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AREST- 2015**

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**Editor-in-Chief**

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Technical Research Organisation India (TROI) is pleased to organize the International Conference on Academic Research in Engineering, Science and Technology. AREST- 2015.

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## **Editorial**

The conference is designed to stimulate the young minds including Research Scholars, Academicians, and Practitioners to contribute their ideas, thoughts and nobility in these two integrated disciplines. Even a fraction of active participation deeply influences the magnanimity of this international event. I must acknowledge your response to this conference. I ought to convey that this conference is only a little step towards knowledge, network and relationship.

The conference is first of its kind and gets granted with lot of blessings. I wish all success to the paper presenters.

I congratulate the participants for getting selected at this conference. I extend heart full thanks to members of faculty from different institutions, research scholars, delegates, TROI Family members, members of the technical and organizing committee. Above all I note the salutation towards the almighty.

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## AN EFFICIENT MIX AND MATCH ARCHITECTURE WITH SINGLE SIGNON FOR INFORMATION DISSEMINATION

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**Abstract - The growth of Internet online services has been very quick in recent years. Each online service requires Internet users to create a new account to use the service. The problem can be seen when each user usually needs more than one service, and consequently, has numerous accounts. These numerous accounts have to be managed in a secure and simple way to be protected against identity theft. Single Sign On (SSO) and Open ID have been used to decrease the complexity of managing numerous accounts required in the Internet identity environment. This project proposes cloud-based single signon model for reliable accessing to cloud computing SaaS application. The proposed method has been analyzed by means of better efficiency and security comparing with existing methods.**

**IndexTerms: AES- Advanced Encryption Standard, SaaS- Software as a Service, PaaS- Platform as a Service, IaaS- Infrastructure as a Service, SSL- Secure Socket Layer, SSO- Single Sign On, PMA- Password Manager Agent, SSOCs- Single Sign On Cloud Server, SSOSA- Single Sign On SaaS Application**

### 1. INTRODUCTION

The use of Internet and new technologies nowadays, for business and for the current users, is already part of everyday life. Any information is available anywhere in the world

at any time. That was not possible few years ago. Nowadays it have arisen a lot of possibilities of access to public and private information like internet speed access or the deployment of mobile dispositive that allow the connection to Internet from almost everywhere. Today a lot of people are consulting their mail online through webmail clients, writing collaborative documents using web browsers, creating virtual albums to upload their photos of the holidays. They are running applications and storing data in servers located in Internet and not in their own computers. Something as simple as enter in a web page is the only thing a user needs to begin to use services that reside on a remote server and lets him share private and confidential information, or using computing cycles of a pile of servers that he will ever see with his own eyes. And every day its being used more this services that are called cloud computer services. That name is given because of the metaphor about Internet, as something than the user see like a cloud and cannot see what's inside.

This services can be offered by free or by paying by demand (pay for consume), can be simply like a function calling (like asking the temperature in some city in the world for include it in a web page) or complex (like the usage of a virtual machine with its own operating system, applications and storage space for running applications).

This means that many users and organizations can avoid install some



applications in their computer or can have more computational power using cloud computer through internet, or they can make their own private cloud to manage it completely, or they can use both options for the moments of high demand of consume.

## 2.LITERATURE REVIEW

Security of federated identity has become an interesting research area in the last few years and been appealed by huge companies like IBM. Security concern in federated environment has been addressed by Huang and Wang in. They proposed an identity federation broker that introduced a trusted third party between SP and the IDP.

According to Freier et al study in [14], there are several different formations of identity management regarding ensuring access control in Cloud Computing environment which is named In-house, IDaaS. The users with In-house identity configuration are able to manage and issue their identity. If identity is configured and issued by outsource company, it is called Identity as a service or IDaaS. IDaaS is divided in to three categories which have been commercially offered in the market. Complete management, pseudonyms implementation, and independently IDaaS implementation are three configuration parts of IDaaS. Furthermore, the wide area of security via security guidance for critical areas of focus in cloud computing has been discussed by cloud security alliance.

Zhang et al in [13] presented the concept of trusted clouds and also discussed the challenges of cloud security and compliance. In this study, the necessities of rusted clouds are argued. Furthermore, four usage models are introduced in order to enable a trusted computing infrastructure.

Fengming in [12] explores the capabilities available to the mobile smartphone platforms to secure such participation, and describes architecture for adding trust management to the exchange of media to and from a smartphone user.

Ghazizadeh et al in [1] suggested a model in order to solve identity theft in the cloud. This model incorporates trusted computing, Federated Identity Management, and OpenID Web SSO. This proposed model is

evaluated through BLP confidential model, security analysing and simulation.

OpenID in comparison with Security Assertion Mark-up Language (SAML) is authentication exchange protocol for identity management in the internet, but SAML is designed for limited or small scale Identity Management, and also OpenID is much easier to be deployed and implemented. SAML's parties are based on trust while the parties in OpenID basically trust on DNS system to find the address of IDP and rely it in any case. Therefore, DNS cache poisoning and DNS hijack are common impersonation attacks in OpenID environment[11].

## 3.SINGLE SIGN ON

Authentication is the process by which a computer system confirms the identity of an individual, usually based on a name and password.

Single sign-on (SSO) is a specialized form of authentication that allows a user to authenticate once in a particular system and thereafter gain access to multiple systems and services. Single sign-on relieves the burden on the user of having to enter authentication information multiple times (e.g., once for every service accessed). In addition, single sign-on facilitates the application of a consistent authentication policy across a domain based on centralized management of authentication.

Numerous single sign-on solutions have been developed by industry and academia. SSO solutions can be organized into two main categories: those that deal with a single set of credentials, and those that deal with multiple sets of credentials. The difference between the two categories is the number of user credentials handled by the SSO solution in a deployment environment. A SSO solution dealing with a single set of credentials only has to handle one type of authentication credential per user; for example, one common authentication mechanism is a username and password, so in SSO all the systems in the domain generally support the same authentication mechanism and accept the same password for an individual user.

#### 4. INTRODUCTION TO PROPOSED MODEL TOOLS

The proposed model was designed by using concepts of agent, version 3.0 of Secure Socket Layer (SSL), Advanced Encryption Standard (AES) model, a middle cloud server, and a middle SaaS application to apply a secure and efficient SSO model for accessing to cloud computing environments.

##### 4.1 Password Manager Agent (PMA)

Password Manager Agent is a client-based agent that is installed on browsers as an extension. The main obligation of PMA is to communicating with the single sign on cloud server for simultaneously sign on various SaaS applications.

##### 4.2 Single Sign On Cloud Server (SSOCS)

Single sign on cloud server is a middle-based cloud server that has two main servers: Password Cloud Server (PCS) and Keys Cloud Server (KCS). Different usernames and passwords are encrypted and stored in PCS and the all keys are stored in KCS.

##### 4.3 Single Sign On SaaS Application (SSOSA)

SSOSA is a cloud-based application that manages usernames and passwords, encrypts them and stores in PCS, stores keys in KCS, decrypts usernames and passwords, connects to various cloud computing environments and SaaS applications, and provides user requests from various applications to the client.

##### 4.4 Secure Socket Layer (SSL)

SSL is used for transferring data from PMA and SSOSA. Moreover, it is used for the communications between SSOSA and various SaaS applications.

##### 4.5 Advanced Encryption Standard (AES)

AES is a private key cryptography algorithm that is used for encryption data by SSOSA and storing them in PCS. In addition keys are stored in KCS. According to the nature of project, AES-192 or AES-256 has been chosen for cryptography processes.

#### 5. PROPOSED ALGORITHM

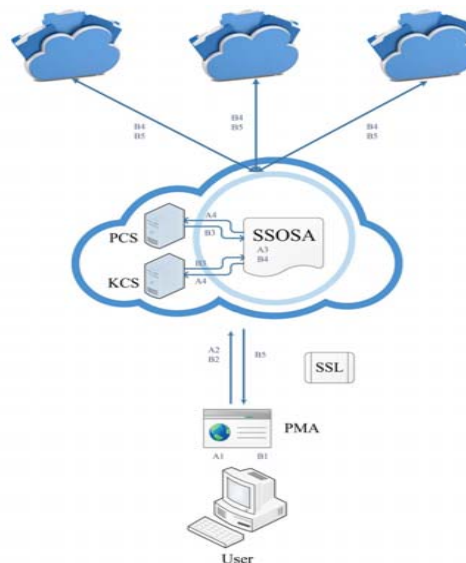


Figure 1: System Overview

The proposed algorithm has been presented in this section according to described tools. Furthermore, Figure. 1 Shows this algorithm in brief.

##### 5.1 Storing Usernames and Passwords

- User installs PMA as an extension in his browser.
- By using PMA and signing on to this extension, user can access to SSOSA for storing his various usernames and passwords.
- SSOSA generates keys according to AES-256 and encrypts given usernames and passwords.
- After the encryption process, encrypted data are stored on PCS and keys are stored on KCS.

##### 5.2 Accessing to Various SaaS Applications

- User accesses to SSOSA by signing on PMA.
- User requests to access on a specific cloud-based SaaS application from SSOSA.
- SSOSA gets encrypted username and password from PCS and related keys from KCS.
- Username and password are decrypted and sent to the requested SaaS application for signing on process.

- After confirmation process, data are transferred from the SaaS application to SSOCS and after that transferred to the user browser.

### 5.3 Specifications of the Proposed Model

#### 5.3.1 Using a Cloud Server for Storing Passwords

In the proposed model, usernames and passwords are stored in a cloud-based server and accessible anytime and anywhere according to cloud computing concepts. Accordingly, the proposed model is more efficient and accessible in comparison with similar client-based password manager and single sign on systems. Furthermore, usernames and passwords are stored encrypted in PCS by one of the most powerful symmetric keys cryptography algorithms (AES-256 or AES-192) for increasing the security and reliability of the model.

#### 5.3.2 Different Cloud Servers for Passwords and Keys

Usernames and passwords are encrypted and stored in PCS and all cryptography keys are stored in a different cloud server. This separation helps to increase the security of passwords according to the power of AES cryptography algorithm. This means, if the encrypted data are lost by possible attacks or unpredictable events, the attacker need  $1.1 \times 10^{17}$  possible combinations for decrypting each password and this amount of combinations needs  $3.31 \times 10^{56}$  years approximately [12]. This amount of time shows that passwords are stored quit safe and after a possible attack, users have enough time to change their passwords without any concerns.

#### 5.3.3 Using SSL during Data Transmission

SSL is the most appropriate solution for providing security in data transmission process [13]. Accordingly, SSL was established in the proposed model in data transmissions between PMA and SSOSA for providing a secure and reliable transmission.

#### 5.3.4 Accessing to SSOSA with Browser Extension

User can access to the single sign on cloud server by log in to an installed extension

in his browser. This extension increases the dependency of the single sign on process to web browser and can use the security and error-handling tools of web browsers without establishing a new stand-alone application.

## 6. PERFORMANCE EVALUATION

The simulation process was done to compare the proposed model with a similar client-based single sign on system. Accordingly, a client-based single sign on prototype was implemented and run in a 2.40 GHz Intel® Core™ i5 CPU and 4.00 GB RAM pc (Com-A). Moreover, a cloud-based SaaS application was simulated in a 3.06 GHz 6-Core Intel® Xeon CPU and 64.00 GB RAM (8×8GB) Mac Pro Server (Com-B) and was connected to Com-A (as PMA) via a wireless network. Furthermore, Microsoft Office 365, Google Docs, Microsoft Outlook, and Amazon have been chosen as target SaaS Applications. The following figure shows the simulation process in details:



Figure. 2: Simulation of the Proposed Model

The process of storing usernames and passwords was simulated as follows:

- Cloud-Based SSO: Sending details from Com-A, encrypting and storing data in Com-B.
- Client-Based SSO: encrypting and storing details in Com-A.

The following table shows the time of storing process in both models according to AES-192 and AES-256 algorithms:

TABLE 1. PERFORMANCE OF THE ALGORITHM

Algorithm	Cloud-Based SSO (ms)	Client-Based SSO (ms)
AES-192	2754	7345
AES-256	3124	9247

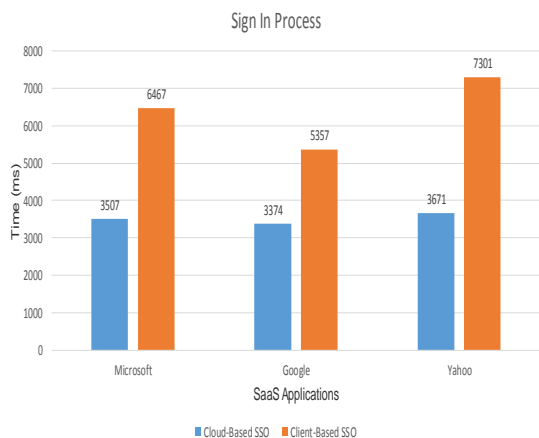


Figure. 3: Sign In Process in Various SaaS Applications

### 6.1 Security Evaluation of the Proposed Algorithm

The theoretical security analysis of the proposed method shows that the algorithm is enough reliable for establishing secure connections between SaaS application service providers and users. The most important advantage of this model is using a cloud-based SaaS application with two separate cloud servers. This separation and encrypting usernames and passwords with AES-256 cryptography algorithm increase the reliability and security of the proposed model for storing details of various user accounts in a cloud server without and concerns. Furthermore, using SSL between PMA and SSOSA establish security during data transmission processes. In addition, using browser extensions as PMA is led to an efficient dependency between PMA and web browsers and lets PMA to use strengths of web browsers in different ways especially in security parts. In overall, the proposed method provides a reliable cloud-based environment for storing important personal details without security concerns.

## 7. CONCLUSION

The proposed model is a cloud-based single-sign-on algorithm as an effective solution to increase the efficiency in cloud-based applications according to the limitations [15] and weaknesses of similar client-based models. The proposed model was designed and described by establishing two cloud servers for storing encrypted account details and cryptography keys. Moreover, a cloud-based SaaS application was designed to connect clients and SaaS service providers. Using AES-256 and SSL in the suggested model improves the security of cloud-based SSO algorithm. In conclusion, the reliability of the proposed model has been assured for storing user’s important data according to specifications of the model.

The future work will involve the development of a prototype of the proposed system for cloud computing and testing it for diverse real-world scenarios. The goal is to prove effectiveness of the proposed privacy and identity management system, as well as its potential to become a standard for privacy and identity management in the Cloud Computing.

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# A FRAME WORK OF ADAPTIVE DECISION BOUNDARY, REPUTATION BASED APPROACH AND DUAL TRUST MODEL FOR HANDLING SECURITY ISSUES IN MANETS.

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## ABSTRACT

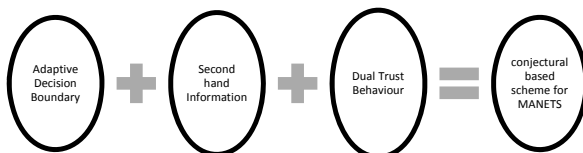
**Mobile ad-hoc network is the spontaneous network which has no fixed infrastructure and the topology of the MANETS keeps changing instantaneously. These kinds of networks are prone to changes and adapts to the changes. The effect of misbehaving and malicious nodes in the route discovery process is adverse. The proposed paper gives the solution to the problems created by the malicious nodes and selfish nodes using the reputation based methods and security in the routing mechanism is based on the dual trust scheme. The classification of the selfish nodes and regular nodes is done using the mathematical model called adaptive decision boundary. Our work provides the extent of noncooperation that a network can allow depending on the current strength of nodes for the given scenario and thus includes selfish nodes in network participation with warning messages.**

## Introduction

For analyzing the security of wireless mobile ad-hoc networks, we need certain parameters [8]. The basic parameters for a secure system are: Authentication Confidentiality, Availability, Integrity, Non-repudiation & Scalability. In mobile ad hoc networks, protecting the network resources from attacks is an important research topic in wireless security. The proposed approach describes a robust and security service scheme for network-layer security solution in ad hoc networks, which preserve both, routing and packet forwarding functionalities without the context of any data forwarding protocol. This approach solves the issue in an efficient manner. The overall idea of this approach is to detect intruder launching attacks and misbehaving links to prevent them from communication network. It is a robust and a very simple idea, which can be implemented and tested in future for more number of attacks, by increasing the number of nodes in the network and routing protocols.

### 1. Adaptive decision boundary model.

In the ad-hoc network, intruders are compromised or cooperated node, which influence network resources ,degrade network performance and drain battery life of genuine nodes. To detect intruders, an approach advised which maintain record of data packet and RREQ and RREP packet at specific node and Xoring of value of forward and receive of packets and analysis the behavior. If the value of Xoring is 0



then node is recognized as intruders otherwise node is normal.

A. Algorithm

Algorithm Int\_Node (node,n)

```
{
DECLARE FWD_packet, RCV_packet
// To keep all possible record for each node in
different cases for each neighbor node of
selected node
Case1:
FWD_packet=0 and RCV_packet=0
Case2:
FWD_packet=1 and RCV_packet=0
Case3:
FWD_packet=0 and RCV_packet=1
Case4:
FWD_packet=1 and RCV_packet=1
//To check the value of XORing of FWD_packet
and RCV_packet to take decisions for malacious
If (FWD_packet XOR RCV_packet==0) then
DISPLAY —Node is normal
ELSE
DISPLAY —Node is malacious
End If
Exit
```

### Reputation based scheme

It relies on building a reputation metric for each node according to its behavioral culture. The effective protocol like Dynamic Source Routing Protocol is used. An observing approach used by most systems in this category is called a watchdog. The watchdog was proposed to detect data packet non forwarding by over-hearing the transmission of the next node. The, entire approach to handle the problem is given in terms of Watchdog mechanism, reputation, second hand information, trust and behavior as follows.

- Observe the action of other nodes – **Watchdog mechanism**
- Develop a perception of other nodes over time – **Reputation**
- Share experiences to facilitate community growth – **Second hand information**
- Predict their future behavior – **Trust**
- Cooperate/Non-cooperate with trustworthy nodes – **Behavior**

### 3.1 Reputation representation

#### □ Probabilistic formulation

Use **beta distribution** to represent reputation of a node.

$$R_{ij} = \text{Beta}(\alpha, \beta) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1} \forall 0 \leq x \leq 1, \alpha \geq 0, \beta \geq 0$$

Reputation of node j from the perspective of node i

#### □ Why beta distribution?

- **Simple** to store: Just characterized by 2 parameters.
- **Intuitive**:  $\alpha$  and  $\beta$  represents magnitude of cooperation and non-cooperation.
- **Efficient**: Easy reputation updates, integration, trust formulation.

#### □ Maintain reputation for just neighboring nodes

Use **locality** – Provides **scalability**

## 2. Dual trust scheme

Most of current trust management models use dual evaluation or zone [0, 1] for evaluation (Yu, Singl, et al., 2004). Dual evaluation is not subjective, but it enables node to get a high trust value by a few successful transactions, which is vulnerable to outside attacks. So our model herein uses zone [0, 1] for evaluation, which enhances the pluralism of trust value and also ensures the continuity of it. We set nodes initial trust value to be 0.5, and after several transactions, the trust value of honest nodes is close to 1 while that of malicious ones will drop to less than 0.5. There are some nodes called strategy nodes. They initially behave well and get high trust value after joining in networks. Afterwards, they start to behave maliciously, reducing QoS or providing dishonest feedback. The most common method to fight against these attacks is to implement punishment mechanism to decrease their trust value. However, some strategy nodes only offer dishonest feedback but without reducing their own QoS. If single trust is employed, the trust value of these nodes will decrease sharply and cannot show their service abilities.

In view of the situation above, we set two trust values, for each node in our model.

One is service trust value (STV), providing the global trust value of the service; the other is request trust value (RTV), providing the global trust value of the evaluation. Both sides evaluate each other and update STV and RTV after each transaction. This dual trust values strategy is more flexible to fight against the attacks. We here set an example to illustrate the execution process of dual trust values in detail, shown in Fig. 2:

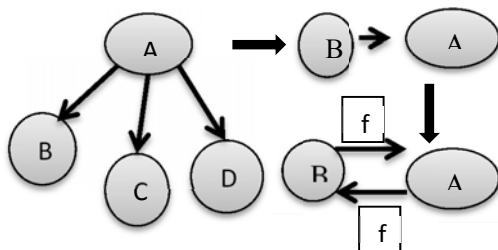


Fig2. Execution process of Dual Trust Values.

1. Supposing that node A has sent out a resource request and node B, C, and D have received it. They start to analyze the request and make response according to their own strategies (The analysis here includes evaluating the RTV of node A, checking whether they have such resource, etc.).
2. Node A will select the node with the highest trust value (for instance, here is node B) in terms of the local trust value (LTV: this trust value is STV stored locally, and it exists if transactions happened between them, otherwise it is set default) and the STV of responding node.
3. After selecting node B, node A will give node B an evaluation 'r' based on the transaction and its own strategies (for example, whether it is a malicious node or whether the response contains malicious information) Meanwhile, node B will give a feedback 'f' to node A as well.
4. Based on the feedback node A gives to node B, node A will calculate and update the STV of node B and save it as LTV as well.
5. Meanwhile, according to the feedback node B gives to node A, node B will calculate and update the RTV of node A.

**5. Expected outcomes**

- (i) Mobility based intrusion detection which overcomes the issues of ambiguous collision.
- (ii) False misbehavior detection by analyzing the identity and behavior of nodes.
- (iii) Partial drops are detected through a central monitoring node.
- (iv) Secure transmission and cooperative attack detection.
- (v) Packet dropping and flooding preemptions removal.
- (vi) Forging attack is timely measured with data analysis module through collector and transmission data storage.

**Advantages:**

- 1) Our proposed work differ from the existing work and by using the Eigen trust and Degree centrality concepts we can have individual trust claims and take routing decisions easily with minimum time.
- 2) Our reputation based security protocol is concerned with the active black hole attack with cryptographic techniques like Digital signature and hashing techniques.
- 3) Avoids the wastage of network resources and increase the network life time.
- 4) The applications like eCommerce: eBay, Email:anti-spam techniques, Personal Reputation: PersonRatings.com, we can provide more security.

**6. Conclusion**

Since mobile ad hoc network is an decentralized network with no fixed infrastructure security issues are the main area of interest. The proposed work gives an elaborative frame work for handling the security issues in the reputation based way. An adaptive decision boundary algorithm is used to classify the selfish nodes and malicious nodes from the regular nodes. The reputation based approach to the nodes uses the Eigen trust and Degree centrality concepts. The dual trust value for the nodes helps the trust evaluation process with different scenario into consideration. A detailed simulation evaluation will be conducted in terms of Routing Packet Overhead, Security Analysis, Mean Time to detect



dropper node, Overall Network Throughput, and Average Latency.

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## PERFORMANCE AND EVALUATION OF SUGAR INDUSTRY EFFLUENT TREATMENT PLANT

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**Abstract**—At present Sugar Industry is one the most polluting industry in the environment. The sugar industry wastewater is characterized by its brown colour, low pH, high temperature, high BOD, high COD, odor problem, total solids, and high percentage of dissolved organic and inorganic matter. So this untreated wastewater will create problem to the environment. The analyzed parameters are pH, COD, BOD, TS, TSS, TDS, OIL and GREASE. Initial concentrations of COD, BOD, TSS, TS, TDS are 5102mg/l, 1988mg/l, 772mg/l, 4530mg/l, 3758mg/l respectively. After treatment of effluent the removal efficiency of COD, BOD, TDS, TSS, TS, OIL and GREASE are 97%, 95%, 69.21%, 87.30%, 72.29%, 64.28% respectively. The low grade potash powder is generated from molasses distillery spent wash. This potash powder is used as fertilizer. It is also a solution for zero water pollution. The powder contains 14.70% of potash.

**Index Terms**—BOD, COD, TSS, efficiency, Sugar ETP

### I. INTRODUCTION

Sugar industry is a seasonal industry working for maximum of 5-6 months in one season. The industry uses sugarcane as their raw

material along with various chemicals added to increase the face value of the final product. During the process a huge amount of water is also used per day and as a result industry generates waste water (effluent) on daily basis [4].

Waste water from sugar industries, if not treated properly, contains significant amount of TDS and TSS. This water may not be useful for crop land irrigation. There are reports which indicate that infiltration rate decreases with increased loading of BOD and TDS & TSS. The high value of TSS can cause decrease in soil porosity due to salt deposition. High TDS value in waste water may also have adverse effect on crops. A TDS of 500-1000 ppm may have detrimental effect on sensitive crops. In view of the above facts, it is quite evident that the sugar industry is a significant contributor to the environmental pollution and has typical problems. Another important factor in studying the pollution effect is that the sugar industry is seasonal industry and the waste flow is mainly during the crushing season. This causes difficulty in employing biological pollutional abatement systems which should otherwise remain very suitable for treating such wastes. Waste water from sugar industries, if not treated properly, contains significant amount of TDS and TSS. This water may not be useful for crop land irrigation. The high value of TSS can cause decrease in soil

porosity due to salt deposition. Due to high concentration of solids in the effluent, the dissolved oxygen available to germinating seeds of plants gets depleted. This results in reduction of energy supply reaching them through anaerobic respiration. This manifests into decreased growth and development of the seedlings. High TDS value in waste water may also have adverse effect on crops. A TDS of 500-1000 ppm may have detrimental effect on sensitive crops. In view of the above facts, it is quite evident that the sugar industry is a significant contributor to the environmental pollution and has typical problems. Another important factor in studying the pollution effect is that the sugar industry is seasonal industry and the waste flow is mainly during the crushing season. This causes difficulty in employing biological pollutional abatement systems which should otherwise remain very suitable for treating such wastes [1].

#### SOURCES OF EFFLUENTS—

The waste water generated from different sub-streams can be classified as follows—

(1) *Mill House*—The effluent consists of water used for cleaning the mill house floor which is liable to be converted by spills and pleased sugar juice (This clearing up operation will prevent growth of bacteria on the juice-covered floor). Water used for cooling of mills also forms part of the waste water from this source. Basically this water contains organic matter like sucrose, bagacillo, oil and grease from the bearings fitted in to the mills.

(2) *Waste Water from Boiling House*—The waste water from boiling house results from leakages through pumps, pipelines and the washings of various section such as evaporators, juice heaters, clarification, pans crystal is action, and centrifugation etc. The cooling water from various pumps also forms part of water.

(3) *Waste Water from Boiler Blow-down*— The water used in boiler contains suspended solids dissolved solids like calcium salts, magnesium salts, sodium salts, fatty salts etc. These salts get concentrated after generation stream from the original water volume. These solids have to

be expelled time to time to save the boiler being covered up by scales.

(4) *Excess Condensate*— The excess condensate does not normally contain any pollutant and is used as boiler feed water and the washing operations. Sometimes it gets contaminated with juice due to entertainment of carryover of solids with the vapors being condensed in that case it goes in to the waste water drain. The treatment requirement in this case is almost negligible and can replace fresh water or let out directly as irrigation water after cooling it to ambient temperature.

(5) *Condenser cooling water*—Condenser cooling water is recirculated again unless it gets contaminated with juice, which is possible due to defective entrainment separators,

Faulty operation beyond the design rate of evaporation etc. if gets contaminated, the water should go into the drain invisibly. This volume of water is also increased by additional condensing of vapour of trained from the boiling juice the pan.

(6) *Soda and Acid Wastes*— The heat exchangers and evaporator are cleaned with caustic soda and hydrochloric acid in order to remove the formation of the deposits of scales on the surface of the tubing. In India, most of the sugar factories let this valuable chemical go into drains. The soda and acid wash contribute considerable amounts of organic and inorganic pollutions and may cause shock loads to waste water treatment once in a fortnight or so.

The present study is carried out in M/s. Ugar Sugar Works Ltd. Its capacity is 20,000 TCD and a distillery of 75KLPD. The total quantity of wastewater generated is 1750 cum/d. The samples are collected from Sugar factory Effluent treatment plant.

## II. MATERIAL AND METHODOLOGY

### A. SAMPLING TECHNIQUE

Water sample will be collected in such a manner that the sample truly represents the water source or the main body of water or wastewater. Sampling is one of the most important and foremost steps in collection of representative wastewater sample from an

effluent treatment plant. The reliability of laboratory analysis and tests depends upon the method of sampling. A factor involved in the proper selection of sampling site depends on the objective of the study. A sample volume between 2 and 3 liters is normally sufficient for a fair complete analysis. The total number of samples will depend upon the objectives of the monitoring program. During the study, the samples were collected in clean polyethylene containers. A total of 3 grab samples were collected at an regular interval of 4 hours in each shift and mixed to give composite sample.

*B. Physical and Chemical methods of analysis for sugar industry wastewater*

The sugar industry wastewater is characterized by its brown colour, low pH, high temperature, high BOD, high COD, odour problem, total solids, and high percentage of dissolved organic and inorganic matter. Some generalized parameters are to be tested to determine the performance and evaluation of sugar industry effluent treatment plant.

*I-Analytical Methods adopted for sugar industry wastewater analysis*

Sl. No	Parameter	Method Used	Experiment Used
1.	pH	Electrometric	Digital pH meter
2.	BOD <sub>5</sub> @ 20 °C	Dilution Method	Volumetric glassware's, BOD Bottles, Incubator
3.	COD	Open reflux method	COD apparatus, Round Bottom Flask
4.	Total Solids	Gravity metric method	Gooch Crucible and electronic Balance, Burner
5.	Total Dissolved Solids	Gravity metric method	Gooch Crucible, Centrifuge machine, Electronic Balance, Burner
6.	Suspended Solids	Gravity metric method	Gooch crucible, Electronic Balance, Burner, Centrifuge Machine

**Performance and Evaluation**

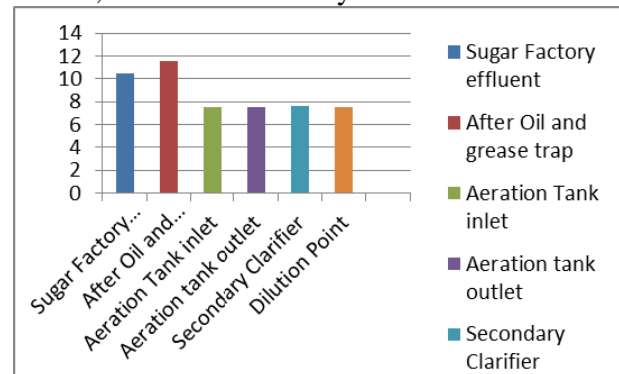
In order to check the efficiency of the sugar industry effluent treatment plant to examine the working of each unit and to determine how much pollution load has been removed and hence performance evaluation has been carried out.

*II-Typical composition of Sugar Industry wastewater*

Sl. No	Parameter	Average Values	Effluent Standard for discharge on inland Surface Water	Effluent Standard for discharge on land for irrigation
1.	pH	10.69	5.5-9.0	5.5-9
2.	COD	5102(mg/L)	250	-
3.	BOD	1988(mg/L)	30	100
4.	TS	4530(mg/L)	-	-
5.	TDS	3758(mg/L)	-	-
6.	TSS	772(mg/L)	100	200
7.	Oil And Grease	14	10	10

**A. pH**

Generally sugar industry effluent is acidic in nature. The lime is added to the effluent to increase pH value so effluent become alkaline in nature , and then it will easy to treat.



**B. Screen and Oil & grease**

Screening is the first unit operation in ETP which removes the solids from the wastewater. Where as Oil & Grease trap removes the floating substances like grease, oil, fats etc. from sugar industry wastewater. And also reduces the COD and BOD values. Removal

efficiency of COD and BOD are 37.33% and 23.13% respectively.

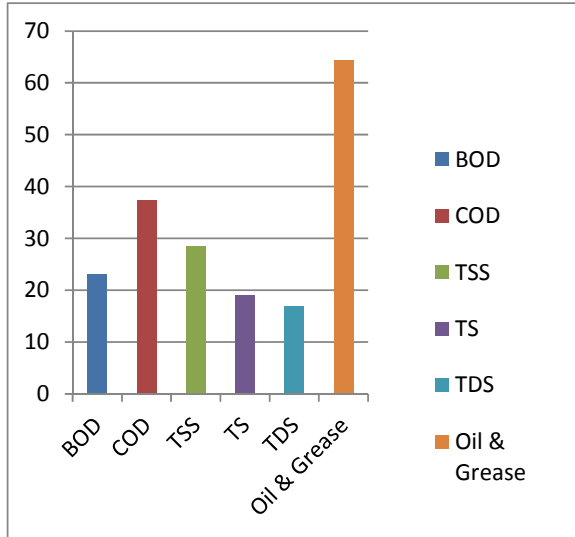


Fig.1.1: Removal Efficiency of Screen And Oil and grease trap

C. Aeration tank

The primary treated effluent would be collected in the aeration Tank for degradation of organic matter with the help of micro-organism, especially grown and maintained in the Aeration Tank in conjugation with oxygen transferred through Diffused Aeration System. Here reduction of BOD is 84.02% and which improves the purification of wastewater.

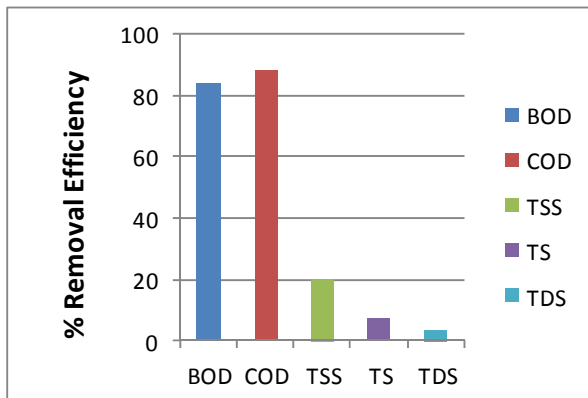


Fig.1.2: Removal Efficiency of Aeration Tank

C.Secondary clarifier

The function of secondary clarifier is to produce clarified effluent. Half of suspended solids will get removed in this clarification process. So removal efficiency of suspended solids is 25.94% and total solids removal efficiency is 27.29 %.

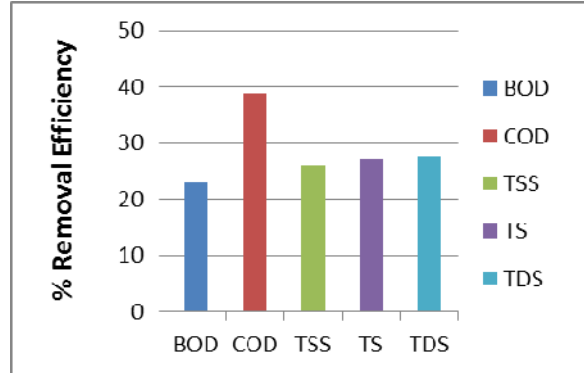


Fig. 1.3 : Removal Efficiency of Secondary Clarifier

C. After Dilution

After secondary clarification the fresh water added to the treated effluent. And then which is used for irrigation purposes. So reduction efficiency of BOD, COD and TSS are 13.76%, 19.78% and 66.66% respectively.

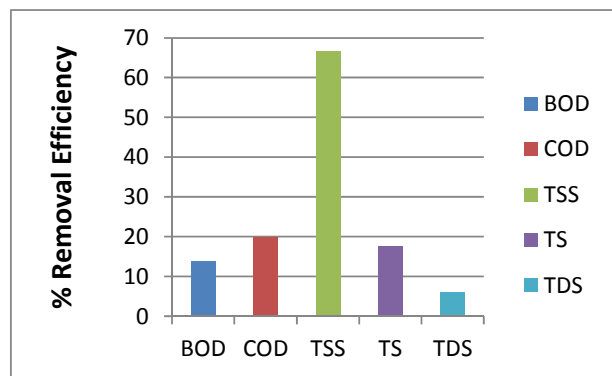


Fig.1.4: Removal Efficiency of dilution point(After Dilution)

D. Overall efficiency

The overall efficiency of treatment plant in BOD<sub>5</sub>, COD and TSS, TS are 95.27%, 97%, 87.30% 72.29%.

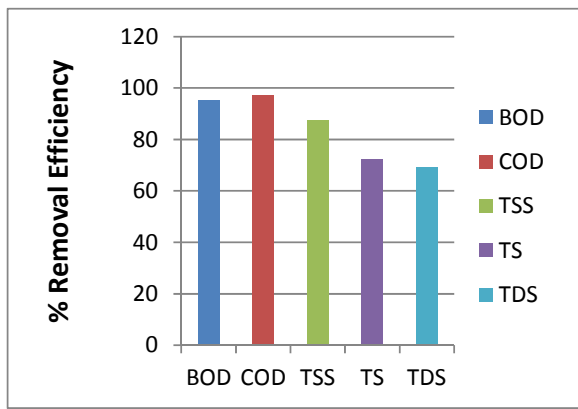


Fig.1.5: Removal Efficiency of treatment plant

The low grade Potash powder is produced from molasses distillery spent wash.

**ZERO POLLUTION PLANT GENERAL DESCRIPTION**

The Evaporator Plant : The plant is designed for 360 m<sup>3</sup>/d post biomethanated effluent feed is received in a level controlled balance tank and passed through pre-heaters, calendrias and vapor separators of various effects. The evaporation takes place under vacuum, which is maintained mainly by vacuum system. Steam is supplied as a heating medium to high heater and through thermal vapor recompression (TVR) to the first effect jacket. The concentrated product at the desired concentration is continuously taken out from the plant.

The spray drying plant: The concentrate is sprayed through spray nozzle with the help of high-pressure pump into the drying chamber. The droplets of feed are atomized with the help of high-pressure nozzle/hot air. The resultant powder is collected in 50 Kg bags.

**III. Conclusions**

- The screen and Oil & Grease trap removes oil and grease, BOD, COD, TSS 64.28%, 23.1%, 37.33%, 28.3.

- The removal efficiency of Aeration for BOD, COD, and TSS are 84.02%, 88.46%, 20.28% respectively.
- The removal efficiency of secondary clarifier BOD, TSS, TS are 23.23%, 38.88%, and 25.94% respectively.
- The removal efficiency after dilution for BOD, COD, and TSS are 13.76%, 19.78%, 66.66% respectively.
- Overall efficiency of treatment plant for removal of COD, BOD, and TSS are 97%, 95.27%, 87.30% respectively.

The sugar industry effluent which is untreated exhibits high COD, BOD, TDS, contents and low contents of DO which is toxic to plants, so it is not permissible for irrigation. Treated effluent of sugar industry which is well balanced of chemicals if it is diluted with other fresh water, will be suitable for irrigation purposes. The treated effluents of sugar industry are not highly polluted and they satisfy the CPCB standards. The low grade potash powder is produced from the molasses distillery spent wash. This potash powder is used as fertilizer. It is also a solution for zero water pollution.

**III -The contents of the powder are as follows**

Parameter		Results
Organic Matter		26.17%
Potassium	As K	14.70%
Phosphorus	As P	0.21%
Nitrogen	As N	1.66%
Gross Calorific Value		2549 cal /gm.
Iron	As Fe	379.7 ppm
Manganese	As MN	40.56 ppm
Zinc	As Zn	7.19 ppm
Copper	As Cu	33.97 ppm
Nickel	As Ni	10.19 ppm
Calcium Carbonate Content		4.73%

*Suggestions*

- Industrialist should check their instruments / equipment to avoid leakage.
- Each industry should follow environmental policies, regulations and environmental protection acts to conserve the environment.
- Industrialist should use such raw materials which will give maximum good products and less toxic waste in fewer quantities.
- Industries should be installed in low laying areas away from the public locality.
- Each industry should have ETP plant to treat the effluents, which can be further used for the agricultural purpose.

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## PROTECTED REMOVAL OF CONNECTION RULES IN STRAIGHT DISSEMINATED DATABASE

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**Abstract— In today’s world the knowledge extraction plays a crucial role. The knowledge extraction know totally depends on scattered or distributed database. In this paper we are studying about the security of distributed database and implementing the hash key concept to improvise the computational speed of the algorithm. The automatic hash key concept will increase the efficiency and improvise the enhancement in the field of secure data mining.**

**Keywords — mining, association, secure, classification.**

### I. INTRODUCTION

The knowledge extraction is very important measure in the area of database. In distributed database system the system should also take care of the privacy of an data. To overcome this measure the paper[1]. Given a protocol which introduce third party system. In this case the protocol comes to solution that the parties should chose a trusted third party an by introducing such third party, we can achieve the goal to maintain the privacy of data. One more problem with the data in distributed database is the data in network. To overcome this measure the protocol use encryption and decryption method. The data is first encrypted and when the data travel in network and then the data is decrypted when it comes to the client.

Data mining and KDD(Knowledge discovery in database) are two different kind of research area which examine the auto extraction of earlier unidentified pattern from huge amount of data. To find the solution of secure mining has become more essential in upcoming years due to the rising capability to save personal data about users and the rising complexity of data mining algorithm to influence this information. A number of technique as such classification, kanonymity, association rule mining, clustering had been recommended in upcoming years in order to performed secure data mining. Besides, the difficulty has been discussed in several community such as the database community, the statistical disclosure control community and the cryptography community. Data mining technique has been evolved successfully to extract knowledge in such to maintain a variety of domains weather, national security, forecasting, medical diagnosis, and marketing. Although it is confront to mine such kind of data without violating the data owner’s privacy. For example, how to mine an employee private data is an ongoing problem in multinational company’s application. As such data mining become more enveloping, secure concern are rising.

### II. HASH KEY

A hash function is the function so as to be used to plot digital data of random size to digital data of permanent size, with small difference in input data producing very large difference in output data. The ideals returned by a hash function are called hash



ideals, simply hash, or hashes codes. One sensible make use of is a data structure called a hash table, extensively used in computer software for fast data hunt for. Hash functions speed up table or database search for by detecting duplicated report in a big file. An pattern is finding similar stretch in DNA sequence. They are also helpful in cryptography. A cryptographic hash function allow one to with no trouble verify that some input data match a stored hash value, but makes it hard to rebuild the data from the hash alone. This standard is used by the PGP algorithm for data justification and by a lot of password examination system.

Hash functions are linked to (and often confused with) ciphers, error-correcting codes, randomization functions, fingerprints, check digits and checksums. Although these concepts partly cover to some extent, each has its own uses and necessities and is considered and optimized differently. The Hash Keeper database maintain by the American National Drug Intelligence Center, for instance, is more aptly described as a catalog of file fingerprints than of hash values.

This concept will increase the computation cost of the protocol and will enhance the mechanism of the protocol.

### III. EXISTING WORK

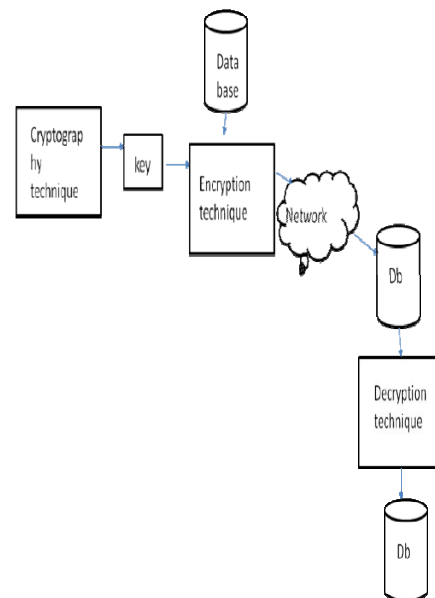
Data mining is a beneficial technique used to extract data/knowledge from large collection of data, but the collection of data is in distributed form many times. In such case privacy plays an important role to maintain the privacy of data or some part of knowledge about the data. The problem here we will discuss from paper[1]. In horizontal distributed data plays an important factor to look for is the distributed database. Here several players that access homogenous databases, i.e., the database that share the same schema but hold different information. The paper[1] support at least  $S$  and confidence  $C$ , for some given minimum support size of  $S$  and confidence  $C$ , that hold in united database, while reducing the information release about the secure (or private) database accessed by such players.

The paper deals with the problem of secure multi-party calculation. If a trusted third party would be present, then the players could devote to such party and such party would evaluate and send them such resulting output. If such third party would not be present, it is need to develop a

protocol that player can use on own in order to get their required output  $Y$ . If no player learn from such view, these protocol is consider perfectly secure more than that the third party would learn the ideal settings where the calculation is carried out by the trusted third party. The protocol that we used here calculates a parameterized family of functions, which we can say as a threshold function, in which the two excessive cases match up to the problem of calculating the union and insertion of private subsets. Those can be said as general purpose protocol that can be used in other part as well. One more problem regarding secure multi-party calculation is the set of addition problem; namely, the problem in which Bobs holds a private subsets of several ground set, and Alice hold an element in the ground set, and they desire to decide whether Alice's element is within Bob's subsets, exclusive of revealing to either of them Knowledge about the other party's input beyond the above describe addition. Here the existing work is an alternative protocol for the secure calculation of the union private subsets. The protocol get better when we use hash key function which will we elaborate in proposed work part

The methodology is given in the architecture in the next system. The architecture is good and efficient but the architecture we proposed will decrease the computational cost than the present work.

### IV. SYSTEM ARCHITECTURE



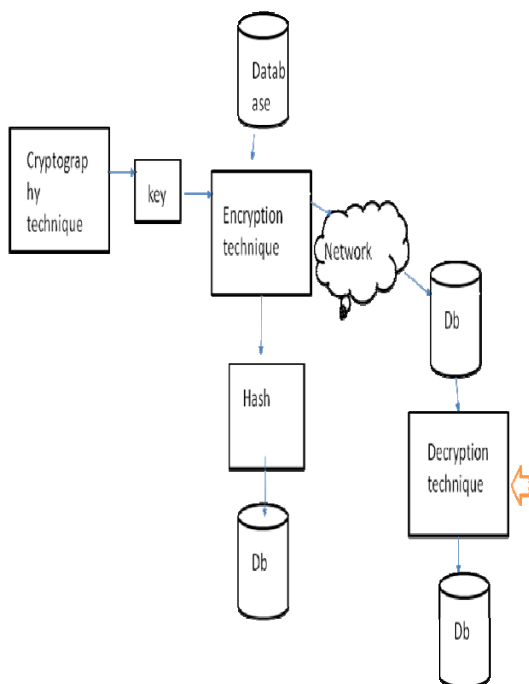
## V. PROPOSED WORK

An rising number of databases have become web easily reached from end to end HTML form-based search interfaces. The data units return from the fundamental database are typically encoded into the outcome pages dynamically for human browse. For the programmed data unit to be machine procedure able, which is necessary for many application such as deep web data collected works and internet link shopping, they require to be extract out and assigned meaningful labels. In this paper, we present an automatic explanation approach that primary aligns the data units on a consequence page into dissimilar groups such that the data in the similar group have the similar semantic. Then, for every group we explain it from dissimilar aspect and combined the different annotations to forecast a final explanation label for it. An explanation wrapper for the look for site is automatically construct and can be used to explain new end result pages from the similar web database.

## VI. ADVANTAGES

As a rising subject, data mining is playing an increasingly important role in the decision support activity of every walk of life. Get Efficient Item set result based on the customer request.

## VII. PROPOSED SYSTEM ARCHITECTURE



## VIII. CONCLUSION

The paper gives the brief idea about the enhancement of the existing model through the use of hash key. The automatic generation of the hash key is possible by making the group and enhancing the data mining speed.

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# MUTUAL COUPLING REDUCTION BETWEEN PLANAR MICROSTRIP PATCH ANTENNAS BY USING A ELECTROMAGNETIC BAND GAP STRUCTURES

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**Abstract— Mutual coupling is an inevitable phenomenon in multi antenna systems, usually reducing the system performance. Numerous works have focused on the reduction of this effect. The aim is maintaining the mutual coupling suppressing structure as simple as possible while having a high amount of mutual coupling reduction. This letter presents a novel structure suppressing the mutual coupling between nearby patches. It is composed of a simple EBG structures in a microstrip, which reduces the mutual coupling considerably. The structure has been constructed and tested. The measurement results prove the high efficiency of this configurations.**

**Index Terms—About Antenna arrays, mutual coupling reduction, parasitic coupling, parasitic element.**

## I. INTRODUCTION

Mutual coupling (MC) has a direct impact on the performance of multiple-input-multiple-output (MIMO) and antenna array systems. This interaction between elements degrades the system performance in two ways, namely by and by distorting the

radiation pattern. This increasing problem mainly arises when the antennas are close to each other. Dealing with the problem of MC has been a topic of interest since the early days of antenna array design. Several authors have proposed different methods to reduce the MC while keeping the antenna elements close to each other. Some of the most referred methods in literature for printed antennas are using defected ground structures (DGS) [1]–[3], electromagnetic band-gap (EBG) [4], [5] structures, and parasitic elements between the antennas [6]. The use of high impedance Electromagnetic Band gap (EBG) structures has been well publicized over many years for improving the input match of antennas, which are placed near metallic ground planes for many applications such as vehicular and aerospace[1,2]. One of the limiting factors of using EBGs is the bandwidth that is available. Much work has been carried out on optimizing EBG geometries to increase bandwidths or to make use of multiband operation, without significantly increasing the thickness of the structure [3]. However [4] illustrated that there is a fundamental thickness to bandwidth limits that can only be overcome with the use of EBGs that are reconfigurable i.e. the parameters of the EBG can be controlled by some external stimuli. It has

also been demonstrated in [5] that tunable EBGs are feasible for beam steering applications. The aim of this paper is to illustrate the advantages of using varactor diode devices in a simple EBG structure to tune the reflection phase over a much larger bandwidth than would be available for a passive structure and its application in compact antenna design. Predictions and measurement of an active EBG/ antenna topology is demonstrated over the frequency range of 800 to 2000MHz.

Insertion of a slot was suggested in [1], with considerable MC reduction. Although it has the advantage of simplicity, it considerably changes the radiation pattern, especially at the rear side. In [2], a ground plane pattern was proposed that efficiently decreases the MC. However, this also significantly distorts the radiation pattern. Other DGS and EBG structures are used [3]–[5] to suppress the surface waves, but they are complex structures, and optimum designs are more difficult to achieve. A simple structure composed of two parasitic elements is presented in [6]. The difficulty with that scheme is that it needs an additional layer, along with metalized holes for grounding. The radiation pattern is also changed. In [7], the antenna elements are physically linked via a narrow line. This technique also causes high MC reduction, but suffers from radiation pattern degradation, mainly due to the cross-polar component related to the current flowing over the long linking line. In general, even now a days, establishing an efficient mutual coupling reduction technique while conserving the radiation pattern is still highly challenging. Table I summarizes a qualitative comparison between some common techniques presented in the literature along with the method proposed in this letter.

The Electromagnetic Band Gap microstrip line section inserted between the coupled elements. The coupling reduction bandwidth fully covers the operating bandwidth of the antennas, and the structure is dedicated to linear polarization. It can be easily fabricated together with the printed antennas without any extra cost. This research was mainly inspired by the unfolding research

activities in the field of MIMO technology, biomedical applications, and radar applications where, in many cases, a two-element antenna is used and an isolation as high as possible is needed between transmit and receive antenna. This can be seen in the large number of publications using two-element structures, including [1]–[4], [6], and [7]. The idea can also be directly applied to the MC reduction in arrays. The approach and design of a prototype are explained in Section II, and results are presented in Section III. Conclusions are drawn in Section IV.

## II. ANTENNA STRUCTURE

- *2 element patch array antenna design using Coaxial feed line, without Electromagnetic Band Gap structures*

The position of the coaxial cable can be obtained by using equation for same rectangular micro strip patch antenna.

$$X_f = L / (2\sqrt{\epsilon_{\text{eff}}}) \quad (1)$$

Where  $X_f$  is the desire input impedance to match the coaxial cable and  $\epsilon_{\text{eff}}$  is the effective dielectric constant.

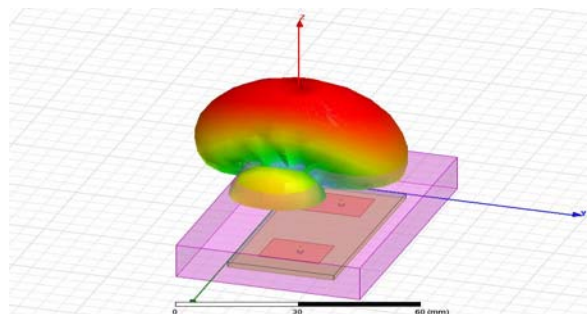


Fig 1. 2 element patch array antenna

$$Y_f = W / 2 \quad (2)$$

So  $(X_f, Y_f, Z)$  represent the coordinate on patch for  $50\Omega$  impedance point in patch.

The impedance with  $50\Omega$  coaxial wire is given by equation

$$Z_0 = 138 * \log_{10} (D/d) / \sqrt{\epsilon_{\text{eff}}} \quad (3)$$

# Mutual Coupling Reduction Between Planer Microstrip Patch Antennas By Using A Electromagnetic Band Gap Structures

- Patch antenna design using Coaxial feed line, with Electromagnetic Band Gap structures

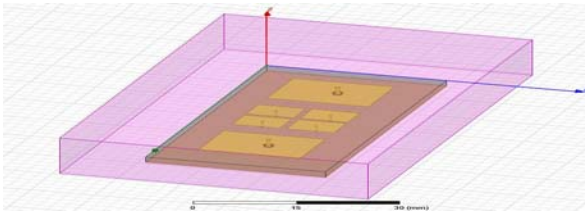


Fig 2. Patch array with EBG structures

$$L = \mu_0 * h \quad (4)$$

Where L= Inductance of the EBG cell.

$\mu_0$ =Absolute permeability of the medium

h=Height or the substrate thickness

$$C = W \epsilon_0 (1 + \epsilon_r) / \pi * \cosh^{-1} [(W+g)/g] \quad (5)$$

Where C=Equivalent capacitance of EBG

$\epsilon_0$ = Absolute permittivity

$\epsilon_r$ =Relative permittivity.

W=Width of EBG

g=Gap between the successive EBG cells

P=periodicity =W+g.

The resonant frequency is given by,  $\omega_0 = 1/\sqrt{LC}$

## III. EXPERIMENTAL RESULTS

Results for 2 element Patch array antenna using Coaxial line feed without EBG.

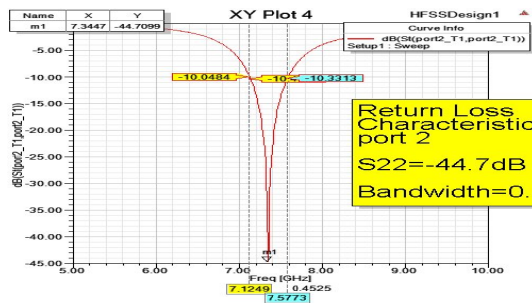


Fig 3: Return loss = -44.7 dB(Centre frequency  $f_c$ =7.5GHz, BW=0.4524GHz)

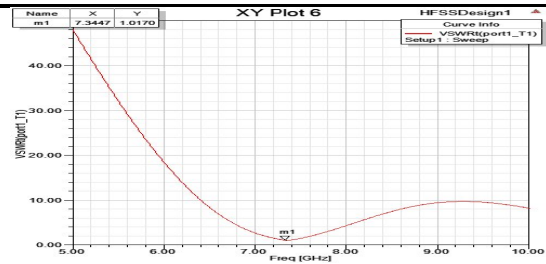


Fig 4. Voltage standing wave ratio=1.0170



Fig 5. Mutual Coupling S12 = -20.894 dB

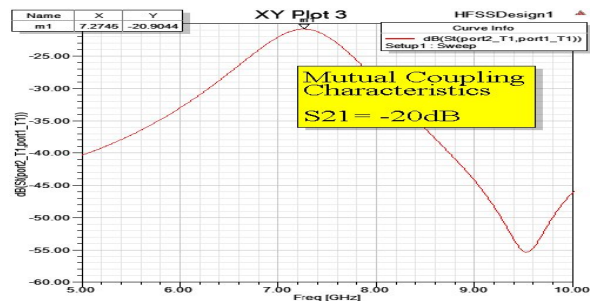


Fig 6. Mutual Coupling S12 = -20 dB

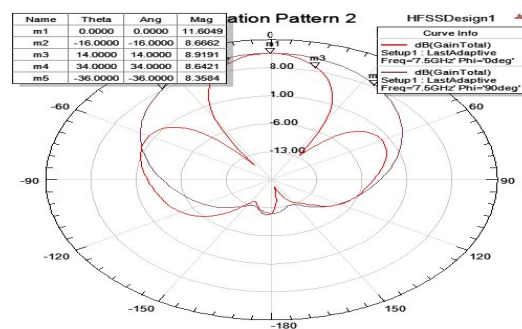


Fig 7. 2D Radiation pattern plot

Results for 2 element Patch array antenna using Coaxial line feed with EBG.

# Mutual Coupling Reduction Between Planer Microstrip Patch Antennas By Using A Electromagnetic Band Gap Structures

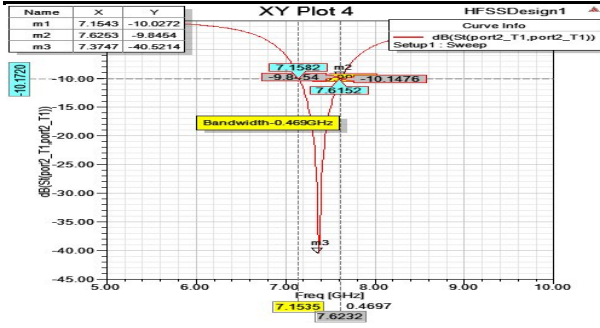


Fig 8: Return loss = -40.5214 (Centre frequency  $f_c=7.5\text{GHz}$ ,  $BW=0.4697\text{GHz}$ )

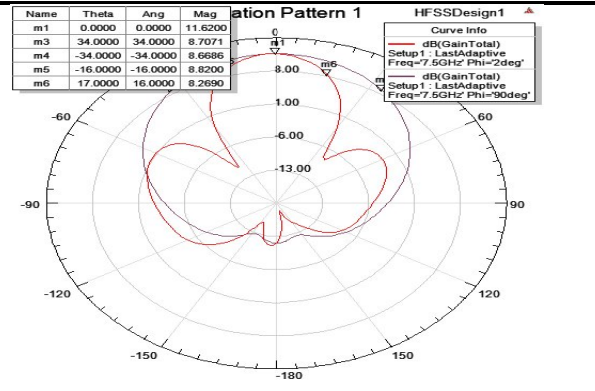


Fig 12. 2D Radiation pattern plot



Fig 9. Voltage standing wave ratio=1.0303



Fig10. Mutual Coupling  $S_{12} = -25.714\text{ dB}$



Fig11. Mutual Coupling  $S_{12} = -25.7\text{ dB}$

Table 1. Comparison of 2 element antenna array without and with EBG using coaxial line feed

Parameter	RESULTS WITHOUT EBG STRUCTURE	RESULTS WITH EBG STRUCTURE
Resonant frequency	7.5 GHz	7.5 GHz
Return loss	-41 dB	-40.3 dB
VSWR	1.017	1.05
Mutual Coupling	-20.95 dB	-25.6 dB
Gain	9.26 dB	8.234 dB
Directivity	9.27 dB	9.27 dB

## IV. CONCLUSION

In this paper, we have designed antenna array with and without EBG structure. There is almost the same return loss value for both the type of structure with and without EBG. The mutual coupling of the array with EBG structure is more. There is also an improvement in the VSWR in case of EBG structured antenna array. Gain is reduced in case of EBG structure which shows that there are radiation losses.

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# TRANSFORMING SUPPLY CHAIN MANAGEMENT THROUGH CLOUD COMPUTING

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**Abstract— Cloud computing is revolutionizing the IT industry by enabling them to offer access to their infrastructure and application services on a subscription basis. As a result, several enterprises including IBM, Microsoft, Google, and Amazon have started to offer different Cloud services to their customers. Increasing complexity of supply chains due to globalisation efforts have led to organizations having difficulties with both collaboration, as well as agility in getting aid to individuals in need. Throughout this research paper, RBV and social capital theory are used to clarify the positive association between cloud computing use and collaboration among organizations and their suppliers. It is also discussed to demonstrate the association of inter-organizational trust and its moderating role in the relationship between cloud computing use and collaboration, as well as collaboration and its positive association with agility.**

**Index Terms— Cloud computing, Service sector, Supply chain management, Resource based view.**

## I. INTRODUCTION

Cloud computing has emerged as a paradigm to deliver on demand resources to customers similar to other utilities. The three main services are provided by the Cloud computing architecture according to the needs of IT customers [1]. Firstly,

Software as a Service (SaaS) provides access to complete applications as a service, such as Customer Relationship Management (CRM) [2]. Secondly, Platform as a Service (PaaS) provides a platform for developing other applications on top of it, such as the Google App Engine (GAE) [3]. Finally, Infrastructure as a Service (IaaS) provides an environment for deploying, running and managing virtual machines and storage. Technically, IaaS offers incremental scalability (scale up and down) of computing resources and on-demand storage [1].

## II. LITERATURE REVIEW

### A. Cloud computing use and collaboration

Based on service level agreements, cloud computing is a large scale, distributed, computing paradigm where virtualised, dynamically scalable, managed computing power, storage platforms and services are delivered on demand to customers via the internet [1], [4]. According to the research, there are two defining attributes of cloud computing technology: massively scalable service and on-demand access to information. Massively scalable service refers to a cloud computing user's ability to choose from a variety of services offered (i.e., infrastructure, software and platforms), payment options (i.e., pay-as-you-go, up-front fee or two tier), as well as how it is delivered (i.e., public vs. private cloud) [5]. Each service can be

tailored according to a user's or a supply chain partner's needs. Since collaboration typically involves consistent communication and alignment of incentives, cloud computing's ability to offer instant scalability in service, pricing options and media, according to an organisation's and the supply chain partner's needs, will enhance alignment in terms of communication and incentives received from cloud computing use [6]. Further, cloud computing offers mobile interactivity and the ability to share information with supply chain partners using a variety of different media [7], [8], [9]. This is dissimilar to web-based EDI applications, which still require a common platform on either end [10]. Additionally, cloud computing offers the ability for users to analyse terabytes of data in a period of minutes, which is a substantial increase in speed of information flow over traditional information technologies [7], [8].

### B. Inter-organizational trust

There are various definitions of inter-organisational trust with dimensions including credibility, goodwill, honesty, integrity, benevolence, etc. Inter-organisational trust, which is one party's confidence and belief in the credibility and goodwill of an object of trust [11]. Further, both dimensions take into account the importance of dependability, reliability, and acting in the best interests of one another. Dependable and reliable supply chain partners are vital for several reasons. First, organisations are increasingly demanding accountability, transparency and value in return for sponsorship. This expectation is also influencing companies to become more professional in their approach to managing operations. Agile supply chains require reduced security risks, while at the same time delivering speed and efficiency that can prove difficult with complex supply chains involving various actors. A transparent supply chain provides timely and accurate exchange of information. This greater transparency is also likely to lead to improved systems' processes. In the majority of empirical studies, inter-organisational trust is seen as a main effect that leads to positive attitudes, higher levels of cooperation and higher levels of performance [12]. Various studies have examined the direct effect of trust on workplace attitudes and

performance [13]. Trust overall is identified as critical for effective collaboration in a supply chain [14].

### C. Collaboration and agility

Perhaps even more vital than the relationships between cloud computing use, inter-organisational trust and collaboration is the ultimate impact on agility. Agility has several definitions, including a supply chain's ability to respond to customers unforeseen changes [15]; responding rapidly to short-term changes in demand and market turbulence [16]; ability to thrive in constant and unpredictable change; being centred on customer responsiveness and focused on market turbulence. All of these definitions have one commonality: responding quickly to unforeseen changes. It also requires higher levels of responsiveness and effectiveness in delivering the correct products to the right place, at the right quantity, and during the right time period [17].

## III. THEORETICAL BACKGROUND AND MODEL

### A. Resource-based view (RBV)

The connection between information technology and collaboration is not new in literature and has a strong background in RBV [18]. RBV mentions that firms compete using unique resources that are valuable, rare, difficult to imitate and non-substitutable by other resources [19]. These resources in turn can be used for competitive advantage. While resources are vital, it is more critical how the firm utilises them to maximise competitive potential. It has been considered in this research that cloud computing to be a valuable, rare and difficult to imitate resource if firms utilise and scale it according to their own and their partner's needs. As described in the previous sections, cloud computing offers users massively scalable service and pricing options that allow organisations to scale according to their own and their supply chain partners' needs [7]. Since collaboration requires mutual incentives [6], cloud computing can optimise it through massively scalable services that perpetuate greater collaborative relationships between supply chain partners.

### B. Social capital theory/ agency theory

Social capital theory suggests that benefits derived from relationships between entities can

generate intangible and tangible benefits, including those that are social, psychological, emotional and economic in the short- and long-term [20]. Social capital is comprised of seven dimensions, including: group characteristics, generalised norms, togetherness, everyday sociability, neighbourhood connections, volunteerism and trust, which help to develop both short- and long-term benefits [21].

This theory helps define the relationship between collaboration and agility, and the moderating impact of inter-organisational trust on the relationship. Collaboration typically involves both continuous communication, as well as an effective platform to collaborate on [22]. When communication and platforms are present, other types of social capital develop, including generalised norms, togetherness, sociability and established connections, which, according to social capital theory, can lead to a variety of benefits, including agility.

Trust is also considered a vital social capital that can lead to a variety of internal and external benefits. Trust is known to offset risks associated with behaviours underlying competitiveness, thereby allowing greater benefits of knowledge transfer, joint learning, and sharing of risks associated with exploiting opportunities in collaboration. Given the recency of cloud computing and associated security concerns; an adequate amount of inter-organisational trust can provide a foundation for using cloud computing to perpetuate greater collaboration.

Both RBV and social capital theory can be used to explain the intricate relationships depicted in Figure 1, which presents our conceptual model that we will analyse using partial least squares analysis.

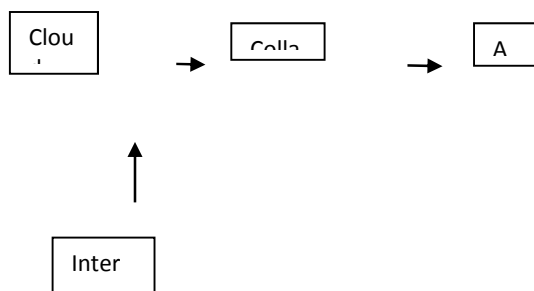


Figure1: Conceptual model

#### IV. RESEARCH METHODOLOGY

The quantitative approach is adopted as the research methodology for this research. A quantitative survey is considered to be the most feasible and adequate research strategy for this research as it is beneficial to deal with the questions of ‘what’ the important factors are, and ‘how much’ strength these factors have. To increase the sample size of the survey, two approaches are adopted. First, an invitation letter and e-mail are sent to directors and senior executive managers of various major IT companies in Bangalore, Delhi, Mumbai, Kolkata, Chennai, Pune, Coimbatore, and Mysore in India. Then questionnaire surveys are distributed by e-mail or post to those directors or managers accepting the survey invitation. The respondents are invited to distribute the questionnaires to their industry partners or practitioners that they know to have rich experiences in SCM development in India. A total of 180 questionnaires are despatched via both e-mail and post, and 58 returns are usable for the analysis—giving a net usable response rate of 32%. The questionnaire consists of two sections. The first section serves to introduce the objectives and scope of the survey. This section is also used to collect demographic data regarding the respondents’ previous experience and general knowledge in the area. In the second section, participants are invited to provide their opinions on the importance of proposed factors that influence cloud computing in SCM on a seven-point Likert scale (1‘Not important at all’ to 7‘Most important’). In order to guarantee that the respondents are knowledgeable about the topic of the research, a survey has been conducted directly associated with information technology or supply chain management activities in the organisations. Titles included information officers, directors of supply, chief and head of operations, etc.

#### V. RESEARCH FINDINGS

The Pearson correlation coefficient has been adopted to test the relationship among all factors. In Table 3, it is found that the Inter-organisational trust, collaboration and agility are all significantly and positively correlated to cloud computing use.

variable	1	2	3	4
Cloud computing use	1.00			
Inter org trust	0.26**	1.00		
Collaboration	0.25**	0.36***	1.00	
Agility	0.08	0.23**	0.34***	1.00

Table1: Pearson correlation (Notes: \*p<0.01, \*\*p<0.05, \*\*\*p<0.001)

Descriptive statistics for all survey items appear in Table. Our model was assessed and validated [23]. Individual item reliability is assessed by looking at the loadings of each item with their construct. The minimum level threshold for item loadings is 0.7 [24]. As seen in Table 2, all items in the research analysis are well above the 0.7, thus providing results for individual reliability. Convergent validity suggests that a number of items represent one and only one underlying construct. To assess convergent validity, each of the composite reliabilities is assessed for each construct all of which has a minimum value of 0.7.

Sl. No	Factors	Mean, SD	Factor loading
<b>1</b>	<b>Cloud computing use [25, 26]</b>		
1.0 1	Use of cloud computing technology relative to Industry standard.	4.48, 1.55	0.73 9
1.0 2	Extent to which our organization uses cloud computing to integrate with our supply chain partners.	4.02, 1.54	0.86 8
1.0 3	Reliance on cloud computing technology in conducting business processes.	3.73, 1.46	0.81 5
1.0 4	Reliance on cloud computing technology in conducting business with our supply chain partners.	5.07, 1.33	0.82 9

<b>2</b>	<b>Inter-organizational Trust[27]</b>		
2.0 1	Our organization feels that it is important not to use any proprietary information to our supply chain partner's disadvantage.	3.89, 1.45	0.91 3
2.0 2	A characteristic of the relationship between our organization and its supply chain partners is that neither supply chain partner is expected to make demands that might be damaging to the other.	5.05, 1.26	0.84 9
2.0 3	Our organization feels that our supply chain partner will not attempt to get its way when it negatively impacts our organization.	4.81, 1.33	0.76 2
2.0 4	Our organization has strong confidence in our supply chain partner.	4.93, 1.31	0.73 7
2.0 5	Our organization can always rely on another supply chain partner when it counts.	3.75, 1.78	0.70 9
2.0 6	Our organization believes that our supply chain partner will work hard in the future to maintain a close relationship with us.	3.74, 1.65	0.82 3
<b>3</b>	<b>Collaboration [28]</b>		
3.0 1	Our organization and supply chain partners exchange timely information.	3.90, 1.63	0.85 1
3.0 2	Our organization and supply chain partners exchange accurate information.	4.24, 1.48	0.81 1
3.0 3	Our organization and supply chain partners exchange complete information.	4.12, 1.59	0.82 3

3.0 4	Our organization and supply chain partners have agreement on the goals of the supply chain.	3.83, 1.65	0.79 2
3.0 5	Our organization and supply chain partners have agreement on the importance of collaboration across the supply chain.	3.64, 1.44	0.85 6
3.0 6	Our organization and supply chain partners share benefits (e.g. saving costs).	3.80, 1.50	0.76 0
3.0 7	Our organization and supply chain partners share any risks that can occur in the supply chain.	4.07, 1.59	0.79 3
3.0 8	Our organization and supply chain partners share benefits for providing to our end user.	3.70, 1.55	0.82 8
3.0 9	Our organization and supply chain partners have frequent contact on a regular basis.	4.40, 1.48	0.73 8
3.1 0	Our organization and supply chain partners have open and two-way communication.	4.48, 1.47	0.76 5
3.1 1	Our organization and supply chain partners influence each other's decisions through discussion.	4.60, 1.38	0.82 3
3.1 2	Our organization and supply chain partners jointly search and acquire new and relevant knowledge.	4.22, 1.44	0.81 4
3.1 3	Our organization and supply chain partners jointly identify end user needs.	4.35, 1.54	0.81 7
<b>4</b>	<b>Agility [29]</b>		
4.0 1	Our supply chain is able to respond to changes in demand.	4.73, 1.35	0.73 5
4.0 2	Our supply chain is able to leverage the competencies of our	4.93, 1.18	0.78 6

	partners to respond to demand.		
4.0 3	Joint planning in our supply chain is important.	4.20, 1.45	0.74 1
4.0 4	Our organization works with our suppliers to seamlessly integrate our inter-organization processes.	4.90, 1.33	0.84 1
4.0 5	Improving our organization's level of service is a high priority.	5.51, 1.22	0.74 5
4.0 6	Improving our organization's delivery reliability is a higher priority.	4.48, 1.54	0.71 9
4.0 7	Improving our organization's responsiveness is a high priority.	4.23, 1.61	0.75 0
4.0 8	Demand is accessible throughout our organization's supply chain.	4.67, 1.77	0.71 3
4.0 9	Inventory levels are visible throughout our organization's supply chain.	4.21, 1.61	0.74 2

## VI. CONCLUSIONS AND FUTURE WORK

Increasing complexity of supply chains due to globalisation efforts have led to organisations having difficulties with both collaboration, as well as agility in getting aid to individuals in need. RBV is used to clarify the positive association between cloud computing use and collaboration among organisations and their suppliers. Social capital theory and its ability is also discussed to demonstrate the association of inter-organisational trust and its moderating role in the relationship between cloud computing use and collaboration, as well as collaboration and its positive association with agility.

A conceptual model of cloud computing has been provided that is both theoretically and empirically supported through the use of RBV, social capital theory and partial least squares analysis. Research provides empirical support for the positive association between cloud computing use and

collaboration among organisations and their suppliers, as well as the ultimate positive impact on agility. This, in turn, creates a framework for supply chain management scholars to examine agility and how it may be impacted by information technology such as cloud computing.

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# PERFORMANCE ANALYSIS OF RECTANGULAR PATCH ANTENNA USING QUARTER WAVE FEED LINE AND COAXIAL FEED LINE METHODS FOR C- BAND RADAR BASED APPLICATIONS

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**Abstract:** Microstrip antenna has various attractive features like light weight, low cost, easy fabrication, etc. Microstrip antenna can be fed in a variety of ways. This paper is focused on the enhancement of gain of the rectangular patch antenna at 7.5 GHz for two different feeds and compare their results. The two types of feed are coaxial cable feed and quarter wave feed. Antenna design has been simulated using HFSS tool. Comparative study of simulated parameters like Gain, Bandwidth, Directivity and Radiation pattern for these two feeding methods have been done and presented in this paper.

**Index Terms**— Microstrip patch antenna, Quarter wave inset feed, Coaxial cable feed, Gain, Bandwidth, Directivity, Radiation pattern.

## I. INTRODUCTION

Microstrip antennas are relatively inexpensive to manufacture and design because of the simple 2-dimensional physical geometry. They are usually employed at UHF and higher frequencies because the size of the antenna is directly tied to the wavelength at the resonant frequency. Different

feeding methods used for Microstrip patch antenna are:

- *Microstrip line inset feed:*

Microstrip line feed is one of the easier methods to fabricate as it is a just conducting strip connecting to the patch and therefore can be considered as an extension of patch. It is simple to model and easy to match by controlling the inset position. Since the current is low at the ends of a half-wave patch and increases in magnitude towards the center, the input impedance ( $Z=V/I$ ) could be reduced if the patch was fed closer to the center. One method of doing this is by using an inset feed (a distance  $R$  from the end) as shown in Figure 1.

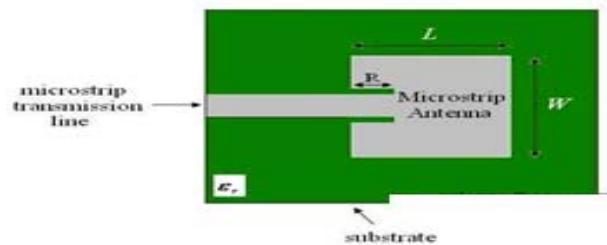


Figure 1: Inset feed

- *Quarter wavelength transmission line*

The microstrip antenna can also be matched to a transmission line of characteristic impedance  $Z_0$  by using a Quarter-wave transmission line of characteristic impedance  $Z_1$  as shown in below Figure 2.



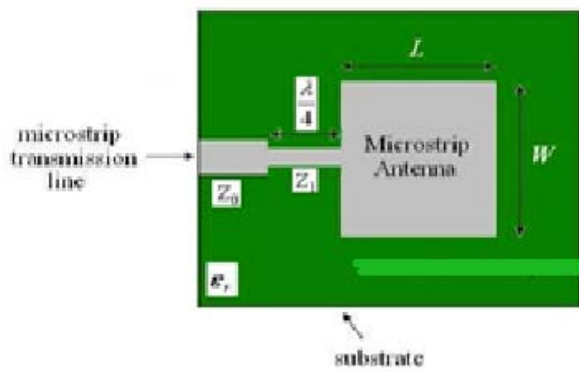
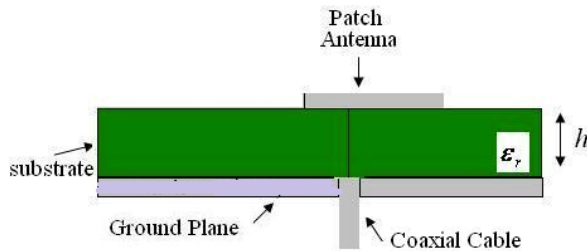


Figure 2: Quarter wavelength transmission line

- Coaxial cable feed

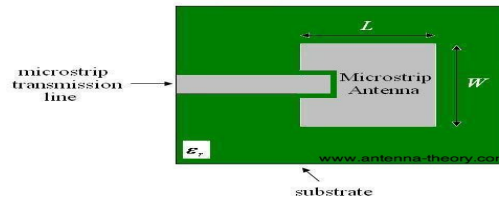
Microstrip antennas can also be fed from underneath via a probe as shown in Figure 3. The outer conductor of the coaxial cable is connected to the ground plane, and the center conductor is extended up to the patch antenna. The position of the feed can be altered as before (in the same way as the inset feed, above) to control the input impedance.



The coaxial feed introduces an inductance into the feed that may need to be taken into account if the height  $h$  gets large (an appreciable fraction of a wavelength). In addition, the probe will also radiate, which can lead to radiation in undesirable directions.

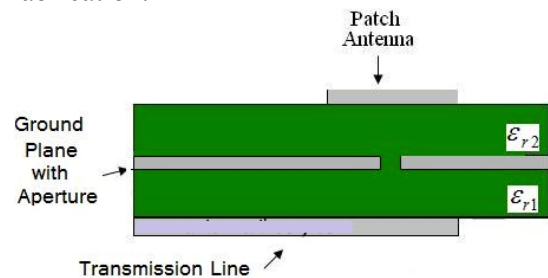
- Coupled feed

The feeds above can be altered such that they do not directly touch the antenna. For instance, the probe feed in Figure 3 can be trimmed such that it does not extend all the way up to the antenna. The inset feed can also be stopped just before the patch antenna, as shown in Figure 4. The advantage of the coupled feed is that it adds an extra degree of freedom to the design. The gap introduces a capacitance into the feed that can cancel out the inductance added by the probe feed.



- Aperture feed

Another method of feeding microstrip antennas is the aperture feed. In this technique, the feed circuitry (transmission line) is shielded from the antenna by a conducting plane with a hole (aperture) to transmit energy to the antenna, as shown in Figure 5. The upper substrate can be made with a lower permittivity to produce loosely bound fringing fields, yielding better radiation. The lower substrate can be independently made with a high value of permittivity for tightly coupled fields that don't produce spurious radiation. The disadvantage of this method is increased difficulty in fabrication.



## II. ANTENNA GEOMETRY

The structure of the proposed antenna is shown in Figure 2 below. For a rectangular patch, the length  $L$  of the patch is usually  $0.3333 \lambda_0 < L < 0.5 \lambda_0$  is the free wavelength. The patch is selected to be very thin such that  $t \gg \lambda_0$ . the height  $h$  of the dielectric is usually  $0.003 \lambda_0 \leq h \leq 0.05 \lambda_0$ . thus, a rectangular patch of dimension  $40.1\text{mm} \times 31\text{mm}$  is designed on one side of the an FR4 substrate of thickness  $1.6\text{mm}$  and relative permittivity  $4.4$  and the ground plane is located on the other side of the substrate with dimension  $50.32\text{mm} \times 41.19\text{mm}$ . The antenna plate is fed by standard coaxial of  $50 \Omega$  at feeding location of  $11.662\text{mm}$  by  $20.286\text{mm}$  on the patch. This type of feeding scheme can be placed at any desired location inside the patch in order to match with the desire input impedance and has low spurious radiation.

### III. DESIGN REQUIREMENT

There are three essential parameter for design a coaxial feed rectangular microstrip patch antenna. Firstly, the resonant (fo) or the antenna must be selected appropriately. The frequency range used is from 2 GHZ-2.5GHZ and the design antenna must be able to operate within this frequency range. The resonant frequency selected for this design is 2.25GHZ with band width of 46MHz.

Secondly, the dielectric material of the substrate selected for this design is FR4 Epoxy which has a dielectric for this design of 4.4 and loss tangent equal to 0.002. The dielectric constant of the substrate material is an important design parameter. Low dielectric constant is used in the prototype design because it gives better efficiency and higher bandwidth, and lower quality factor Q. The low value of dielectric constant increases the fringing field at the patch periphery and thus increase the radiated power. The proposed design has patch size independent of dielectric constant. So the way of reduction of patch size is by using higher dielectric constant and FR4 Epoxy is good in this regard. The small loss tangent was neglected in the simulation.

Lastly, substrate thickness is another important design parameter. Thick substrate increases the fringing field at the patch periphery like low dielectric constant and thus increases the radiated power. The height of dielectric substrate (h) of the microstrip patch antenna with coaxial feed is to used in S-band range frequencies. Hence, the height of dielectric substrate employed in this design of antenna is h=1.6mm.

### IV. ANTENNA STRUCTURE

#### Patch antenna design with Quarter wave line feed

- i. Width (W):

$$W = \frac{c}{2fr\sqrt{\frac{\epsilon_r + 1}{2}}}$$

where:

c - free space velocity of light,  $3 \times 10^8$  m/s

- ii. Effective dielectric constant ( $\epsilon_{eff}$ ):

$$\epsilon_{eff} = \frac{(\epsilon_r + 1)}{2} + \frac{(\epsilon_r - 1)}{2} \left[1 + 12 \frac{h}{W}\right]^{-1/2}$$

Where,

$\epsilon_r$  - dielectric constant  
W - width of the patch  
h - Height of dielectric substrate

- iii. Effective length (Leff):

$$L_{eff} = \frac{c}{2fr\sqrt{\epsilon_{eff}}}$$

- iv. Patch length extension ( $\Delta L$ ):

$$\Delta L = 0.412h \frac{(\epsilon_{eff} + 0.3) \left[\frac{W}{h} + 0.264\right]}{(\epsilon_{eff} - 0.258) \left[\frac{W}{h} + 0.8\right]}$$

- v. Actual length of patch (L):

$$L = L_{eff} - (2\Delta L)$$

*Equations for impedance Matching*

$$Z = (60 / \sqrt{\epsilon_{eff}}) \ln \left[ \frac{8h/w + w/4h}{1} \right] \quad (6)$$

Where,  $Z=Z_0$ =impedance of the port feed =50  $\Omega$ .

$$\lambda_g = \lambda_0 / \sqrt{\epsilon_{eff}} \quad (7)$$

$\lambda_0$ =Free space wavelength

$\epsilon_{eff}$ =Effective permittivity of the microstrip

#### Patch antenna design with Coaxial line feed

The position of the coaxial cable can be obtained by using equation for same rectangular micro strip patch antenna.

$$X_f = \frac{L}{2\sqrt{\epsilon_{eff}}} \quad (8)$$

Where  $X_f$  is the desire input impedance to match the coaxial cable and  $\epsilon_{eff}$  is the effective dielectric constant.

$$Y_f = W / 2 \quad (9)$$

So ( $X_f, Y_f, Z$ ) represent the coordinate on patch for 50 $\Omega$  impedance point in patch .

The impedance with 50 $\Omega$  coaxial wire is given by equation

$$Z_0 = 138 * \log_{10} \left( \frac{D/d}{\sqrt{\epsilon_{eff}}} \right) \quad (10)$$

• Results for Patch antenna with Coaxial line feed

V. EXPERIMENTAL RESULTS

• Results for Patch antenna with Quarter wave line feed.

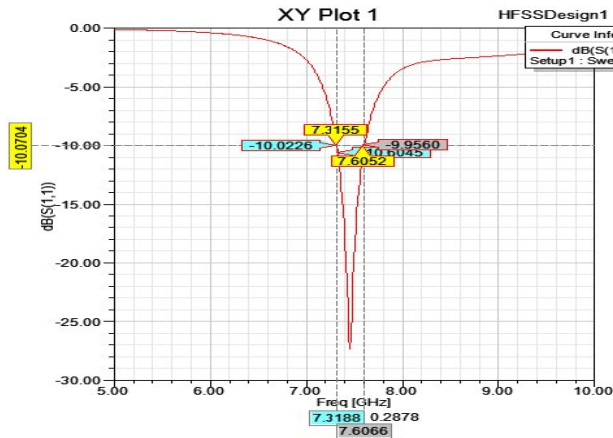


Fig6: Return loss = -27.5 dB (Centre frequency  $f_r=7.5\text{GHz}$ ,  $\text{BW}=0.2878\text{GHz}$ )



Fig7: Voltage Standing Wave Ratio

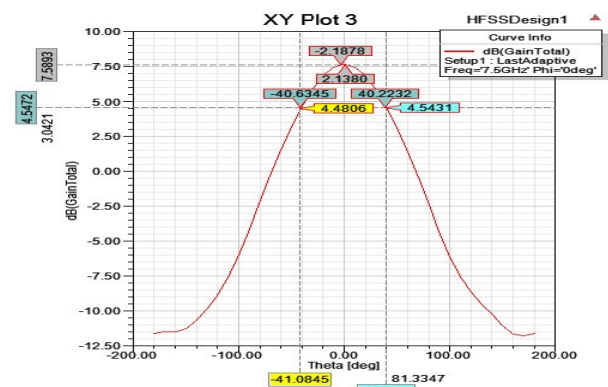


Fig8: Gain plot

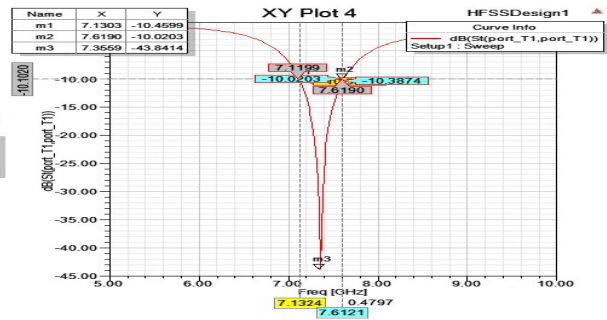


Fig9: Return loss = -43.8414 (Centre frequency  $f_r=7.5\text{GHz}$ ,  $\text{BW}=0.2878\text{GHz}$ )

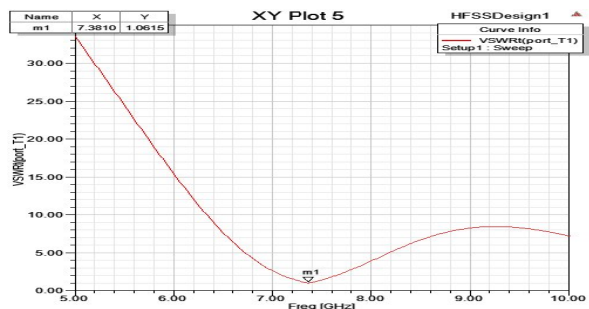


Fig10: Voltage standing wave ratio=1.0615

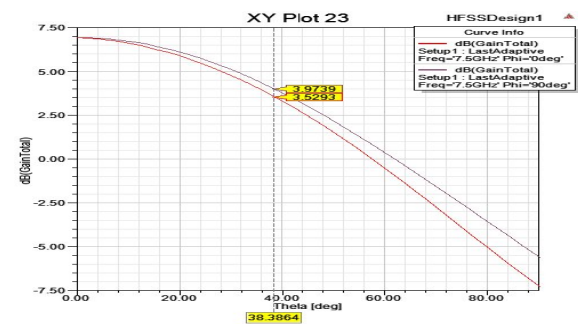


Fig: Gain = 6.927 dB

Table 1 Comparison of radiation properties two methods.

Parameter	Microstrip line feed	Co-axial probe feed
Resonant frequency	7.5 GHz	7.5GHz
Return loss	-27.5 dB	-39 dB
VSWR	1.2	1.05
Gain	7.69 dB	8.54dB
Directivity	7.625 dB	8.5 dB

## VI. CONCLUSION

In this paper, we have designed a rectangular microstrip patch Antenna covering the 7.5 GHz frequency spectrum. It has been observed that there is 40 % improvement in the Bandwidth in case of a coaxial line feed compared with microstrip line feed and there is also an improvement in the VSWR in case of coaxial feeding technique. There is a 9 % improvement in the Gain and 11% increase in the Directivity which shows that there are radiation losses and losses within the feed system and it is difficult to achieve impedance matching for Microstrip line feeding technique.

## VII. ACKNOWLEDGMENT

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## WAVELET BASED LOSSLESS COMPRESSION FOR DOCUMENT IMAGE

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**Abstract**— recent years have seen an increased level of research in image Compression. Certain application such as medical imaging, image archiving & remote sensing require or desire lossless compression. As cameras and display systems are going high quality and as the cost of memory are lowered. We may also wish to keep our precious and artistic photos free from compression artifacts. Hence efficient lossless compression will become more & more important. In this proposed work we presents lossless color image compression algorithm. An input RGB color image is transformed into YCuCv color space by an RCT. The luminance image Y is encoded by any of the lossless grayscale image coders such as CALIC, JPEG-LS, or JPEG 2000 lossless. The chrominance image and are encoded using hierarchical decomposition & pixel prediction. For each context, a generic adaptive arithmetic coder is used to encode the prediction error. The proposed method and several conventional methods have been tested on the various image sets.

**Index Terms**—Image Compression, lossless compression, hierarchical decomposition, pixel prediction.

### I. INTRODUCTION

The goal of lossless image compression is to represent an image signal with the smallest possible number of bits without loss of any information, thereby speeding up transmission

and minimizing storage requirements. The number of bits representing the signal is typically expressed as an average bit rate (average number of bits per sample for still images, and average number of bits per second for video). The goal of lossy compression is to achieve the best possible fidelity given an available communication or storage bit rate capacity or to minimize the number of bits representing the image signal subject to some allowable loss of information. In this way, a much greater reduction in bit rate can be attained as compared to lossless compression, which is necessary for enabling many realtime applications involving the handling and transmission of audiovisual information.

Coding techniques are crucial for the effective transmission or storage of data intensive visual information. In fact, a single uncompressed color image with a medium resolution of 500\_500 pixels would require 100 seconds for transmission over an Integrated Services Digital Network (ISDN) link having a capacity of 64,000 bits per second (64 Kbps). The resulting delay is intolerably large considering that a delay as small as 1 to 2 seconds is needed to conduct an interactive “slide show,” and a much smaller delay (on the order of 0.1 second) is required for video transmission or Playback. Although a CD-ROM device has a storage capacity of a few gigabits, its average Data-read throughput is only a Few Megabits per second (about 1.2 Mbps to 1.5 Mbps for the common read speed CLV CDs). As a result, compression is essential for the storage and real-time transmission of digital

audio-visual information, where large amounts of data must be handled by devices having a limited bandwidth and storage capacity. Lossless compression is possible because, in general, there is significant redundancy present in image signals. This redundancy is proportional to the amount of correlation among the image data samples.

LOCO-I:

LOCO-I (Low Complexity Lossless Compression for Images) is the algorithm at the core of the new ISO/ITU standard for lossless and near-lossless compression of continuous-tone images, JPEG-LS. It is conceived as a—low complexity projection of the universal context modeling paradigm, matching its modeling unit to a simple coding unit. By compounding simplicity with the compression potential of context models, the algorithm—enjoys the best of both worlds. It is established on a simple fixed context model, which comes near the capability of the more complex universal techniques for capturing high-order dependencies. The model is tuned for efficient operation in conjunction with an extended family of Golomb-type codes, which are adaptively selected, and an embedded alphabet extension for coding of low-entropy image regions. LOCO-I makes compression ratios similar or superior to those obtained with state-of-the-art schemes based on arithmetic coding. Furthermore, it is within a few percentage points of the best available compression ratios, at a much drop in complexity level.

CALIC:

Context-based, adaptive, lossless image codec (CALIC). The codec obtains higher lossless compression of continuous-tone images than other lossless image coding techniques in the literature. This high coding efficiency is achieved with relatively low time and space complexities. CALIC place heavy emphasis on image data modeling. A unique characteristic of CALIC is the use of a large number of modeling contexts (states) to condition a nonlinear predictor and adapt the predictor to varying source statistics. The nonlinear predictor can make up itself via an error feedback mechanism by learning from its mistakes under a given context in the past. In this studying process,

CALIC estimates only the expectation of prediction errors conditioned on a large number of different contexts rather than estimating a large number of conditional error probabilities. The former approximation technique can afford a large number of

modeling contexts without suffering from the context dilution problem of insufficient counting statistics as in the latter approach, nor from inordinate memory use. The low time and space complexities are also attributed to efficient techniques for forming and quantizing modeling contexts. CALIC was designed in response to the ISO/IEC JTC 1/SC 29/WG 1 (JPEG) call soliciting proposals for a new international standard for lossless compression of continuous tone images. In the initial evaluation of the nine proposals submitted at the JPEG meeting in Epernay, France, July 1995, CALIC had the lowest lossless bit rates in six of seven image classes: medical, aerial, prepress, scanned, video, and compound document, and the third lowest bit rate in the class of computer-generated images. CALIC gave an average lossless bit rate of 2.99 b/pixel on the 18 8-b test images selected by JPEG for proposal evaluation, equate with an average bit rate of 3.98 b/pixel for lossless JPEG on the same set of test images.

JPEG (Joint Photographic Experts Group) (1992) is an algorithm designed to compress images with 24 bits depth or grayscale images. It is a lossy compression method to implement algorithm. One of the characteristics that make the algorithm very flexible is that the compression rate can be adjusted. If we compress a lot, more information will be lost, but the output image size will be smaller. With a smaller compression rate we obtain a better quality, but the size of the out coming image will be bigger. This compression consists in making the coefficients in the quantization matrix bigger when we desire more compression, and smaller when we want less compression. The algorithm is established in two visual effects of the people visual system. First, people are more sensitive to the luminance than to the chrominance. Second, humans are more sensitive to changes in homogeneous areas, than in areas where there is more variation (higher frequencies). JPEG is the most utilized format for storing and transmitting images in Internet.

## 2. THE WAVELET TRANSFORM

Wavelet based techniques for image compression has been increasingly used for image compression. The wavelet uses sub band coding to selectively extract different sub bands from the given image. These sub bands can then be quantized with different quantizes to give better compression. The wavelet filters are particularly designed to satisfy certain constraints called the smoothness constraints. The wavelet filters are designed so that the coefficients in each sub band are almost uncorrelated from the coefficients in other sub bands. The wavelet transform achieves better energy compaction than the DCT and hence can help in providing better compression for the same Peak Signal to Noise Ratio (PSNR). A lot of research has been done on the performance comparison of the DWT and DCT for image compression. A comparative study of DCT and wavelet based image coding can be found. The Embedded Zerotree Wavelet or popularly known as EZW is an efficient coding scheme developed by Shapiro. The resulting algorithm gave a better performance at low bit rates over the then existing schemes. The EZW marked the beginning of a new era of wavelet coding and ignited a lot of research work in this field. The two important characteristics of the EZW coding are significance map coding and successive approximation quantization. This algorithm exploits the energy compaction properties and the self-similar and hierarchical nature of the wavelet transform. The hierarchical nature facilitates coding as it forms a tree structure. Inter band prediction is used to code the positions of the significant coefficients. The EZW algorithm does not code the location of significant coefficients but instead codes the location of zeros. The EZW algorithm was further extended by Amir et. al to give a new scheme called the Set Partitioning in Hierarchical Trees (SPIHT). SPIHT achieved better performance than the EZW without having to use the arithmetic encoder and so the algorithm was computationally more efficient. The SPIHT uses a more effective subset partitioning scheme. Due to this, even binary encoded transmission achieves almost similar performance compared to EZW. The better performance of the SPIHT over EZW can be

attributed to better wavelet filters (7/9 orthogonal wavelet filters instead of length 9 QMF filters), separation of the significance of the child nodes from that of the grand child nodes, and separation of the child nodes from the parent. In this proposed work, the authors study the performance difference by comparing the entire coding scheme on the same footing. The authors indicate that the wavelet transform outperforms the DCT by around 1 dB PSNR. Some interesting results have been described by the authors in this work. Wavelet based JPEG like image coding has been shown to increase the PSNR by 1 dB over baseline JPEG. DCT-Based Embedded Image coding has been suggested.

## 3. WAVELET TRANSFORM BASED EMBEDDED ZEROTREE CODING

This scheme effectively exploits the parent-child relationship of the DWT coefficients to code and compress them efficiently. Symbols are used to represent the four different kinds of node types (ps, ns, ztr and iz) in the dominance table. The significance table contains the elements 0 and 1. From our analysis, it was found that arithmetic coding of the dominance table and the significance table together achieved better compression ratios and this was adopted in this project. In this case only 4 symbols were used to represent all the different kinds of symbols in the dominance table and the significance table. The presence of the arithmetic encoder part however makes the scheme computationally inefficient. This also forms one of the advantages of the SPIHT scheme over the EZW.

## 4. COLOR TRANSFORM:

In this proposal to develop a hierarchical prediction methods in lossless compression are based on the raster scan prediction which is sometimes inefficient in the high frequency region? In this proposal we design an edge directed predictor and context adaptive model for this hierarchical scheme. For the compression of color images RGB is first transformed to YCuCv by an RCT. RCT Reversible color transform for 16-bit-color (hicolor) picture coding. The work is incited by the increasing needs of multimedia applications

on low-end devices such as mobile phones and PDAs. They have fixed resources and up to 16-bit displays. Current image/video coding systems can barely manage this case effectively. To enhance coding efficiency on this consideration, a reversible color transform customized for hicolor systems is derived from Y'CrCb and JPEG2000 Reversible Component Transformation (RCT). The transform proves simple but highly-decorrelating, and capable to reduce the computation time of decoding. Comparison experiment presents the effectiveness of this transform with equal or even higher coding efficiency on low-end devices with 16-bit display mode.

## 5. CONCLUSION

This paper presents a wavelet based lossless image compression which minimizes the time complexity and effectively used to compress the image in lossless images.

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## MISBEHAVIOR DETECTION SCHEME IN DELAY TOLERANT NETWORKS (DTNS) USING ITRUST

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**Abstract**— The delay/disruption tolerant networks are affected by the malicious and selfish behavior of the nodes. This misbehavior detection in the networks with specific characteristics is a challengeable issue. We propose, iTrust, a misbehavior detection scheme to provide efficient trust establishment in the networks. The iTrust scheme works similar to the inspection game, with a trusted authority in it. The TA (trusted authority) finds all the information from the nodes periodically to alert them. This scheme runs on the game theory model. The proposed work is the basic iTrust mechanism which is secured and trust worthy.

**Keywords**— Misbavior detection, Security, Inspection Game, Incentive scheme, Delay Tolerant Networks.

### I. INTRODUCTION

The transmission in the delay tolerant networks get troubled with continuous network disconnectivity and many other routing problems. The message propagation process in the delay tolerant networks happens as “Store-Carry-and-Forward” method. In this method, each node enters all these levels during its message transmission. The node stores the message at first in its buffer for a time period till it finds the next right hop to send, it carries the message to the next hop and forwards it.

In DTNs, a node could misbehave probably in two ways, a malicious and selfish behaviors. A malicious node is one which drops the packets intentionally into the wrong router. They would launch the attacks, by not forwarding the messages though it has enough buffer and the capacity. A selfish (rational) node is one which does not want to forward the messages to other nodes wontedly. It wants to maximize its own benefits. However, these misbehavior nodes cause threats to the network performance. The packet delivery rate and other routing, message transmission problems cause the DTNs to low performance. Henceforth, a misbehavior detection scheme is highly desirable to overcome the problems in the DTNs.

In the traditional misbehavior schemes, works followed are neighborhood monitoring or destination acknowledgement to defect packet dropping, and exploit credit-based and reputation-based incentive schemes.

*A neighborhood monitoring or destination acknowledgement*

In this scheme, each node will be monitoring its respective neighbor in forwarding the messages. The node acts as the monitor in the transmission of the messages. The destination acknowledgement is, each node provides a message with an acknowledgement saying it has received the message. But this method of acknowledgment becomes an issue in storage capacity of the buffer. The node may take a very long time to acknowledge about the message which makes the sender to retransmit the

message. So, the long delay in receiving acknowledgement does not support the DTNs.

*Credit based model*

The credit based model works on gaining the credits on each transmission of the message. A node will be credited each time it completes its transmission of the message successfully. The node with least credentials will be discarded from the network. Though the traditional misbehavior detection techniques works will with a limited number of nodes in a network, they cannot work in the wide range of networks. The continuous change in the number of nodes and network topology in these days makes these traditional misbehavior schemes unsuitable.

II. PROPOSED WORK

Recently there are quite a few proposals for misbehavior detection in DTNs [5], [6], [7], [8], most of which are based on forwarding history verification (e.g., multilayered credit [5], [6], three-hop feedback mechanism [8], or encounter ticket [9], [10], which are costly in terms of transmission overhead and verification cost. The proposed scheme is iTrust, a misbehavior detection scheme in delay tolerant networks (DTNs). The presence of trusted authority (TA) makes the scheme unique.

*Trusted authority*

TA works just similar to the inspection game, a game theory model. In the inspection game theory, a inspector with number of inspectee will be present and the inspector verifies the inspectee if he is following the legal rules or not. The inspectee may try to violate the rules by not following them. The inspector checks on the inspectee and punishes him to discourage the misbehaviors in the game.

The similar process is followed in the DTNs, the trusted authority (TA) as the inspector and the nodes as the inspectee. The TA will check on the nodes periodically using the history from the nodes. The type of history it collects and their process is mentioned in 3.1. iTrust introduces a periodically available TA, which could launch the misbehavior detection for the target node and judge it by collecting the history evidence [1].

The working model of iTrust scheme with TA can be summarized as follows:

- First, a general misbehavior detection framework is introduced with collecting the evidences of history from the nodes.
- Second, the misbehavior detection scheme by adopting the inspection game model is followed.

TA after receiving the history evidences from the nodes for the target node, will compensate it for the misbehavior done in the network.

*Requirements for the design of the proposed work*

The design requirements are as follows:

- The trusted authority (TA) must be capable of monitoring the network periodically without fail and it should be trust worthy.
- The scheme should be independent of the size and density of the network.
- The misbehavior detection scheme should be able to tolerate the external failures such as network environments, as including nodes or deleting nodes from the network at any point of time.

III. THE PROPOSED BASIC ITRUST SCHEME

The iTrust scheme works with the Trust Authority (TA) which follows the inspection game theory for misbehavior detection in delay tolerant networks. The basic iTrust scheme has two phases, routing evidence generation phase and routing evidence auditing phase. The method works as shown in Fig. 1,

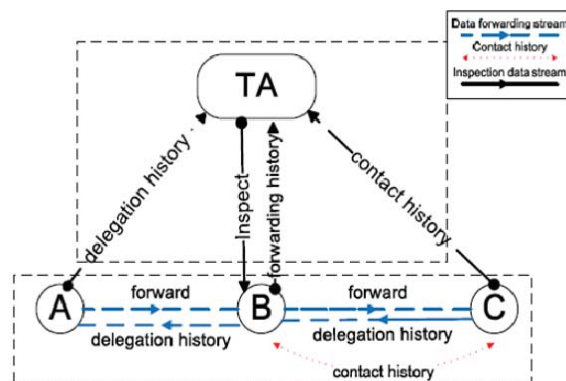


Fig. 1. The basic architecture of the iTrust misbehavior detection scheme

## 1. Routing Evidence Generation Phase

In this phase, the Trusted Authority (TA) generates evidences from all the nodes in the network. This phase contains three-steps, using this we could find the malicious node easily. This three-step process in this phase is to make the procedure as simple.

### ▪ *Delegation Task Evidence*

Now, if a source node S has to send a message M to the destination D. We assume that the forwarded message has to be stored in some intermediate node N. Here, source S generates a delegation task evidence to say that a new task has been delegated from S to N.

The delegation task evidence is used to record the number of tasks assigned from the upstream nodes to the lower stream nodes. During the audit phase, the trusted authority collects this delegation task evidences from the upstream nodes.

### ▪ *Forwarding History Evidence*

Suppose, J is another intermediate node after node N. Node N has to forward the message M to node J after checking its availability. Node J generates the forwarding history evidence on node N, indicating that node N has successfully completed its task.

The forwarding history evidence, the tasks generated by the delegation task evidences are attained.

### ▪ *Contact History Evidence*

A new contact history will be generated when the two nodes meet to forward a message. Say, node N and node J meet to forward message M. Node N generates a contact history evidence.

In the audit phase, node N submits the contact history evidence showing all the contacts it has during the process of forwarding the message M. In this step, the malicious and selfish nodes can be easily detected, as the nodes which are in contact

history and does not participate in forwarding message are considered as malicious and selfish nodes.

## 2. Routing Evidence Auditing Phase

In the auditing phase, trusted authority (TA) will request all the nodes to send their history. To check if a node has misbehaved in the network or not, TA request for the history of all the nodes on the suspected node. This misbehavior detection procedure is as follows:

### • *An honest data forwarding with sufficient contacts*

A node forwards the data honestly without dropping it in wrong node. This phase shows that, an honest data forwarding with sufficient contacts will forward data to next hop successfully without misbehaving.

### • *An honest data forwarding with insufficient contacts*

A node would misbehave here due to lack of contacts. The node may not find the next hop to forward the data, as the node has dead or discarded from the network. Network connections, network environment are also the problems in failure of finding the contacts to forward the data.

### • *A misbehaving data forwarding with/without sufficient contacts*

Nodes which are malicious and selfish fall under this category. These type of nodes does not forward the data though they have sufficient contacts. Malicious nodes drops the data into wrong contact wontedly.

## IV. OPERATIONS IN THE ITRUST SCHEME

iTrust, a misbehavior detection mechanism in delay tolerant networks with trusted authority (TA) in it is inspired by the inspection game, a game theory model. The workflow in the TA is mentioned in the Fig. 2.

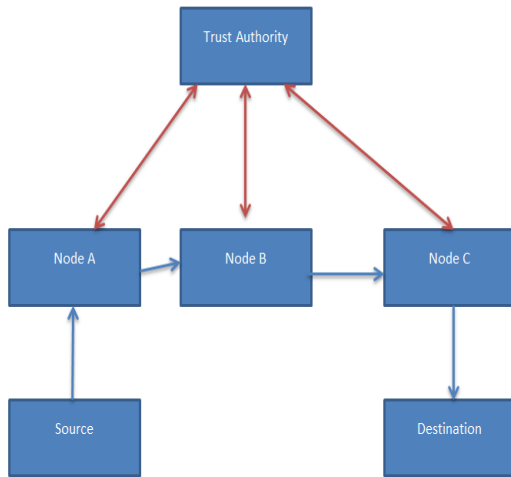


Fig. 2. Operations in the basic iTrust scheme

*Nodes*

From the figure we see that, nodes are the intermediate nodes which are forwarding the message from source to destination. Any node could misbehave at any time.

*Source*

Source is the node that generates a message that to be transmitted to the destination. In this framework, the destination is fixed. The message generated by the source should reach destination from passing through all the nodes.

*Destination*

The message reaches the final node is destination.

*Trusted authority (TA)*

The misbehavior detection scheme completely depends on the TA. TA verifies all the nodes with the inspection game model.

V. EXPERIMENT RESULTS

The nodes in the network transmits the messages to the destination from the source. To demonstrate the procedure we can see the Fig. 3, which is the result to the input of sequence of messages into the source.

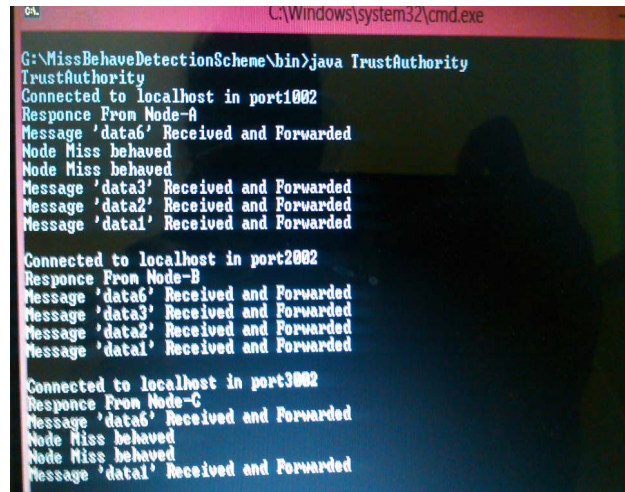


Fig. 3. Output of the messages transmitted in the iTrust mechanism

Considering Fig. 2, Fig. 3, three nodes are experimented in this section with a source and destination under TA. The result is shown in the TA, in which each time one of the nodes fails to forward the message.

CONCLUSION

In this paper, we propose a misbehavior detection scheme (iTrust), inspired with the inspection game. We have focused in detecting the misbehaving node in the network mostly. Our future work will focus on the process of reducing the transmission overhead incurred by misbehavior detection.

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# A SEMANTIC BASED APPROACH FOR TEXT CLUSTERING USING AN ADVANCED CONCEPT-BASED MINING MODEL

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**Abstract-**The most common methods for text mining are based on the statistical analysis of the terms or word, Here the frequency of the terms are considered to find out the importance of a word in the document only. But the term which contribute to the sentence semantic is significant, which leads to the discovery of the topic. In this proposed model the natural language processing technique is efficiently used to capture the semantics of the text can be applied to enhance text clustering. A concept based mining model is introduced for this. The term which contributes to the sentence semantics is analyzed on the sentence, document and corpus levels rather than the traditional analysis of document only. According to the semantics of the sentence the proposed model can identify concept match between the documents. Experiments are conducted on different datasets using this proposed concept mining model for text clustering. The experiment results are the display of extracted concepts and proposed concept based mining model can be used for the enhancement of the clustering.

**Index terms-**concept based mining, Text clustering, Concept based similarity.

## I. INTRODUCTION

Natural Language Processing is concerned with the interactions between computer and human languages. NLP has significant overlap with the field of computational linguistics, [1] and is often

considered as a subfield of Artificial Intelligence (AI).

Clustering is one of the traditional data mining techniques. Clustering is the process of grouping the documents where the topic of the one group will be different from the other group [2]. Most current document clustering methods are based on Vector Space Model (VSM) [3]. VSM is widely used for text clustering and text classification.

Another common methods used for text clustering include decision trees [4], conceptual clustering [5], statistical analysis [6] etc. Usually in text mining the importance of a term in a document is identified by computing the term frequency in documents [7]. Even though two terms can have the same frequency in their documents, but one term contributes more to the meaning of its sentences than the other term.

Semantics deals with the meaning of the sentence. Semantic analysis is basically capturing the meaning conveyed by the sentence. It plays an important role in natural language processing [8]. In this paper a semantic based approach for text clustering using an advanced concept mining model is proposed. The proposed model captures the semantic structure of each term within a document rather than the frequency of the term within a document only. In this model, three measures for analysing concepts on the sentence, document and corpus levels are possible.

Here the concept means the semantic role of each term in the sentence. The proposed model can detect the concept in the text document by the analysis of sentence. When a new document is introduced the system can identify the matching

concepts by processing introduced document and previous document. Here an extraction of matching concepts of the given documents can be done for clustering.

A new concept based similarity measure of the concept analysis on sentence and document levels are proposed. Similarity measure can be based on the sentence based, document based and corpus based concept analysis when it is applied for clustering. The concept can be a word or phrase which is totally dependent on the semantic structure of that particular sentence.

In this paper the results are demonstrated as the extracted concept list and the results are evaluated.

## II. PROPOSED WORK

The proposed concept based mining model consists of sentence based and document based concept analysis. Fig .1 shows the working model of the concept based mining model.

A raw text document is input to the proposed model. Text processing is the first step applied to the raw text document. Sentences in the document are arranged with well defined boundaries, which ease the process of separation of sentences for the analysis [10], [11]. Each sentence in the document may have one or more verb argument structures. The verb arguments are labelled and the sentences which have many labelled verb argument structures have many verbs associated with their arguments. This verb argument structures are captured and analysed in document and corpus level using concept based mining model.

In this model the arguments and verbs are considered as terms. One term can be an argument to more than one verb in the same sentence. This means that, this term can have more than one semantic role in the same sentence. Here the term plays important semantic role that contribute to the meaning of the sentence. In the concept based mining model the labelled term that either word or phrase considered as concept [9].

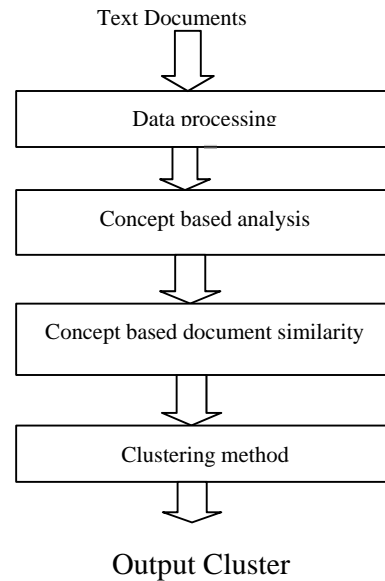


Fig .1. Concept based mining model system

### A. Sentence based concept analysis

Each sentence in the document is analysed. A conceptual term frequency (ctf) is proposed in this model by analysing the concept of the sentences, which gives the conceptual term frequency measure.

Here in sentence based concept analysis ctf is local measure on the sentence level.

### B. Calculating ctf of sentence s

Ctf of the sentence is calculated by counting the number of occurrence of concept c in the verb argument structures of sentence s. If the concept c appears frequently in the verb argument structure of same sentence, and then it has very much importance in the meaning of that particular sentence.

### C. Calculating ctf of document d

The concept c might have number of ctf values in different sentences in the same document d. The ctf value of concept c in the document can be calculated using the equation below:

$$ctf = \frac{\sum_{n=1}^{sn} ctf_n}{sn}$$

Here sn is the total number of sentences that contain concept c in document d [9].

By calculation of the ctf values, this represents the overall importance of each concept to the semantics of a document through the sentences.

Table 1  
Example of calculating ctf measure

Row Number	Sentence concept	CTF
1	observed	1
2	intrusion technique created military effort eventually e-commerce IT industry	1
3	intrusion technique	3
4	created	3
5	military effort	3
6	intrusion technique created military effort	2
7	eventually	2
8	e-commerce IT industry	2
	<b>Individual concept</b>	<b>CTF</b>
9	intrusion	3
10	technique	3
11	military	3
12	effort	3
13	eventually	2
14	e-commerce	2
15	IT industry	2

D. Document based concept analysis

Document based concept analysis is accomplished by calculating the number of occurrence of concept c in the original document.

E. Corpus based concept analysis

To identify the concepts of different documents, concept based document frequency is calculated. This concept based document frequency is global measure.

F. Illustration of computing the proposed conceptual term frequency (ctf).

Sentence based concept analysis is explained using the example below:

“We have **observed** how some intrusion techniques, **created** for the military effort, have eventually been **applied** for the ecommerce and IT industry”

The words which marked bold are the verbs of the sentence are important for the semantic structure of the sentence. These words are **observed**, **created** and **applied**. Document cleaning is the first step performed. The stop words are removed and stemming is performed using stemming algorithm [12], [13]. These all operations are done in the sentence level.

Identify the verb argument structures in the sentence are the important step in the first stage. There by the semantic analysis [14], [15] of the each sentence will be possible. Then the term or word generated after all these steps are called concepts. In this example, the concepts generated after all steps are shown below without stemming for better understanding:

1. Concepts in the first verb argument structure of the verb **observed**:
  - “observed”, “intrusion technique created military effort eventually e-commerce IT industry”
2. Concepts in second verb argument structure of the verb **created**:
  - “Intrusion technique”, “created” and “military effort”.
3. Concepts in the third verb argument of the word **applied**:
  - “Intrusion technique created military effort”, “eventually”, and “e-commerce IT industry”.

These concepts obtained from the same sentence. The concepts extracted are “observed”, “intrusion technique created military effort eventually e-commerce IT industry”, “intrusion technique”, ”created”, ”military effort”, ”intrusion technique created military effort”, ”eventually”, ”e-commerce IT industry”.

In traditional analysis same weight is given for the words that present in the same sentence. In concept based analysis which analyse the semantics of the sentence.

Table1 shows the calculation of conceptual term frequency measure (ctf) of this particular sentence. Higher value of the conceptual term frequency measure is important which contributes more to the meaning of that sentence.

The table shows the ctf measures of the sentence. The rows 1 to 8 show the extracted sentence concepts. The rows 3 to 8 show the concepts which are overlapped with the other concepts. The individual concepts are in row 9 to 15.

Here topic of the sentence will be the concept which has the highest ctf value. In this example



“observed” has the very lowest ctf value, so it has very less importance in the meaning of the sentence.” Intrusion technique”, “created”, “military” and effort have the importance in the meaning of the sentence.

G. Concept based similarity measure

To enhance clustering concept based similarity measure of the input documents can be calculated. The efficient algorithm developed from the proposed concept based mining model can efficiently be used for the clustering purpose. The concept based mining model identifies matching concepts in sentence and document level. Finally the clustering of documents is possible by extracting the concepts of different documents and the documents have the same concept can put together.

III. EXPERIMENT RESULTS

To demonstrate the improvement in clustering the different documents given as the input and which processed with proposed concept mining algorithm. The figure 2.1 shows the window where user can give the inputs. Using the browse button user can input the text document.



Figure.2.1 inputting the text

The figure 2.2 shows the output results where the verb frame displays the concept of the sentences. Here the concept which has the highest value will be the considered as the concept of the document.



Figure 2.2 The Concept List

IV. CONCLUSIONS

The proposed concept mining model is an efficient clustering technique which makes use of the natural language processing. The semantic based approach of this model improved the clustering quality. The proposed model analyzed the documents in the sentence level, document level. The concept term frequency of the documents are calculated, by that the concept of document are identified.

The documents allowed to process with the algorithm and the concept lists are showed in the frame.

The proposed model can be efficiently used in different areas where clustering is important. Applying the proposed model to the web documents is one of the extensions for this work. This can be efficiently used for different web applications; search engines are one of the examples where we can use this clustering method. Another extension for this concept based mining model is which can be efficiently used for text classification.

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## MECHANICAL AND TRIBOLOGICAL PROPERTIES OF ALUMINUM AL6061 ALLOY REINFORCED WITH SICP

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**Abstract—** After making and controlling fire and inventing the wheel, spinning of continuous yarns is probably the most important development of mankind, enabling him to survive outside the tropical climate zones and spread across the surface of the Earth. Flexible fabrics made of locally grown and spun fibers as cotton; flax and jute were a big step forward compared to animal skins. More and more natural resources were used, soon resulting in the first composites. These composites are classified as Organic Matrix Composites (OMCs), Metal Matrix Composites (MMCs) and Ceramic Matrix Composites (CMCs).

Metal matrix composite (MMC) are composed of particles distributed or embedded in a matrix body. The particles may be flakes or in powder form. Concrete and wood particle boards are examples of MMC's. In present day design and development activity aluminum (Al) and its alloys are most popular matrix for the MMC's because of their low density, good thermal conductivity, electrical properties, corrosion resistance and damping capacity due these properties aluminum based alloys are widely used in prototyping for the space

shuttle, commercial airlines, electronic substrates, bicycles, automobiles, golf clubs, and a variety of other applications. Aluminum based composites are reinforced with several particles like SiC, Al<sub>2</sub>O<sub>3</sub>, Gr, TiC, Fly ash, TiB<sub>2</sub>, B<sub>4</sub>C, TiO<sub>2</sub> etc., to get better mechanical and tribological properties.

In the present work Al6061 alloy is reinforced with commercially available Silicon carbide particle (SiCp) were manufactured using to stir casting process to investigate mechanical and wear properties using ASTM E-384 for Hardness and ASTM E8M-11 for tensile test by varying the wt% fractions of SiCp. The microstructures of the AMC's were studied using optical microscopy to observe grain boundaries and particles distribution in the aluminum matrix.

It is observed that a significant improvement mechanical properties by increasing the weight percentage of SiC particles. The particle size, volume fraction, shapes of the particles very much influence the mechanical properties of composite materials.

**Index Terms—**Al6061 alloy, ASTM E-384, ASTM E8M-11, Mechanical and Wear Properties and SiCp.

## I. INTRODUCTION

Fibers or particles embedded in matrix of another material are the best examples of modern-day composite materials which are mostly structural. Laminates are composite material where different layers of materials gave them the specific character of a composite material having a specific function to perform. Fabrics have no matrix to fall back on, but in them, fibers of different compositions combine to obtain a specific character. Reinforcing materials generally withstand maximum load and serve the desirable properties in matrix-based structural composites. The matrix serves two paramount purposes viz., binding the reinforcement phases in place and deforming to distribute the stresses among the constituent reinforcement materials under an applied load.

Metal matrix composite (MMC) is engineered combination of the metal (Matrix) and hard particle/ceramic (Reinforcement) to get tailored properties. Most metals and alloys could be used as matrices and they require reinforcement materials which need to be stable over a range of temperature and non-reactive too. However the guiding aspect for the choice depends essentially on the matrix material. Light metals form the matrix for temperature application and the reinforcements in addition to the aforementioned reasons are characterized by high moduli. Titanium, Aluminum and Magnesium are the popular matrix metals currently in vogue, which are particularly useful for aircraft applications. If metallic matrix materials have to offer high strength, they require high modulus reinforcements. The strength-to-weight ratios of resulting composites can be higher than most alloys.

The melting point, physical and mechanical properties of the composite at various temperatures determine the service temperature of composites. Reinforcements for the composites can be fibers, fabrics particles or whiskers. Reinforcing constituents in composites, as the word indicates, provides the strength to the composite. But they also serve certain additional purposes of heat resistance or conduction, resistance to corrosion and provide rigidity. Reinforcement can be made to perform all or one of these functions as per the requirements. A reinforcement that embellishes the matrix strength must be stronger and stiffer

than the matrix and capable of changing failure mechanism to the advantage of the composite.

Choice of fabrication method depends on matrix properties and the effect of matrix on properties of reinforcements. One of the prime considerations in the selection and fabrication of composites is that the constituents should be chemically inert non-reactive.

Many investigations were carried out to study the mechanical and wear properties of aluminum based composites which are listed in foredooming sections

G.B.Veeresh Kumar et.al. [1] Studied the mechanical and dry sliding wear of Al6061-SiC composites and proposed that, the tensile strength has enhanced with the addition of SiC.

A El-Sabbagh and others [2] were investigated the distribution of SiC particulates before and after rolling Al 6061 and Al 6082 alloys reinforced with SiC and concluded that the improvement in redistribution of SiC in a structure and also studied the mechanical properties such as strength and modulus of elasticity and identified that after rolling ductility was decreased.

Ahmed M and El-Sabbagh [3] analyzed the effect of hot rolling on tensile behavior of wrought Al-SiCp composites prepared by stir-casting method and concluded that with increasing the volume fraction of SiCp, UTS and Young's modulus are increased.

S.Gopalakrishnan [4] investigated the production and wear characteristics of AA 6061 and titanium carbide particulate reinforced composite and suggested that composite manufactured with stir casting process is most economical and effective way of producing Al-TiCp composite.

J.Jebeen Moses et.al., [5] explored the characterization of SiC with AA 6061 aluminum alloy composites produced via stir casting and showed that SiC particles refined the grains boundaries and bonding strength is strong and clean without the presence of pores and voids.

Pradeep Sharma et.al., [6] investigated the production of AMC by stir casting and stated the characteristics of Al6061.

All literatures are revealed that different alloys of aluminum are having lower density, lower melting point, and ease of processing, high thermal conductivity, low coefficient of thermal expansion; good wear resistance, high temperature strength, availability and low cost influence the choice of Al6061 as a base metal. Silicon carbide is used as reinforcement material because of the fact that the density of SiC (3.2g/cm) is very close that of aluminum AL6061 (2.7g/cm<sup>3</sup>) and it is commercially available with different grades and the resistance of SiC to acids, alkalis or molten salts up to 800°C thus it makes a good reinforcement for aluminum. Hence in the present study, Al6061–SiC composites containing various weight percentages of SiC particulates are used to study the mechanical and wear properties.

## II. MANUFACTURING OF MMC

Manufacturing of aluminum alloy based casting composite by stir casting is one of the most economical methods of processing MMC's because of its simplicity, flexibility and applicability to large quantity of production.

In a stir casting process, the reinforcing particles are added into molten Aluminum at elevated temperatures along with the mechanical stirring. Mechanical stirring in the furnace is a key element of this process. The molten alloys, with ceramic particles are stirred around 10-20 minutes to obtain uniform distribution of SiC particles. This molten metal was poured to get required castings.

In this work, Al6061 aluminum alloy melted in a 6 KW electrical resistance furnace and the furnace temperature rose to 750°C and maintained until the matrix material melted completely, at this stage the Hexachloroethane de-gasifying tablets were added to remove the slag and the entrapped gases.

The stirring was done using the four blade stirrer, which is driven by a variable speed motor, to create vortex in the melt. Preheated SiC powder of laboratory grade particulate size of 400 μm at 600°C was introduced into the vortex. After the addition of the SiC, the temperature of furnace was maintained at 700°C and stirring was continued for 10 minutes with 400 rpm in order to maintain uniform distribution of SiC in aluminum. The semi-solid slurry was poured into specially designed moulds. The cylinders of 22

mm x 210 mm cast composites of Al6061–SiC were obtained.

The extent of incorporation of SiC in the matrix alloy was varied from 2 to 8 wt% in the steps of 2. The casted ingots are shown in Figure 2.

The cast composites were machined as per ASTM – 384 and ASTM E8M–11 to conduct mechanical properties. Tribological test were conducted by weight loss using pin on disc experiment.



Fig.1. Experimental setup for stir casting process



Fig.2. Al 6061 and SiC Casting.

## III. MECHANICAL CHARACTERIZATION OF MMC

Mechanical properties like tensile strength, hardness, impact strength, wear strength etc are to be carried out for different weight fractions of SiC reinforced Al 6061 alloy using different ASTM standards.

### A. Tensile Test

ASTM E8M–11 test specimens according to the dimensions were prepared for analyzing the tensile strength for different weight fractions of SiC i.e., 2%, 4%, 6% and 8 %.

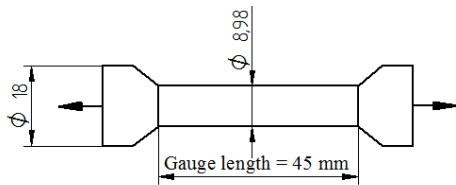


Fig.3. ASTM E8M-11 test specimen.

The tensile test specimen is clamped in the jaws of the UTM (universal testing machine) model TUE400(C) with suitable holders and it is stretched by applying a force through the hydraulic drives. At each load step deformations are noted with the help of extensometer using strain displacement relations strains were computed, with the help of stress – strain relations stresses developed in the test specimens were calculated and stress- strain diagrams were plotted for different weight percentage of SiC.

*B. Hardness test*

Hardness is the measure of a materials resistance to plastic deformation against indentation with an applied load. A standard way of representing the micro-hardness value of a material is by Vickers hardness number (VHN). A material with a higher VHN value has greater resistance against deformation. Vickers hardness testing machine Model HV114 according to ASTM: E-384 standard is used. The apex angle of the pyramid indenter used in this machine is 136° and the load applied is 100 kgf. Hardness test specimen shown in figure 4 for different wt% of SiC were machined and tested.

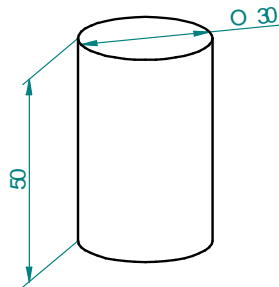


Fig.4 ASTM E- 384 test specimen for Vickers hardness test.

Three impressions are made with an applied load of 100 kgf by the pyramid-shaped diamond indenter of the machine at different locations on the polished surface of each sample. The diagonal of the impressions are measured and processed by the image processing techniques

that are intrinsic to the machine, and the VHNs of different samples are calculated using a standard formula.

*C. Wear observations*

Wear is the progressive removal of material from the surface caused by microscopic removal mechanisms in sliding or rolling contact against a counter surface [7]. Abrasive wear is the continuous removal of material due to grooving by hard particles occurs from the pin surface when it slides over an abrasive disc. Normally, abrasive wear is caused by mechanisms such as micro-cutting and micro-ploughing. Micro-cutting results in microscopic chips due to material removal and micro-ploughing results in the formation of side edges due to material displacement.

Wear tests were performed by using pin-on-disc equipment. A typical wear testing machine is shown in figure 5.

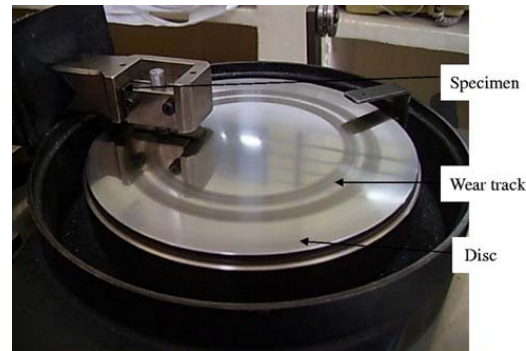


Fig.5. Pin on disk wear testing machine

*D. Microstructure studies*

Microstructure analyses were carried to know the distribution and grain boundaries in the material system. The micrographs of the composites with different wt% of SiC sample are cut from each of weight fractions and it is polished with different grades of emery paper using polishing machine, then polished with silky smooth rolling diamond polish and dipped in Keller’s agent. Specimens are viewed through Nikon optical microscope model LV 150 and micrographs are obtained from the samples with different magnification.

IV. RESULTS AND DISCUSSIONS

*A. Tensile strength*

The tensile test was performed in accordance with ASTM – E8M-11 standard at room

temperature for different wt% of SiC. Table 3 shows the values of tensile strength and percentage elongation of the specimen.

Table 1. Tensile strength for different wt% of SiC

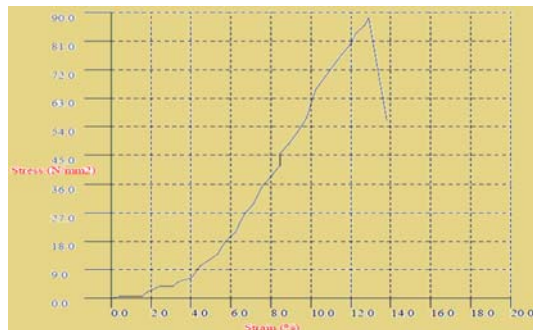
% of SiCp	Tensile Strength (MPa)	% Elongation
2%	88	2.8
4%	98	2.52
6%	105	2.27
8%	113	2.24

It can be noted that the addition of silicon carbide particles improves the tensile strength of the composites. The surrounded hard particles in the matrix act as barrier that resists the plastic deformation of composites when it is subjected to strain.

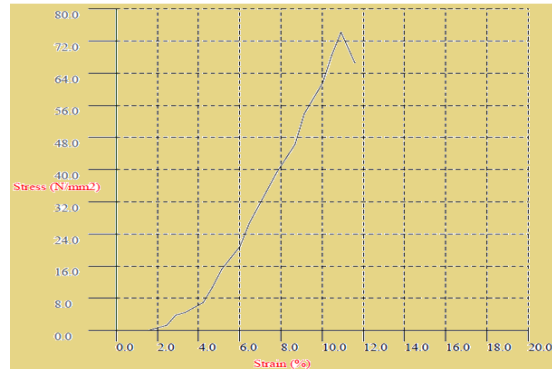
The tensile strength of the composite was increased by 28% with increase of silicon carbide particulates from 2 to 8wt%. Further, increase in SiC in composite system ductility decrease and material becomes brittle hence, it is required to optimize the wt% of SiC.

Similarly, with the increase in SiC content the percentage elongation of the composite decrease and drops from 2.8% to 2.24% this is due to increased embrittlement effect in local stress concentration sites at the reinforcement-matrix interface.

**B. Stress Strain Curve**

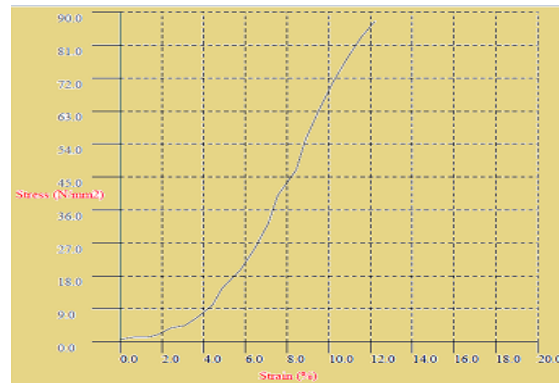


(a) 2% SiC

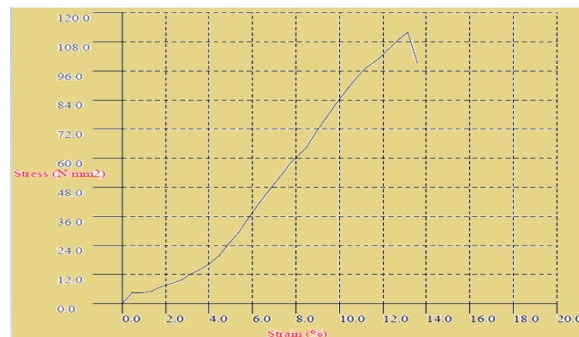


(b) 4% SiC

From the stress strain curve the specimen exhibited elastic properties predominately the maximum stress at the failure were observed for different wt% of SiC as shown in figure 6. composite with 8 wt% of SiC shows a considerable improvement in the tensile strength.



(c) 6% SiC



(d) 8% SiC

Fig.6 Stress & strain curve for different weight fractions of SiC.

C. Hardness studies

Variation in the indentation resistance behavior of Al6061/SiC composites due to the inclusion of different percentages of SiC were compared by their Vickers hardness numbers (VHNs) as shown in Table 2.

Table 2. Vickers hardness numbers (VHNs)

% of SiCp	Trial 1	Trial 2	Trial 3	Average Hardness Number(HV)
2%	67	68	70	68
4%	80	82	78	80
6%	93	94	92	93
8%	103	102	100	104

In the hardness test, severe plastic flow has been concentrated in the localized region directly below the indentation, outside the indentation the material still behaves elastically.

As the indenter moves downward during the test, the pressure has been accompanied by non-uniform matrix flow along with localized region which increase in particle concentration, which tends to increase the resistance to deformation. Consequently, the hardness value increases due to local increase in particle concentration associated with indentation of SiC.

Hardness of the Al6061–SiC composite material increases by an amount of 53% as the content of SiC increased from 2-8wt%. The improvement in the hardness can be attributed to the fact that the SiC possess higher hardness and its presence in the matrix improves the hardness of the composite [8].

D. Wear observations

The variations in the wear resistance behavior of Al6061/SiC composites due to the addition of different wt% of SiC particles were observed by conducting a pin-on-disc dry wear testing.

Table 3. Wear rate of Al6061/SiC composites

% of SiC p	Load W (Newton)	Velocity (m/s)	Sliding Distance (m)	Time (s)	Wear loss (gm)
2%	50	2	1000	500	0.0112
	75	2	1000	500	0.0184
	100	2	1000	500	0.0199
4%	50	2	1000	500	0.0103
	75	2	1000	500	0.0175
	100	2	1000	500	0.0178
6%	50	2	1000	500	0.0099
	75	2	1000	500	0.0148
	100	2	1000	500	0.0157
8%	50	2	1000	500	0.0074
	75	2	1000	500	0.0117
	100	2	1000	500	0.0123

Table 3 shows the results of wear loss for different wt% of SiC. In this test, the wear test specimen in the shape of a square pin is pressed under load onto a rotating disc made of hardened steel. The distance of the pin from the centre of the disc and the rotating speed can be controlled to obtain a constant sliding velocity. The constant sliding distance can be achieved by calculating the number of disc revolutions and test was carried out for different loads i.e., 50, 75 and 100 N. The sliding velocity and the sliding distance were fixed at 2m/s and 1000 m for a sliding time of 500 seconds.

It can be seen that as the percentage of reinforcement increases, the wear rate of the composites decreases. The lower wear rates in composites with higher amount of SiC particles can be attributed to the high peak hardness and good interfacial bonding in the composites. On the other hand, the composite experiences a decrease in volumetric wear rate with increasing applied loads, indicating that hard SiC particles can protect the aluminum alloy matrix effectively during sliding wear.

E. Microstructure studies

The microstructure of the composites used as an important indicator of the quality of the composites and a measure of the effectiveness of the technique adopted for the production.



Figures.7 shows microstructure of Al6061/SiC metal matrix composites produced by stir casting process.

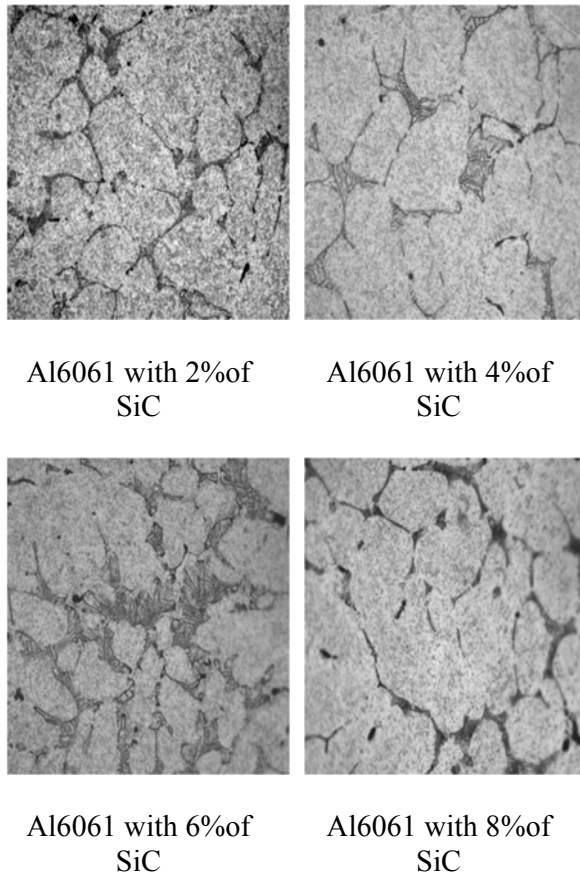


Fig.7. Microstructure (500 X) of the AA6061/SiC composite samples.

Micrographs reveal that there is fairly uniform distribution and proper bonding of SiC particulates throughout the matrix alloy. It is also observed that porosity is lower and good bonding between the matrix and the reinforcement resulting in better load transfer from the matrix to reinforcement material.

#### V. CONCLUSION

Al6061/SiC AMC's were fabricated using stir casting technique. The effect of SiC content on microstructure and mechanical properties were analyzed

- The tensile strength of the composites has found to be increased with increase in reinforcement of SiC.
- Hardness value of the composites increases with addition of SiC particles it was observed

that 50-53% of hardness was increased with the addition of 8% SiC particles.

- A significant difference in the transition of wear rate was observed for the Al6061/SiC composites with different weight percentages. Composites material's resistance to wear increases due to the addition of SiC particles hence these composites are used in high temperature applications.
- The microstructure studies revealed the uniform distribution of the particulates in the matrix system to get better strength.
- Concluded that Al6061-8 wt% SiC exhibits superior mechanical and tribological properties.

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## SELECTION OF A RTOS FOR AN EFFICIENT DESIGN OF EMBEDDED SYSTEMS

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**Abstract:** Real Time Operating Systems (RTOS's) are the basic building block for most of the Embedded Systems (ES). There are wide ranges of RTOS's available to the designers/ developers of ES's ranging from RTOS for robotics to home appliances. Each application demands a specialized set of requirements and to meet these requirements the designer needs to select the RTOS, which meets the desired requirement. This is a critical task for him/her and time consuming because it involves to know all the specifications of different RTOS and there are various RTOS's available in the market that include micro kernels to commercial RTOS's. So it is the task of the designer to select the suitable RTOS from the vast list of RTOS's. The design space available to any RTOS is very large and there are countless set of characteristics such as Development Methodology, Scheduling Algorithms, Kind of Real Time (Soft or Hard), Priority Levels, Development Host, Standards followed, Kernel ROM size, Kernel RAM size, Multi process Support, Multiprocessor Support, Interrupt latency, Task Switching time, Kind of IPC mechanism, Memory management, Power management, Task management, Price etc. These characteristics will guide the designer for selecting the RTOS that meets the requirements. Selecting the RTOS based on these parameters is a multidimensional search problem with each dimension corresponds to a RTOS characteristic and it requires an exhaustive search with

tremendous computing resources and time. In our framework of RTOS selection, we have used the Simple Genetic Algorithm (GA) with interactive GUI by which the developer can choose the proper RTOS for a given application or a project efficiently.

**Index Terms –** RTOS, GA, Real Time Systems, Embedded System Design

### I. INTRODUCTION

Embedded systems are an invention that has taken more than a hundred years to take the present day shape. The way they have manifested themselves in our lives, is nothing less than the effect that the discovery of fire or the invention of the wheel had on the evolution of mankind. An embedded computing system or embedded system includes a digital electronic system embedded in a larger system and it is an application specific. These systems are becoming an integral part of various commercial products like mobile phones, watches, flight controllers etc. The developer needs to select a right RTOS based on these applications. There is a strong and compatible relationship between the system hardware and the software, primarily the operating system to ensure hard real time deadlines. The paper is organized in various sections: In section II we survey the related work in selecting the RTOS and its important parameters. In section III, we explain the important parameters of a RTOS and its role in embedded systems design. Section IV describes

the fundamentals of Genetic Algorithm GA and its operators. Section V describes the selection of RTOS and in section VI, the example. In section VII, experimental results are provided as well as discussions and finally, in section VIII we have provided the conclusions and directions for future work.

#### Related Prior Work

Decision making occurs in all fields of human activities, such as scientific, technological and every sphere of our life. Engineering design, which entails sizing, dimensioning and detailed element planning is also not exempt from its influence. The past decade has seen a significant research work on selecting the RTOS [17, 18, and 19]. Designers are impressive task when selecting the RTOS for specific applications like Space, Security, military, process industry, communications, robotics, Data Acquisition, consumer electronics and so on in which each application demands specific requirements.

Just like high-level languages, RTOS's allow you to develop applications faster [19]. They can require a little more overhead, but as the technology improves, the overhead seems to diminish. In Greg Hawley [19], he has provided criteria for selection of RTOS based on the processor and based on the requirements. He also considered many other parameters like, company profile, licensing policy, technical support etc. In Philip Melanson, Siamak Tafazoli [17], a selection methodology for the RTOS market various method are adopted for space applications. This aper describes the elimination criteria for selection of RTOS to a very specific space application and ranked the existing commercial RTOS that are available in the market but they have not provided the generic framework for RTOS selection. In Ger Scoeber, how to select your RTOS [18] described the framework for selection of RTOS for a class of applications and its characteristics that meets the application but it doesn't provided the methodology to select the RTOS based on the designers/developers requirements which are incorporated in this paper.

Criteria for selection of a RTOS need to be much more flexible and much less specific [20]. Since 1940, several optimization problems have not been tackled by classical procedures including: Linear Programming, Transportation,

Assignment, Nonlinear Programming, Dynamic Programming, Inventory, Queuing, Replacement, Scheduling [3, 9] etc. Normally, any engineering problem will have a large number of solutions out of the feasible solutions. The designer's task is to get the best solution out of the feasible solutions. The complete set of feasible solutions constitutes feasible design space and the progress towards the optimal design space involves some kind of search within the space. The search is of two kinds, namely deterministic and stochastic. Nontraditional search and optimization methods have become popular in engineering optimization in the recent past, and these algorithms include: *Simulated Annealing, Ant Colony Optimization, Random Cost, Evolution Strategy, Genetic Algorithms, Cellular automata* [3, 9, 12] etc. Obenland's [16] paper looks at POSIX in real time systems and POSIX thread extensions and compares the performance of the general purpose operating systems and two real time operating systems. Stewart's [15] paper illustrates different methods for estimating execution time of both user level and operating system overhead. Coarse gain timing measurements is calculated in software in real time granularity in milliseconds. Mana discusses Linux as a real time operating system and different approaches for real time Linux kernel. Timmerman [14] describes the framework for evaluation of real time operating systems. This article makes a really good point of comparing RTOS under different load conditions. Yodaiken's [2] paper explains hard real time approach of RTLinux and it's one of the first papers written on RTLinux.

## II. NEED OF RTOS FOR AN EMBEDDED SYSTEM

Embedded systems are continuously increasing their hardware and software complexity moving to singlechip solutions [1] (SoC's). The RTOS in Embedded System mainly does the following tasks.

- It will simplify control code required to coordinate processes.
- It also provides an abstraction interface between applications with hard real-time requirements and the target system architecture.

- The availability of RTOS models is becoming strategic inside hardware/software co-design environments.

### III RTOS

RTOS can be defined as “The ability of the operating system to provide a required level of service in a bounded response time.” (POSIX Standard 1003.1). A real-time system responds in a (timely) predictable way to unpredictable external stimuli arrivals. To build a predictable system, all its components (hardware & software) should enable this requirement to be fulfilled. Traffic on a bus for example should take place in a way allowing all events to be managed within the prescribed time limit. RTOS should have all the features necessary to be a good building block for a Real Time system. However it should not be forgotten that a good RTOS is only a building block. Using it in a wrongly designed system may lead to a malfunctioning of the RT system. *A good RTOS can be defined as one that has a bounded (predictable) behavior under all system load scenarios (simultaneous interrupts and thread execution).* In RT system, each individual deadline should be met. There are various types of real-time systems

#### Types of RTOS

RTOS’s can be broadly classified in to three types, namely, the Hard Real Time RTOS, Firm Real Time RTOS and Soft Real Time RTOS, which are describes bellow.

Hard real-time: A deadline cant be missed as it can lead to catastrophic results for the system;  
 Firm real-time: If a deadline is missed causes an unacceptable quality reduction as a consequence;  
 Soft real-time: deadlines may be missed and can be recovered from. The reduction in system quality is acceptable.

#### IV Algorithms for RTOS Selection

There is hardly any specific algorithm found for RTOS selection except the elimination criteria, which is difficult for the developer and time consuming as it mentioned in the related work. It is the first attempt to use a tool to select RTOS which uses the Genetic Algorithm. Over the last couple of decade, GA’s have been extensively used for optimization and search tools in various domains, which includes all branches of engineering and Science. The basic reasons for

the success of GA’s are their broad applications, Parallelism, easy of use and global perspective<sup>2</sup> In principle, GA’s are adaptive procedures that find the solutions to problems by evolutionary process based on natural selection. In practice, GA’s are iterative search algorithms with various applications. In general, GA’s maintain a population of individual solutions to the problem. Each individual can be represented by a string called chromosome. During each iteration, or called generation, the individuals in the current population are rated for their fitness as a solution. The fitness function evaluates the “survival” or “goodness” of each chromosome. By applying the different genetic operators, new populations of candidate solutions are generated.

#### GA Operators

In general, GA’s make use of different operators. In this implementation, we use the *selection, crossover, and mutation* operators which are described below.

#### Selection or Reproduction

Individuals in the population can be heuristically or randomly initialized. The population of the next generation is reproduces using a probabilistic selection process. Individuals with higher fitness will have the more chance to reproduce.

#### Crossover

This operator takes two randomly chosen parent individuals as input and combines to generate two children. This is performed by choosing two crossing points in the strings of the parents and then exchanging the allelic values between these two points as shown in the Fig 1. The crossover operator provides a powerful exploration capacity by exchanging the information from two parents.

A: 00 111 000

B: 11 000 111

Before crossover

A: 00 000 000

B: 11 111 111

After Crossover

Fig. 1. Crossover operation

#### Mutation

The crossover operator may lead to falling into a local minimum of the fitness function because a generated child tends to be very similar to its parents. In order to reduce this phenomenon, mutation operator is used. This operator creates

new individual by modifying gene values of an existing individual as shown in the Figure 2.

Before Mutation: 110 0 011

After Mutation: 110 1 011

Fig. 2. Mutation Operation

Mutation provides the random search in the problem space and prevents complete loss of genetic features through selection and elimination. Thus mutation operator reduces the probability of falling into a local minimum of the fitness function. After applying reproduction, crossover and mutation, the new population is ready for testing for fitness. Now, we apply GA for decoding new strings, calculate fitness, and then generate a new population.

### V SELECTION OF RTOS

Ranking RTOS is a tricky and difficult because there are so many good choices are available in the market [21]. The developer can choose either commercial RTOS (44% developers are using) or open- source RTOS (20) or internally developed RTOS (17 %). This shows that almost 70% of developers are using the RTOS for their current projects [20] and are migrating from one RTOS to another due to various reasons. To handle the current requirements of the customers, developers are using 32 bit controllers in their projects in which 92% projects/ products are using RTOS[21] and 50% of developers are migrating to another RTOS for there next project. This influences importance of the selection of right RTOS to a particular project so that it meets all the requirements and fulfills its intended task. In all of the related work authors have used the elimination criteria which are manual and it takes more time and need the detailed specifications of all the existing commercial RTOS's. In order to select RTOS, the designer first identify the parameters for selection based on the application and the intended requirements are provided to the systems through an interactive user friendly GUI which is shown in below. The designer has the freedom to omit and or include parameters and also he/she can edit the database of RTOS for efficient selection under multi user environment. Subsequently, genetic algorithm is used to arrive at the RTOS taking into account the parameters that are specified.

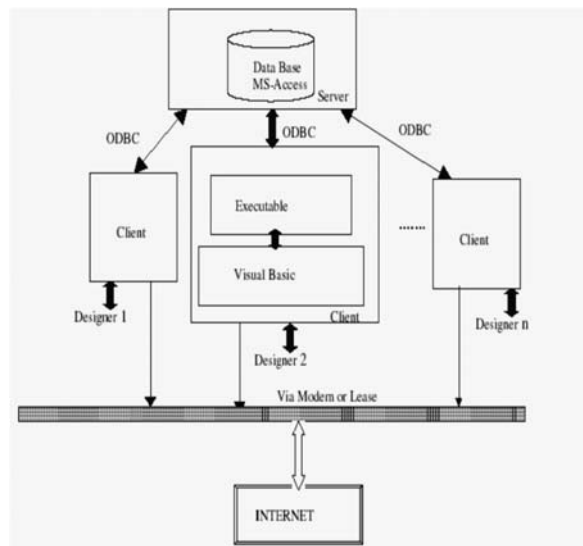


Fig. 3. Architecture of the System  
RTOS Parameters

Among the different parameters for selecting the RTOS, the ones used in our system are: 1. Interrupt Latency, 2. Context switching 3. Inter task Communication (Message Queue Mechanism, Signal Mechanism, Semaphores), 4. Power Management (Sleep mode, Low power mode, idle mode, Standby mode) 5. No. of Interrupt levels 6. Kernel Size 7. Scheduling Algorithms (Round Robin Scheduling, First Come First Serve, Shortest Job First etc), 8. Interrupt Levels, 9 Maintenance Fee 10. Timers 11. Priority Levels 12. Kernel Synchronization (timers, mutexes, events, semaphores etc), 13. Cost, 14. Development host, 15. Royalty Fee and 16. Task switching time. There are more parameters like target processor support, Languages supported, Technical Support etc are also important which are considered by the developer. We have used the SGA for selecting RTOS, which is described in the following section. Our system will output a set of RTOS's from which one will be selected by considering the processor support, languages supported and Technical Support etc which are also important.

Before Mutation: 110 0 011

After Mutation: 110 1 011

### Genetic Algorithm

The genetic algorithm that is used in our system is given below.

Simple Genetic Algorithm (SGA)

1. Randomly initialize population (t)
2. Determine fitness of population(t)
3. Repeat
4. select parents from population(t)

- a. Perform crossover on parents creating population(t+1)
  - b. Perform mutation of population(t+1)
  - c. Determine fitness of population(t+1)
5. Until best individual is good enough

The Population

The population is created statically and stored in the system. From these, an initial population is created randomly by using a random function.

The Fitness Function

The fitness function is the weighted sum of the parameters given in section III, each of which contribute the “goodness” of the final selection of RTOS Fitness of a chromosome is evaluated by using the fitness function (FF) which is given by

$$FF = \sum_{i=0}^{16} (W_i F_i) \quad \text{Where}$$

where  $W_i$  is the weight of the  $i^{th}$  parameter and  $F_i$  is the fitness of the  $i^{th}$  parameter

Let us first consider the weights. Each application of an embedded system will have specialized requirements. The requirements can be characterized using the parameters specified in previous sections by assigning appropriate weights. The weights change depending on the application. To meet these specifications, the user has to specify the weights for each parameter so that an appropriate RTOS will be selected. In the fitness function,  $W_i$  is the weights assigned by the user. Consider, now, the fitness values. The parameters of RTOS given above have different values for different RTOS. For example, the interrupt latency can be 5ns for one RTOS and 15ns for another. The different values are mapped to a scale and the value on the scale is the fitness value. For example, if the scale for interrupt latency is 5 to 15 then, for the RTOS with 5ns as interrupt latency, the fitness value is 1 as it is better to have low interrupt latency. Since the values of these parameters are available beforehand for the RTOS that are available in the market, the fitness values are precompiled at the time of generating the database of RTOS. However, the designer can alter the values if needed. Now, by using the fitness function FF defined earlier, we evaluate the overall fitness value of the Chromosomes.

The Operations

Cross Over

In our algorithm, two-point cross over is used, which means that the cross over operation as described in section IV is performed at two places, which are selected randomly. It helps to avoid the generation of chromosomes, which are replica of their parents. The cross over itself is performed using fifteen bits of the selected chromosomes for cross over.

Mutation

In our algorithm, mutation is performed on five bits of a chromosome, which are selected randomly by using random function. To overcome the problem of local minimum we have chosen five bits.

The New Population

The population is generated by using the Roulette Wheel Selection, which is shown in the Figure 4. Based on the chromosome fitness function value, the survival of the chromosome is selected In our system, if the chromosome fitness function value is less then 19 %, the chromosome will not be survived for next generation. And if the chromosome fitness function value is in between 19 to 35 %, the only one copy is considered for next generation, else two copies are considered for the nest generation.

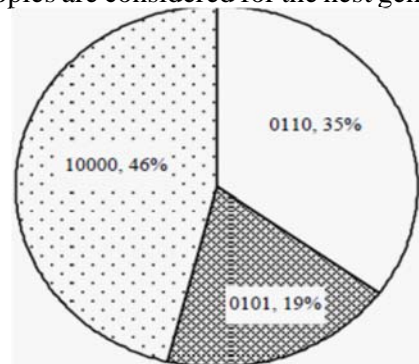


Fig.4. Roulette Wheel Selection Accuracy Percentage

If a RTOS that is chosen matches all the specified parameters then the accuracy percentage is said to be 100%. In terms of fitness function, the accuracy percentage is defined as follows:

First the chromosome corresponding to the parameters specified by the user is created. The fitness function value for this chromosome is computed. Let it be x. Let y be the fitness function

value of a generated chromosome. The accuracy percentage of this chromosome is

$$\text{Accuracy percentage} = y / x * 100$$

In our system the user can specify the accuracy percentage. Thus, if none of the RTOS which are

available in the system are matching exactly, it is still possible to choose an RTOS which is close to the required one. Accuracy percentage acts also as stopping criteria for the SGA.

VI EXAMPLE

We have developed a graphical user interface so that the user can specify the weights for the parameters of the RTOS for his application. The parameters specified by the user using the GUI are given below.

- Development Methodology – Cross Weight – 1
- RTOS Supplied as – Object Weight – 2
- Development Host – UNIX Weight – 3
- Standard – POSIX .1 Weight – 4
- Kernel ROM – 280K/4M Weight – 5
- Kernel RAM – 500K/4G Weight – 6
- Priority Levels – 512 Weight – 7
- Multi process Support – No Weight – 8
- Multiprocessor Support – No Weight – 9
- MMU Support – No Weight – 10
- Royalty free – No Weight – 11
- Standard phone support – Paid Weight – 12
- Preferred phone support – Paid Weight – 13
- Base price – 7495\$ Weight – 14

Maintenance fee – 15% of list price Weight – 15  
 Task switching time – 4us to 19us Weight – 16  
 In addition the user is asked to specify the percentage of accuracy. Let it be 80%. For the above specification, decoded binary Chromosome is  
 0.0.0000.0000.0000.0000.000.0.0.0.0.0.001.0  
 00.00

and for which the Fitness Function value is calculated as 34. For each chromosome is represented with the 36 bit length binary string. Each decimal point separates the one characteristic of the RTOS which represents the values of it. Hence we require 36 bits to represent the entire chromosome. The first population is generated randomly along with its fitness function values corresponding to each chromosome. The process is repeated until the desired accuracy achieved. Here the *RTOS that specifies the given description is: VxWorks.*

VII RESULTS

We have implemented the SGA with Visual Basic, and experiments were conducted on Intel P4, 1.8 GHz with 128 MB of RAM. In this section we compare the results of the above example with different population sizes taking a constant crossover and mutation rate with 50% accuracy. Here, Ch1 to Ch14 represents the

Chromosome Number (Ch Num), F Val G1 to F Val G3 are Fitness value of Generation 1, Generation 2 and Generation 3.

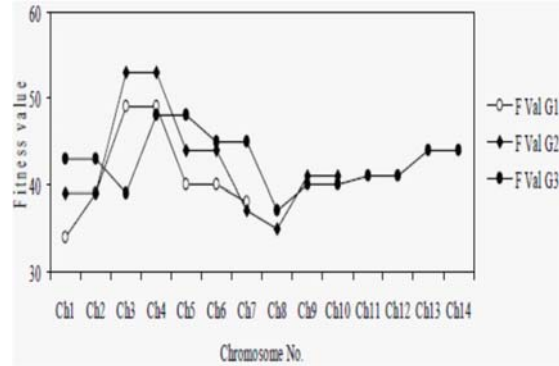


Fig. 5. Fitness values of chromosomes with different generations.

Fig 5 shows the chromosomes fitness values with various generations and it is found that the fitness values of the chromosomes are more stable in generation three and it takes more CPU time. Fig 6 depicts the CPU time/Population size and it shows that more the population size and more the CPU time.

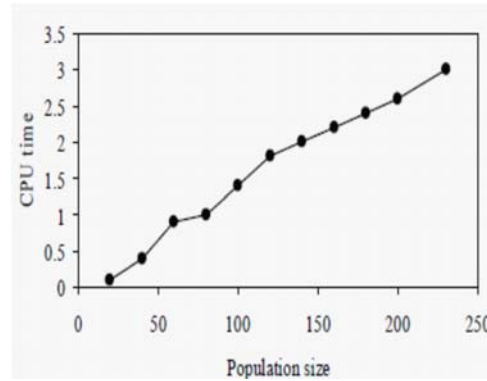


Fig. 6. Population Vs CPU Time

We compare the results of the test cases with constant population sizes taking a variable crossover rate and constant mutation rate of 5 bits per chromosome with 50% accuracy is shown in the fig 7.

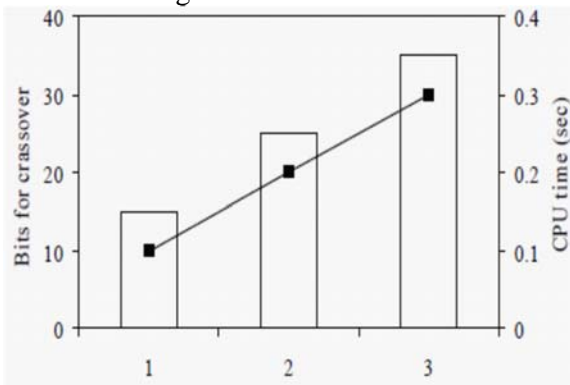


Fig. 7. No. of Bits for crossover Vs CPU Time



We again compare the results of the test cases with constant population sizes taking a constant crossover rate of 15 bits per chromosome and a variable mutation rate with 50% accuracy which is shown in table 1.

Table 1 .Mutation Vs CPU Time

Test No	NO of Bits for Mutation	CPU Time (sec)
1	5	0
2	10	0.05
3	15	0.08

We compare the results of the test cases with constant population sizes taking a constant crossover rate of 15 bits per chromosome and a constant mutation rate of 5 bits per chromosome with variable accuracy percentage and the results are depicted in the fig 8.

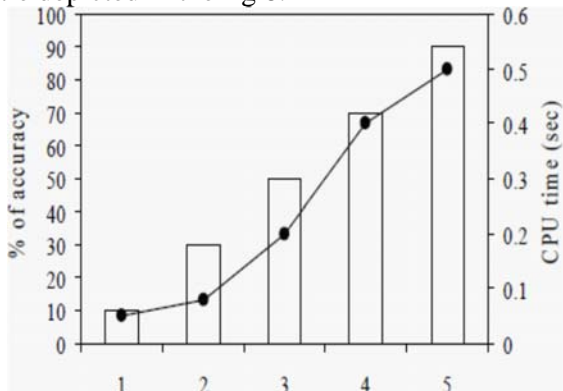


Fig. 8. Percentage of accuracy Vs CPU time Discussions

As shown by the output of various test cases, the graphs depict the result of various parameters which affect the output of the system in terms of CPU time and find that even though the output varies considerably from sample to sample, there is a tremendous reduction in performance due to increased levels of percentage accuracy. As the number of bits used for crossover and mutation operations increases, the efficiency of the system reduces and consumed more time. However, the difference is very small considerably and can be ignored.

However the effect on performance cannot be ignored due to large population sizes. When more generations are developed, they will become better than the previous generations, and thus a large population of chromosomes is developed. Because of the large population size, trying to find an optimal RTOS takes more time than usually required. This is because a large number of chromosomes have to be crossed over,

then mutated and compared for the final results. One of the most challenging aspects was to represent the chromosomes in terms of binary strings. We have used automatic allocation of each parameter to variable length binary digits. We have used the concept of separators to distinguish between the binary conversions for many different parameters. We have even used a weight system so as to calculate the fitness number. Assignment of the weight is done by the user according the degree of effectiveness of each parameter. A higher value will result in a higher fitness number if that parameter has that specific value for an RTOS.

Operations like crossover, mutation, fitness number etc are used often in the processing of chromosomes. These have been coded in the form of functions that are global to all modules. Studying the output for the most optimal RTOS based on user specifications, we came to the conclusion that the most optimal RTOS was strictly dependent on the test metrics parameters like

scheduling priorities, timing constraints, RAM and Rom size, Development host, Development methodology. It was seen that when the percentage accuracy was 50%, the results were obtained most easily. As the accuracy of percentage increased the RTOS's matching the specified criterion were fewer. However a higher percentage of accuracy means a more optimal solution. Our analysis gives the developer/designer a portal to decide on a real time operating system which must suits his choice of parameters and is the most optimal one available for that particular purpose, within a short time.

This method is efficient then the elimination techniques because

- It doesn't considers all the specifications of the RTOS but it only consider the specified ones of the developer.
- It doesn't require much time.
- This system has a provision to provide percentage accuracy (It helps to allow the developers that how much % of guarantee that the selected RTOS is) and weights for all the specified parameters so that it selects the optimal one that exits in the data base.

### VIII CONCLUSION

Real time applications have become a popular these days due to the complexity in all of the systems. So as to meet those complexities, the

developers are given the invariable task of making the real time software. There are quite large number of RTOS are available in the market and one dose get confused as to which one such that it provides the efficient embedded systems design in terms of cost, power consumption, reliability, speed etc. In this paper, we described a Simple Genetic Algorithm that is designed to find the suitable RTOS for a particular application. The methodology that is described for RTOS selection is unique and efficient for large number of RTOS's. It has graphical interface (GUI) that is user-friendly though which the designer can alter the specifications and specify the new requirements for RTOS selection for a given application. It generates the optimal RTOS based on the requirements that are entered by the user keeping in mind the amount of accuracy required. This is done with the help of genetic algorithms. Our analysis and the developed system gives the user a portal to decide a real time operating system which most suits his choice of parameters and is the most optimal one available for that purpose. The designer has an option of choosing from pre-defined input or can specify his/ her own input.

#### Advantages of the system

The main advantages of the system are:

The user will get an appropriate RTOS by just giving the specifications and the desired accuracy. A complete search based on these specifications is carried out by the system and hence the result is provided through an easy designed interactive GUI. The user has the option of specifying the accuracy percentage to carry out his search which could vary depending on the level of strictness required, which is an efficient method compared to other methods which uses the elimination criteria. The user has the provision of selecting more than one option in each parameter thus making his search more advanced in terms of parameters. If the most appropriate RTOS is chosen it will result in significant cost savings as well as improved level of technical support and high levels of product integration.

#### Limitations of the system

Though there are advantages of the system there are some limitations which can be eliminated in future work. Only sixteen parameters have been taken into consideration for carrying out the

search and the user cannot increase or add more parameters to this list and can be dynamic.

The search is restricted as it runs only for those RTOS's already provided in the database as entered by the administrator/user and not for all. The number bits involved in the crossover and mutation operations are fixed. Fifteen bits are taken for crossover and five for mutation and can be made variable. It is necessary that the user be aware of the priority/weight of each sub option in each parameter in order to obtain desired results.

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# VEHICLE MONITORING USING THE CLOUD COMPUTING ENVIRONMENT

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**Abstract**— To resolve the challenges caused by the increasing transportation issues. We present a novel multilayered vehicular data cloud platform by using cloud computing and internet of technologies. Two innovative vehicular data cloud services, an intelligent parking cloud service and a vehicular data mining cloud service in the internet of technologies environment are also presented reviews.

**Index Terms**—Vehicle Monitoring, Background Subtraction, Data mining

## I. INTRODUCTION

The advances in cloud computing and internet of things (IoT) have provided a promising opportunity to further address the increasing transportation issues, such as heavy traffic, congestion, and vehicle safety. In the past few years, researchers have proposed a few models that use cloud computing for implementing intelligent transportation systems (ITSs). For example, a new vehicular cloud architecture called ITS-Cloud was proposed to improve vehicle-to-vehicle communication and road safety. A cloud-based urban traffic control system was proposed to optimize traffic control. Based on a service-oriented architecture (SOA), this system uses a number of software services

(SaaS), such as intersection control services, area management service, cloud service discovery service, and sensor service, to perform different tasks. These services also interact with each other to exchange information and provide a solid basis for building a collaborative traffic control and processing system in a distributed cloud environment. As an emerging technology caused by rapid advances in modern wireless telecommunication, IoT has received a lot of attention and is expected to bring benefits to numerous application areas including health care, manufacturing, and transportation. Currently, the use of IoT in transportation is still in its early stage and most research on ITSs has not leveraged the IoT technology as a solution or an enabling infrastructure.

## II RELATED WORK

The original idea is that the roadside infrastructure and the radio-equipped vehicles could communicate using wireless networks. To make networking operations such as routing effective, researchers had developed a dynamic inter-vehicle network called vehicular ad-hoc networks (VANET). Cloud computing has been proposed to reshape vehicular software and services in the

automotive domain. As more and more cars are equipped with devices that can access the internet. Existing vehicular networks, various sensors, on-board devices in vehicles, and cloud computing to create vehicular clouds. They suggest that vehicular clouds are technologically feasible and will have a significant impact on the society once they are built. Thus, both existing automobile software and a variety of information resources are being virtualized and packaged as services to build vehicular clouds. Different vehicular services are often combined and used to implement the mapping, encapsulation, aggregation, and composition and allow vehicles to interact with various hosted services outside the vehicles. The integration of sensors and communication technologies provides a way for us to track the changing status of an object through the Internet. IoT explains a future in which a variety of physical objects and devices around us, such as various sensors, radio frequency identification (RFID) tags, GPS devices, and mobile devices, will be associated to the Internet and allows these objects and devices to connect, cooperate, and communicate within social, environmental, and user contexts to reach common goals.

### III PROPOSED SYSTEM

The goal of this platform is to provide real-time, economic, secure, and on-demand services to customers through the associated clouds including a conventional cloud and a temporary cloud (vehicular cloud). The conventional cloud is composed of virtualized computers and provides SaaS, PaaS, and IaaS to interested customers. For example, cloud management services and many traffic administration applications can be hosted on the conventional cloud. The temporary cloud is typically formed on demand and is composed of under-utilized computing, networking, and storage facilities of vehicles and is designed to expand the conventional cloud in order to increase the whole cloud's computing, processing, and storing capabilities. The temporary cloud supports a compound of SaaS, PaaS, and IaaS and primarily hosts highly dynamic vehicular applications which may have issues running

on the conventional clouds. For example, traffic-related applications and smart parking applications are suitable for the temporary cloud. The temporary cloud often needs to communicate with the conventional clouds and there is a frequent exchange of data and services between the two clouds. Based on the layered architecture heterogeneous IoT-related devices, network, community technologies, and cloud-based services on different layers can be integrated to exchange information, share resources, and collaborate on the clouds.

#### *A. Establishing a cloud*

In this section we will create a registration form for drivers, who have to register in the cloud. Registration of driver is compulsory then only the driver can take car from networking side. Once the registration process is done and updated to cloud, driver will provide his details for verification. Once the verification forces done successfully, and then the driver chooses the car brand and model and current location. After choosing this system automatically generates the values I he/she wearing seat belt or not and alcoholic or not. And for every few seconds he will be keep on moving to some other place in between this the jerk level for that road. All this details we will be updating in to cloud.

#### *B. Vehicular Data Mining Cloud Service*

As vehicular data clouds contain a variety of heterogeneous data and information resources, effective data mining service must be developed to quickly detect dangerous road situations, issue early warning messages, and assist drivers to make informed decisions to prevent accidents. Data mining services can also be used to assess drivers' behavior or performance of vehicles to find problems in advance. The core of any data mining service is the data mining models. So far, few models were developed and tested for mining vehicular data collected from vehicular networks or data clouds. Below is a specialized data mining service for car warranty early-warning analysis. We applied the models that we developed to design and develop the data mining service. In vehicle manufacturing process, sometimes, some

quality issues can be hidden for a long time without being identified. Due to a lack of events or signals to correlate several discrete issues, potential problems may not be investigated at all. To avoid accidents, it is important to develop new techniques that reveal these hidden problems in advance. By using the two modified data mining models (Naive Bays Classifier and Logistic Regression Classifier) to cluster and classify the real car warranty and maintenance data we collected from a local automobile company, we demonstrated how data mining cloud service could be used to identify potential issues that could become a problem later. This experiment assumes a new product that is under development and has some potential but unknown issues. As a result of applying the two data mining models, we were able to acquire some preliminary results. We found that the precision in column cross dropped dramatically.

*C. Intelligent Parking Cloud Service*

- 1) Background subtraction
- 2) Decision Process
- 3) Web server process
- 4) Android application service

*D. Background Subtraction*

Background Subtraction is a computational vision process of extracting foreground objects in a particular scene. A foreground object can be described as an object of attention which helps in reducing the amount of data to be processed as well as provide important information to the task under consideration. Often, the foreground object can be thought of as a coherently moving object in a scene.

*E. Decision Process*

The Car Parking Area, parked by cars, means it is defined as “Occupancy”. The car parking area has a free space means it is defined as “Vacancy”. This decision updated to server part. Finally, in decision step, the mixed feature is compared with pre-defined threshold.

*F. Web Server Process*

All the processes are updated to the web server which receives the value from the DB via MATLAB. We send SMS and MAIL (1 per day) to monitor the delayed car duration (12 hours above) based on the Validated information.

*G. Android Application Service*

Android application collects all information from server through web server, and it calculates total no of slots, engaged and free slots. It shows graphical view for engaged and free slots via apps. It validating information’s continuously to the web server.

**IV.PRACTICAL IMPLEMENTATION**

The practical implementation of the vehicle monitoring in the cloud computing environment is shown When the application being launched first the user to register in the cloud to establish the connection.

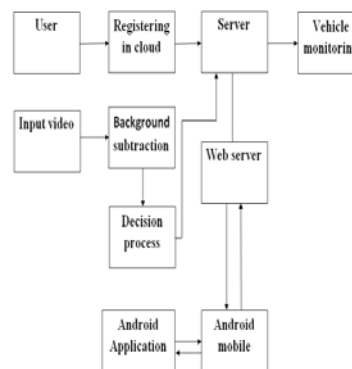


Fig.1. System Overview

Once the registration process over the user is checked over authentication The slots and the locations are chosen based on the user demand the regions are divided into three geographical area. The cloud monitor can track the vehicle whether the user is going in over speed or not and the path are viewed (safety, comfortable, speed) the android application are created to book the slot for vehicle parking and to check whether the slot is free or full by using background s

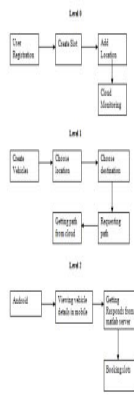


Fig.2. Data Flow Diagram

## V.RESULTS AND OUTPUT

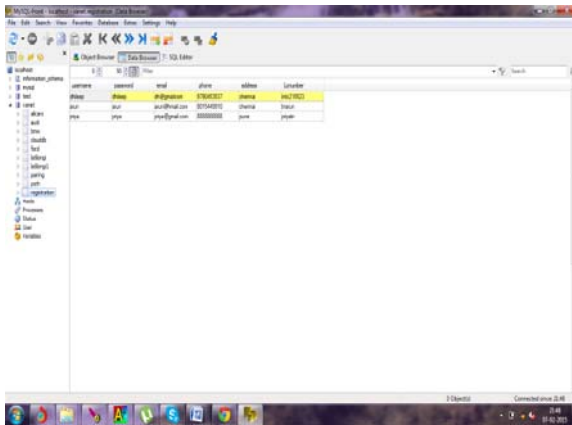


Fig.3. Database Creation



Fig.4. User Registration In Cloud



Fig.5. Viewing Cloud Services



Fig.6. Slot Creation

S.N	Vehicle ID	Driver Loc. Time	Place	Travel	Bank Level Speed	Druck	Seat Belt
1	09999	122854789117139	Ennore	Anna Auto-Ennore	32	0%	yes
2	09999	122854789117139	Ennore	Ennore-Anna Auto	30	7%	not driven
3	09999	122854789117139	Chennai Trade Center	Chennai Trade Center-Chennai Trade Center	32	6%	not driven
4	09999	122854789117139	Indira Nagar-Adyar	Indira Nagar-Adyar	35	6%	not driven
5	09999	122854789117139	Trouvillur	Indira Nagar-Adyar-Trouvillur	42	7%	not driven
6	09999	122854789117140	Anakkalam	Trouvillur-Anakkalam	47	6%	not driven
7	09999	122854789117140	Pallavaram	Anakkalam-Pallavaram	22	6%	not driven
8	09999	122854789117140	Pallavaram	Trouvillur-Pallavaram	37	6%	driven
9	09999	122854789117140	Ennore	Anna Auto-Ennore	22	0%	yes
10	09999	122854789117139	Porur	Ennore-Porur	100	6%	driven
11	09999	122854789117139	Chennai Trade Center	Porur-Chennai Trade Center	50	6%	driven
12	09999	122854789117139	Indira Nagar-Adyar	Chennai Trade Center-Indira Nagar-Adyar	60	6%	driven
13	09999	122854789117139	Chennai Airport	Indira Nagar-Adyar-Chennai Airport	60	6%	driven
14	09999	122854789117139	Anakkalam	Chennai Airport-Anakkalam	57	7%	driven
15	09999	122854789117139	Trouvillur	Anakkalam-Trouvillur	60	10%	yes
16	09999	122854789117139	Anakkalam	Trouvillur-Anakkalam	56	7%	driven
17	09999	122854789117139	Rambanikam	Anakkalam-Rambanikam	42	11%	driven
18	09999	122854789117139	Indira Nagar-Adyar	Rambanikam-Indira Nagar-Adyar	56	7%	driven
19	09999	122854789117139	Chennai Trade Center	Indira Nagar-Adyar-Chennai Trade Center	24	8%	driven
20	09999	122854789117139	Heard	Chennai Trade Center-Heard	48	6%	driven
21	09999	122854789117139	Chennai Airport	Indira Nagar-Adyar-Chennai Airport	48	6%	driven
22	09999	122854789117139	Anakkalam	Chennai Airport-Anakkalam	57	7%	driven
23	09999	122854789117139	Trouvillur	Anakkalam-Trouvillur	60	10%	driven
24	09999	122854789117139	Ennore	Anakkalam-Ennore	25	10%	not driven
25	09999	122854789117139	Madhav (Chennai)	Ennore-Madhav (Chennai)	124	7%	not driven
26	09999	122854789117139	Chennai Trade Center	Madhav (Chennai)-Chennai Trade Center	50	6%	not driven
27	09999	122854789117139	Adyar-Sea Dabot	Chennai Trade Center-Adyar-Sea Dabot	50	7%	not driven
28	09999	122854789117139	Anakkalam	Adyar-Sea Dabot-Anakkalam	110	11%	not driven
29	09999	122854789117139	Trouvillur	Anakkalam-Trouvillur	105	8%	not driven
30	09999	122854789117139	Indira Nagar-Adyar	Trouvillur-Indira Nagar-Adyar	58	6%	not driven
31	09999	122854789117139	Chennai Trade Center	Indira Nagar-Adyar-Chennai Trade Center	65	6%	not driven
32	09999	122854789117139	Ennore	Anna Auto-Ennore	25	14%	yes
33	09999	122854789117139	Chennai Trade Center	Chennai Trade Center-Honnam	47	10%	not driven
34	09999	122854789117139	Madhav (Chennai)	Ennore-Madhav (Chennai)	104	6%	driven
35	09999	122854789117139	Chennai Trade Center	Rambanikam-Chennai Trade Center	50	11%	not driven
36	09999	122854789117139	Chennai Trade Center	Madhav (Chennai)-Chennai Trade Center	51	6%	driven
37	09999	122854789117139	Indira Nagar-Adyar	Chennai Trade Center-Indira Nagar-Adyar	50	10%	not driven
38	09999	122854789117139	Anakkalam	Chennai Trade Center-Indira Nagar-Adyar	48	14%	driven
39	09999	122854789117139	Anakkalam	Indira Nagar-Adyar-Anakkalam	25	10%	not driven
40	09999	122854789117139	Anakkalam	Indira Nagar-Adyar-Anakkalam	72	11%	driven
41	09999	122854789117139	Indira Nagar-Adyar	Ennore-Indira Nagar-Adyar	25	10%	not driven
42	09999	122854789117139	Anakkalam	Indira Nagar-Adyar-Anakkalam	41	10%	not driven

Fig.7. Vehicle Tracking

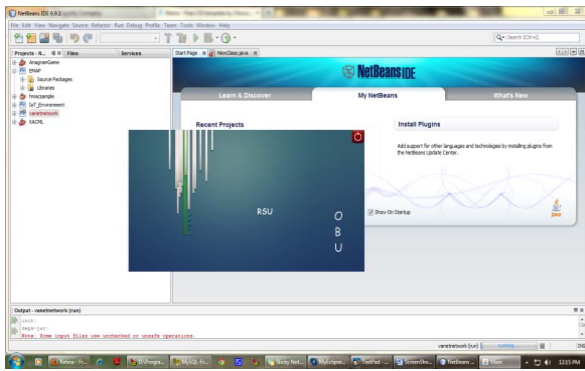


Fig.8. Creating A Location

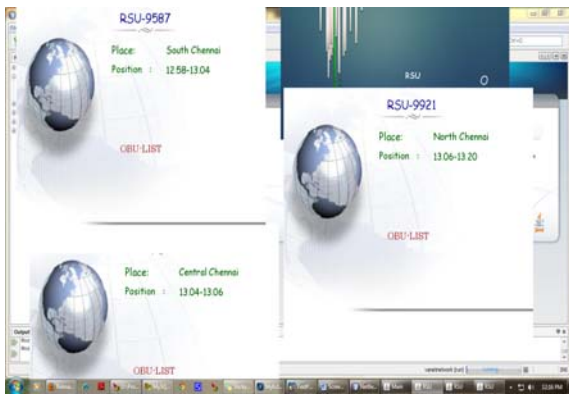


Fig.9. Viewing A Location

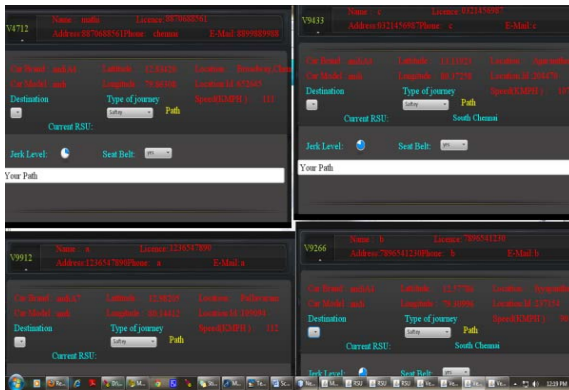


Fig.10. Source and the Destination Are Created

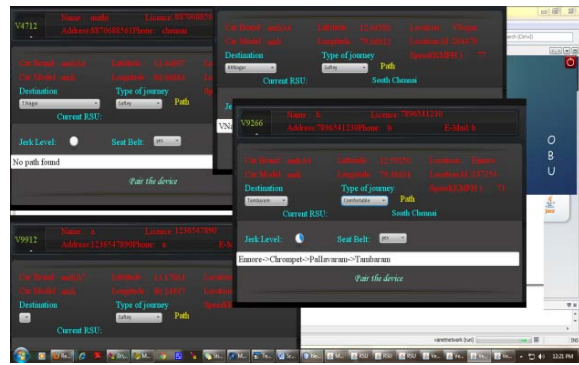


Fig.11. Showing the Path Based On the User Need

## VI. CONCLUSION

The objective is to create a novel vehicle tracking system for the user who can register in the cloud and create a slot for him to park the vehicle and different path are selected based in their user need. The review of the literature related to the problem revealed the need for a vehicle tracking system application .A detailed design flow for the entire project is formulated. Mysql database for storing and retrieving the task contents are created and the application developed and it will be deployed in the eyes .Application can be enhanced and made more reachable by adding support for tablets and smart phones.

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