications can greatly benefit all parties involved in the healthcare industry. For example, data mining can help healthcare insurers detect fraud and abuse, healthcare organizations make customer relationship management decisions, physicians identify effective treatments and best practices, and patients receive better and more affordable healthcare services. The huge amounts of data generated by healthcare transactions are too complex and voluminous to be processed and analyzed by traditional methods.[10]

A data mining algorithm is a set of heuristics and calculations that creates a data mining model from data. To create a model, the algorithm first analyzes the data you provide, looking for specific types of patterns or trends[11]. The algorithm uses the results of the analysis to find the optimal parameters for creating a data mining model. These parameters are then applied across the entire data set to extract actionable patterns and detailed statistics. Choosing the best algorithm to use for a specific analytical task can be a challenge. Different types of data mining algorithms:

Classification algorithms, Regression algorithms, Segmentation algorithms, Association algorithms, Sequence analysis algorithms .For predicting diseases there are different algorithms like decision tree, naive bayes, Multilayer perception, Multiclass Classifier. Each algorithm has accuracy and error rate. Among these algorithms the proposed system uses naïve Bayesian algorithm.

Healthcare has tremendous amount of data which is present in unorganized form. It contains large amount of sensitive data which can help to integrate, store and analyze patients data. The incorporation of technologies in health care can improve quality of analysis, reduce errors, streamline processes, and improve performance. Data-mining technology is used in various fields in the health care industry, primarily for performance assessment and quality improvement.[12]

The paper is organized as follows. In Section II, the different data mining techniques are introduced. Section III describes the proposed system and Section VI contains information about the prototype. Finally, conclusions are drawn in Section V.

II. DATA MINING ALGORITHMS

1. Association Algorithm: It finds correlations between different attributes in a dataset.

Apriori algorithm: The Apriori Algorithm is an frequent item set algorithm. The algorithm analyzes a data set to determine which combinations of items occur together frequently. Frequent Itemsets are the sets of items that have minimum support. i.e if{AB} is a frequent itemset,both {A} and {B} should be frequent itemset.[8]

2. Classification Algorithm: It predicts one or more discrete variables, based on the other attributes in the dataset.

2.1 .Naive Bayes: Naïve Bayes (NB) based on applying Bayes' theorem (from Bayesian statistics) with strong (naive) independence assumptions .Naive Bayes classifiers can handle an arbitrary number of independent variables whether continuous or categorical. Given a set of variables, X = {x1,x2,x3,xn} we want to construct the posterior probability for the Cj event on a set of possible outcome Cj among a set of possible outcomes of C={c1,c2,c3..,cn}. [3]

$$P(C|x1,...,xd) = \frac{P(C)*P(x1,...,xd|C)}{P(x1,....,xd)} \quad \ldots\ldots\ldots\ldots\ldots(1)$$

2.2 .ID3:Iterative Dichotomiser 3 is a decision tree learning algorithm which is used for the classification of the objects with the iterative inductive approach. In this algorithm the top to down approach is used. The top node is called as the root node and others are the leaf nodes. Each node requires some test on the attributes which decide the level of the leaf nodes. The tree calculates entropy and information gain at each level.[9]

2.3. J48: J48 is an extension of ID3. The additional features of J48 are accounting for missing values, decision trees pruning, continuous attribute value ranges, derivation of rules, etc .[6] This algorithm it generates the rules from which particular identity of that data is generated. The objective is progressively generalization of a decision tree until it gains equilibrium of flexibility and accuracy.

2.4 . SVM(Support Vector Machine):Support vector machines are a moderately type of learning algorithm, originally introduced. Naturally, SVM aim at pointed for the hyper plane that most excellent separates the classes of data.[5] SVMs have confirmed the capability not only to accurately separate entities into correct classes, but also to identify instance whose establish classification is not supported by data.

Table 1: Survey of accuracy measures for each data mining algorithms

Algorithm	Accuracy	Reference
Naive bayes	81.48%	[3]
ID3	81.11%	[2]

SVM	74.1%	[5]
J48	78.11%	[6]

III. PROPOSED SYSTEM

The new system uses Data Mining for analysis of past data and to predict the occurrence of Diabetes or Cardiovascular diseases in a person. It is a text-based prediction system for medical records. The system takes various factors, listed in Table 2, as inputs from a patient and uses Naive Bayes Algorithm to calculate probability of risk for the disease. The system also analyses which factors affect the risk probability the most and then suggests personalized solutions to control these factors. Also, the proposed system monitors the personal health records of the patients to control and compare over a long time.

3.1 Architecture

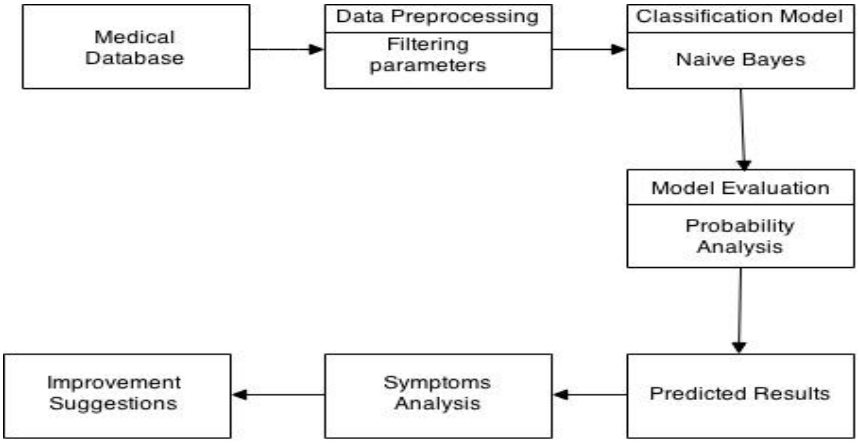

Fig. 1: Architecture diagram for proposed system

3.1.1 Medical Database: The Proposed System uses a large database acquired from a local pathology lab, which contains numerical values for the required factor.

3.1.2 Filtering Parameters: Stored data is pre-processed, empty spaces are filled and values are checked for upper and lower limits using data Warehousing Techniques.

3.1.3 Naïve Bayes Algorithm: Naïve bayes is used to calculate probabilities for each factor.

3.1.4 Probability analysis: Calculated probabilities from the database are analysed and compared with the user's values for predicting results.

3.1.5 Predicted Results: Probabilities for each factor are combined together and total probability of risk is calculated using the Naïve Bayes formulae.

3.1.6 Symptom Analysis: The factors that increase the risk of a disease are displayed and treatments to control each symptom are given.

3.1.7 Improvement suggestions: Data is provided to users to improve health and reduce risk of analysed diseases.

IV. FACTORS

Prediction of Diabetes is based on a number of numerical factor and statistics. The factors used in the proposed system are tabulated below.

Table 2: Factors for prediction

SR .no	Parameter	Description	Allowed values (Type)
1	Age	Age of the Subject	Discrete Integer values
2.	Gender	Gender of Subject	Male or female
3.	Body Mass Index(BMI)	Weight in kg/(Height in m)^2	Discrete Integer values
4.	Genetics	Family History of subject	Yes or No
5.	Blood Pressure	Diastolic blood pressure (mm hg)	Discrete integer values
6.	Pregnant	Number of times pregnant	Discrete integer values
7.	Plasma glucose Concentration	Blood sugar of the subject	Discrete integer values
8.	Smoking	Whether subject is smoking or not	Yes or No
9.	Drinking	Whether subject drinks occasionally	Yes or No

V. ALGORITHM

The proposed system uses Naïve Bayes Algorithm to analyze data and predict risks of diseases.

Input: Numerical or fixed value inputs for different factors.

VI. PROCESS

6.1 Run probabilities for each factor in the database within a fixed range. Probability of Diabetes risk with each Factor is calculated separately using:

P(Factor1|yes) = Number of people with Factor1 and Diabetes / Total Number of People

6.2 Find the range in which each input factor lies. Most numerical factors have fixed values of normal, high or low. Extract probabilities for particular range. eg. Cholesterol=250 means high Cholesterol

6.3 Mathematically the probability model for a classifier is a conditional model over a dependent class variable with a small number of outcomes or classes, conditional on several Factors F1 to Fn.

Using Bayes' theorem we rewrite the equation as:

P(Diabetes risk) = P(Factor1|Yes) * P(Factor2|yes) * ….

6.4 The probability is compared with a minimum value and analysed for risk assesment. High risk factors are analysed and used for personalised solutions.

Output: Display Risk probability and solutions for the risks.

VII. PROTOTYPE SCREENSHOTS

Given below is the prediction system for the prototype

Prediction Page

Fig. 2: Refers to the page where the researcher has to fill the details for predicting the disease

Result Page

Fig. 3: Refers to Results of the Predicted Disease.

VII. CONCLUSION

This system shows accurate results for prediction using Naïve Bayes. The Algorithm uses probabilities calculated from a large number of patients and hence has a low error rate which can be improvised by using a larger database. This system can be used extensively by patients to check their risk for certain diseases. In the future, this project can be expanded for many other diseases and their various symptoms.

REFERENCES

[1] G. Parthiban,A.Rajesh,S.K.Srivatsa,' Diagnosis of Heart Disease for Diabetic Patients using Naive Bayes Method', International Journal of Computer Applications (0975 – 8887) Volume 24– No.3, June 2011.

[2] Ravneet Jyot Singh, Williamjeet Singh,' Data Mining in Healthcare for Diabetes Mellitus' International Journal of Science and Research (IJSR), Volume 3 Issue 7, July 2014

[3]. Abid Sarwar Vinod Sharma,'Intelligent Naïve Bayes Approach to Diagnose Diabetes Type-2', Special Issue of International Journal of Computer Applications (0975 – 8887) on Issues and Challenges in Networking, Intelligence and Computing Technologies – ICNICT 2012, November 2012

[4] Srideivanai Nagarajan, R.M.Chandrasekaran, and P.Ramasubramanian, 'Data Mining Techniques for Performance Evaluation of Diagnosis in Gestational Diabetes ', International journal of current research and academic review, ISSN: 2347-3215 Volume 2 Number 10 (October-2014) pp. 91-98

[5] Abdullah Aljumah, Mohammed Gulam Ahamad, Mohammad Khubeb Siddiqui, 'Applications of data mining: Diabetes health care in young and old patients', Jounal of King Saud University- Computer and Information Science (2013).

[6]. Gaganjot Kaur Amit Chhabra, 'Improved J48 Classification Algorithm for the Prediction of Diabetes', International Journal of Computer Applications (0975 – 8887) Volume 98 – No.22, July 2014

[7]. Kavitha K , Sarojamma R M 'Monitoring of Diabetes with Data Mining via CART Method',International Journal of Emerging Technology and Advanced Engineering. Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 11, November 2012).

[8] http://www3.cs.stonybrook.edu

[9] Rupali Bhardwaj , Sonia Vatta,' Implementation of ID3 Algorithm'.' International Journal of Advanced Research in Computer Science and Software Engineering', Volume 3, Issue 6, June 2013

[10] Monali Dey, Siddharth Swarup Rautaray, 'Study and Analysis of Data mining Algorithms for Healthcare Decision Support System', (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (1) , 2014, 470-477.

[11] msdn.microsoft.com/en-IN/library/ms175595.aspx

[12] http://www.ncbi.nlm.nih.gov/

A STUDY ON NOISE POLLUTION IN SOME PLACES OF INDUSTRIAL, COMMERCIAL, RESIDENTIAL AND SILENCE ZONE WITHIN JAGIROAD TOWN, ASSAM

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ABSTRACT

Noise has become an important aspect of urban environmental due to ever increasing urbanization. It is assuming increasing dimensions with rapid increase in the number of vehicles, industrialization and urbanization. To know the status of the noise pollution level in Jagiroad town of Assam, a study on noise pollution level has been carried out during the period between June to August 2013. Some particular areas have been selected and divided into four zones viz. (a) Industrial zone, (b) Commercial zone, (c) Residential zone, (d) Silence zone. Noise level, the said zones are collected at day time between 10am to 6pm and evening 6pm to 9pm.The observed noise level ranges are 69.6 to 88.7 dB (A), 61.5 to 89.5 dB(A), 38.7 to 59.5 dB (A) and 40.1 to 59.8 dB(A) in industrial, commercial, residential and silence areas respectively. The findings indicates that the maximum noise level is found in commercial area due to heavy vehicular movement, high traffic congestion and outdated vehicles, narrow and poorly managed roads, etc. Moreover, urban area and commercial zones are not established according to land use plan, which is responsible to noise level enhancement. The absence of proper footpaths in the commercial area leads people to sprawl on the roads, which cause frequent traffic congestions and noise pollution.

Keywords- Noise, Decibel , Sound Pressure Level, Dimoria Tribal Block, Assam

I. INTRODUCTION

The term 'noise' may be defined as unwanted sound at a wrong time and a wrong place. The word noise is derived from the Latin Word 'NAUSEA', meaning a feeling of sickness. Most Indian cities and metropolises have a higher than desired level of noise in their environment (Naik and Purohit,1999). Noise levels in Indian cities also sour during festivals (Shastri and Trivedi, 1988). The increasing number of vehicles, musical instruments, small scale industries, urbanisation and human activites are the main source of noise pollution (Gangwar et. al. 2006) Deepawali is one of the major Indian festival which causes sound pollution(Kudesia and Tiwari,1994). Fireworks push up the level from the normal 50 db(A)during evening hours to 80 to100db(A).The focus is to reduce noise and sound pollution that is intense during the festival days(Pawar and Joshi,2005).

Noise is a persistent environmental problem. It is also an important aspect of urban environmental pollution after only air and water. Noise pollution causes various degrees of psychological and physiological effects on human health. It directly or indirectly influences our behaviour, cognition, mental performance, normal sleep duration and studies of students. Due to high volume of noise the metabolism, quickened heart rate, boosted

blood pressure, rapid stomach contraction etc., are increased. The present study is under taken to estimate the noise levels in Jagiroad town.

II. MATERIALS AND METHODS

2.1 Study Area

Jagiroad is a small industrial town in Morigaon district in the Indian state of Assam. As of 2001 Indian census, Jagiroad had a population of 17,254. It is famous for paper mill and dry fish market.

The main source of noise pollution in Jagiroad town is 'highway noise' which depend upon road conditions, the number of vehicles using the road, the kinds or vehicles using the road, its distance from nearby dwellings, the landscaping along the road. For these cause Jagiroad has small no. of markets, restaurants and hotels, courier agencies. In Jagiroad, there is one railway station which also contribute to noise pollution.

Another source of noise pollution in Jagiroad town is industries. The well-known Hindustan Paper Mill is located here. Chemical and Fertilizers, Paper mill, Stone crushers are some of the small scale industries located in the town of Jagiroad. Industries have significantly contributed to higher level of noise pollution which has penetrated human comforts and living.

The instrument used for the collection of data is sound level meter (model: SL-4012). The data of noise level were collected at different places of Jagiroad town at the day and the evening of July and August months of 2013.For this purpose, the locations are divided into the following four zones:

i. Industrial zone
ii. Commercial zone
iii. Residential zone
iv. Silence zone

A total of 23 stations were selected for study; industrial: 3 stations, commercial: 6 stations, residential: 9 stations and silence: 5 stations.

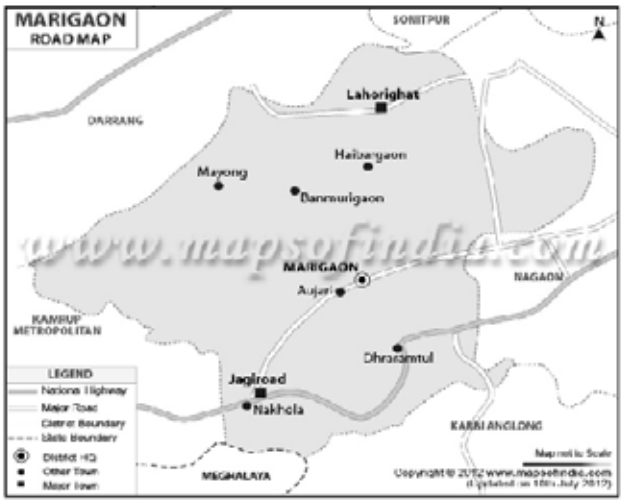

Fig: Map of Morigaon District showing Jagiroad Town

Fig. GPS LOCATION OF THE STUDY AREAS

The sound level meter was placed at least 10 meter away from the source. Reading was taken for 20 minute and mean reading were recorded as shown in the table given below and graphical analysis is done for noise levels for four different zones at day and evening compared with the standard of the Central Pollution Control Board (CPCB).

III. RESULTS AND DISCUSSION

The results of the analysis has been shown on **table 2, 3, 4 & 5**.The average noise level each zone is compared to the standard limits (**table 1**). In industrial, the maximum noise level in the day period is 88.7 dB (A), whereas the standard limit prescribed by CPCB is 75 dB (A) in the day period. The difference between the observed noise level and prescribed noise level in the day time at the industrial zone is 13.7dB (A).

Moreover, in commercial and silence zone, the average noise level in the day time is 89.5 dB(A), 59.8 respectively. The standard noise level in the day period in these zones are 65 dB (A) and 50 dB (A) respectively. But the difference of prescribed limits and obtained noise level 24.5 dB (A) and 9.8 dB (A).The residential zone,

the average, noise level in the day time is 59.5 dB (A) is not limited sound level, because the standard noise level in the day period in this zone is 55 dB (A) and the difference of prescribed limits and obtained noise level is 4.5 dB (A).

From the study it is clear that the noise level of the industrial zone is approximately in the standard limit. Among these three zones of the Jagiroad town, especially the Commercial zone has exceeded the standard limit.

Table 1: Noise standards as given by the Central Pollution Control Board, India (CPCB, 1998)

Area Code	Category of Area/Zone	Limits in dB(A) L_{eq}	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Table: 2 Noise level in Industrial area:

Sl. No	Locations	Collected data			
		Day (10am-6pm), noise level in dB (A)		Evening (6pm-9pm), noise level in dB (A)	
		Minimum	Maximum	Minimum	Maximum
1	Sunakuchi (Paper mill)	73.3	85.7	71.5	81.7
2	Shilbhanga (Stone crusher)	71.2	83.4	69.6	78.5
3	Pashim nagaon (Fertilizer Industry)	71.5	82.6	67.3	77.4

Table: 3 Noise level in Commercial areas:

Sl. No.	LOCATIONS	COLLECTED DATA			
		Day (10 am-6pm), noise level in dB (A)		Evening (6pm-9pm), noise level in dB (A)	
		Minimum	Maximum	Minimum	Maximum
1	Druga Market	71.9	86.3	72.4	83.5
2	Morigaon Road	75.3	87.5	73.6	82.7
3	Amrit Market	76.4	86.9	68.8	71.2
4	Shiv Mandir Road	72.3	85.2	65.7	76.7
5	Jagiroad Chariali	76.6	82.7	69.4	75.5
6	Super Market	77.2	89.5	61.5	72.6

Table: 4 Noise level in Residential Areas:

Sl. No.	LOCATIONS	COLLECTED DATA			
		Day (10am-6pm), noise level in dB(A)		Evening (6pm-9pm), noise level in dB (A)	
		Minimum	Maximum	Minimum	Maximum
1	Nijarapar	45.1	56.5	43.8	53.9
2	Nakhula	47.2	56.1	41.6	51.7
3	Markangkuchi	52.5	58.5	49.8	55.0
4	Nakhula grant	50.0	57.7	45.5	52.6
5	Ghunucha	53.8	57.6	45.6	51.6

6	Jyotikusi	42.3	50.8	38.7	47.2
7	Semapoli	47.4	53.7	51.9	57.0
8	Pala sung	56.9	59.5	49.1	53.0
9	Bhumuraguri	56.1	58.7	48.1	55.8

Table: 5 Noise Level in Silence Area:

Sl. No.	LOCATIONS	COLLECTED DATA			
		Day (10am-6pm),noise level in dB(A)		Evening (6pm-9pm), noise Level in dB(A)	
		Minimum	Maximum	Minimum	Maximum
1	Kishur club	48.9	54.2	44.5	524.
2	Nakhula Hospital	53.9	59.8	40.1	50.4
3	Jagiroad College	43.9	53.2	45.1	51.6
4	Jyothi nevus high school	55.2	58.6	52.1	55.4
5	Deusal Temple	53.5	60.2	42.7	48.3

IV. CONCLUSION

Post–independent India has witnessed the phenomenon of rapid urbanisation and industrialisation coupled with revolutionary changes in the field of entertainment. In rapidly urbanizing Jagiroad, the transportation sector is growing rapidly. This has led to overcrowded roads and noise pollution in the town. The present study explicitly reveals that the noise levels are more than the permissible limit in all the 23 sites. The individual can control noise from his own vehicle by adequate maintenance, by fitting a suitable silencer and even by considering noise as a criterion when purchasing the vehicle. It is also worth noting that from the noise point of view, it is better to concentrate traffic along main roads (that are already noisy) then to distribute between parallel roads. By double-glazing the windows of homes, facing the road will reduce the level by up to 20 dB(A).Some other suggestion such as banning hydraulic horns, improvement and streamlining of roads and parking system, discouragement of high sound producing vehicles, industries and public awareness would also be helpful in reduction of the present noise level in Jagiroad. Vegetation Buffer zones must be created in different parts of the city. Efforts should be made for roadside plantations, which absorb the sound. In the noisy places, we should wear earplugs and earmuffs. Communities should be educated on the negative effort of noise. The role of NGOS, researchers and professionals, media and concerned individuals is significant in minimizing the envonmental hazard of noise pollution.

REFERENCES

[1] Naik,,S and Purohit, K.M.,Traffic pollution at Bondamunda of Rourkela industrial complex. *Pol. Res. 18 (4)*, 1999, pp.475-478

[2] Shastri,S. and Trivedi, M.B. Noise pollution:Its Scientific and legal perspective,1988,Divyajyoti Prakashan, Jodhpur.

[3] K.K. Gangwar, B.D. Joshi, and A. Swami, Noise pollution status at four selected intersections in commercial areas of Bareilly Metropolitan city, U.P. *Him. J. Env. & Zool.* 2006; 20(1): 75- 77.

[4] V.P Kudesa, and T.N. Tiwari, “Noise Pollution and its control”(1st Edn) Pragati Prakashan, Meerut.

[5] C.T. Pawar, and M.V. Joshi, Urban development and sound level in Ichalkaranji city, Maharashtra.Indian, *J. Environ And Ecoplan*, 2005, 10(i): 177-181

STUDY OF LEAN, GREEN AND LEAN-GREEN MANUFACTURING PRACTICES IN MANUFACTURING SECTOR

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ABSTRACT

Lean production and lean manufacturing refer to the use of systematic methods to reduce costs by eliminating wastes and non value-added activities, while delivering what the customer wants, on time. Lean manufacturing was originally developed by the Toyota Motor Co. in Japan based on concepts pioneered by Henry Ford, and is now being applied beyond mass production, into service-oriented businesses, agencies and offices.

Even without explicitly targeting environmental outcomes, lean efforts can yield substantial environmental benefits. However, because environmental wastes and pollution are not the primary focal points, these gains may not be maximised in the normal scheme of lean.

The two strategies can be integrated and offered simultaneously. The approaches have similarities, in that they strive to eliminate non value-added components, assess baseline conditions and operations, capture the details of process inputs and outputs, and strategize to design and incorporate changes that will reduce environmental or productivity inefficiencies.

As soon as your operations implement Lean you will become more capable of enabling increased capacity by freeing up underutilised office and plant space. Your people will be capable of reducing wasteful outsourcing, increasing production flexibility to add product lines and additional services, or economically and faultlessly delivering more of what you already provide, without acquiring new facilities or higher overheads.

Moving ahead, Green Implementation will make you able to respond to changing customer demand with high variety, high quality, low cost, and much improved throughput without destroying the environment. Green practices will also help you simplify business and earn greater value to your on-going business transformation.

Keywords: Environment, Green Implementation, Production Flexibility, Reducing wasteful, value-added activities, Value added component

I. INTRODUCTION

There is a great need for an environmental, economic and social sustainable society, meeting the needs of the present without compromising the ability of future generations. Focusing on environmental sustainability,

legislation and industrially accepted emission targets have emerged, on an overall level represented by the Kyoto protocol. Green as well as Lean production has thus become a more and more important topic in recent years. Based on the gigantic need for technologies and strategies that will reduce CO2 emissions globally, as well as customer demands for cost efficient and environmental friendly goods and processes, companies are starting to change their principles towards Green and Lean philosophies. In Green and/or Lean development, like other systematic approaches towards improved processes, business sustainability comes first.

II. LEAN

The history of lean began in early 1950s in Japanese's car maker factory, Toyota. Toyota was into textile manufacturing in the beginning, then they shifted to be a car manufacturing. In 1937 by the name of "Toyota Motor Company" they started manufacturing cars. The world was facing war and by the force of the military government they had to change their direction from car manufacturing to truck vehicle provider. And soon after the war they came back to their primary product and made themselves competitive in the car market. The problems that they faced were. By the time they returned variety of problems were waiting for them.

• A small Domestic market was demanding large variety.
• Employees powers were restricted and work union, work laws had gained strength.
• World War had weaken Japan economy, which restricted import of western technology to Japan.
• They couldn't compete with huge companies such as Ford in foreign market.

So they soon realised, with current methods they cannot compete in international market. Taiichi Ohno, production manager of Toyota, found new methods which later became the fundamental of lean production.(Womack et al. 1990).One of the concepts that Ohno was going to change was the press machine or in general machining. In mass production system, different parts was produced in huge numbers in one go. This used to involve many machines and manpower for all the time. These parts were stored in inventory and then they changed the setup of the machines to produce the other part. As changing dies or other setups was so time consuming and needed experts, this mass production approach was implemented.. Ohno applied his experience and observations to improved the process of changing the dies. He could reduced the setup up time for machines and used regular operator to make the production line more flexible. Doing this he made it possible to produce different parts with the same machine and the same day. By this improvement he reduced the number of machines needed for the production line, reduced the inventory and the cost of inventory and transportation and also improved the quality of the production line during the production process.

The impact of this change was wide spread. It also reduced the rework as the defected part would be identified immediately and the failure reason would be repaired before making another defected batch.(Womack et al. 1990) Liker in his book describes this achievement as "when you make lead times short and focus on keeping production lines flexible, you actually get higher quality, better customer responsiveness, better productivity, and better utilization of equipment and space."(Liker 2007)

By studying mass production Ohno realized that there are so many wastes in material, effort and time in the production system which enforced extra cost to the company and also its customers. To reduce these wastes,

Ohno formed teams with team leaders. These teams were responsible for the jobs in the process, cleaning the work place, doing small repair and solving the quality issues. Ohno believed in finding the roots of any defected part immediately before the next defected part get to produce. As a consequence everyone in the production line could stop the whole line to identify the roots of the mistaken part and whole team would come together to solve the problem and rerun the line. As a result of this there was no defected car at the end of the assembly line and by improving the teams, number of stops in the line also reduced almost to zero.(Womack et al. 1990)

According to Liker in his book, The Toyota Way, Ohno knew that Toyota did not have as much capital as Ford did and the technology and the machining facilities of Toyota were so tiny. Therefore it was not feasible for Toyota to have the same system as Ford had and could not make a huge number of works in process inventory and have mass production. Hence he tried to use the idea of Frederick Taylor, as also Ford has tried to use it, but in another way. Taylor's idea was to have a continues flow in order to have high productivity.(Liker 2007)

In lean everything will focus on customer (internal or external) point of view. In each process there is a question: "What does the customer want from this process?" By answering this question we can divide the activities in the process into two types: value added and non-value added activates. Any non-value added activity will produce waste of material or at least waste of time and money in customer perspective. Toyota has categorized these wastes in eight categories:

- Over production: producing items where there is no order for them.
- Waiting: operators time waiting for a reason than lack of order.
- Transportation: any transportation is a waste however sometimes it is necessary.
- Over processing: having extra step in the process or rework or producing defected items.
- Inventory
- Unnecessary movement
- Defects
- Unused employee creativity.

Ohno believed that the most important waste is over production; hence it can produce other waste by itself. By having over production, an inventory of works in process is unavoidable and thus continues flow and perhaps quality in process will be affected.(Liker 2007) Womack and Jones at 1996 in their book, Lean Thinking, give us a whole picture of lean system based on their study of Toyota and other Japanese company and also comparing them with the American lean manufacturers. They describe the whole system on the five basic principles:

- Specifying the value
- Identifying the value stream
- Flow
- Pull system
- Perfection

In the system, the "Value" is defined by the customer. It is the costumer who specifies the value of a product. By this background anything (activities, movement, service or process) which is not involved in making this

value, is a waste in the system. Value stream is the chain of steps in the system which prepares the final product to the customer. By mapping this chain of steps or processes we can easily identify the steps which are adding value to the product and the ones that are not adding value to the product. The next step is to ease the flow of material and information in the value stream by reducing the non value added steps of the process. In the pull system (in order to reduce the inventory between steps) each step will proceed and operate a new part only if the next step needs a part. Perfection in this system means that we produce based on the customer order (eliminating the overproduction, one of the eight wastes) and at the exact time that the customer needs it (Just in Time) and in the least waste process. (Womack et al. 1996)

Bergmiller and McCright has drawn a lean System Model based on the Womack theory about lean and other best practices and prizes such as Shingo prize for improving the manufacturing processes. Their coherent model is shown in the figure below. (Bergmiller & McCright 2009b)

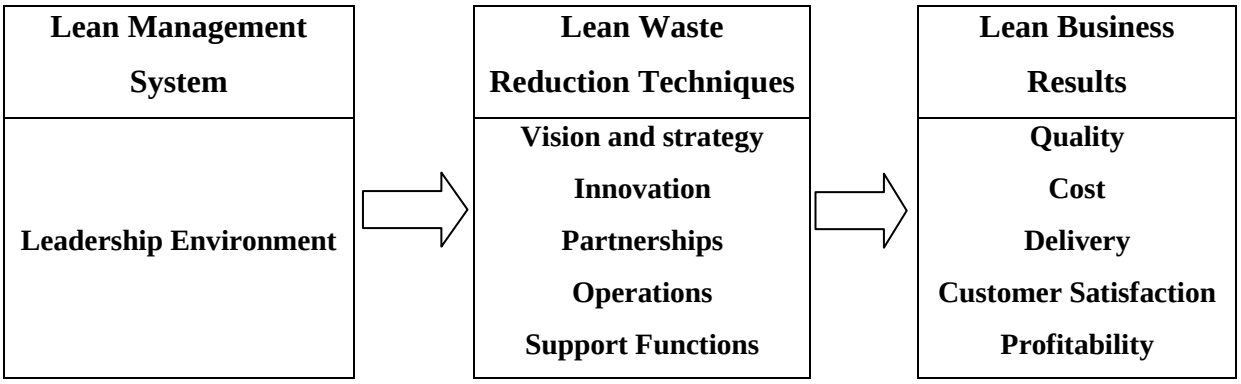

Figure 1 Advanced Lean System Model (Bergmiller & Mccright 2009)

One of the key steps in lean system is providing a good map and understanding over the value stream in order to be able to find and reduce the wasted steps and ease the flow in the value stream. One of the tools which has been used widely is value stream mapping.

Lean business can be defined as one which eliminates waste, embraces sustainability practices and adapts the techniques of lean manufacturing. An emphasis on sustainability can improve the performance of an organisation in long run. Well structured lean manufacturing programs leads to waste elimination and the involvement of employees in improvement initiatives. In time to come, as the cost of material and energy continues to increase, costing of the products and services for organisations is going to be biggest challenge. Any lean program's success is predicated on four essential components:

- **Clarity of the lean philosophy**, to one and all in the organisation is must. All the employees must, understand the lean philosophy, Lean Tools and the targeted results.
- **Active Participation Employees** and their direct–indirect contribution lean implementation's outcomes.
- **Management of the Organisation must offer** a sound platform for enterprise's over all improvement.
- **Financial Support**, Lean Implementation process must be fully funded,

Lean Production has common goals with environmental production in some parts, e.g. during improving manufacturing efficiency, energy and environmental benefits are often also attained. When using lean principles to achieve environmental production, it will bring us considerable cost benefits besides green production.(Florida 1996; King & Lenox 2001; Rothenberg et al. 2001). Environmental analysis of a process or green manufacturing has some different sections such as raw material, energy, water and hazardous material etc.

III. ENVIRONMENTAL (GREEN) PRODUCTION

In the recent decades as a consequence of fast growth in the population, industrialization, usage of fossil fuel, growth in the economy and need of accelerated production, mankind has started a massive use of natural resources to meet its demand in a way that in some area it has passed the limitation of sustained trend of resources. On the other hand such a massive consumption has ended up in polluting the environment by the waste of its product and production. Thus there has been such pressure on the companies to minimize their emission and pollution of their activities from their supply chain to their product.(Hart 1995; Corbett & Klassen 2006). Hart has introduced three strategies from the natural resource perspective to the firms (Hart 1995):

Strategic Capability	Environmental Driving Force	Key Resource	Competitive Advantage
Pollution Preservation	**Minimise Emission, Effluent and waste**	**Continues Improvement**	**Lower costs**
Product Stewardship	**Minimise life Cycle cost of product**	**Stakeholder integration**	**Pre-empt Competitors**
Sustainable Development	**Minimise environmental burden of firm growth and development**	**Shared vision**	**Future position**

Figure 2 (Hart 1995)

Pollution prevention argues about changing the focus of the firm from investing in the “end of pipe” strategies (trying to recycling the waste or putting filters for the air pollution) to the more continues development methods.(Rooney 1993; Florida 1996) Product stewardship is a strategy that aims to combine the customer needs with environmental issues in the design phase of the product life cycle. In sustainable development strategy, the aim is to bring the environmental perspective to the long term plan and strategy in the companies. Making the shared vision for the top managers of the companies about the environmental issues not only in the developed countries but also in the developing countries (where the 90% of the raw material for the developed countries are coming from) is the main line of this strategy (Hart 1995)

Companies and also environmental organizations have shown more interest in Preventive Actions comparing to end-of-the-pipe strategies. Florida has concluded from a survey that companies have three main elements in their pollution preventive strategies:

- Utilize source reduction
- Recycling
- Production process improvements

Companies who involved in the survey mentioned that: "The implementation of new technologies in the form of production process improvements is a central factor in the development of joint improvements in environmental and manufacturing methods." (Florida 1996)

Wide usage of quality management systems is irrefragable. TQM and ISO standards are the example of these families. Based on the brilliant philosophy of these methods, in the field of environmental management, there exist TQEM and ISO 14000 families. Florida defines TQEM as:

"Total quality environmental management (TQEM) extends the principles of quality management to include manufacturing practices and processes that affect environmental quality."(Florida 1996)

The first stage in environmental production system (like other management systems) is top management engagement. An Environmental Management System (EMS) is a good frame work for the whole organization which should be established from the top level management. "The EMS defines the corporate environmental policies and procedures that assure good environmental performance" (Bergmiller 2006) however EMS, itself does not reduce the environmental impact of the production but it makes the whole system proper for being more resource saver and makes the suitable environment for performing the practical solutions for being green. One of the well known standards for EMS is ISO 14001 which is widely used in the industries and also service companies nowadays. Three disciplines which are helping reduce the resource and energy usage in a manufacturing process are (Bergmiller 2006):

1. Design for Environment: it has an engineering perspective in to a production process and the scope is the whole life cycle. "The premise of Design for the Environment is to design a product with minimum impact on the environment. It is during the design phase that almost all potential environmental effects of the product are determined."(Bergmiller 2006)
2. Total Cost Accounting.
3. Industrial Ecology

Later on Bergmiller and McCright in 2009 by studying other best tested Green System models draw their own aggregative Advance Green System model. Their model is shown in the figure below. (Bergmiller & McCright 2009b)

Green Management System	**Green Waste Reduction Techniques**	**Green Business Results**
Environmental Management Systems Year ISO 14001 Certified	**Process Redesign** **Product Redesign** **Disassembly** **Substitution** **Reduce** **Recycling** **Remanufacturing**	**Cost** **Lead Time** **Quality** **Market Position** **Product Design**

	Consume Internally **Prolong Use** **Returnable Packaging** **Spreading Risks** **Creating Markets** **Waste Segregation** **Alliances**	**Process Waste** **Equipment** **Benefits** **Internal Sales**

Figure 3 Advance Green System (Bergmiller & Mccright 2009)

Natural Drivers of The Green Wave

"Smart companies use environmental strategies to innovate create vale and build competitive advantages"

The top ten environmental issues for organisations to understand and consider the impact of are

1. Climate change
2. Energy
3. Water
4. Biodiversity and land use
5. Chemicals, toxics, and heavy metals
6. Air pollution
7. Waste management
8. Ozone layer depletion
9. Oceans and fisheries
10. Deforestation.

Green to Gold, Daniel C. Esty and Andrew S. Winston (Yale University)

Leading companies, such as those participating in the Lean to Green consortia, understand that "green" isn't as much about becoming more "socially responsible" or environmentally friendly; it's about running a better business

IV. LEAN GREEN PRODUCTION

It has been thought that industrial performance (cost efficiency) is in a "tradeoff" relation with environmental performance. The only motive or actual pressure for the companies to take action in environmental performance improvement is the regulations and policies. The results of these regulations are the end-of-the-pipe methods to reduce the environmental emission and wastes. (Florida 1996)

There are some empirical and theoretical researches and scholars that have argued to neither sacrificing environmental performances nor cost performances for the other one. In other words they tried to proceed some innovative methods in production and operation management to reduce the environmental emission and cost of

the process at the same time.(Rothenberg et al. 2001; King & Lenox 2001; Helper et al. 2002; Florida 1996; Miller et al. 2010; Mollenkopf et al. 2010)

Florida in his survey research concludes that companies prefer "source reduction, recycling and production process improvement" over the end of the pipe treatment. In overall of his study he provided a conclusion that: "firms and plants that are R&D-intensive and manufacturing innovators possess the capacity to both improve productivity and reduce environmental costs and risks."(Florida 1996)

In the line with Florida, Helper et al. support this idea and make it clearer by studying some examples of empirical practices and quoted that: "firms were simultaneously able to reduce pollution and increase efficiency by adopting innovations in manufacturing practice (lean manufacturing) and in environmental management (pollution prevention)."(Helper et al. 2002) the issues that are involved in success of lean system in the pollution prevention management are:

- Reducing set-up times
- Less inventories
- Root cause of defects and therefore less scrap

"In sum, these efforts are directed toward preventing the generation of waste in the first place, in ways that actually reduce production cost" (Helper et al. 2002)

The essence of lean production system, the most famous innovative production system, is "to produce more with less".(Found 2009) This phrase suggests that lean firms use less non renewable resources in the position of raw material and also are more energy saving in their process. "This concept can be extended to determine whether Lean thinking can be applied to producing less pollution and emissions and whether Lean manufacturers are therefore more eco-friendly than traditional manufacturers." (Found 2009) King and Lenox propose in their study that "lean production is complementary to environmental performance". They believed that adopting the lean production system will reduce the overall cost of pollution prevention by decreasing the source wasting in the firms. Consequently they assert that "lean is green". (King & Lenox 2001)

From a systematic point of view to the green lean production, and based on the management system models that we have seen before in this research, now we can think of a cumulative management system model for green lean system. According to the best practices and comparing the two models of management systems for environmental management system and lean management system, and similarities between their business results and waste reduction techniques Bergmiller et. al. has suggested a comprehensive "Lean and Green System Model". The figure below is his model which is so similar to its parents; lean model and green model.(Bergmiller & McCright 2009b)

Lean / Green Management	**Lean / Green Waste Reduction Techniques**	**Lean Green Business Results**
Leadership **Empowerment**	**Vision and Strategy Innovation** **Partnerships - Alliance** **Support Functions** **Process and Product Redesigns**	**Quality – Cost** **Delivery** **Customer Satisfaction** **Profitability**

Environmental Management Systems **Years ISO 14001 Certified**	**Disassembly -Substitution** **Reduce- recycling- Remanufacturing** **Consume Internally – Prolong Use** **Returnable Packaging** **Spreading Risks** **Creating Market** **Waste Segregation**	**Lead Times** **Market Position** **Reputation** **Product Design** **Process Waste** **Equipment** **Benefits** **Internal Sales**

Figure 4 Comprehensive Lean And Green Systems Model (Bergmiller & Mccright 2009)

Overall looking to the literature and researches beside the best practices in green lean, we can conclude that there exist strong similarities between lean system and green system and in fact they seem to go a parallel path through the manufacturing system. (Bergmiller & McCright 2009b) these two systems mainly act complimentary to each other. Some aspects of lean like; inventory minimization, work system and human resource practices can end up with the environmental resource inventory reduction, environmental improvement due to the personnel continues improvement and can make the whole organization and people more amendable for the further environmental training.(Rothenberg et al. 2001) A statistical survey shows that "plants with Lean systems yield higher Green Results".

It seems that having lean system will act as catalyst to implement environmental best practices. (Bergmiller & McCright 2009a)

However lean and green seem so complimentary to each other but sometimes some conflict may occur. For instance the quality technology which might be used in lean system may not satisfy properly the environmental expectation. (Rothenberg et al. 2001) Or some other aspects such as JIT and one peace flow, while they can reduce the in-process inventory, they may cause over transportation, more packaging and handling which are not so convenient from environmental point of view. (Mollenkopf et al. 2010)

It appears that lean and green combined system is not initiatively considered as win-win situation for plants however these firms can use innovative technology or solution to overcome these conflicts like using reasonable batch size or reusable packages.(Mollenkopf et al. 2010; Rothenberg et al. 2001

Tools and Techniques to Go Green from Lean

A range of tools and techniques mentioned below can make the path smoother towards Lean and further to Greening the company.

- Draw a Value Stream Map of the material conversion processes or water usage
- Undertake a Mass Balance of all energy and materials into and out of a process
- Conduct a material waste assessment of your organisations
- Develop a Waste Reduction Action Plan (WRAP)
- Assess requirements and prepare for Waste wise accreditation

- Create a Deployment Chart to demonstrate the link between specific improvement initiatives and a Sustainability strategy that links with the other strategic goals of the organisation

V. SIGNIFICANCE OF THE RESEARCH & RESEARCH METHODOLOGY

After doing extensive literature study on Lean, Green, Lean-Green and Lean to Green systems researcher wanted to design a frame work for Indian companies. Lean manufacturing has its advantages and disadvantages when it is studied in context of environmental care and protection. In order to sustain global competition researcher wish to produce in-depth understanding for Indian companies on Green Manufacturing.

- The research will establish Green Manufacturing frame work and bring about its benefits for Industry.
- The research will be focused on factors responsible for Organisation's Environmental Productivity Enhancement. The important factors are sustainable development, cost benefits, resource reduction and manpower, special skill requirement, waste management, working conditions, working environment, hygiene etc.
- The research will be focused on Industry conditions in implementing Green manufacturing and suggest a roadmap for Industries.

5.1 Aims and Objectives of Research

After exploring various dimensions of Green manufacturing researcher proposes following objectives.

- To understand the Employee Productivity in relation to Green Manufacturing.
- Elaborate and explain concept of Green Performance and productivity.
- Understand the green manufacturing application status in manufacturing Industry.
- Establish understanding and application of tools of Green Manufacturing Technique in general to enhance Eco-friendly production.
- To know the reasons for not implementing green manufacturing in manufacturing Industry
- To explore the motive of implementing Green Manufacturing.
- To analyze the cases where Green Manufacturing is implemented and being practiced in Industry fully or partially.
- To analyze critical success factors for green manufacturing Implementation in Manufacturing Industry.
- Evolve green manufacturing framework for Manufacturing Industry.
- To validate the comprehensive roadmap / framework with the case studies.

5.2 Key Areas to Investigate

Companies who are complied with Lean to Green practices shall be investigated and analysed to fulfil following objectives.

Lean to Green

- What is the impact on landfill
- Does the approach affects energy consumption in organisation.
- How much is the reduction on carbon footprint.
- Finding the savings on water consumption
- How much is reduction on landfill waste from per month.

5.3 Proposed Guide For Going Lean And Green (Shall Be Tested And Analysed During Study)

1. Know what Lean and Green really means. It is a process where you use more eco-friendly processes and products that help reduce or eliminate the 7 wastes in Manufacturing processes plus the 8 wastes of Environment.
2. Identify, assess and manage risks to employees, customers, suppliers, contractors, visitors and the environment.
3. Conduct operations in compliance with all relevant legislation & other requirements as a minimum condition.
4. Consult and communicate regularly with employees about Lean Environmental Health & Safety (LEH&S) issues, improvements and about individual responsibilities.
5. Develop improvement strategies and Key Performance Indicators (KPIs) on a continual basis, with appropriate targets, which aim to eliminate unsafe conditions, reduce non-value wastes and prevent environmental pollution.
6. Prepare and provide the necessary resources and investment in time to meet the targets.
7. Continually conduct a Plan-Do-Check-Act (PDCA) review on performance and reassess the goals.
8. Develop procedures, work instructions, and training material to assist the workforce to develop;

- A Safer place to work
- Lean Systems to reduce non-value steps
- Processes that eliminate environmental pollution and energy wastes

5.4 Research Methodology & Design (Plan Of Research)

The purpose of this research is to determine how business functions are affected by 'going Lean to Green'. Firstly, the problem statement and objectives of the research project are provided. A theoretical exposition of what 'Lean to Green' entails and the impact thereof on business functions will be outlined. Thereafter, the research methodology of the study will be highlighted. The research results will be given, followed by the main conclusions and guidelines for businesses to implement green issues within business functions.

1. Collection of data through literature survey, interviews, group discussions, questionnaires, seminars, short term training program, journals, conferences etc.
2. Analysis of data using analytical and statistical tools / software.

3. Establishment of framework for Lean to Green manufacturing with Employee productivity, production functions, Waste reduction and Management, efficiency and quality of the product and employee work life in Industry in India.
4. Validation of Framework through Problem identification and analysis..

The research work will be exploratory in nature and shall be corroborated through case studies.

VI. BIBLIOGRAPHY

1) A. A. King, and M. J. Lenox, (2001) "Lean and green? An empirical examination of the relationship between lean production and environmental performance", Production and Operations Management, Vol.10, No. 3, pg. 244-257.
2) ABB, 2011a. ABB Energy efficiency. Available at: http://www.abb.com/cawp/abbzh258/070c3d1cc1baa1e4c1257314003329c4.as px [Accessed May 12, 2011].
3) ABB, 2011b. ABB Robotics. Available at: http://www.abb.se/product/us/9AAC910011.aspx?country=SE [Accessed April 29, 2011].
4) Abdulmalek, F. & Rajgopal, J., 2007. Analyzing the benefits of lean manufacturing and value stream mapping via simulation: A process sector case study. International Journal of Production Economics, 107(1), pp.223-236.
5) Alarilla, M. & Decena, J. (2009). Green Productivity Initiatives: Intel Malaysia's Experiences and Perspectives
6) Arlbjørn, J.S. & Halldorsson, Á., 2010. Logistics knowledge creation: reflections on content, processes and context. International Journal of Physical Distribution & Logistics Management, 32(1), pp.22-40.
7) Bergman, L., Hermann, C., Stehr, J., & Sebastian T. (2007). An Environmental Perspective on Lean Production. A case study of lean, sustainable manufacturing, **A** case study of lean, sustainable manufacturing 11, *G. Miller; J. Pawloski; C. Standridge,* **G**eoff Miller[1,] Janice Pawloski[2,] Charles.
8) Bergmiller, G.G. & McCright, P.R., 2009a. Lean Manufacturers' Transcendence to Green Manufacturing. In Industrial Engineering Research Conference.
9) Bergmiller, G.G. & McCright, P.R., 2009b. Parallel models for lean and green operations. In Proceedings of the 2009 Industrial Engineering Research Conference, Miami, FL.
10) Bergmiller, G.G., (2006), "Lean Manufacturers Transcendence to Green Manufacturing: Correlating the Diffusion of Lean and Green Manufacturing Systems," PhD Dissertation, University of South Florida.
11) Bergmiller, G.G., 2006. Lean manufacturers transcendence to green manufacturing: Correlating the diffusion of lean and green manufacturing systems. University of South Florida.
12) Bharati Chaturvedi , (2002), "Imports Versus Surplus: A Glut of Plastics in India Today, January 10, Director, Chintan Environmental Organisation in New Delhi.

13) Bharati Chaturvedi, (2001), Letter written by Tim Krupnik of the Berkeley Ecology Center to Dr A N Bhat of ICPE supporting the attempt to ban disposable plastics in India, March 15, 2001., Director, Chintan Environmental Organisation, New Delhi.
14) Corbett, C.J. & Klassen, R.D., 2006. Extending the Horizons: Environmental Excellence as Key to Improving Operations. Manufacturing & Service Operations Management, 8(1), pp.5-22.
15) Coughlan, P. & Coghlan, D., 2002. Action research for operations management. International Journal of Operations & Production Management, 22(2), pp.220240.
16) Eisenhardt, K.M., 1989. Building Theories from Case Study Research. The Academy of Management Review, 14(4), pp.532-550.
17) EPA, 2007a. The Lean and Energy Toolkit. Energy, p.56.
18) EPA, 2007b. The Lean and Environment Toolkit, US EPA.
19) EPA, 2011. The Lean and Chemicals Toolkit – Chapter 3 | Lean Manufacturing and the Environment | US EPA. Available at: http://www.epa.gov/lean/chemicalstoolkit/ch3.htm [Accessed April 29, 2011].
20) European Commission Environment, 2011. European Commission Environment: Integrated Product Policy (IPP). Available at: http://ec.europa.eu/environment/ipp/ [Accessed April 28, 2011].
21) Florida, R., 1996. Lean and green: the move to environmentally conscious manufacturing. California Management Review, 39(1), pp.80-105.
22) Found, P.A., 2009. Lean and Low Environmental Impact Manufacturing. coba.georgiasouthern.edu, 54, p.7.
23) Franco, M.D., 2009. Transport Packaging: Pallet-able Solutions. Catalog Age, (February).
24) Graham, B.B., 2004. Detail process charting: speaking the language of process, John Wiley& sons.
25) H. Griese, J. Muller, L. Stobbe, H. Reichl and K. Rick, (2003), "Strategies to integrate life cycle engineering into technological developments-the 3G Greenbook Initiative", IEEE International Symposium on Electronics and the Environment, pp. 25 – 29.
26) Hart, S.L., 1995. A Natural-Resource-Based View of the Firm. The Academy of Management Review, 20(4), p.986.
27) Helper, S., Clifford, P.G. & Rozwadowski, H., 2002. Can Green Be Lean? Academy of Management Annual Meeting 1997, (404).
28) J. Sarkis, (2002) "Manufacturing's role in corporate environment sustainability: concerns for the new millennium", International Journal of Operations & Production Management, Vol. 21, No. 5/6, pp. 225-248. 2002.
29) Khaswala, Z. & Irani, S.A., 2001. Value network mapping (VNM): visualization and analysis of multiple flows in value stream maps. In Proceedings of the Lean Management Solutions Conference.
30) King and Lenox, (2001) "Lean and Green? An empirical examination of the relationship between lean Production and environmental performance." Production and Operations Management, Vol. 10, No. 3, pp. 244-256.
31) King, A.A. & Lenox, M.J., 2001. Lean and green ? An empirical examination of the relationship between lean pr ... Production and Operations Management, 10(3), p.244.
32) Lasa, I.S., Laburu, C.O. & Vila, R. de C., 2008. An evaluation of the value stream mapping tool. Business Process Management Journal, 14(1), pp.39-52.

33) Lean vs. Green manufacturing: Similarities and differences 'Department of Industrial Engineering and Management, School of Engineering, Jönköping University, Sweden Division of Operations Management, Department of Technology Management and Economics, Chalmers University of Technology, Göteborg, Sweden."
34) Lewis, M. (2000), "Lean production and sustainable competitive advantage", International Journal of Operations & Production Management, vol. 20, No. 8, pp. 959-978.
35) Liker, J.K., 2007. The Toyota way: 14 management principles from the world's greatest manufacturer, McGraw-Hill Professional.
36) Manos, T., 2006. Value stream mapping—An introduction. Quality Progress, 12(6), p.64–69.
37) McDonald, T., Van Aken, E.M. & Rentes, A.F., 2002. Utilising simulation to enhance value stream mapping: a manufacturing case application. International Journal of Logistics, 5(2), p.213–232.
38) Miljomal.nu, 2011. Sixteen environmental quality objectives. Available at: http://www.miljomal.nu/Environmental-Objectives-Portal/Undre-meny/About-theEnvironmental-Objectives/ [Accessed May 11, 2011].
39) Miller, G., Pawloski, J. & Standridge, C.R., 2010. A case study of lean, sustainable manufacturing. Journal of Industrial Engineering and Management, 3(1), pp.1132.
40) Mollenkopf, D. et al., 2010. Green, lean, and global supply chains. International Journal of Physical Distribution & Logistics Management, 40(1/2), pp.14-41.
41) PLASTICS NEWS, (2010), 'Report on AIPMA delegation to CHINAPLAS,'.
42) Rooney, C., 1993. Economic of pollution prevention: How waste reduction pays. , Summer, pp.261-276.
43) Rothenberg, S., Pil, F.K. & Maxwell, J., 2001. Lean, green, and the quest for superior environmental performance. Production and Operations Management, 10(3), p.228–243.
44) Rother, M. & Shook, J., 2003. Learning to see, Lean Enterprise Institute.
45) Sawhney, R. et al., 2007. En-Lean: a framework to align lean and green manufacturing in the metal cutting supply chain. International Journal of Enterprise Network Management, 1(3), p.238–260.
46) Schmidt, M. et al., 2007. Energy and material stream mapping. Recovery of Materials and Energy for Resource Efficiency. Davos, 7, p.3–5.
47) Simons, D. & Mason, R., 2003. Lean and green: doing more with less. ECR Journal, 3(1), p.84–91.
48) Singgih, M., Suef, M. & Putra, C.A. (2010, December). Waste reduction with green productivity approach for increasing productivity (Case Study: PT Indopherin Jaya).
49) Swedish Waste Management (2000)—Annual Publication of RVF, RVF - The Swedish Association of Waste Management.
50) Tammemagi H. (1999), ―The Waste Crisis: Landfills, Incinerators and the Search for a Sustainable Future Oxford University Press, New York.
51) Voss, C., Tsikriktsis, N. & Frohlich, M., 2002. Case research in operations management. International Journal of Operations & Production Management, 22(2), p.195–219.
52) Waste Technology,(2001), "Waste to Energy Project in India, Asian and Pacific Centre for Transfer of Technology", New Delhi, Volume 5, Number 44,

53) Womack J.P., Jones, D.T. and Roos, D. (1990), The Machine That Changed the World, Rawsons Associates,
54) Womack, J.P., Jones, D.T. & (Firm), S.& S.A., 1996. Lean thinking, Simon & Schuster Audio.
55) Womack, J.P., Jones, D.T. & Roos, D., 1990. The machine that changed the world, Simon & Schuster New York.
56) Yin, R.K., 2009. Case study research: Design and methods 4th ed., Sage
57) http://www. umassd.edu/Public / People/Kamaral/ thesis/plasticsarticle.html.
58) http://www.allbusiness.com/company-activities-management/management/5905156-1.html.
59) http://www.goacom.com/news/news98/jun/msg00043.html.
60) http://www.lir.msu.edu/piers/leanproduction.htm, The School of Labor.
61) http://www.plastemart.com/upload/home/icpe.asp.
62) http://www.plastemart.com/upload/literature/246_art_synopsis.asp.
63) http://www.plasticsresource.com/plastics_101/manufacture/how_plastics_are_made.html
64) http://www.sipi.org.sg/pdf/SiPi_Newsletter5_2012.pdf
65) http://www.toyotageorgetown.com/terms.asp.

SECURITY ACCESS FROM GLOBAL DATABASE USING BIOMETRIC

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ABSTRACT

In today's society advances in technology have made life easier by providing us with higher levels of knowledge through the invention of different devices. Establishing identify is becoming critical in our vastly interconnected society. The need for reliable user authentication technique has increase in the wake off heighted concern about security and raid advancement in networking communication and mobility .Biometric face recognition iris extraction ,finger print extraction ,get input compare to the aadhaar date base , Aadhaar unique identification based all operation will performed (Unique identification authority of India 12 digit unique id.) Unique identification project was initially conceived by the Planning Commission as an initiative that would provide identification for each resident across the country and would be used primarily as the basis for efficient delivery of welfare services. It would also act as a tool for effective monitoring of various programs and schemes of the Government based on the biometric similar recognition automatically the calculation performed and to identify the particular person. It based on the identify we easily find the particular person all details through the global database.

I. INTRODUCTION

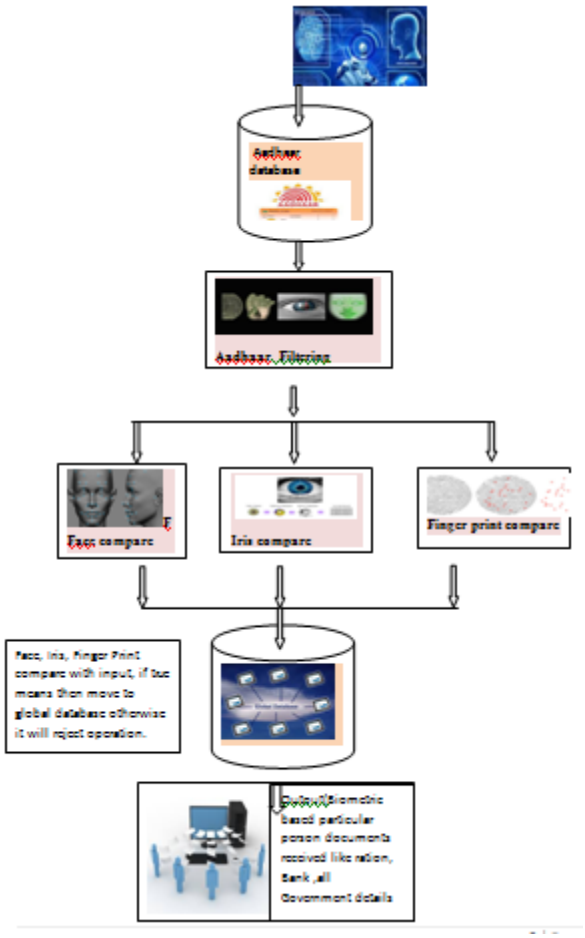
In this paper, biometric identification refer to the process of identifying an individual based on their unique characteristics. Authentication becomes a challenging task when it has to be automated with high accuracy and with low probability of break-ins and reliable non-repudiation scheme that can verify by investigating the consistency of the reports without submitting and processing security and without false accusation. Precisely identify the cheating persons without false accusation. In our daily life we are facing many problems ,for example - while going to office, on the way traffic police may investigate the vehicle documents such as RC book, Insurance, Driving License and if the people do not have any of these details with them, then in this situation our project plays a role (i.e) Some biometric operation will be performed like iris, face ,thumbprint e.t.c to get the particular document through the global database and all the required details will find match to the aadhaar database and perform comparison operation then based on the fingerprint or iris easily. [1]One of the critical steps in designing a secure biometric system is protecting the templates of the users that are stored either in a central database or on smart cards.Only the transformed template is stored and matching is performed directly in the transformed domain. In this paper, we formally investigate the security strength of template transformation techniques and define six metrics that facilitate a holistic security evaluation. We argue that the security strength of template transformation techniques must also consider the computational complexity of obtaining a complete pre-image of the transformed template in addition to the complexity of recovering the original biometric template.**[2]** Reliable information security mechanisms are required to combat the rising magnitude of identity theft in our society. While cryptography is a powerful tool to achieve information

security, one of the main challenges in cryptosystems is to maintain the secrecy of the cryptographic keys. Though biometric authentication can be used to ensure that only the legitimate user has access to the secret keys, a biometric system itself is vulnerable to a number of threats. A critical issue in biometric systems is to protect the template of a user which is typically stored in a database or a smart card. The fuzzy vault construct is a biometric cryptosystem that secures both the secret key and the biometric template by binding them within a cryptographic framework. We present a fully automatic implementation of the fuzzy vault scheme based on fingerprint minutiae. Since the fuzzy vault stores only a transformed version of the template, aligning the query fingerprint with the template is a challenging task.[3] This paper is a security analysis of leading privacy enhanced technologies (PETs) for biometrics including biometric fuzzy vaults (BFV) and biometric encryption (BE). We introduce three disturbing classes of attacks against PET techniques including attack via record multiplicity, surreptitious key-inversion attack, and novel blended substitution attacks. The paper ends with a discussion of the requirements for an architecture to address the privacy and security requirements. The works in [4]–[5] combine two different fingerprints into a single new identity either in the feature level [4] or in the image level [5], [6]. In [4], the concept of combining two different fingerprints into a new identity is first proposed, where then we identity is created by combining the minutia extracted from the two fingerprints. The original minu-tiae positions of each fingerprint can be protected in the new identity. However, it is easy for the attacker to identify such a new identity because it contains many more minutiae positions than that of an original fingerprint. The experiment shows that the EER of matching the new identities is 2.1% when the original minutiae positions are marked manually from the original fingerprints.[7] In RACE, Evidences are submitted and the AC applies cryptographic operations to verify them only in case of cheating, but the nodes always submit security tokens, e.g., signatures, and the AC always applies cryptographic operations to verify the payment in the existing receipt based schemes. RACE can clear the payment nearly without applying cryptographic operations and with submitting lightweight reports when Evidences are not frequently requested. In TPD-based payment schemes [8], [9], [10] a TPD is installed in each node to store and manage its credit account and secure its operation. For receipt-based payment schemes line central unit called the accounting center stores and manages the nodes' credit accounts. The nodes usually submit undeniable proofs for relaying packets, called receipts, to the AC to update their credit accounts.

In This Paper the Following operations contents are perform

1. Face Recognition
2. Iris Recognition
3. Finger print
4. Aadhaar Database
5. Global Database

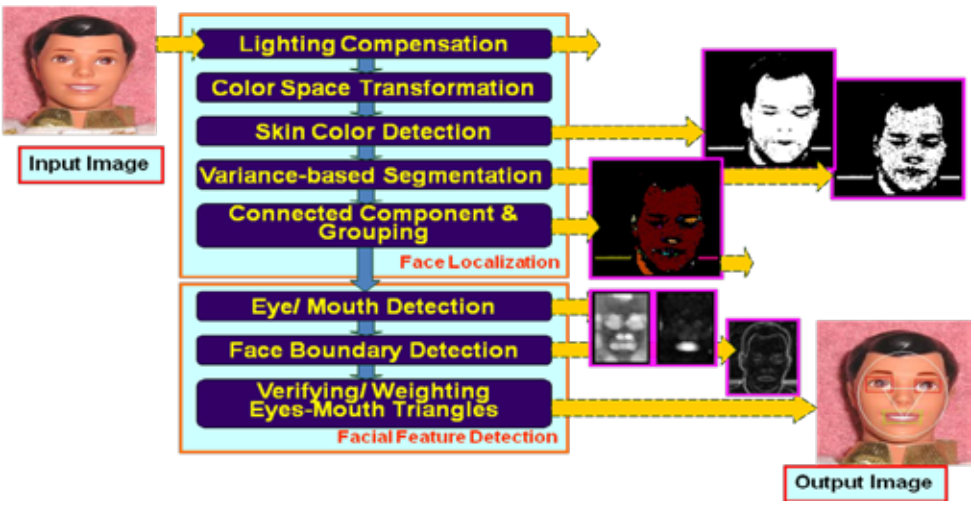
ARCHITECTURE: Input (biometric iris, finger print face recognition)



II. FACE RECOGNITION

Face recognition the human face if one the easiest characteristics which can be used biometric security system to iditify usher camerace scan be usher face and match it to a data base for a veryficaion.it will measure overall structure , shape and proportion of features on the user's face such as: Distance between eyes, nose, mouth, ears, jaw, size of eyes ,mouth and other expressions. Facial expression is also counted as one of the factors to change during user's facial recognition.

2.1 Face Detection Algoithm



III. IRIS REGONITION

Iris recognition is a method of biometric authentication that uses pattern recognition techniques based on high-resolution images of the ridges of an individual's eyes. Iris systems have a very low False Accept Rate (FAR) compared to other biometric traits; the False Reject Rate (FRR) of these systems can be rather high. Iris recognition analyzes features like rings, furrows, and freckles existing in the colored tissue surrounding the pupil. Image processing techniques can be employed to extract the unique iris pattern from a digitized image of the eye, and encode it into a biometric template, which can be stored in a database. This biometric template contains an objective mathematical representation of the unique information stored in the iris, and allows comparisons to be made between templates.

3.1 Variations In Eye

Optical size (iris), position (pupil), Orientation (iris).

Fixed Dimension, Cartesian co-ordinates to Polar co-ordinates.

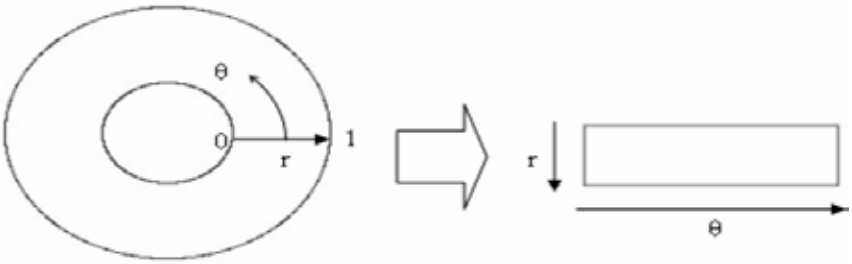
3.2 Daugman's Rubber Sheet Model

(R, theta) to unwrap iris and easily generate a template code.

Step 1: Capturing the image of the eye using a camera.

Step 2: Differentiating the outline of the iris and the sclera, and the pupil from the iris.

Step 3: Encoding the image using demodulation (also removes reflections, intrusion of eye lid lashes, contact lens outline etc.,). Code is 256 bytes.

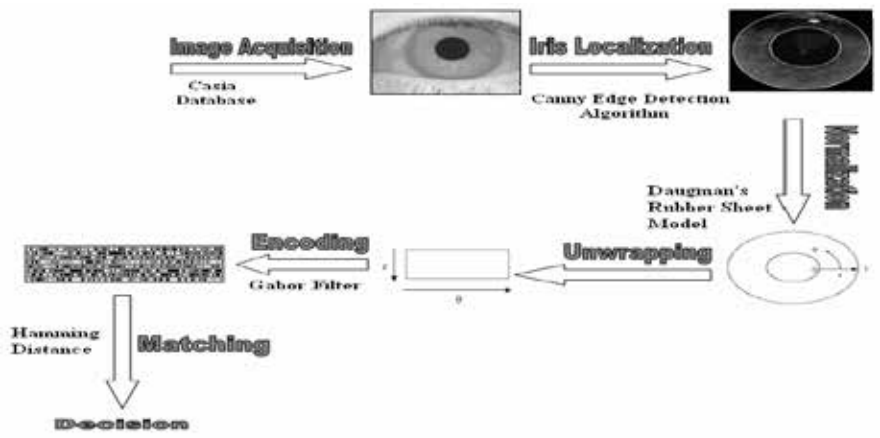


3.3 Following are The Various Steps During Image Preprocessing Stage

1. Iris Segmentation:This involves first employing Canny Edge Detection to generate an edge map.
2. Iris Localization: In the work, in order to increase the overall speed of the system, circle detection algorithm is used. Circle detection in the work contributes to:
   a. It has good recognition performance and speed
   b. The algorithm is able to very accurately detect even partially occluded circles.
   c. The algorithm needs a very small amount of memory.
   d. The algorithm creates low processing burden than other methods.
   e. It is simple and efficient method.

3. Iris Normalization:After successfully extracting the iris part from the eye image, in order to allow comparisons between different irises, transform the extracted iris region so that it has a fixed dimension, and hence removing the dimensional inconsistencies between eye images due to the stretching of the iris caused by the pupil dilation from varying levels of illumination. Therefore, this normalization process will produce irises with same fixed dimensions so that two photographs for the same iris under different lighting conditions will have the same characteristic features.

3.4 Iris Algorithm



3.5 Iris Feature Extraction

This is the most key component of an iris recognition system and determines the system's performance to a large extent. Iris recognition produces the correct result by extracting features of the input images and matching these features with known patterns in the feature database. Features are the attributes or values extracted to get the unique characteristics from the image. Features from the iris image are extracted using Wavelet decomposition process. In the wavelet decomposition the image is decomposed into four coefficient i.e., horizontal, diagonal, vertical and approximation.

$$IC(i) = \begin{cases} 1 & FV(i) > 0 \\ 0 & FV(i) < 0 \end{cases}$$

The approximation coefficients are further decomposed into four coefficients. The sequences of steps are repeated for five levels and the last level coefficients are combined to form a vector. The combined vector is binarized to allow easy comparisons between the iris codes for database and query image.

3.6 Matching

The comparison is done between iris codes and fingerprint codes generated for database and query images using hamming distance approach. In this approach the difference between the bits of two codes of both are counted and the number is divided by the total number of comparisons.

$$MS = \frac{1}{N}\sum_{i-1}^{N} Ai \oplus Bi$$

Where A is the binary vector for database image and B is the binary vector for query image while N is the number of elements. This matching score (MS) is used as input for the fusion module where the final matching score is generated.

IV. FINGER PRINT OPERATION

4.1 Minutiae Extraction

Typically each detected minutiae mi is described by four parameters:

$$m_i = (x_i, y_i, \theta_i, t_i)$$

where:

x_i, y_i – are coordinates of the minutiae point,

θ_i – is minutiae direction typically obtained from local ridge orientation,

t_i – is type of the minutiae point (ridge ending or ridge bifurcation),

The position of the minutiae point is at the tip of the ridge or the valley and the direction is computed to the X axis (Fig 2).

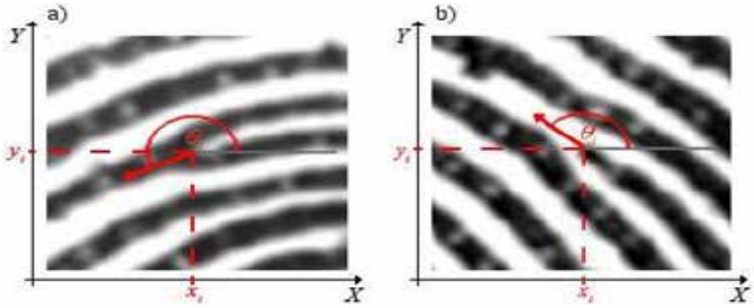


Fig. 2 a) Bifurcation and b) ridge ending type.

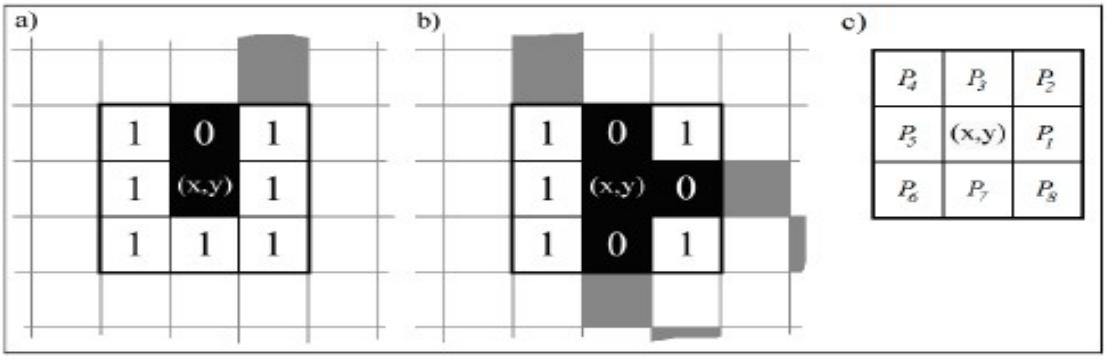
4.1.1 Feature Extraction

Two approaches of minutia extraction process can be found. The simplest and most used method is based on binarization and ridge thinning stage . Due to a problem of the false minutiae introduced by thinning, some authors proposed direct grey-scale minutiae extraction.

4.1.2 Ridge Thinning Method

Fig. 3. Fingerprint image a) binarization and b) skeletonization

The minutiae points are determined by scanning the local neighbourhood of each pixel in the ridge thinned image, using a 3×3 window (Fig. 4)



The most commonly used method of minutiae extraction is the Crossing Number (CN) concept [11, 12,13]. The binary ridge image needs further processing, before the minutiae features can be extracted. The first step is to binarizate and further to thin the ridges, so that they are single pixel wide (Fig. 3). A large number of

skeletonization methods are available in the literature, due to important role in many recognition systems. Rata, Chen and Jain [14] adopted a technique included in HIPS library. One of the most tolerant on irregularity of binary images is method proposed by Pavlidis [15].

$$CN(x,y) = \frac{1}{2}\sum_{i=1}^{8}[pi - pi + 1], p1 = pq$$

Using the properties of the CN as shown in Table (Fig. 5), the ridge pixel can be then classified as a ridge ending, bifurcation or non-minutiae point**.**

Fig: Processing of the finger

4.2 Direct Grey-Scale Method

- Enhancement algorithms are time-consuming,
- a significant amount of information may be lost during the binarization process,
- Skeletonization may introduce a large number of false minutia.
- Unsatisfactory results when applied to low quality images.

Maio and Maltoni [17] proposed a direct-grey scale minutiae extraction technique. Their basic idea is ridge tracing, by sailing according to the local orientation. The ridge line algorithm attempts to locate at each step, the local maxima, relative to a section perpendicular to the local ridge direction. The algorithm avoids revisiting the same ridge, by keeping track of the points traced so far. They also compared their method to binarization and thinning approaches and concluded that ridge following, significantly reduce computation time.

Nilsson and Bigun [18] proposed using Linear Symmetry (LS) filter in the minutiae extract approach, based on the concept that minutiae are local discontinuities of the LS vector field. Two types of symmetries - parabolic symmetry and linear symmetry are adapted to model and locate the points in the grey-scale image, where there is lack of symmetry (Fig. 6).

Fig. 6. Symmetry filter response in the minutiae point. a) ridge bifurcation, b) ridge ending (from [12]).

Finally, Govindaraju, Schneider and Shi [19] proposed a new algorithm based on chain code contour following. Chain codes have been used in computer vision to describe the shapes of object boundaries and in this case they

are loss-less representation of ridge contours, at the same time yielding a wide range of information about the contour such as curvature, direction, length etc [20]. As the contour of the ridges is traced consistently in a counter-clockwise direction, the minutiae points are encountered as locations, where the contour has a significant turn. Specifically, the ridge end occurs as significant left turn and the bifurcation as a significant right turn in the contour (Fig. 7). Analytically, the turning direction may be determined by considering the sign of the cross product of the incoming and outgoing vectors at each point.

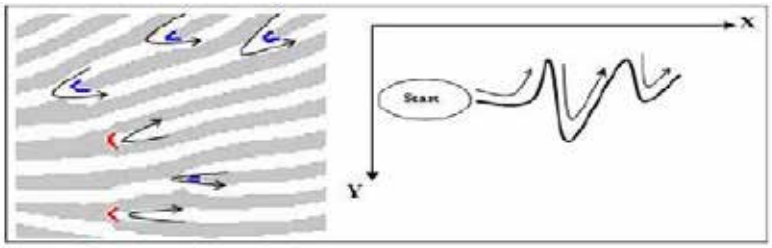


Fig. 7. A) Minutiae Marked By Significant Turn In The Contour,
B) The Contour Extracted By Tracing The Ridge Boundaries In A Counter Clockwise Direction.

V. GLOBAL DATABASE

A database management system (DBMS) defines, creates and maintains a database. The DBMS also allows controlled access to data in the database. A DBMS is a combination of five components: hardware, software, data, users and procedures. An object-oriented database tries to keep the advantages of the relational model and at the same time allows applications to access structured data. In an object-oriented database, objects and their relations are defined. In addition, each object can have attributes that can be expressed as fields.

Global Directory is an extension of the normal directory, including information about the location of the fragments as well as the makeup of the fragments, for cases of distributed DBMS or a multi-DBMS, that uses a global conceptual schema,

5.1 Global Directory Issues

- Relevant for distributed DBMS or a multi-DBMS that uses a global conceptual schema
- Includes information about the location of the fragments as well as the makeup of fragments.
- Directory is itself a database that contains meta-data about the actual data stored in database.
- Three issues
  - A directory may either be global to the entire database or local to each site.
  - Directory may be maintained centrally at one site, or in a distributed fashion by distributing it over a number of sites.
- If system is distributed, directory is always distributed
  - Replication, may be single copy or multiple copies.
    Multiple copies would provide more reliability

VI. CONCLUSION

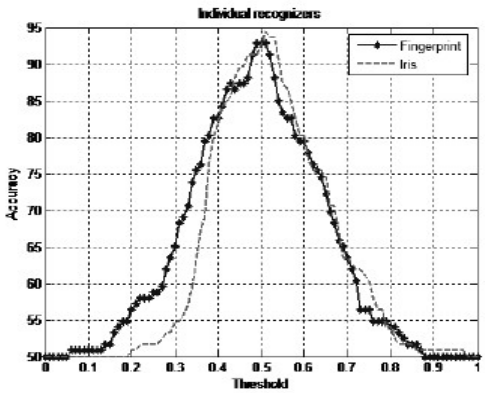
In this project, we have achieved the security and raid advancement. It reduces the need to maintaining manual documents. This project also reduces the possibilities of cheating. The level of security is high due to the

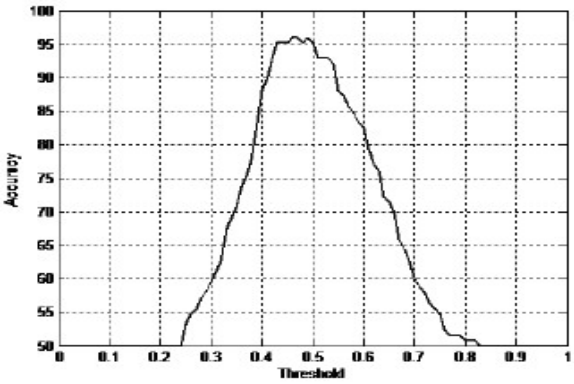
individual characteristics of human being. Due to the advancement in technologies, we have made our lives easier.Some Advantages and Disadvantages are mention in the following table

Biometric System	Advantages	Disadvantages
Finger_Print Verification based recognition	This approach is proven and highly accurate one. Hence it is used widely and has the ability to enroll multiple fingers. The system comes with a wide range of deployment environment.	The verification system remind, one of law. Enforce in the minds of the users Impaired or damaged finger print can be difficult to verify standard for interoperability need to be established.
Iris and retinal scanning based recognition	Operations are highly reliable and hands free and the characteristics remain stable over a lifetime.	This is highly sophisticated technology that needs proper training. sometimes glasses with strong lenses can impact the performance of the system.
Facial Recognition	This can operate without user compliance, work from a distance, and leverage existing image database to establish identify.	The system is susceptible to error non matching depends on factors such as lighting, camera angle, and facial alteration caused by surgery, accidents.

VII. EXPERIMENTAL RESULTS

The results are tested on iris,face and fingerprint images given to us by our guide. The database consists of four iris images (50×4) and four fingerprint images (50×4) per person with total of 50 persons. For the purpose allowing comparisons two levels of experiments are performed. At first level iris and fingerprints algorithms are tested individually. However in order to increase the accuracy of the biometric system as a whole the individual results are combined at matching score level. The accuracy and error rates obtained from the individual and combined system. The overall performance of the system has increased showing an accuracy of 94.07% with FAR of 1.46% and FRR of 6.87% respectively. Receiver Operating Characteristic Histograms for genuine and imposter data are shown in Figure 9 below. The distribution of genuine and imposter data shows that at threshold of 0.5 the system would give minimum FAR and FRR rates with maximum accuracy of 96.04%.





Tracking capabilities: the biometrics system has large amounts of databases which contain personal details and information of the public and private sectors raising many questions of maintaining each individual's anonymity. Many people are concerned that authorized people who got control over biometrics systems will be able to track individuals without their knowledge. One of example of this concern is facial recognition software and systems. With this technology, the system can recognize and verify each individual wherever they go which might be seen as an invasion of privacy.

REFERENCE

[1] Biometric Template Transformation: A Security Analysis: Abhishek Nagara Karthik ,Nandakumarb and Anil K.

[2] Fingerprint-Based Fuzzy Vault: Implementation and Performance Nandakumar**, K. ; Michigan State Univ., East Lansing ;** Jain, A.K. ; Pankanti, S.

[3] CRACKING FUZZY VAULTS AND BIOMETRIC ENCRYPTION Walter J. Scheirer and Terrance E. Boult∗

[4] B. Yanikoglu and A. Kholmatov, "Combining multiple biometrics to protect privacy," in Proc. ICPR- BCTP Workshop, Cambridge, U.K ., Aug. 2004.

[5]A.RossandA.Othman,"Mixingfingerprintsfortemplatesecurityandprivacy,"inProc.19thEur.SignalProc.Conf.(EUSIPCO),Barcelona, Spain, Aug. 29–Sep. 2, 2011. [6] A. Othman and A. Ross, "Mixing fingerprints for generating virtual identities," in Proc. IEEE Int. Workshop on Inform. Forensics and Se- curity (WIFS), Foz do Iguacu, Brazil, Nov. 29–Dec. 2, 2011.

[7] A Secure Payment Scheme with Low Communication and Processing Overhead for Multihop Wireless Networks Mohamed M.E.A. Mahmoud and Xuemin (Sherman) Shen, Fellow, IEEE

[8] L. Buttyan and J. Hubaux, "Stimulating Cooperation in Self- Organizing Mobile Ad Hoc Networks," Mobile Networks and Applications, vol. 8, no. 5, pp. 579-592, Oct. 2004.

[9] Y. Zhang, W. Lou, and Y. Fang, "A Secure Incentive Protocol for Mobile Ad Hoc Networks," ACM Wireless Networks, vol. 13, no. 5, pp. 569-582, Oct. 2007. [18] A. Weyland, "Cooperation and Accounting in Multi-Hop Cellular Networks," PhD thesis, Univ. of Bern, Nov. 2005.

[10] A. Weyland, T. Staub, and T. Braun, "Comparison of Motivation- Based Cooperation Mechanisms for Hybrid Wireless Networks," J. Computer Comm., vol. 29, pp. 2661-2670, 2006.

[11] BEBIS G., DEACONU T., GEORGIOPOULOS M., Fingerprint Identification Using Delaunay Triangulation, Proc. of Int. Conf. on Information Intelligence and Systems, pp. 452-459, Washington, DC, USA, 1999.

[12] AMENGUAL J., JUAN A., PREZ J., PRAT F., SEZ S., VILAR J., Real-time minutiae extraction in fingerprint images,Proc. of the 6th Int. Conf. on Image Processing and its Applications, pp. 871–875, Ireland, 1997.

[13] MEHTRE B. M., Fingerprint image analysis for automatic identification, Machine Vision and Applications 6, 2, pp. 124–139,India, 1993.

[14] BOASHASH B., DERICHE M., KASAEI S., Fingerprint feature extraction using block-direction on reconstructed images, IEEE region TEN Conf., digital signal Processing applications, TENCON pp. 303–306, Australia, 1997.

[15] GOVINDARAJU V., JEA T., Minutiae-based partial fingerprint recognition, Pattern Recognition, Vol. 38,

pp.

[16] CHEN S., JAIN A., RATHA K., Adaptive Flow Orientation-Based Feature Extraction in. Fingerprint Images, Pattern Recognition, Vol. 28, No. 11, pp. 1657-1672, USA, 1995.

[17] PAVLIDIS T., A thinning algorithm for discrete binary images. Computer Graphics and Image Processing,

[18] TAMURA H., A comparison of line thinning algorithms from digital geometry viewpoint. Proc. of the 4th Int. Conf. on Patte Recognition, pp. 715–719, 1978.

[19] MALTONI D., MAIO D. , JAIN A.K., PRABHAKAR S., Handbook of Fingerprint Recognition. Springer.

[20] MAIO D., MALTONI D., Direct Gray-Scale Minutiae Detection In Fingerprints, IEEE Trans. Pattern Anal.

TRACKING AND DETECTION OF OCCLUDED HUMAN

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ABSTRACT

Tracking of human is a common requirement for many real world applications such as video surveillance, games, cultural and medical applications. In this paper an appearance based tracking system is proposed which tracks human motion from different video scenes. The system is based on two main models such as color histogram and color correlogram model. This system works well in indoor and semi-indoor environment. The proposed system comprises of five major steps. Firstly all motion blobs in the video scene are extracted. Morphological operations are applied then on extracted motion blobs for removing noises associated with blobs. After that all the motion blobs are counted and labeled by connected component finding. Correlogram and histogram model for each blob are built from the color information of moving blobs in the next step. Similarity measures between the blobs of the current image frame and previous image frame are calculated. Finally system performs tracking based on the similarity measures from frame to frame. Multiple people can be tracked consistently by this proposed system. The system is consistent during partial occlusion. During occlusion occluding entities are tracked as one entity and tracked separately when they split.

Keywords: Computer Vision, Video Surveillance, Background Subtraction, Color Histogram, Color Correlogram.

I. INTRODUCTION

The analysis of human actions by computer is gaining more and more interest. Any system that needs to employ automated surveillance on a scene must require analyze the happenings on the scene firstly. After analyzing the scene properly system can be able to take any necessary decision based on those gained information. So in any sort of application related to automated surveillance or analyzing scene must go through a precise pathway of motion tracking of objects on the scene. There is particular area in human brain that processes what we accept as image in the form of electromagnetic wave. As a basic idea of theological speculation, scientists have always been trying to build something which would act something similar like human being. The ultimate goal is to make a machine capable of doing something similar enough to how human being deals with surroundings. According to a survey carried by Oklahoma State University about 83% of information about surroundings we do intake through our sight [12]. That's where the computer vision comes into actions, which deals with the mechanisms how a machine can be made with sight sense. With the increase threats of terrorism video surveillance system on important public places may greatly mitigate the losses embodied by terrorism. With the competitive environment of business and technology at present time surveillance system is needed in private security level to provide more secure and protected environment. As a whole human motion tracking firstly deals with detection of moving objects [1]. There are extensive approaches on human motion tracking [1, 2].

Presented approach is developed based on color information that is appearance of human motion entities. This system is capable of tracking each moving human on the video scene. Besides system has a total control on each moving blob on the video so that this control could be used in any kind of higher level analysis (activity recognition, human machine interaction). The system comprises of background subtraction, connected component finding, building models for moving entities and finally tracking the peoples based on built models. Proposed system is robust to gradual illumination changes because of application of adaptive update to the background and the color models. The system is developed assuming that the only moving entities on the video scene is human. The work is based on focusing indoor or semi -indoor environment, with static camera. But the system could easily be incorporated into outdoor environment.

II. RELATED RESEARCH

There are two vital phases of human motion tracking system. First one is the foreground segmentation. The most vital part of our proposed surveillance system is the extraction of foreground objects. Two mainly common techniques exist in the literature are the optical flow computation and background subtraction. Background subtraction works with calculating the differences between the foreground pixel and corresponding background pixel and with a help of threshold value final decision is taken. There are number of systems where background subtraction was adopted for foreground segmentation [1, 2, 4]. In [1] background subtraction was done by modeling, representing and maintaining background which is time consuming for special cases such as indoor environment with symmetric lighting all over the scene. Maintenance of statistical background used in [2], may flaw in gradual illumination with changing environment. Optical flow based methods have been used in [5]. As our main focus on to the tracking of human motion, we proposed a simple equation for background subtraction. Addressing tracking position is also an important portion of human man motion tracking. Several work have done for tracking purpose. Mean shift based methods used in [11] may flaw for lack of proper kernel choice or proper target model build up. Here in this paper, color based histogram and correlogram models are used for tracking. This method is very robust in case of rotation or challenging gradual illumination changes.

III. ARCHITECTURE

A total glance of the proposed system is given in the Fig 1. Brief description of each of the cited phases in the figure is discussed in the following sections with result.

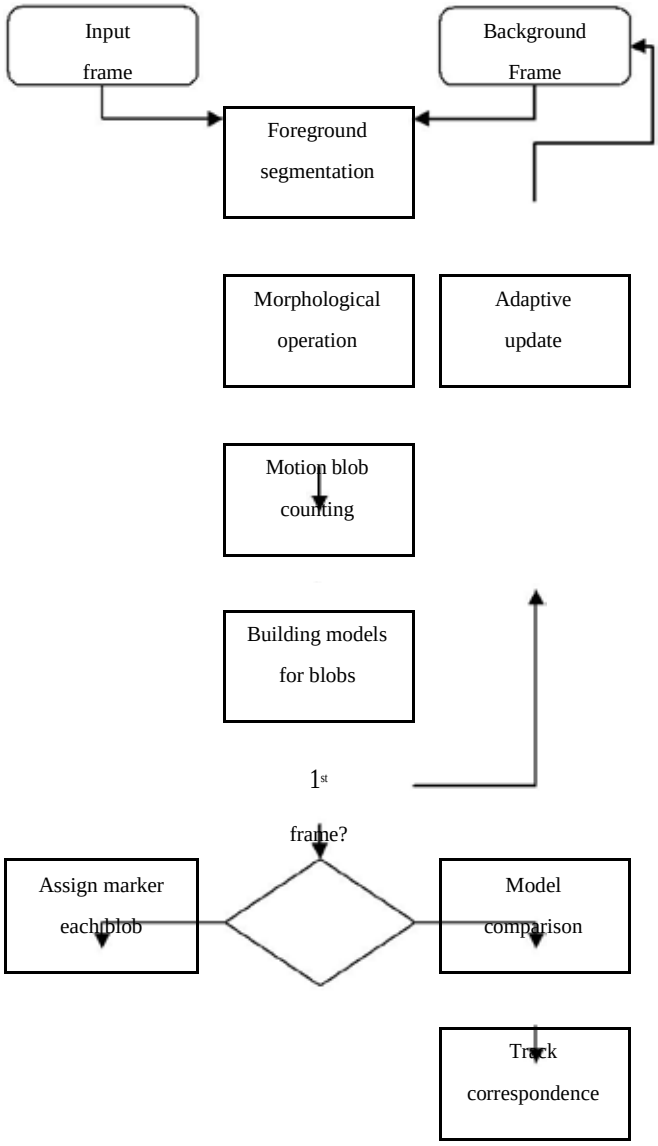

Fig. 1. System architecture of Human Tracking System

3.1 Foreground Segmentation

Background subtraction method is used here to extract foreground objects from current image frame. From the input background image frame and current image frame the following equation is used to extract foreground objects,

$$FI_{(x,y)} = [(r_f - r_b)^2 + (g_f - g_b)^2 + (b_f - b_b)^2] \qquad (1)$$

Where $FI_{(x,y)}$ is the extracted foreground pixel and r_f, g_f, b_f are the (x,y) pixel's RGB value of current image frame and r_b,

g_b, b_b are the corresponding pixel's RGB vector of background image. Then a threshold value is used to find out the correct foreground motion entities. Threshold value for the background subtraction is chosen statistically

from a set of tested historical thresholds. The system is run for a large number of test cases using heuristic threshold value for each test case. Finally from those values of heuristic threshold, mean value of threshold set is chosen which gives minimum standard deviation. This optimal threshold value is then used in the system.

3.2 . Morphological Operations

Some unexpected noises appear due to unusual camera movements, gradual illumination changes. Holes are created inside extracted moving blobs which must be constructed to make the system's performance accurate. Image closing operation is applied to extracted foreground entities. Image closing operation is defined by an image dilation operation followed by an image erosion operation with same structuring element. As a structuring element a line vector of 10 pixels is used with 80 degree angles in the developed system. Elliptical or polygon shaped structuring element might grow the motion entity unusually at the edge. That's why vector line structuring element was chosen for this morphology.

3.3 Motion Blobs Counting

Counting how many objects in the scene is the most crucial part of the system. All the connected components must be detected and controlled successfully for better tracking. Breadth First Search (BFS) is used to find all the connected components in the frame. Unexpected noises or existed blobs having no possibility of being human entity are removed in this phase based on a size thresholding. By the end of this phase system is able to answer the questions like how many people on the scene, how many pixels each human object consists of etc. The system also labeled each human for the purpose of tracking in future in this phase.

3.4 Appearance Based Model

System is based on appearance based color histogram and color correlogram models. Models for each detected human entity are built dynamically.

1) Color histogram: Color histogram is the frequency of color in an image showed in a structured way. Formally The color histogram h of image I is defined for i ∈ [m] such that $hist_I(c_i)$ gives for any pixel in I , the probability that the color of the pixel is c_i could be defined as,

$$hist_I(c_i) \quad \frac{count_I(c_i)}{|size_I|} \qquad (2)$$

Where, $count_I(c_i)$ is the count of pixels of color c_i, $size_I$ is the size of the image *I*. Color histogram model are built for each detected moving blob in the video scene and by

comparing models of current image frame with models of previous image frame tracking is achieved.

2) Color correlogram: Unlike histrogram color correlogram has some corretional information about frequency of color. Informally correlogram is the probability of a pixel to be some color from a pixel of some color in a given distance.

Formally Correlogram value of a pixel of color c_i distance k to be of color c_j can be expressed as,

$$correl_I(c_i, c_j, k) = \frac{count_I(c_i, c_j, k)}{8k * count_I(c_i)} \quad (3)$$

Where $count_I(c_i, c_j, k)$ symbolizes the count of total of a pixel of color *ci* is *k* unit distant from another pixel of color *cj*. And 8k is a factor representing how many neighboring pixels in distance k. if *k*=1 then, 8 neighboring pixels, if k=2 then, 16 neighboring pixels and so on.( ) *I i count c* is the count of pixels of color ci in the image I. Correlogram models are also used for each moving blobs as histogram models. Main goal of using correlogram having still histogram is make the system robust to rotational changes of moving blobs from frame to frame.

3.5 Similarity Measure

Similarity measure is required among the models of current image frame's moving blobs and previous image frame's models for implementing the tracking from frame to frame. Once models have been acquired a good similarity measure is to be applied to get correct result. In this system a modified version of L_1 distance norm is used. Suppose that we have *HP* and *HC*, the color histograms of previous and current frame respectively. Then our similarity result can be represented as,

$$SIM = \frac{\sum_{i=1}^{256} [(HP_i - HC_i)]}{\min(NC, NP)} \quad (4)$$

Where *NP* is the number of pixels in the blob of previous frame, *NC* is the number of pixels in the blob of current frame.

The similarity measure of correlogram could be similarly represented.

3.6 Tracking

We have a value of each of the blobs of current image frame with each of blobs of previous image frame from equation (5). Based on this value and with comparing it with some threshold tracking decision are made. Threshold value may differ from the fact which one of histogram and correlogram is using. The equation here is used to find out the accurate correspondence of a moving entity of previous frame to another moving entity in the current frame,

$$Mark_i = \cap \sum_{i=1}^{NBC} \sum_{j=1}^{NBP} SIM(i, j) \quad (5)$$

Here NBC is the number of motion blobs in the current input image frame and NBP is the count of the number of motion blob in the previously processed image frame. ∩ denotes that system takes the marker from the previous frame's blob from where the similarity measure value is the minimum and above system's threshold. This is how the tracking occurs. There is exception for the first case that is when the first image frame is processed. For the first time there is no previous frame that's why only a unique marker to each blob is given at this step. This marker is consistently continuing in the later frame which is the sign of successful tracking. In case of occlusion this system handles the occluded entities as a single one and continue to track the group of people until they split. After an occluded object split, system tracks individually each entity. This system may change the marker of tracking but it holds the control over the object which might be useful for security purposes. It is very difficult to resolve the occluding situation in the surveillance system. This is because of camera is missing the occluded entity. The information needed to track the occluded object remains unavailable

during an occlusion. Tracking application faces the occlusion problem in different ways. But none of these ways are stand alone to resolve problem if system uses single camera. System with multiple camera arrangement can remove the problem successfully. As our system is based on single camera, the problem is defended by tracking the occluded entity as a whole.

Fig. 2. Processed output of system in occluding situation

It can be seen from Fig 2 that two people were tracked individually in the first four frames. They are marked with separate marker. In the 5th frame an occlusion occurs and the occluded object is tracked with a single marker. In the 6th frame of the figure the occluded object breaks into parts. As soon as the occluded object splits they are being tracked individually with their respective marker again. Thus system holds the control over the moving entities of the scene in the situation where occlusion occurs.

3.7 . Update

To handle gradual illumination change and maintain the background consistently the system updates both the models and background frame adaptively. All of those things can be updated adaptively by following equation,

$$obj(t)=\alpha*obj(t)+(1-\alpha)*obj(t-1) \qquad (6)$$

Where α is the updating constant which determines how slowly or rapidly the updating incorporates new value for respective objects. Value of α may vary for those three objects namely histogram, correlogram and background frame. Here t denotes the current instance of things so $(t-1)$ denotes previous.

IV. EXPERIMENT RESULT & DISCUSSION

We have tested our system on various real time video scene and found satisfactory result. A demonstration of the performance of the system on scattered background and untidy lighting condition over the scene in given in Fig 3.

Fig. 3. Processed frames (1st, 50th, 150th, 198th) of a test video of challenging indoor environment

This result shows that the system is robust under challenging situation with asymmetric lighting condition over the scene and disturbing background. We can see when the entities turn around after an occlusion, system still holds accurate performance. The system holds the total control over the entities in the scene in any situation

A comparison of our system's output and standard CAMSHIFT's tracked output over the video cited in the earlier section is given below in the table. The table shows the displacement error between the ground truth data and CAMSHIFT's result in the second column. Displacement error between ground truth data and developed system's results is showing column titled as Displacement Error in the Table 1. Comparison is shown for 25 frames.

Table 1 shows center location of region of interest (ROI) in each frame from 1 to 25. In the first column given co-ordinates are ground truth data which means actual center location of ROI in image frame. Column named gives the co-ordinates gained from CAMSHIFT and displacement error from ground truth data. Column titled System's Results specifies co-ordinates of center of ROI from developed system's output and displacement error with ground truth. From the comparison it can be seen that, our system is giving much better center of ROI with compare to standard CAMSHIFT results.

Table 1.Comparision of Data

Ground Truth Data (x, y co-ordinates)	CAMSHIFT Results		System's Results	
	(x, y)	Displacement Error	(x, y)	Displacement Error
598, 376	596, 368	8.25	600, 375	2.24
598, 375	572, 361	29.53	596, 375	2.00
593, 376	572, 363	24.70	596, 375	3.16
593, 376	568, 363	28.18	593, 375	1.00
588, 375	567, 364	23.71	593, 375	5.00
581, 375	561, 368	21.19	587, 375	6.00
581, 375	554, 367	28.16	581, 375	0.00
576, 375	552, 363	26.83	581, 375	5.00
572, 375	545, 364	29.15	575, 375	3.00
572, 375	541, 365	32.57	570, 375	2.00
567, 375	540, 365	28.79	570, 375	3.00
566, 375	535, 367	32.02	564, 375	2.00
560, 375	535, 367	26.25	564, 375	4.00
560, 375	530, 369	30.59	558, 375	2.00
554, 375	529, 370	25.50	558, 375	4.00
547, 374	526, 371	21.21	551, 375	4.12
547, 375	523, 369	24.74	545, 374	2.24
541, 375	524, 368	18.38	545, 374	4.12
539, 374	523, 370	16.49	541, 374	2.00
538, 374	520, 370	18.44	537, 374	1.00
536, 373	520, 369	16.49	537, 374	1.41
536, 373	518, 368	18.68	535, 373	1.00
534, 374	518, 368	17.09	535, 373	1.41
534, 373	516, 367	18.97	533, 373	1.00
532, 373	516, 367	17.09	533, 373	1.00

V. CONCLUSION AND FUTURE WORK

In this paper we proposed an appearance based tracking system for tracking human motion from video. Correlogram and histogram based model is used to separate each human and mark them with different marker. The system works efficiently in the indoor environment although it can be appropriated for outdoor environment with a little modification. The performance degradation of the proposed tracking method could have been overlooked in case any rectangular boxes were used as markers of the moving object. But all the moving entities could not be tracked and identified successfully. Our system can maintain the control over the moving entities of the frame even in scattered ambience which is the ultimate goal of any tracking system. The performance of the proposed system may degrade when people under surveillance have dress with similar color or pattern. The system can also be extended in different environmental conditions such as rain, fog, night time etc. The occlusion resolving method could also be added to this system to make the performance better.

REFERENCE

[1] Shireen Y. Elhabian, Khaled M.E1-Sayed and Sumaya H. Ahmed,"Moving object detection in spatial domain using background removal techniques- State-of-Art.", Recent Patents on Computer Schiene, 2008, Vol. 1, No. 1

[2] Prithiviraj banerjee and Somnath Sengupta, " Human motion detection and tracking for video surveillance.", National Conference for communication, 2008, Bombay, India

[3] Jianpeng Zhou and Jack Hoang, "Real time robust human detection and tracking system.", Conference on Face and Gesture Recognition, April, 1998

[4] Pranab Kumar Dhar, DM. Hasibul Hasan, Springerlink, "Real time moving object detection based on masking approach.", International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 5, No. 3, September, 2012

[5] S.S. Beauchemin and J.L Barron, "The computation of optical computing surveys, Vol.27, 1995, pp 433-466

[6] Qi Zhao and Hai Tao, "Object tracking using color correlogram.", 14th International Conference on Computer Communications and Networks, page 263-270

[7] Mart´ı Balcells Capellades, David Doermann, Daniel DeMenthon and Rama Chellappa, "An appearance based approach for human and object tracking.", Conference on Image Processing 2003, ICIP 2003

[8] Jing Huang, S. Ravi Kumar, Mandar Mitra, Wie-Zheng Jhu, Ramin Jabih, "Image indexing using color correlogram.", Conference on Computer Vision and Patternt Recognition, Page 762

[9] Mary J. Comer and Edward J. Delp, "Morphological operations for digital image processing.", Purdue University

[10] Yang Songy, Xiaolin Fengy and Pietro Peron, "Toward detection of human motions.", Computer Vision and Pattertn Recognition, 200

[11] Vlademer nedovik, "Tracking Moving Video Objects using Mean Shift Algorithm.", 6th International Conference on Automatic Face and Gesture Recognition.

[12] Oklahoma cooperative extension service, 4-H youth development, http://www.oces.okstate.edu/washita/uploaded_files/4h_Learni ng_Styles.doc

OPTIMIZE COST OF CONSTRUCTION PROJECTS USING OPTICON (ERP SYSTEM) SOFTWARE- A CASE STUDY

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ABSTRACT

Enterprise Resource Planning (ERP) is originated in the construction business industry. This project deals with the construction management ERP software "OPTICON" EDU plus is useful tool for civil engineering discipline to work on construction management related aspects of tendering, estimating, planning, scheduling, monitoring, material management, subcontractor management, billing and accounting in an integrated manner in an ERP environment. This availability also provides an opportunity to understand the flow of men machine materials and all resources from estimating, scheduling, procurement to consumption on site. The tracking of resources, subcontractor management Billing and accounting modules help determine cost control of the project and indicates whether the project has a cost overrun or under run. Thus this thesis discusses about tracking of resources, project scheduling, project monitoring and controlling. These modules help determine cost control of the project and indicate whether the project has a cost overrun or under run.MIS reports is the main feature against the established thumb rules and in totality that will help to understand the construction management aspects of project on a per unit basis which is one step towards sustainable development of construction.

Key words: "OPTICON" ERP Software, Estimating, Scheduling, Monitoring and Controlling.

I.INTRODUCTION

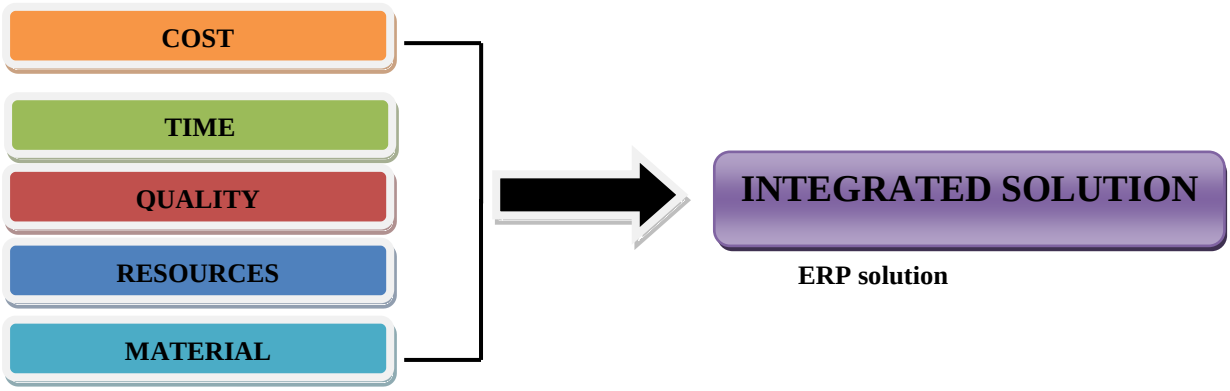
As the complexity and size of the construction projects, management always face problem regarding to cost management and time management. In the conventional process, a firm uses various types of software such as MSP and primavera for scheduling, Estimator for cost estimation and much more for various operations such purchase, billing, tendering and monitoring. Coordination of all this processes generated through use of no. of software's and collection of various reports from various sites is time consuming and consist a cost factor. Moreover there is a risk of transferring wrong information. So, every construction companies need to implement in management system for optimization of cost and time of construction projects**.**

1.1 Importance of the Study

Enterprise resource planning (ERP) is a technique used to integrate resources and material required for completion construction project. The difference between the conventional technique & ERP technique is the optimize cost and time by integrating resources and material. Now days the 90% construction project fails because of cost overrun and time overrun. For this problem Enterprise resource planning (ERP) is the best solution

II.CONCEPT OF ERP

In conventional method five parameters are separated which denotes costs, time, quality, resources and material which gives us general solution for each individual parameter. While the ERP system offers the integrated solution which link all those five parameters together.



2.1 Concept of OPTICON

"OPTICON" is construction management software which is based on ERP system which helps in solving such new challenges in construction business management. It involves web enable ERP system designed for construction business management within built Decision Support and Management system.

The system provides the graphical analysis like:

Planed v/s Actual project progress

Estimated v/s Actual Resource consumption

Periodical resource requirement

Detail analysis of the estimates of the resources.

2.1.1 OPTICON- Information Flow Across Enterprise

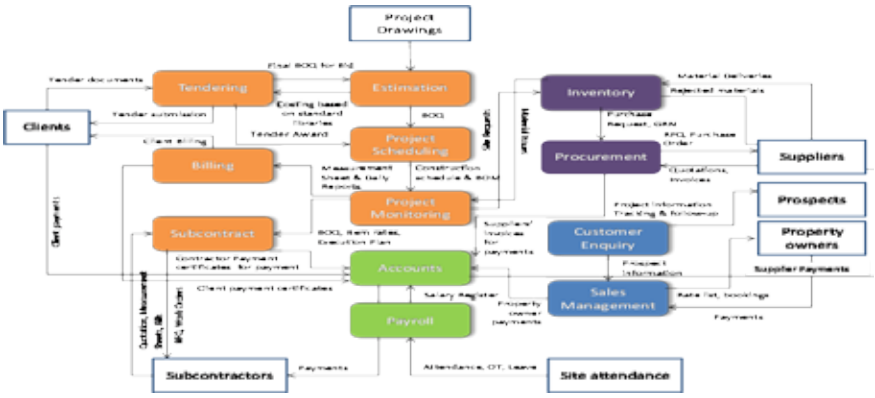
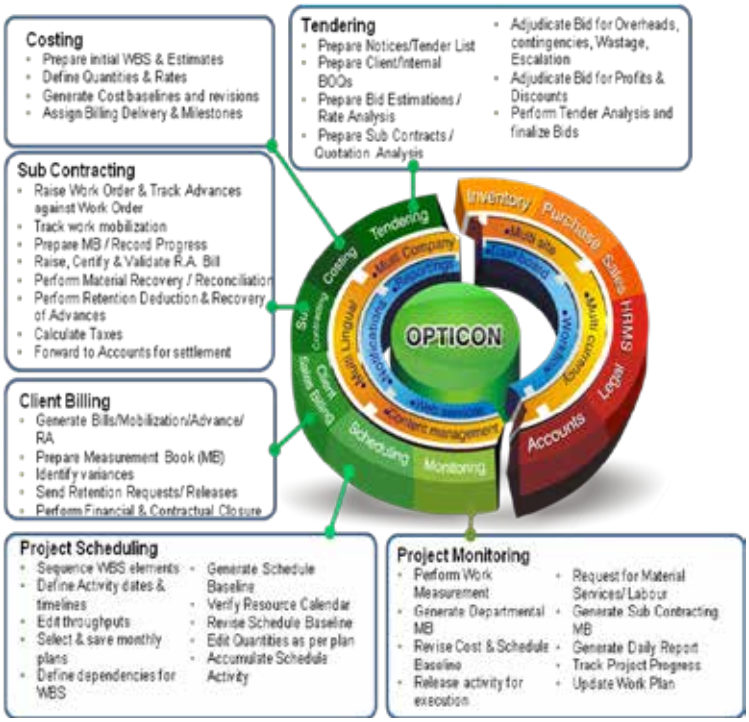


Fig. 1.2 Working of OPTICON (ERP System)

2.1.2 The OPTICON has the following modules

1. Tender Bid Management
2. Project Cost Management
3. Project Schedule Management
4. Project Monitoring and Control
5. Sub-Contract Management
6. Material Procurement
7. Inventory Management
8. Financial Accounting
9. User and system Administration



2.1.2.9 User and System Administration

This module is used for the defining the Organizational Information, Configuration, User Authorization, Approval Work Flows and many master data, which are required and used at a company level. The user will have the access to the processes in which he is authorized to do. This module has Setup, Masters and Report section. In Setup the details of Group Company, Its Structure, Authorization, Organization, Document Numbers, Employees, Financial Year, Approval Work Flows, Site Access Security, Day Book Access Security and Additional Authority are defined.

III.A CASE STUDY

3.1 Head Wise Total Estimate Report

Head wise Estimate report of construction project case study-I in OPTICON software .This report prepared by OPTICON using SOR and Rate analysis report which is prepared in OPTICON before Preparation of Estimate report .This Estimate report help us at the time of preparation of Tender notice of construction project

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Ninaedevi shikshan prasarak mandal, Red-Shirala

Site : Springdale public school

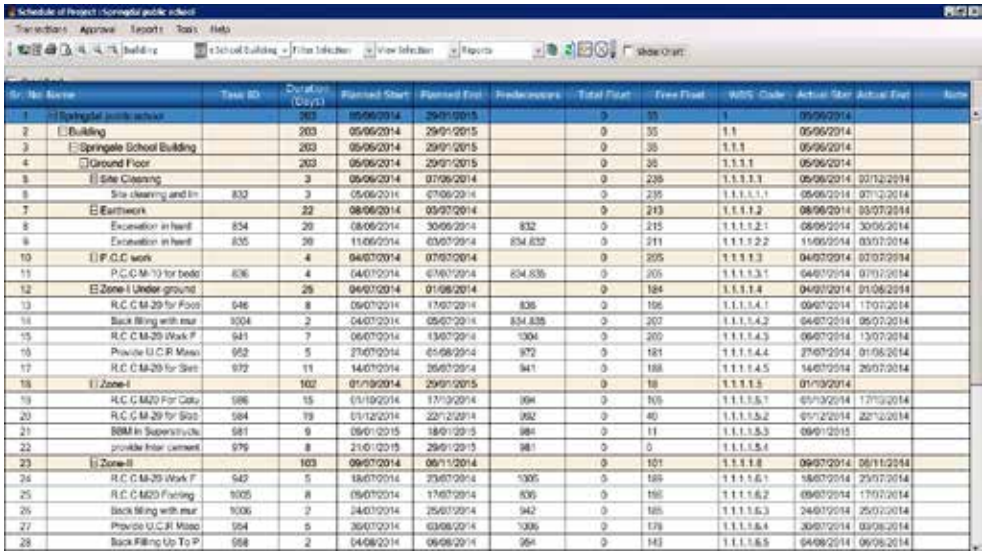
Unit : Building

Sr. no	Item Code	Item Description	Quantity	Unit	Rate	Amount
Work in Plinth(Substructure) – Excavation						
1	03.01.1	Cleaning the building / structure site about 15.0 m all around as directed, with cleaning shrubs.	1.000	Sq.Mtr	5000.00	5000.00
2	03.01.4	Excavation for foundation by mechanical / manual in hard Murom & boulders.	20.000	Cu.Mtr	400.00	8000.00
3	03.01.6	Excavation for foundation by mechanical / manual in hard rock by chiseling.	50.000	Cu.Mtr	750.00	37500.00
Work in Plinth(Substructure) - Excavation Total Amount (Rupee)						50500.00
Work in Plinth(Substructure) - PCC works						
4	03.03.10	Providing and laying in situ, cement concrete M-10.	94.000	Cu.Mtr	4018.10	377701.40
Work in Plinth(Substructure) - PCC works Total Amount (Rupee)						377701.40
Work in Plinth(Substructure) - RCC Works						
5	03.04.12	Providing and laying in situ, cement concrete M -20.	307.000	Cu.Mtr	12728.54	3907661.78
Work in Plinth(Substructure) - RCC Works Total Amount (Rupee)						3907661.78
Work in Plinth(Substructure) - UCR Masonry						
6	03.05.32	Providing un-coursed rubble masonry out trap stones in cement mortar 1:6 in foundations.	22.000	Cu.Mtr	2812.70	61879.40
Work in Plinth(Substructure) - UCR Masonry Total Amount (Rupee)						61879.40
Work In Superstructure – Brickwork						

7	04.03.34	Providing Exposed 230 mm thk brick cavity wall.	97.000	Cu.Mtr	3808.40	369414.80
Work In Superstructure - Brickwork Total Amount (Rupee)						369414.80
Work In Superstructure - Plaster work						
8	04.04.43	Providing internal cement plaster 20mm thick in two coats in cement mortar 1:4.	1,031.000	Sq.Mtr	129.76	133782.56
Work In Superstructure - Plaster work Total Amount (Rupee)						133782.56
Total Amount (Rupee)						**4900939.94**

3.2 Detail Schedule Report

Fig. show that the Detail Schedule of construction project case study-I prepared in "OPTICON. The construction schedule involve Duration , planed start date, planed end date, actual start date, actual end date, predecessor of each activity.



3.3 Item Wise Resource Consumption

Fig Shows item wise planed Vs actual resource consumption on site. It helps to know budget allocated to resources of each item is under run or overrun.

3.4 Project Cost Calendar

In Fig. shows that the project cost calendar of construction site. These project cost calendars represent cost for resources and material required in each month of construction project. It helps us to solve financial problem of owner and also help to minimize risk of time overrun due to financial problem.

Report Code: PS-03

Project Cost Calendar

Ninaedevi shikshan prasarak mandal, Red-Shirala

Report Date: 04/Mar/2015

The report shows the various categories of costs incurred by the project on a monthly basis from start to end of the project.

Filter Criteria

From Date: 05/06/2014 To Date: 29/01/2015

Site Name: Springdal public school

Sr.No.	Resources	Unit	Jun 2014	Jul 2014	Aug 2014	Sep 2014 Amount	Oct 2014	Nov 2014	Dec 2014	Jan 2015
	Civil Material Group									
1	Aggregate	Cu.Mt.		82,379.520	33,673.179	28,219.621	31,795.200	0.000	21,859.200	0.000
2	Bar Bender	Day		38,808.000	9,653.684	11,406.316	17,280.000	0.000	11,880.000	0.000
3	Bhisti	Day		17,125.000	5,488.895	5,022.105	6,833.600	1,053.600	4,272.200	1,347.200
4	Binding Wire	KG		1,253.600	321.389	380.211	576.000	0.000	396.000	0.000
5	Blasting	Nos	18,086.957	2,713.043	0.000	0.000	0.000	0.000	0.000	0.000
6	Breaker	Hours	19,825.087	2,973.913	0.000	0.000	0.000	0.000	0.000	0.000
7	Brick (9"x4"x3")	Nos					50,000.000	44,000.000	0.000	50,000.000
8	Carpenter	Day		32,340.000	8,044.737	9,905.263	14,400.000	0.000	9,900.000	0.000
9	Cement	Nos		334,753.500	112,473.076	95,635.684	145,032.500	18,531.800	99,758.000	27,698.500
10	coolies	Day		64,173.333	27,672.952	16,673.684	23,196.000	3,576.000	14,052.000	4,492.200
11	Head Mason	Day		2,827.583	1,210.493	729.474	1,407.700	595.200	811.650	697.900
12	JCB	Hours	8,000.000	1,120.000	16,080.000	0.000	0.000	0.000	0.000	0.000

3.5 Procurement Calendar Report

Fig shows material procurement calendar of construction site. These project Material procurement calendars represent procurement of resources and material required in each month of construction project. It helps us to solve problem of delay in procurement of material and also help to minimize risk of time overrun due to procurement of material.

Report Code: PS-04

Procurement Calender Report

Ninaedevi shikshan prasarak mandal, Red-Shirala

Report Date: 04/Mar/2015

start to end of the project.

Filter Criteria

From Date: 05/06/2014

To Date: 29/01/2015

Site Name: Springdal public school

Sr.No.	Resources	Unit	Quantity Jun 2014	Jul 2014	Aug 2014	Sep 2014	Oct 2014	Nov 2014	Dec 2014	Jan 2015
	Civil Material Group									
1	Aggregate	Cu.Mt.		115.474	42.091	35.275	39.744	0.000	27.324	0.000
2	Bar Bender	Day		129.360	32.179	38.021	57.600	0.000	39.600	0.000
3	Bhisti	Day		85.625	32.344	25.011	34.668	5.268	21.361	6.736
4	Binding Wire	KG		21.560	5.263	6.537	9.600	0.000	6.600	0.000
5	Blasting	Nos	224.087	33.913	0.000	0.000	0.000	0.000	0.000	0.000
6	Breaker	Hours	22.609	3.391	0.000	0.000	0.000	0.000	0.000	0.000
7	Brick (9"x4"x3")	Nos					12,500.000	11,000.000	0.000	12,500.000
8	Carpenter	Day		197.000	26.816	31.684	48.000	0.000	33.000	0.000
9	Cement	Nos		1,676.850	382.623	318.947	467.750	59.780	321.000	89.350

3.6 Interim Profitability Report

Fig shows interim profitability report of construction site. These project interim profitability reports represent Planed Vs Actual Expenditure of each activity of construction project. It helps us to know whether the construction project has cost overrun or under run at specific time.

Interim Profitability Statement

Report Code	Report Date
PM-085	04/Mar/2015

Minaedevi shikshan prasarak mandal, Red-Shirala

Site: Springdale public school Item: All

Amount in Rs

Sr. No	Item Code	Item Description	Unit	Planned			Actual			Planned Profit	Actual Profit	Status
				Qty	Rate	Amount	Qty	Rate	Amount			
1	03.01.1	Cleaning the building / structure site about 15.0 m	Sq.Mtr	1.000	5,000.000000	5,000.000000	1.000	4,000.000000	4,000.000000	(5,000.00)	(4,000.00)	CMPL (100.000000 %)
2	03.01.4	Excavation for foundation by mechanical / manually	Cu.Mtr	20.000	400.000000	8,000.000000	18.000	355.555556	6,400.000000	(8,000.00)	(6,400.00)	CMPL (90.000000 %)
3	03.01.8	Excavation for foundation by mechanical / manual in hard rock by chiseling	Cu.Mtr	52.000	750.000000	39,000.000000	49.000	712.244898	34,900.000000	(39,000.00)	(34,900.00)	CMPL (94.230769 %)
4	03.03.10	Providing and laying in situ, cement concrete M-10	Cu.Mtr	61.000	4,018.100000	245,104.100000	57.860	3,990.294853	230,878.466000	(245,104.100000)	(230,878.466000)	CMPL (94.852459 %)
5	03.04.12	Providing and laying in situ, cement concrete M-20	Cu.Mtr	247.900	12,728.540000	3,147,767.942000	241.270	12,721.487602	3,069,313.313800	(3,147,767.942000)	(3,069,313.313800)	CMPL (97.341866 %)
6	03.05.32	Providing wasted rubble masonry out trap stones in cement mortar 1:8	Cu.Mtr	44.000	2,812.700000	123,758.800000	42.590	2,812.700000	119,230.353000	(123,758.800000)	(119,230.353000)	CMPL (96.340909 %)
7	03.07.8	Filling in plinth and floors with approved hard excavated materials in 15 cm to 20 cm	Cu.Mtr	430.000	0.000000	0.000000	413.000	140.000000	57,862.000000	0.000000	(57,862.00)	CMPL (96.116279 %)
8	04.03.34	Providing Exposed 230 mm thk brick cavity wall	Cu.Mtr	72.000	3,808.400000	274,204.800000	63.850	3,808.400000	243,166.340000	(243,166.340000)	(243,166.340000)	WIP (88.680556%)
9	04.04.43	Providing internal cement plaster 20mm thick in two coats in cement mortar 1:4	Sq.Mtr	718.000	129.760000	93,287.440000	465.000	129.760000	60,338.400000	(93,287.44)	0.000000	NTSD (0 %)
			Total			3,936,133.082000			3,826,088.872800	3,905,094.622000	3,765,750.472800	

IVCONCLUSION

- A conventional case study represents the actual cost required to complete the construction activity at interim stage is 1 lack 70 thousand less than planed cost for these activity with the help of Enterprise Resource Planning system.
- The material management played very important role, In this case study the material was procured with the help of per month procurement calendar reports due to this construction activity completed within duration.

V.ACKNOWLEDGEMENTS

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REFERENCES

1. BooYoung Chung, Mirosław J. Skibniewski and Young HoonKwak, (2009), “Developing ERP Systems Success Model for the Construction Industry”, ASCE, 0733-9364, 135:3(207).
2. Jonathan Jingsheng and Daniel W. Halpin, (2003), “Enterprise Resource Planning for Construction Business Management”, ASCE, 0733-9364, 129:4(446)

3. Mirosław J. Skibniewski and SaumyenduGhosh, (2009), "Determination of Key Performance Indicators with Enterprise Resource Planning Systems in Engineering Construction Firms", ASCE, 0733-9364, 135:10(965).
4. Syed M. Ahmed; Irtishad Ahmad; Selman Azhar; and SuneethaMallikarjuna, (2003),"Implementation of Enterprise Resource Planning (ERP) Systems in the Construction Industry", ASCE, 978-0-7844-0671-7.
5. Dr.Almahdi M. S. Ibrahim "WHAT ORGANISATIONS SHOULD KNOW ABOUT ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM" European, Mediterranean & Middle Eastern Conference on Information Systems 2010.

WIRELESS EEG

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ABSTRACT

Electroencephalogram signals commonly known as EEG is a representative signal containing information about the condition of the brain. The device used to measure these signals is restricted to one room. This project aims to increase the distance and make the EEG accessible within a building making patient monitoring comfortable for doctor.Also this project deals with a comparative study of the PSD achieved from normal, epileptic EEG signals.Currently analysis of electroencephalogram (EEG) remains a challenge owing to limited understanding of the signal origin which leads to the complication of developing evaluation techniques. We are using the VB software in our PC for the user interface with the system.

Keywords: Artifacts, Distance, EEG, RF, Wireless EEG

I.INTRODUCTION

The conventional wired EEG systems are limited to distance, are large and stationary that require the patient to be tethered to the system via a wired connection. Measurement of EEG is simple but patient have to wait till the doctor arrives at the room, to the patient. Also the wired transmissions always cause inconvenience in mobilization.

The methods in examining brain diseases are improving continuously in recent years. Due to the advantages of non-invasive measurement and the capability of long term monitoring of the EEG signal, the electroencephalograph machine plays an important role in brain examination and study.Especially, in the diagnosis of brain disease such as epilepsy, sleeping disorder and abnormal behavior, this machine is used most commonly.

The approach is to make the EEG compact, portable and more accurate. The main purpose is to increase the distance through which data travels from patient to doctor. Use of wireless technology will help to make the system portable and reach to the end easily.

II BLOCK DIAGRAM

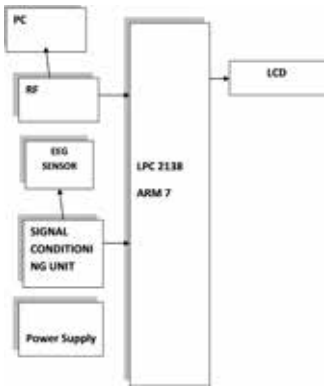

Fig 1. Block Diagram of Wireless EEG

III. SYSTEM DESCRIPTION

3.1 Arm 7

It is a versatile processor designed for mobile devices and other low power electronics. This processor architecture is capable of up to 130 MIPS on a typical 0.13 µm process. The ARM7TDMI processor core implements ARM architecture v4T. The processor supports both 32-bit and 16-bit instructions via the ARM and Thumb instruction sets.ARM series is a series of low-cost, power-efficient, 32-bit microprocessors. Theseprovide the maximum performance amount and place a lower importance on minimizing power consumption and cost. Another major distinguishing feature of a microprocessor is that the chip itself consists only of a processing unit. The microprocessor must be programmed to communicate with peripherals, such as analog and digital I/O, external to the chip.

3.2 Signal Conditioning

Since the scalp EEG signal is very weak, typically with an amplitude in range of 10~100uV, thereby requiring conditioning prior to any signal processing. Furthermore, the human skin typically provides source impedance on the order of 1~5Mohm. To acquire the signal effectively,the amplifier must match or have greater input impedancethan the source impedance.

3.3 Transmission Module

Transmission module reduces the need of connecting wires.This project uses RF module as a wireless medium to increase the transmission distance. Transmission module makes the conventional EEG more compact and portable. RF will be fitted both in the transmission section as well as receiver section. The recorded readings will travel from signal conditioning circuit from the transmitter to the RF module of the receiver and to the PC.

3.4 PC

The PC and RF receiver can be interfaced with the help of the data cable DKU-50.We are using the VB software in our PC for the user interface with the system. With the help of this VB software any user can easily make the use of the system.This VB software provides the notice typing and editing facility. Also we can copy the same content as received through mobile in the editing window and call it as a notice.Hence the PC/VB software provides the typing, editing and formatting options to the user.

IV. MATHEMATICAL MODEL

The Burg’s method for AR spectral estimation is based on minimizing the forward and backward prediction errors at the same time fulfilling the Levinson-Durbin recursion. On the contrary to other AR estimation techniques, the Burg’s method refrains from calculating the autocorrelation function but estimates the reflection coefficients directly. The primary advantages of the Burg’s method are resolving closely spaced sinusoids in signals with low noise levels, and estimating short data records, in which case the AR power spectral density estimates are very close to the true values. In addition, the Burg’s method ensures a stable AR model and is computationally efficient. The accuracy of the Burg’s method is lower for high-order models, long data records, and high signal-to-noise ratios (which can cause line splitting, or the generation of extraneous peaks in the spectrum estimate).

The spectral density estimate computed by the Burg's method is also susceptible to frequency shifts (relative to the true frequency) resulting from the initial phase of noisy sinusoidal signals. This effect is magnified when analyzing short data sequences. Burg's method is capable of resolving close spaced sinusoids in signal with low noise levels. Hence this method is selected to analyze EEG in this project.

$$P_{xx}^{BU}(f) = \frac{\hat{E}_p}{\left|1 + \sum_{k=1}^{p} \hat{a}_p(k)\, e^{-j2\pi fk}\right|^2} \qquad (1)$$

$\hat{a}_p(k)$ = estimates of the AR parameters obtained from Levinson-Durbin recursion

$\hat{E}_p$ = reflection coefficients in an equivalent lattice structure (chosen to attain total least square error)

V. CONCLUSION

The designing of wireless EEG recording system is studied in this paper. The device is compact and portable using which remote monitoring can be possible. Also the system is more efficient than conventional EEG and easy to use.

This can be used for Neurological defect estimation, determination of the mental state of an individual, in video gaming and to control various mobile apps.

The wireless transmission mechanism eliminates wire-line connections. Also, the signal filtering and digitization in the system reduce the possible noise interference. In contrast with the current EEG recording systems, such improvements make this EEG signal measuring system more applicable to studying on non-consecutive brain diseases. The primary improvements that this design exemplifies are its portability and adaptability. In addition to this Wireless EEG will allow the remote observation of relevant EEG data. The adaptability of the system will allow a variety of end application users.

REFERENCES

[1] "Design and implementation of wireless multi-channel EEG recording system and study of EEG clustering method" byRobert Lin, Ren-gueyLee,Chwan-Lu Tseng, Yan Fa Wu, Joe-Air JianBiomedical Engineering Applications ,Basis & Communications.

[2] A low-power, wireless, 8-channel EEG monitoring headset by Lindsay Brown, Jef van de Molengraft, RefetFiratYazicioglu, Tom Torfs, JulienPenders, Chris Van Hoof In 32nd Annual International Conference of the IEEE EMB Buenos Aires, Argentina, Publication Year- 2010 , Page(s)4197-4200, ISSN 1557-170X

[3] Design of a Wireless EEG System for Point-of-Care Applications by WenyanJia, Yicheng Bai1, Mingui Sun, In 2013 39th Annual Northeast Bioengineering Conference Publication Year-2013, Page(s)-78-79, ISSN-2160-7001

[4] Bluetooth Enabled Electroencephalograph (EEG) Platform by Joseph A. Lovelace, Tyler S. Witt, and Fred R. Beyette, Jr.In Circuits and systems (MWSCAS), 2013 IEEE 56th International Midwest Symposium Publication Year- 2013, Page(s)-1172-1175, ISSN- 1548-3746

[5] The Implementation of a Wireless Electroencephalogram Information System using WLAN byHaifeng Chen and Jungtae Lee In IJCSNS International Journal of Computer Science and Network Security VOL.8 No.2, Publication Year-February 2008

[6] A Wearable UHF RFID-Based EEG System by ArtemDementyev, Joshua R. Smith In IEEE RFID 2013 Technical Program University of Washington (US)

[7] Remote monitoring of EEG signals through wireless sensor networks by AnkitBhutani, Zachary McGarvey, John Frye, Jonathan Finamore Daniel F. Pontillo, In Multi-Disciplinary Engineering Design Conference, Kate Gleason College of Engineering, Rochester Institute of Technology, New York

[8] Biomedical instrumentation and measurements-Leslie Cromwell

[9] Handbook of biomedical instrumentation-R.S.Khandpur

[10] Application and design of medical instruments-John G. Webster

BIOGRAPHICAL NOTES

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A SURVEY ON RELABELLING OF WRONGLY ANNOTATED FACIAL IMAGES

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ABSTRACT

Face annotation related to face detection and recognition. Automatic Image Tagging seeks to assign relevant words to images that describe the actual content found in the images without intermediate manual labeling. Recently researches interests in labeling with appropriate name in place of wrongly labeled facial images on the internet to resolve research challenge in computer vision and image understanding. This paper provides various techniques or methods that are used to annotating facial images.

Keywords: Content-Based Image Retrieval, Face Annotation, Search Based Face Annotation, Weak Label, Web Facial Images

I. INTRODUCTION

Day by day the digital media devices are increasing so the different social media tools used for sharing photos. The large number of human facial images shared over the different social real world application some of this images are tagged properly but many of images are not tagged properly so the facial annotation are came. The model base annotation has more limitations i.e. it is more time consuming and more costly to collect large amount of human labeled training facial image. It is more difficult to generalize the models when new persons are added, in which retraining process is required and last the annotation performance is become poor when the number of persons is very more. To address the challenges “Auto face annotation” is important technique which automatically gives name of relevant person[1]. This technique is more beneficial to different real world application for (e.g. face book) which annotates photos uploaded by the users for managing online album and searches the photos. Recently search base annotation are used for facial image annotation by mining the World Wide Web (WWW), where large number of weakly labeled facial Images are freely available. The search-based face annotation paradigm aims to tackle the automated face annotation task by exploiting content-based image retrieval (CBIR) techniques [2], [3] in mining number of weakly labeled facial images on the web. The main objective of search-based face annotation is to assign correct name labels to a given query facial image.

II. RELATED WORKS

In many real-world applications, the data is naturally multi-model, in the sense that they are represented by multiple sets of features. Different studies are perform on face annotation in mining weakly labeled facial

images which are present over internet in this human name are treated as input query and aim is to refine the text-based search results by achieving consist facial Images.

2.1 Content Based Image Retrieval

Hui Wang [4] specified that initially image retrieval researches are moving from keyword to low level feature and to semantic feature. Unlike keywords-based system, visual features for content based system are extracted from the image itself. All images undergo the low level feature extraction process before being added to the image database. This paper attempts to discuss the evolution of the retrieval approaches focusing on development, challenges and future direction of the image retrieval. The explosive growth of image data leads to the need of research and development of Image Retrieval. Drive towards semantic features is due to the problem of the keywords which can be very subjective and time consuming while low level features cannot always describe high level concepts in the users' mind. Hence, introducing an interpretation inconsistency between image descriptors and high level semantics that known as the semantic gap. This paper also discusses the semantic gap issues, user query mechanisms as well as common ways used to bridge the gap in image retrieval. Zhu and Liu[5] introduce a novel approach for automatic face annotation by a semi-supervised learning model in CBIR. Various steps in this approach: Candidate annotations are first obtained by progressive relevance model. Then apply ranking operation for data retrieval and apply Final image annotation.

2.2 Semantic Based Image Retrieval

S.Gao, D.H.Wang and C.H.Lee [6] propose a new framework for automatic image annotation through multi-topic text categorization. Given a test image, it is first converted into a text document using a visual codebook learnt from a collection of training images. Latent semantic analysis is then performed on the tokenized document to extract a feature vector based on a visual lexicon with its vocabulary items defined as either a codeword or a co-occurrence of multiple code words. The high-dimension feature vector is finally compared with a set of topic models, one for each concept to be annotated, to decide on the top concepts related to the test image. These topic classifiers are discriminatively trained from images with multiple associations, including spatial, syntactic, or semantic relationship, between images and concepts.

2.3 Clustering Algorithm with possibility Model

Berg et al.[7] presents the combination of a possibility model with a clustering algorithm for image annotation. This helps to find the relationship between the facial image and the captions for the images and detect names in the document. In this work, first take large collection of news images and captions as semi-supervised input and produce fully supervised dataset of faces labeled with names. Face detector is used to identify potential faces and named entity recognizer to identify names. Use generative model for face annotation. Semantic gap problem is minimized in this method. This method works on a particular data set.

2.4 Graph Based Approach

Ozkan and Duygulu [8] proposed a graph based model for face annotation. By finding the similar subset of possible set of faces with query person name is the objective. Implementation is based on SIFT descriptors. These methods ignore some set of information. First step is Integration on names and faces and then making a graph based on the similarity of faces. Final step is to find densest component and extract group of faces

corresponding to the person. IP points are to be retrieved with the help of geometrical and unique match constraints. Guillemin et al [9] introduced a novel graph based approach. It solves both single person retrieval and multi person retrieval problem. Propose lower level methods for constructing graphs. Made a comparative study between generative and graph based model. Steps : Document based densest component preparation by greedy based algorithm, Graph construction, facial feature mining based on Euclidean distance concept and finally assignment of names with the help of minimum cost matching algorithm. Precision increase about 44% but worked on certain assumptions. We combine an initial text-based step that restricts the name assigned to a face to the set of names appearing in the caption, with a second step that analyzes visual features of faces. By searching for groups of highly similar faces that can be associated with a name, the results of purely text-based search can be greatly ameliorated. We improve a recent graph-based approach, in which nodes correspond to faces and edges connect highly similar faces. We introduce constraints when optimizing the objective function, and propose improvements in the low-level methods used to construct the graphs. Furthermore, we generalize the graph-based approach to face naming in the full data set. In this multi-person naming case the optimization quickly becomes computationally demanding, and we present an important speed-up using graph-flows to compute the optimal name assignments in documents. Generative models have previously been proposed to solve the multi-person naming task. We compare the generative and graph-based methods in both scenarios, and find significantly better performance using the graph-based methods in both cases.

2.5 Query Expansion

T. Mensink and J.J. Verbeek [10],Z.Wu et.al[11] using ideas from query expansion the performance of name-based scheme can be further improved. In this paper they are interested to finding images of people on the web and more clearly labeled the new images. The text base initial results are not perfect. The performances are depending on the assumptions.

2.6 Retrieval Based Face Annotation

D. Wang, S.C.H. Hoi, Y. He. And J. Zhu [12] the WLRLCC algorithm is focused on learning more features for the top retrieved facial images for each query. By weak label regularized local coordinate coding. Retrieval based face annotation is used in mining massive web facial images for automatic face annotation .there are two challenges first is how effectively retrieve most of similar facial images. Second is how to effectively perform annotation. They proposed weak label regularised local coordinate coding (WLRLCC) technique. They also proposed the optimization algorithm i.e.WLRLCC algorithm This algorithm boosts the performance of the retrieval based face annotation approach on a large scale web facial image D. Wang, S.C.H. Hoi, and Y. He et al. [13] this proposed system investigated a unifying learning scheme by combining both transductive and inductive learning technique to mine web facial images for face annotation. They proposed Weak label Laplacian support vector machine (WL-LapSVM) algorithm by adopting WLRLCC algorithm

2.7 Search Based Face Annotation

Dayong Wang, Steven C.H. Hoi et al. [14] propose an effective unsupervised label refinement for refining the web facial images. For improving the performance they also propose optimization algorithm to solve large-scale learning effectively i.e. clustering based approximation the propose system improve the performance of search based face annotation scheme. The work are different form all previous work by two things. To solve general

content based face annotation problem using search based where face image as query image. They used unsupervised label refinement algorithm which enhanced new label matrix. This work also related recent work of the WLRLCC method [12].

III. APPLICATIONS

Face annotation finds its application in the field of:

1) Face annotation at macro scale and micro scale
2) Wild landmark face annotation
3) Online photo album management

IV.CONCLUSION

This paper presents an extensive survey on face annotation techniques for web facial images. Currently, many new approaches are proposed in the field of Auto Face Annotation. Many research issues have been highlighted and direction for future work has been suggested. Many open issues have been highlighted by the researchers such as dealing with auto face annotation.

V. ACKNOWLEDGMENT

We would like to thank various technological experts who researches about data mining and improve the result by implementing new methods. We would also like to thank Google for providing details on different issues addressing the challenges of web multimedia object classification tasks and about other related techniques.

REFERENCES

[1] M. Zhao, J. Yagnik, H. Adam, and D. Bau, *"Large Scale Learning and Recognition of Faces in Web Videos,"* Proc. IEEE Eighth Int'l Conf. Automatic Face and Gesture Recognition (FG), pp. 1-7, 2008.

[2] A.W.M. Smeulders, M. Worring, S. Santini, A. Gupta, and R. Jain,"*Content-Based Image Retrieval at the End of the Early Years,"*IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 22, no. 12,pp. 1349-1380, Dec. 2000.

[3] T.L. Berg, A.C. Berg, J. Edwards, M. Maire, R. White, Y.W. Teh, E.G. Learned-Miller, and D.A. Forsyth, *"Names and Faces in the News,"* Proc. IEEE CS Conf. Computer Vision and Pattern Recognition (CVPR), pp. 848-854, 2004.

[4]. Hui Hui Wang,Dzulkifli Mohammad, N.A.Ismali, *"Approaches, Challenges and Future Direction of Image retreival"*Journal of Computing,Volume 2,Issue 6,June 2010,ISSN 2151-9617.

[5] S.C.H. Hoi, R. Jin, J. Zhu, and M.R. Lyu, *"Semi-Supervised SVM Batch Mode Active Learning with Applications to Image Retrieval,"* ACM Trans. Information Systems, vol. 27, pp. 1-29, 2009.

[6] S.Gao, D.H.Wang and C.H.Lee," *Automatic face annotation through multi topic text categorization"*, Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing, volume 2,May 2006.

[7] T.L. Berg, A.C. Berg, J. Edwards, and D. Forsyth, *"Who's in the Picture,"* Proc. Neural Information Processing Systems Conf.(NIPS),2005.

[8] D. Ozkan and P. Duygulu, *"A Graph Based Approach for Naming Faces in News Photos,"* Proc. IEEE CS Conf. Computer.

[9] M. Guillaumin, T. Mensink, J.Verbeek, and C. Schmid, "*Face Recognition from Caption-Based Supervision*," Int'l J. Computer Vision, vol. 96, pp. 64-82, 2011.

[10] T. Mensink and J.J. Verbeek, "*Improving People Search Using Query Expansions*," Proc. 10th European Conf. Computer Vision (ECCV), vol. 2, pp. 86-99, 2008.

[11] Z. Wu, Q. Ke, J. Sun, and H.-Y Shum, "*Scalable Face Image Retrieval with Identity-Based Quantization and Multi-Reference Re-Ranking*," Proc. IEEE Conf. Computer Vision and Pattern Recognition (CVPR), pp. 3469-3476, 2010.

[12] D. Wang, S.C.H. Hoi, Y. He, and J. Zhu, "*Retrieval-Based Face Annotation by Weak Label Regularized Local Coordinate Coding*," Proc. 19th ACM Int'l Conf. Multimedia (Multimedia), pp. 353-362, 2011

[13] D. Wang, S.C.H. Hoi, and Y. He, "*A Unified Learning Framework for Auto Face Annotation by MiningWeb Facial Images*," Proc. 21st ACM Int'l Conf. Information and Knowledge Management (CIKM), pp. 1392-1401, 2012.

[14] Dayong Wang, Steven C.H. Hoi, Ying He, and Jianke Zhu, "*Mining Weakly Labeled Web Facial Images for Search-Based Face Annotation*" IEEE Transactions on Knowledge and Data Engineering, vol. 26, no. 1, January 2014.

CELLULAR CONCRETE WALL PANEL AN ALTERNATIVE TO WALLING SYSTEM

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ABSTRACT

In this paper method of prefabricated wall panel with the use of cellular lightweight concrete and bamboo is described. This is prefabricated building methodology for low cost housing and the economical advantages achieved by its adoption. In a building wall is most important component, which can be analyzed, based on the need thus, it improving speed of construction and reduces the construction cost. Cellular lightweight concrete wall panel consist bamboo as reinforcement. At all four side of panel grooves are provided for interlocking and it reduces cost of mortar. Prefabricated panel assured a higher level of quality assurance.

Key Words: CLC Technology, Cellular Lightweight Concrete, Prefabrication, Bamboo.

I. INTRODUCTION

1.1 Cellular Lightweight Concrete

Cellular lightweight concrete is nothing but concrete which is mixture of foam, cement, water and fly ash. This technology is useful for the developing the residential and other non-commercial constructions or buildings. Foam concrete and bamboo can be used for cast in place construction as well as precast construction. Cement based units such as panels can be prefabricated, and this contains a higher level of quality assurance for the constructed facilities.

1.2 Benefits

There are number of benefits of LCM. These include:

1. Reduces the dead weight of a structure from 1/3rd to ½ the weight of normal concrete.
2. Can be manufactured to precise specifications of strength and density.
3. Can be nailed, planed, drilled and sawed.
4. Provides excellent heat and sound insulation.
5. Can be applied with all traditional surface finishes: paint, tiles, bituminous membranes, Carpets etc.
6. oisture/water resistant and fire resistant.

1.3 Bamboo

Bamboo is giant grass, not a tree. Bamboo culms are a cylindrical shell divided by solid transversal diaphragms at nodes and have some intriguing properties such as high strength in the direction parallel to the fibbers, which run longitudinally along the length of the Culm, and low strength in a direction perpendicular to the fibbers. The

density of fibbers in cross-section of a bamboo shell varies with thickness as well as height. Fiber distribution is more uniform at the base than at the top or the middle. This is because bamboo is subjected to maximum bending stress due to wind at the top portion of the Culm.

Bamboo is a natural Functionally Graded Material (FGM). It is a composite with hierarchical structure. The strength of bamboo is greater than most of the timber products.

The mechanical properties vary with height and age of the bamboo Culm. Research findings indicate that the strength of bamboo increases with age. The optimum strength value occurs between 2.5 and 4 years. The strength decreases at a later age. The function of the nodes is to prevent buckling and they play a role of axial crack arresters.

Prefabricated structure means a structure which is fabricated in workshop and then installed on site. In this the method measurements are directly taken from the site. Then required component are manufacture in the workshop and then these components are directly placed on the site.

Low cost means the cost is minimizing by the use of appropriate alternative material or methodology which are same in practices.

II. MATERIALS

2.1 Cement

In the foam concrete cement is used. Portland cement of 43 grade confirming to IS 12269:1987 is used in this study.

2.2 Fly ash

Fly ash, the bye - product in thermal power plants. Fly ash conforming to IS 3812 (part-1).

2.3 Foaming agent

For making foam, air entering agent is used in the proportion of 30 ml per litter water.

III. PANEL DESIGN

3.1. Introduction

This cellular light weight concrete wall panel consist bamboo as reinforcement and it covers with the foam concrete. For designing new wall panel following following points are taken in to consideration.

3.2. Simplicity of Design

The design made is moreover quit simple to understand. This interlocking pattern so provided that it locks the panel horizontal as well as vertical. The side grooves are made deep so as to provide good interlocking.

3.3 Convenience in use

The main purpose or aim of developing interlocking panel is it’s easy to use. i.e. easy to placing and lying. The cement paste is applied to the wall with the help of brush on the bottom and side of wall.

3.4 Eco-friendly

The new designed wall panel has combined advantages of bamboo and cellular lightweight concrete as both materials are eco-friendly. The wall built in CLC wall panel would not require plaster it saves natural sand.

3.5 Details of New Designed Wall

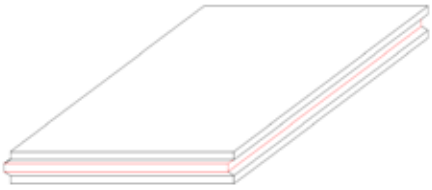

Fig. 1 Designed Wall Panel

This fig.3 shows the detail joints pattern of panel. At all four sides there are grooves are provided which helps for interlocking the panel. There are two different sizes of panels i.e. 3'x3'x4" and 3'x4'x4".

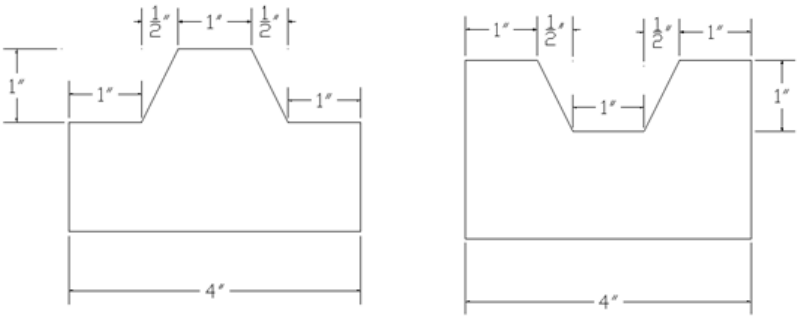

Fig.2 Designed Grooves(Male And Female)

In this fig.4 the details of grooves are shown. The depth of groove is 1 inch (1") and total thickness of panel is 4 inch (4"). There are male-female joints at exactly opposite side of panel. The depth of groove is 1 inch (1").

Fig.3 Bamboo Reinforcement

In above picture the details of bamboo reinforcement are shown. The bamboo strips are arranged in that fashion that the centre to centre distance between these strips is 4 inch (4"). And this strips are bind each other with the help of jute fibre. The size of bamboo strip is 1cm x1cm x90 cm. The arrangement of bamboo strips is shown in above fig.3.

IV. TESTS ON PANEL

Compressive test which is conducted on wall panel. The test results of wall panels compared with standard values confirming IS code.

Particulars	Unit	Value of Panel	Standard values confirming of (Red brick IS 2691-1988, IS 1077-1992)
Avg. Compressive strength IS 3495 part 1-1992	N/mm^2	2.53 – 2.9	3.5 N/mm^2


Fig 4.Compressive Testing

V. CONCLUSION

- Construction of wall with CLC wall panel is faster than normal brick construction.
- Bamboo reinforcement does not affected by foam concrete, it has proper bonding.
- Strength achieved by CLC wall panel is nearly equal to class second brick i.e 2.9 N/mm^2.
- It gives proper appearance which avoid plastering.

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REFRENCES

1. "Light weight/low cost construction methods for developing countries", By Engr. M. Haq and Engr. A. Liew in CBM-CI International Workshop, Karachi, Pakistan.
2. "Low Cost Housing ", By Mr.Raku Taur & Mr.Vidya Devit ACSGE-2009, Oct 25-27, BITS Pilani, India.
3. "Alternative building Material" By K.S.Gagdish.
4. www.buildwithhebel.com.
5. "A Structural Romance with Bamboo",By Inspiration.
6. "Performance Evaluation Of Bamboo Reinforced Concrete Beams",By Leena Khare The University Of Texas At Arlington December 2005.
7. "Research and Development on Bamboo Reinforced Concrete Structure" By Masakazu TERAI & Koichi MINAMI Fukuyama University, Japan 2012
8. " Experimental Investigation of Bamboo Reinforced Concrete Slab" By Dinesh Bhonde1, P. B. Nagarnaik2, D. K. Parbat, U. P. Waghe. 2014
9. "Development of structural lightweight foamed Concrete using polymer foam agent" By K.-J. Byun, H.-W. Song and S.-S. Park.
10. IS 2185 part 3.
11. IS 3495 part 1-1992

DYNAMIC MEMORY MANAGEMENT FOR FPGA-BASED RECONFIGURABLE ARCHITECTURES

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ABSTRACT

In this paper, an adaptive architecture for dynamic management and allocation of on-chip FPGA Block Random Access Memory (BRAM) resources is presented. This facilitates the dynamic sharing of valuable and scarce on-chip memory among several processing elements (PEs), according to their dynamic run-time memory requirements. The proposed scalable BRAM memory management architecture adaptively manages these dynamic memory requirements and balances the buffer memory over several PEs to reduce the total memory required, compared to the worst-case memory footprint for all PEs. The runtime adaptive system allocates BRAM to each PE sufficiently fast enough as required and utilized. The proposed system suited for the dynamic memory footprints of FPGA-based reconfigurable architectures.

Keywords- Block Random Access Memory (BRAM), Dynamic On-chip Memory Management Unit (DOMMU), Dynamic Partial Reconfiguration (DPR), Processing Elements (PEs).

1. INTRODUCTION

With the increasing complexity and performance requirements of real-time embedded systems and the advances in FPGA technology, came the advent of multi-processor architectures and, more recently, of reconfigurable computing. Reconfigurable computing exploits the reconfiguration capabilities of FPGA devices to reconfigure the resources on the FPGA to modify and adapt the functionality of these resources to a specific application or computation that needs to be performed. More recently, dynamic partial reconfiguration (DPR) of FPGAs provided the possibility to specify and constrain certain partitions on an FPGA such that they can execute different tasks at different points in time without consuming additional area.

One main challenge of dynamic reconfigurable computing is the efficient assignment of resources to different partitions, such as the scarce and valuable block random access memory (BRAM), which is often a limiting factor in the design of complex embedded systems. Modules designed to occupy the same physical partition on FPGA can only utilize the on-chip BRAM resources within this partition, which are often not sufficient for memory-intense applications. However, this imposes many physical

design constraints on the FPGA-based implementation, and reduces its potential for flexibility and reconfigurability. Moreover, local on-chip memory is almost always the preferred memory choice for real-time applications, since it is the lowest latency (one clock cycle), fastest, and highest bandwidth memory solution available. Hence, it becomes necessary to design the system using maximum worst-case memory footprint estimates, but such static memory allocation is inefficient and would impose excessive area and power consumption overheads. Dynamic memory management is needed to enhance the gains of reconfigurable computing by meeting the dynamic context dependent memory requirements of embedded reconfigurable applications and to avoid costly static memory allocations at design-time.

In this proposed paper, a Dynamic On-chip Memory Management Unit (DOMMU) which is customized to target the run-time dynamic management of on-chip BRAM to parallel FPGA-based PEs, according to their dynamic runtime memory footprints. DOMMU is designed with flexible user-configurability and scalability. It supports automated BRAM (de)allocation, which ensures that memory management remains transparent to the PEs. Support for sharing BRAM between PEs is also integrated, and can be extended to support additional BRAM configuration types.

II DESIGN GOALS AND FUNCTIONALITY OF DOMMU

For DOMMU to dynamically manage on-chip memory allocation of PEs in reconfigurable computing, it has to meet the following requirements:

2.1 Dynamic Memory (De) AlIocation

Static memory allocation architectures often force PEs to reserve enough BRAM to cover worst-case requirements and to resort to off-chip memory for more. In typical cases, significantly less than worst-case memory is required, and the worst-case buffer can be provided for other PEs while unused. This dynamic sharing and allocation of memory can reduce the total memory required at run-time and improve BRAM utilization. However, dynamic allocation should be guaranteed to occur faster than the first access of the PE to this BRAM to ensure that memory requirements are served with quality.

2.2Transparency

An important design goal is to decouple the internal functionality of DOMMU from the PEs using it. Therefore, DOMMU's interface as well as its behavior and timing performance has to be identical to that of traditional BRAM access. This is achieved by BRAM virtual address mapping which is transparent to the PEs, and maintaining a single clock cycle latency for BRAM access. Moreover, it is necessary to provide all the PEs with access to their allocated BRAM simultaneously via independent dedicated channels without any bandwidth sharing. To provide a PE transparently with memory when it is needed, automated dynamic BRAM (de)allocation is realized which should be enabled or disabled for different PEs independently at run-time, according to the application requirements.

2.3Scalability

DOMMU has to be designed with user-configured parameters to make it reusable and scalable in terms of the number of memory ports, number of BRAMs managed, their types and configurations. Moreover, the required hardware resources have to scale well with increasing numbers of memory ports and managed BRAMs. Additionally, the design has to provide integrated support for shared BRAM for communication between PEs through dual-port BRAM access, and should be extensible to integrate application-specific BRAM type templates.

2.4 Conservation of an optimal point in design space

Since DOMMU replaces static allocation of BRAMs, the design space exploration for the architecture using DOMMU has to consider bandwidth, latency and hardware resources. Independent dedicated channels between PEs and their associated BRAMs assure a latency of one clock cycle for memory accesses. In order not to outweigh the gains of DOMMU, the hardware resources have to be kept minimal. This preserves the point in the design space of the original architecture, while enabling efficient utilization of BRAM resources by dynamic management.

III PROPOSED DESIGN

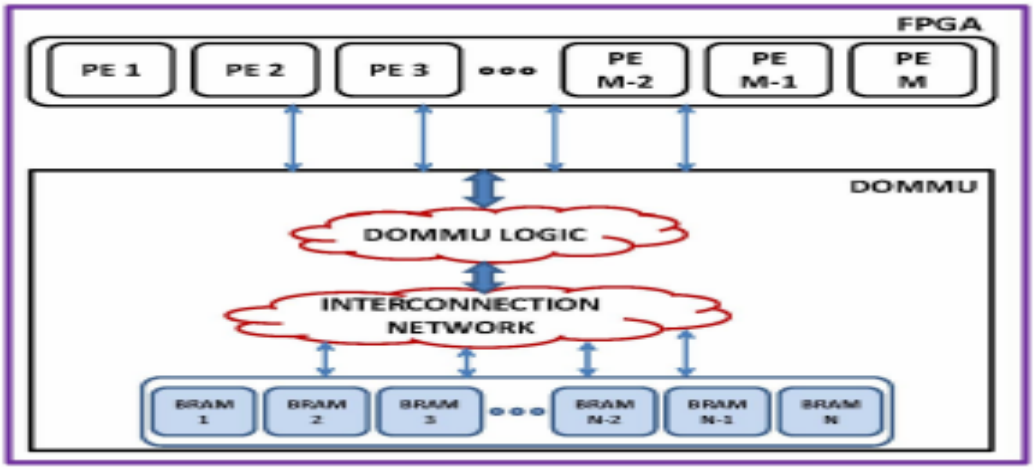

Fig. 1: Illustration of the general system overview of DOMMU

In Fig. 1, each PE is assigned one or more memory ports, by the user at design-time. These memory ports interface with DOMMU for BRAM (de)allocation and access. Memory ports share access to N BRAM elements via an interconnection network as shown in Fig. 1.

To manage this dynamic sharing while keeping the BRAM management transparent to the PEs, it must keep track of the BRAM configurations (width and depth) available "in stock", the BRAM assigned to each PE, the configuration details of this BRAM, how often the BRAM is accessed, and how much more or less BRAM is required by each PE at any point in time. To keep the BRAM management transparent to the PEs, an address mapping scheme ensures correct PE-BRAM association.

IV BRAM ORGANIZATION AND ADDRESS TRANSLATION SCHEME

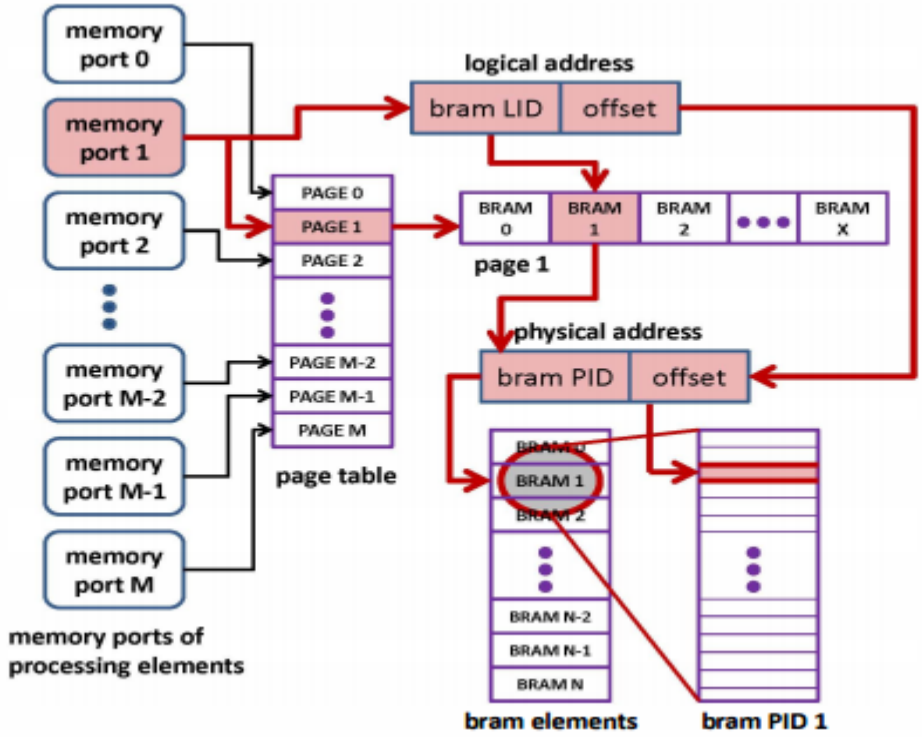

Fig. 2: Logical to physical address translation scheme of DOMMU

The set of BRAM elements shown in Fig. 2 and their physical configurations is the BRAM physical address space, which is realized by initializing a subset of the available BRAM resources on the device in different configurations (width X depth) depending on the design requirements.

To provide transparency to the PEs, the BRAM elements are also arranged in a logical address space, in the form of logical pages. Concepts of logical addressing and paging are borrowed from software memory management of operating systems, and employed similarly in the design of DOMMU. Each memory port is assigned a logical page which can be assigned up to X BRAM elements as shown in Figure 2. The BRAM elements are assigned a Logical Identification (LID) according to their order of assignment within the logical page. These LIDs are assigned at run-time independently of the Physical ID (PIDs) of the BRAM elements managed by DOMMU. Each memory port should "know" its logical page, its word width and depth. Each PE accesses its allocated BRAM by communicating the logical addresses via its memory port(s) to the DOMMU. The logical address is mapped to the physical address (BRAM PID and offset within the BRAM element) to access the correct data word. DOMMU interfaces with the PEs via the memory ports shown in Fig. 2, which introduces a degree of freedom to assign more than one memory port for each PE at design-time.

V ARCHITECTURE OF DOMMU

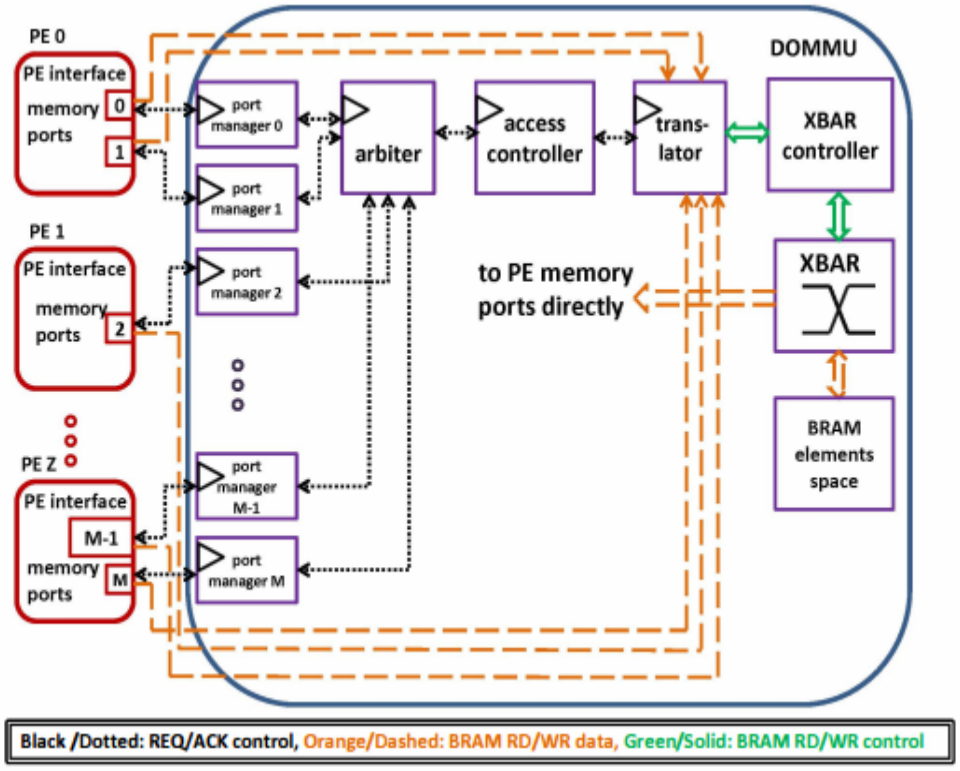

Fig. 3: Block diagram of DOMMU architecture

A detailed block diagram of DOMMU and its components is illustrated in Fig. 3.

5.1 Crossbar (XBAR) switch

The PE ß > BRAM interconnection network required in DOMMU must allow all PEs to be physically able to access all the configured BRAM elements. Bi-directional communication is required to support both read and write access, as well as non-blocking switching to ensure that multiple simultaneous PE ß > BRAM interconnections can always be established. The crossbar switch satisfies these requirements.

The original idea was to dynamically reconfigure the FPGA routing resources to implement the crossbar switch, or implementing the crossbar multiplexers using LUTs and reconfiguring their configuration contents by bit stream manipulation via internal dynamic partial reconfiguration of the corresponding FPGA configuration frames, in order to control the multiplexed output. However, for ease of initial implementation and proof-of-concept, the crossbar is implemented in this work using regular multiplexers. It is realized using two crossbars: a unidirectional (PE à BRAM) crossbar for writing to BRAM, and a bi-directional (PE ß > BRAM) crossbar for reading from BRAM.

5.2 Address translator (BRAT)

The PEs communicate with the BRAMs by logical addresses. Hence, each memory port is assigned a BRAM Address Translator (BRAT), which performs the functionality described in Fig. 2.

When a read or write access request is received through a memory port (orange/dashed path in Fig. 3), BRAT maps this memory port to the associated logical page by queuing an array which maps each port to its corresponding logical page and the allowed access credentials (RD, WR, or RDIWR) of this memory port to this page. If the address is out-of-bounds or involves illegal access, the incoming address is rejected, and the PE is flagged for requesting an illegal access. This feature enforces implicit memory access rights to ensure that each PE can only access its assigned memory.

BRAT also receives incoming control requests from a controller to update its stored arrays for new (de)allocations. ACKINACK message reporting the status and details of each request is returned to the controller. Errors such as a full logical page that cannot be allocated more BRAM or an empty page that cannot be (de)allocated from are handled by returning the corresponding NACK message back to the controller. In general, all incoming control requests are acknowledged with ACKINACK response messages communicated to the controller which indicate the details of status of the request. BRA T also keeps track of the logical page associated with each memory port, and the details of each logical page, such as its access credentials, word width, allowed maximum and actual depth. All details about the BRAM elements assigned to each page are also stored to ensure correct PE-BRAM association, correct logical-to-physical address mapping, and detection of illegal accesses.

5.3 Arbiter- Arbitration using adaptive, dynamic and user configurable priorities was implemented, since this was most suited for dynamic reconfigurable systems. The scheduling priorities associated with these PEs are dynamic and can change at run-time. Every memory port is assigned a priority, which is one of the three levels: low, medium or high, and this priority level is assigned as static or dynamic either at design-time or run-time. A static priority maintains its default value throughout operation, unless it gets re-assigned explicitly by the PE. At every clock cycle, all incoming requests from all memory ports are read and arbitration selects the request to serve. If the waiting time of a request exceeds a userconfigured threshold and if the priority of that port is dynamic, then the corresponding priority is upgraded to the next level. The dynamic priority of a memory port also gets downgraded if its pending request gets served, and its request waiting time is smaller than a user-configured threshold. Configurable and dynamic priority arbitration is suitable for real-time embedded systems in which some running applications are more time critical than others, and scheduling priorities can be adjusted accordingly. Hierarchical arbitration is implemented in which higher priority is always reserved for all allocation requests followed by a lower priority for all (de)allocation requestsbecause allocation requests are more critical to the PE. Within every level of hierarchy, the assigned priorities are examined to schedule the highest priority request to be first served. Latency overhead due to arbitration is unavoidable yet critical, since it is a significant factor in the latency incurred in serving memory allocation requests, which is crucial for scheduling memory requests associated with real-time applications. Arbitration latency has a deterministic maximum which is a function of the number of PE memory ports configured and the maximum number of BRAM elements that can be requested at one time by any memory port. This latency should be considered when scheduling BRAM allocation requests, and is guaranteed, when dynamic automated BRAM allocation is enabled, to remain below the first access of the PE to the

requested BRAM. This overhead can be reduced by minimizing the arbiter logic and dynamism. Moreover, more aggressive pipelining can be attempted in order to serve multiple BRAM requests at one time, although in the current architecture design this would result in inconsistencies in shared data arrays.

5.4 Memory Port Manager

Each PE memory port that interfaces with DOMMU consists of a dedicated BRAM access port and a control port for (de)allocation control requests. The BRAM access port constitutes of two independent ports. Data can be read from or written to one or both of them simultaneously which enables access of single-port BRAM as well as dual-port BRAM for double the bandwidth, and supports inter-PE communication, which is often required in real-time image processing applications. If a PE requires more BRAM bandwidth, additional memory ports can be configured for it. The control port is assigned a memory port manager which matches the requested BRAM type, word width, and number of words to the closest BRAM configuration (width X depth) available. This ensures that the internal BRAM management and configuration details remain transparent to the PE. Since this mapping is embedded and time-critical, and has to occur with minimal impact on timing performance and area overhead, this limits the maximum complexity of the methodology and logic implemented. There is no optimal resolution to this mapping problem due to the different optimization factors that can be considered such as speed, power or area utilization. Themethodology implemented in this work selects the match that minimizes in the number of BRAM elements assigned.

Automated dynamic (de)allocation of BRAM is one of the distinguishing features of DOMMU. This allows additional BRAM to be requested for allocation automatically when the assigned BRAM for the memory port is close to running out. This is indicated when the number of BRAM addresses that get written to, increase beyond a user-configured threshold. If the assigned BRAM remains idle. Dynamic (de)allocation can be enabled or disabled by each port manager at run-time according to the application requirements. This feature is based upon several simplifying assumptions that every incoming read/write access is a valid one, that every incoming write access is associated with a new BRAM address, and that when the number of idle cycles exceeds a certain threshold, that this BRAM is not required by the memory port anymore, and should be (de)allocated.

The currently supported control requests a PE can issue via a memory port to its memory port manager are allocating a new single-port or shared BRAM logical page, (de)allocating a BRAM logical page, or a requested number of words from a logical page, or assigning a new priority to the concerned memory port. The parameters required for each request depend on the request code issued, and each request is acknowledged by a response message which indicates the details of the granted/denied request.

VI CONCLUSION

In this paper, a Dynamic On-chip Memory Management Unit (DOMMU) is proposed to support dynamic BRAM sharing among several processing elements in FPGA-based dynamic reconfigurable architectures, such that the BRAM allocation and utilization adapt to the variable run-time memory footprints of the PEs. A dynamic fine-grain control of BRAM (de)allocation, as opposed to previous static traditional approaches is introduced, as well as a virtual BRAM addressing scheme, and an automated dynamic memory (de)allocation algorithm, thus making DOMMU superior to previous architectures in terms of scalability, flexibility and its usability for reconfigurable computing in particular.

REFERENCES

[1] M. Majer, J. Teich, A.Ahmadinia, and C. Bobda, "The Erlangen slot machine: A dynamically reconfigurable FPGA-based computer," *The Journal of VLSI Signal Processing Systems for Signal, Image, and Video Technology, vol. 47, no.I, pp. 15-31,2007.*

[2] I. Koutras, A.Bartzas, and D. Soudris, "Adaptive dynamic memory allocators by estimating application workloads," in 2012 *International Conference on Embedded Computer Systems (SAMOS).* IEEE, 2012, pp.252-259.

[3] D. Goehringer, L. Meder, M. Hubner, and J. Becker, "Adaptive multi-client network-on-chip memory," in 2011 *International Conference on Reconfigurable Computing and FPGAs (ReConFig)*, 2011, pp. 7-12.

[4] l. Anagnostopoulos, S. Xydis,A. Bartzas, Z. Lu, D. Soudris, and A. Jantsch, "Custom microcoded dynamic memory management for distributed on-chip memory organizations," IEEE *Embedded Systems Letters*, vol. 3, no. 2, pp. 66-69, 2011.

[5] M. ShalanandY. 1. Mooney, "A dynamic memory management unit for embedded real-time system-on-a-chip," *in International Conference on Compilers, Architecture and Synthesis for Embedded Systems*, 2000, vol. 17, no. 19, 2000, pp. 180-186.

[6] C. H. Hoo and A. Kumar, "An area-efficient partially reconfigurable crossbar switch with low reconfiguration delay," in 22nd 2012 *International Conference on Field Programmable Logic and Applications (FPL)*, Aug 2012, pp. 400-406.