

# VIJANAN

## INFORMATION TECHNOLOGY



**Dr. N. Lakshmi Kavitha**  
**Mithila Satam**

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**Edited By:**

**Dr. N. Lakshmi Kavitha**

Assistant Professor

Vidyalankar School of Information Technology  
Mumbai

**Mithila Satam**

Assistant Professor

Vidyalankar School of Information Technology  
Mumbai

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## INFORMATION TECHNOLOGY



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## Prologue

Humans are curious beings, constantly seeking knowledge and meaning and formalizing improved fields of enquiry. The more we probe into the vast unknown and the seemingly known, the greater the realization of limitless knowledge dawns with a promise of transformative cognitive capacity to both human comprehension and the rigid principles of stoic disciplines. Learners gain much from an active participation in the world of academic research as they learn to re-question, rethink and revise expedient information passively received from an oft-inflexible curriculum.

V-Search at Vidyalankar School of Information Technology serves as an opportune platform to inculcate autonomy in learning and resilience towards passive information collection. Undergraduates and Postgraduates are encouraged to develop an aptitude for research. The themes of the Inter-Collegiate Conference were both contemporary and of a broad-spectrum to invite maximum participation and additionally provide flexibility of exploring various domains of knowledge. We are fortunate to have received an overwhelming 77 number of papers submitted which reflects the propitious rise of interest in participatory academia. Since the year of its inception, V-Search has only grown, and it is with much anticipation and excitement that we look forward to the conferences to follow.

## **Acknowledgement**

We would like to the judges Dr. Seema Petkar , Mrs. Vaishali H. Pardeshi , Mr. Milind H. Karande and Mr. Dayanand Ambeade for investing their valuable time for this VSIT annual Student Research Conference Competition called “VSEARCH” held in March 2019.

We would like to acknowledge the guidance and efforts of the College Management, Principal, Adjunct Faculty Members, the Organising committee, all the faculty members and students of Information Technology, Commerce and Management department.

We are also grateful to the participants who presented their papers from Mumbai as well as from Tamil Nadu for this National Level Research Conference.

**Dr. N. Lakshmi Kavitha**  
**Mithila Satam**

Vidyalankar School of Information Technology  
Mumbai

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## MACHINE LEARNING APPROACH TO CONSUMER COMPLAINT RESOLUTION

**Rohana Ranadive**

Student, Vidyalankar School of Information Technology, Wadala (East), Mumbai

### ABSTRACT

*Consumer Complaint Resolution is a process to record, analyse and find the solution to the consumer's dissatisfaction. Timely response and proper resolving of problems turns a dissatisfied consumer to a satisfied one and also increases the consumer confidence in the organization's products/services and administrative processes. In this paper, we are predicting whether consumer is disputed or not using a Machine Learning approach. Linear model for Classification, Logistic Regression, has been used to train the model and test data has been classified in two groups Yes and No.*

*Keywords: Machine Learning, Logistic, Regression, Classification, Training data, Test data, Linear model*

### 1. INTRODUCTION

Machine Learning is use of statistical algorithms to convert business problem to data problems. Machine Learning is a subset of Artificial Intelligence. The dataset which we use is called 'Training Data' on which we build models to predict the outcome. Note that, the outcome is not always the desired one, i.e it has some kind of noise. The accuracy of the model built is calculated by various methods (here, in this paper I have used AUC score).

There are mainly three kind of problems which can then be clubbed into two categories :

1. Supervised
2. Unsupervised

Supervised problems are the problems which have explicit outcome, such as default on loan, Required Number of Staff, Server Load etc. Within these, you can see separated kind.

1. Regression
2. Classification

Regression problems are those where outcome is a continuous numeric value. Classification problem on the other hand have their outcome as categories [e.g.: good/bad/worse; yes/no ; 1/0 etc]

Unsupervised problems are those where there is no explicit measurable outcome associated with the problem. You just need to find general pattern hidden in the measured factors. Finding different customer segments or electoral segments or finding latent factors in the data comes under such problems. Now categories of problems can be formally grouped like this: 1. Supervised

1. Regression
2. Classification
2. Unsupervised

In this paper, Logistic Regression has been implemented which is a Linear model used for Classification. Mathematically, a binary logistic model has a dependent variable with two possible values, such as pass/fail, win/lose, alive/dead or healthy/sick; these are represented by an indicator variable, where the two values are labelled "0" and "1"<sup>[5]</sup>. In this particular case we have been given details of consumer complaints along with whether consumer disputed with the conclusion. If we are able to predict this, consumer likely disputed can be given more attention as to how the complaints are handled as well as how to convincingly convey the final conclusions to them. Our target here is to build prediction model for column "Consumer disputed".

### 2. LITERATURE REVIEW

Jackson Isaac and Sandhya Harikumar has proposed Logistic Regression approach on DBMS. DBMS is the asset for almost every business/organization, so classification can help in getting better insight and control

over the data. The paper proposes an alternative strategy, based on SQL and UDFs, to integrate the logistic regression for data categorization as well as prediction query processing within DBMS<sup>[6]</sup>. Experimentation has been done on real datasets by comparing SQL with user defined methods and also statistical packages such as R. Analysing the data within DBMS using SQL Query and UDF models is much more efficient instead of exporting the data from DBMS and then analysing it. It is noticed that R becomes a poor candidate while analysing big data. when the logistic model is stored within the DBMS, new data can be classified in constant time using the Query processor<sup>[6]</sup>.

Darwin Prasetyo and Dra. Harlili, M.Sc has proposed Logistic Regression approach on predicting football match results. In the paper a logistic regression model is built to predict matches results of Barclays' Premier League season 2015/2016 for home win or away win and to determine what are the significant variable to win matches<sup>[7]</sup>. They also claim that their work is different from others as they have only used significant variables gathered from researches in the same field rather than guessing the significant variables. They have also gathered data from video game FIFA, because including data from the video game could improve prediction quality. The model was built using variations of training data from 2010/2011 season until 2015/2016<sup>[7]</sup>. "Home Offense", "Home Defense", "Away Offense", and "Away Defense" were the variables used. The accuracy of their implemented model was 69.5%. They concluded that the significant variables are "Home Defense", and "Away Defense"<sup>[7]</sup>.

Tao Lu, Zhu Dunyao, Yan Lixin and Zhang Pan has proposed Logistic Regression approach on traffic accident hotspots prediction. They did their research on the 400 sets of accidents data of 10 major roads in Beijing city. Through the statistics of the typical factors, and the Logistic regression analysis, the relationships between the traffic accident and the road type, the vehicle type, the driver state, the weather, the date etc., were studied, and the prediction model was built. The results show that the location of car in road transects, the road safety grade, the road surface condition, the visual condition, the vehicle condition and the driver state are the most significant factors which may lead to traffic accident<sup>[8]</sup>. The model achieved approximately 86.67% accuracy.

### 3. RESEARCH METHODOLOGY

Logistic Regression algorithm has been implemented on train data using Python.

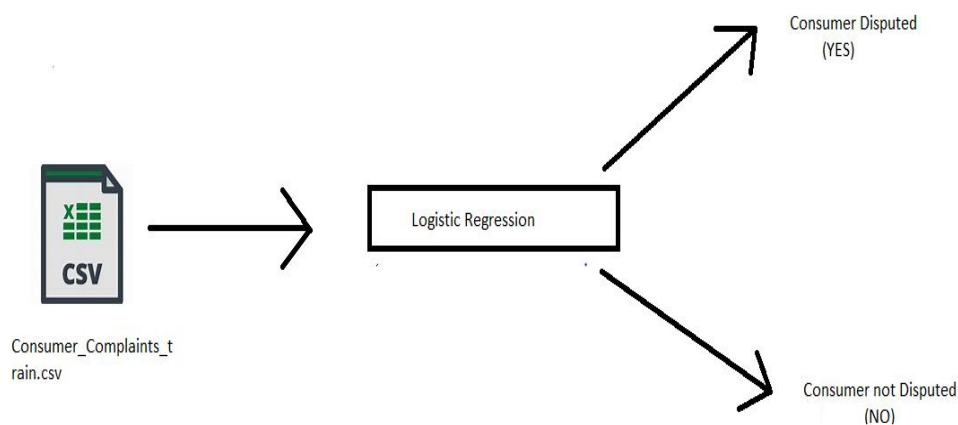


Fig-1: Diagrammatic representation of model

Following are the steps used to build model:

Step 1: Importing the data.

Train data has been imported from 'Consumer\_Complaints\_train.csv' and test data has been imported from 'Consumer\_Complaints\_test.csv'.

Step 2: Combining data from train and test and checking the columns. The test data doesnot contains 'Consumer disputed?'. So first, we have to create a column Consumer disputed? in test data with NAN values.

```
# Combinig data from train and test and checking the columns|

cd_test['Consumer disputed?']=np.nan
cd_train['data']='train'
cd_test['data']='test'
cd_test=cd_test[cd_train.columns]
cd_all=pd.concat([cd_train,cd_test],axis=0)
```

Fig-2: Comparing train and test data

The above figure shows, the data from train dataset is named as 'train' and same is done for test dataset. Then the columns from train dataset are compared with test dataset columns. This comparison is necessary to check whether both train and test data are having same columns. After comparing, we will concat train and test data at axis=0 (i.e horizontally) and save it in cd\_all.

### Step 3: Data Preparation

Data which is to be fed to the algorithm is prepared. In this step, first the data types of the columns are determined. Then the categoricla data is converted into numeric data, because ML algorithms doesnot understand categorical data. Columns names are also changed, i.e spaces, '?' are replaces with underscore(\_). The 'Date received' and 'Date sent to company' columns are first converted to DateTime format and then they are converted to numeric by obtaining their difference(difference is saved in day\_diff). After converting categorical data into numeric and/or dummy values, the original columns are dropped.

```
# Data Predictions :
# Complaint ID, ZIP code, Company -> drop
# Date received , Date sent to company -> DateTime format -> numeric
# Sub-product, Sub-issue, Consumer complaint narrative, Company public response, Tags, Consumer consent provided? -> repalcement
# and numeric
# Consumer disputed?, Timely response? -> numeric
# Product, Submitted via, Company response to consumer? -> dummies
```

Fig-3: Data Preparation

```
for col in ['Sub-product', 'Sub-issue', 'Consumer complaint narrative',
            'Company public response', 'Tags', 'Consumer consent provided?']:
    varname=col.replace(' ','_').replace('?','').replace(" ", '_')+'_isNan'
    cd_all[varname]=np.where(pd.isnull(cd_all[col]),1,0)
    cd_all.drop([col],1,inplace=True)

for val in k.axes[0][0:10]:
    varname='Issue_'+val.replace(' ','_').replace(' ','_')
    cd_all[varname]=np.where(cd_all['Issue']==val,1,0)
```

Fig-4: Replacement

Here, we are considering only first 10 values of 'Issue' column.

### Step 4 : Removing null values

Null values can be removed either by taking mean or median or mode.

If the number of null values is large then that column can be dropped.

### Step 5 : Creating dummy variables

```
cat_cols=cd_all.select_dtypes(['object']).columns

cat_cols

Index(['Product', 'State', 'Submitted via', 'Company response to consumer',
       'data'],
      dtype='object')

for col in cat_cols:
    freqs=cd_all[col].value_counts()
    k=freqs.index[freqs>100][:-1]
    for cat in k:
        name=col+'_'+cat
        cd_all[name]=(cd_all[col]==cat).astype(int)
    del cd_all[col]
    print(col)

Product
State
Submitted via
Company response to consumer
```

Fig-5: Creating dummies

Here, from the Fig 4, we have created dummies for columns 'Product', 'State', 'Submitted via', 'Company reponse to consumer'. If converting a certain categorical data into numeric changes the whole meaning of data then dummies are created for that data. We have taken into consideration only those values from these columns whose frequency is greater than 100. Dummy variables have been created with (n-1) values, which means the last value has been dropped.

Step 5 : Splitting the train and test data

```
cd_train=cd_all[cd_all['data']=='train']
del cd_train['data']
cd_test=cd_all[cd_all['data']=='test']
cd_test.drop(['Consumer disputed?','data'],axis=1,inplace=True)
```

Fig-6: Splitting train and test data

Here, we are dropping 'Consumer disputed?' column from test data, because we have to predict its values.

Step 6 : Splitting train data into two parts

The train data has been splitted into 2 parts. First the model has been built on first half of the train data and then on entire test data.

```
from sklearn.model_selection import train_test_split

cd_train1,cd_train2=train_test_split(cd_train,test_size=0.2,random_state=2)

x_train1=cd_train1.drop(['Consumer disputed?','Complaint ID'],axis=1)
y_train1=cd_train1['Consumer disputed?']
```

Fig-7: Splitting train data into two parts

The first part will be treated as training data and the second part will be treated as test data.

Here, train\_test\_split package is imported from sklearn package. SciKit Learn gives variety of methods for model prediction.

Step-7: Applying response and predictors to function

Predictors are those on which processing will be done, whereas reponse is that which is to be predicted.

```
from sklearn.linear_model import LogisticRegression

clf=LogisticRegression()

x=cd_train.drop(['Consumer disputed?','Complaint ID'],1)    #predictors
y=cd_train['Consumer disputed?']                            # response

clf.fit(x,y)

LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                    intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
                    penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
                    verbose=0, warm_start=False)
```

Fig-8: Giving reponse and predictors to LogisticRegression

Here, we have created an object of LogisticRegression and fitted our parameters to it.

Step 8 : Building model on entire test data

Now, here we are using the test data cd\_test, which we created at the beginning.

```
prediction=np.where(clf.predict(cd_test.drop(['Complaint ID'],1))==1,"yes","no")

submission=pd.DataFrame(list(zip(cd_test['Complaint ID'],list(prediction))),
                        columns=['Complaint ID','Consumer disputed?'])

submission.head(4)
```

	Complaint ID	Consumer disputed?
0	675956	Yes
1	1858796	No
2	32637	No
3	1731374	No

Fig-9: Building model on entire test data

Using predict() function it is determined whether consumer is disputed or not. This is a predefined function provided by sci-kit learn.

Step 9 : Determine model score

The accuracy score obtained after applying the model on train data is 0.50 i.e. 50%.

```
from sklearn import metrics

from sklearn.metrics import roc_auc_score

roc_auc_score(y,clf.predict(x))

0.5002183614410464
```

Fig-10: Calculating score

## CONCLUSION AND FUTURE ENHANCEMENT

In this paper, we have implemented Logistic Regression to classify whether consumer is disputed or not. Multiple parameters have been analysed to predict the outcome. Using Logistic Regression the accuracy score attained is 0.50. The more accuracy score is possible to achieve if data is increased or a different model can also be implemented. This future enhancement can increase accuracy to 0.60 or more.

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\*Corresponding Author
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  - Sandhya Harikumar Department of Computer Science and Engineering Amrita School of Engineering, Amritapuri Amrita Vishwa Vidyapeetham, Amrita University, India Email: sandhyaharikumar@am.amrita.edu
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- Darwin Prasetio Department of Informatics Engineering Institut Teknologi Bandung Bandung, Indonesia prasetiodarwin@gmail.com
- Dra. Harlili, M.Sc. Department of Informatics Engineering Institut Teknologi Bandung Bandung, Indonesia harlili@informatika.org

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- Tao Lu GNSS Research Center Wuhan University Wuhan, 430079, China
- Zhu Danyao Intelligent Transport Systems Research Center, Wuhan University of Technology GNSS Research Center, Wuhan University Wuhan, 430063, China
- Yan Lixin Intelligent Transport Systems Research Center Wuhan University of Technology Wuhan, 430063, China
- Zhang Pan GNSS Research Center Wuhan University Wuhan, 430079, China



## NETWORK ISSUE RESOLUTION

**Aniket Shelar and Tabish Dalvi**

Student, Vidyalkar School of Information Technology, Wadala (E) Mumbai

### ABSTRACT

*Network issue resolution Tool connects to the USER and the TECHNICIAN in a proper manner. The user will first view or search to existing problem solution if he cannot get the solution then he can register or login on the application then user is able to view the data (i.e. Advance existing problem solution ) to solve his problem. If the user does not get the solution to his problem, the user can contact to a technician. And one particular Technician is assign to user. After assigning the technician, the technician will come to solve user's problem. If work is done then, the technician and user will have the opportunity to give feedback. And work is not done the task is goes on pending Work. If the technician is not free then he will give you some time interval at what time he is free. Admin will have the direct access to all the data, means he can view all data. Admin can also assign a technician to the user.*

**Keywords:** Network, Technician, User, Network Problems, Admin.

### 1. INTRODUCTION

In this application there has many existing solution before user login or register. Solutions is about network problems like network configuration and LAN, WAN connection and wire connections etc. If Customer is not able to solve any problem in network configuration or hardware like wire connection or any network problem then Customer directly contact to their nearest Technician by using their location. Then user can send request to Technician and type their problem or issue, Thus issue stored in a database named Problem Ticket. And this Problem Ticket send to Technician. And Technician will see this request and Technician gets some time of interval to accept or reject this request. If Technician accept this request then user will get notification that Technician is assigned. And Technician as well as user do contact to each other. If work is done then user as well as Technician takes feedback to each other, when both feedback comes then Problem Ticket will closed. In this application, if customer is new in any place or customer shifted in new city then he able to find their nearest best ISPs (Internet service provider) using GPS location.

### 2. BLOCK-DIAGRAM AND WORKFLOW

#### 2.1 USER

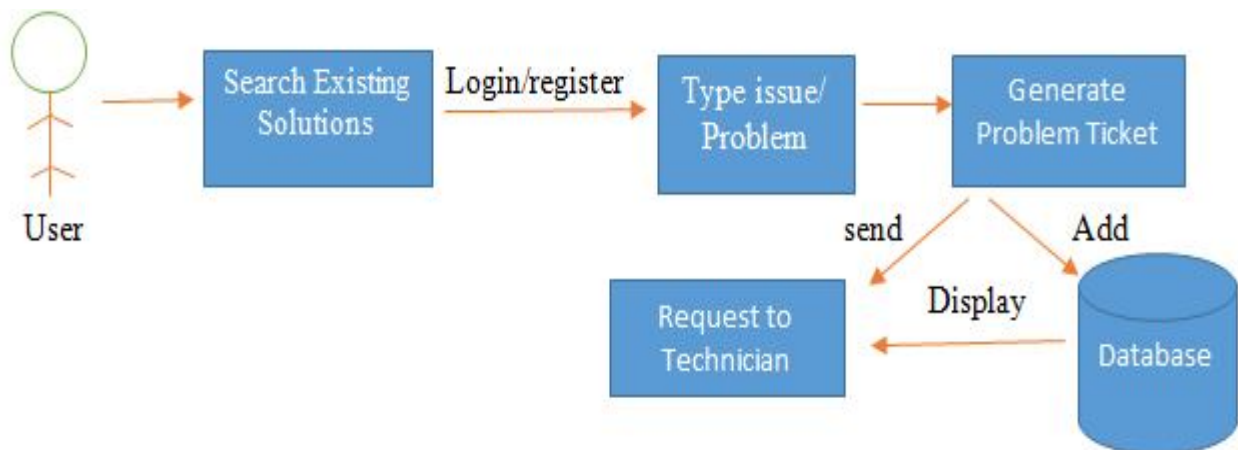


Figure-1

Figure 1 shows the workflow of the user site in application. First user can open the application and he can search in existing Network Problem solution. This solution formatted by step by step or image format for user's understanding. If user is not understand or not able to find their Network Problem, then it needs to login or register in application. Then user will type their issue in textbox and send it to technician. This issue stored in database name Problem Ticket. This Problem Ticket forwarded to the technician. Technician name and details is also stored in database, those Available Technicians are displayed for user.

## 2.2 TECHNICIAN

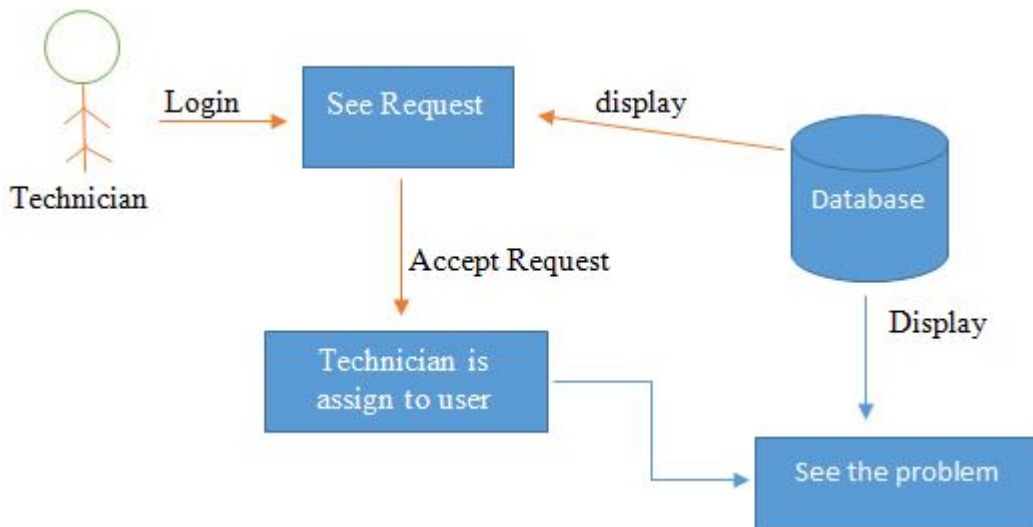


Figure-2

Figure 2 shows the workflow of the Technician site in application. First Technician is login in the application, then Technician will see requests (if request is occurs otherwise nothing will show). Request is displayed from the database. If Technician is accept any request, those Technician is assigned to particular user. Next Technician able to see what problem user has, this problem is stored in database named Problem Ticket.

## 2.3 ADMIN

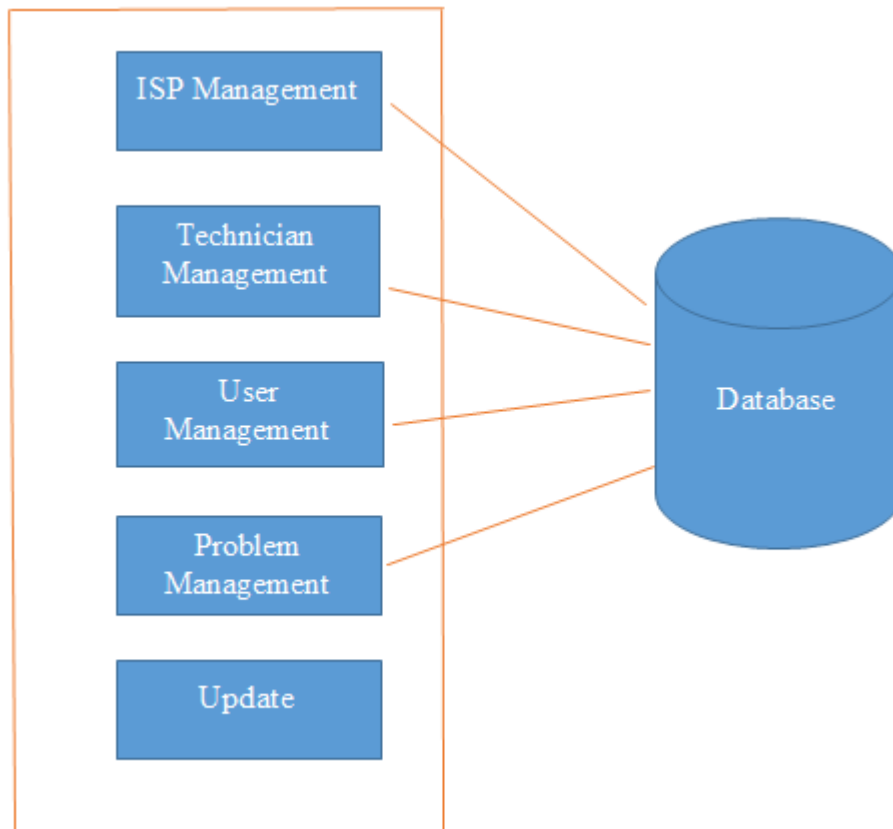
Admin  
Figure-3



Figure 3 shows the workflow of the Admin site in application. Admin have an all access to the application. Admin can manage all the data lie Technician management, User Management, Problem Management, All data stored in database those data are visible to the Admin. Admin will access database also like add or delete any Technician or user. Admin can see all the Activities which is going on between to the User and the Technician.

### 3. BACKEND

The centralized database used is Firebase database. Firebase gives you functions like analytics, databases, messaging and crash reporting so you can move quickly and focus on your users. Backed by Google, it is trusted by top apps. You can perform various complex operation very easily with firebase to build a quality and bug-free apps for Android, iOS, and The Web.

The value to be checked in the database are obtained from the URL using GET command. The database mainly contains 4 tables. First table is used to maintain user data. Second table is used to maintain Technician data. And this Technicians are available for user. Third table is used to maintain Problem data (i.e. Problem Ticket). This Problem ticket is visible for Technician. Last table is used to maintain Feedback from user and Technician. All of the data are access to Admin.

### 4. SCREENSHOTS

Following are some screenshots of the application running on mobile connect to android studio (using Developer option).



Screenshot 1

This is existing Network Problem



Screenshot 2

Login page for User and Technician

For user

Network

Customer Registration

Name:

E-Mail:

Password:

Location: Mumbai ▼

Mobile no.

**SIGNUP**

Screenshot 3

Customer or user Registration page.

Network

Technician Registration

Name:

E-Mail:

Password:

Location: Mumbai ▼

Mobile no.

**SIGNUP**

Screenshot 4

Technician Registration page.

## 5. TECHNOLOGIES USED

Software:-Android studio.

Language:-Advanced Java.

Database:-Firebase

## 6. CONCLUSION

Complexity will be reduced in Network problem because this problems are formatted by step by step. User will get to know which the best ISP for user. Maintaining user data will be done regularly. Application is easy to understand. Effectiveness for the user is major achievements.

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**BE SAFE EVERYWHERE****Omkar Dhurat<sup>1</sup>, Vedang Dharve<sup>2</sup> and Janhavi Vadke<sup>3</sup>**Student<sup>1,2</sup> and Assistant Professor<sup>3</sup>, Department of Information Technology, Vidyalkar School of Information Technology, Wadala, Mumbai**ABSTRACT**

*The moto of the project is to develop an Android application that lets its users to send notifications in case of an emergency. The users can send text messages on press of a single button. The phone numbers and the contents of the text can be set from within the application. The text messages sent, along with the content, also have the last known location of the user. This is very helpful in tracking whereabouts of the person. The user can also call 108 & Other emergency number directly from within the application, if the nature of the situation demands it. Additionally, the user of the application uses the primary kit, this kit Contain the Basic information to live in critical situation, in this kit provided survival manual is very helpful to survival in remote location where don't have network.*

*Keywords: Women safety, Panic, Primary Kit.*

**1. INTRODUCTION**

Here we introduced an app which ensures the safety of women as well as men. Our app helps to recognized and call on resources to help the one out of dangerous situations. This slow down the risk and bring assistance when we need it and help us to identify the location of the one in danger. We recommend our app as it have some key features which diverse it from others. They are quoted below: The user of the application has to login by entering a username and password first time when he opens the app on his device. The user remains logged into the application until he logs out explicitly. A new password is created for the user and a mail containing this new password is sent to the registered email id. After that user must save some details. These details include: - 1) Giving information of his Blood group. 2) Contact number of his relatives and friends

Panic message option. This message also includes the current position (latitude and longitude) of the user: - Offline Survival kit, News Update Emergency help number.

**2. RELATED WORK****1) Watch Over Me**

**Download Cost:** Free

**Additional Costs:** 3-month premium subscription, \$9.99; 1-year subscription, \$23.99

**What It Does:** Set time period you want to be watched over for, then either tell the app "I'm Safe" when the time is up, or, if you don't, it'll emergency alert your contracts (via e-mail in the free version, text in the pay version), and also alert Facebook friends and Twitter followers if you want. You can also "Report Crime" in the paid version, if you want to be Good Samaritan.

**The Verdict:** The free version's is not that awesome: Most notably, you can only be watched over for five minutes (five minutes?). But the paid version's is slightly more expensive than the paid services are in other similar apps, which is annoying, but it works well.

**2) Circle of 6**

**Download Cost:** Free

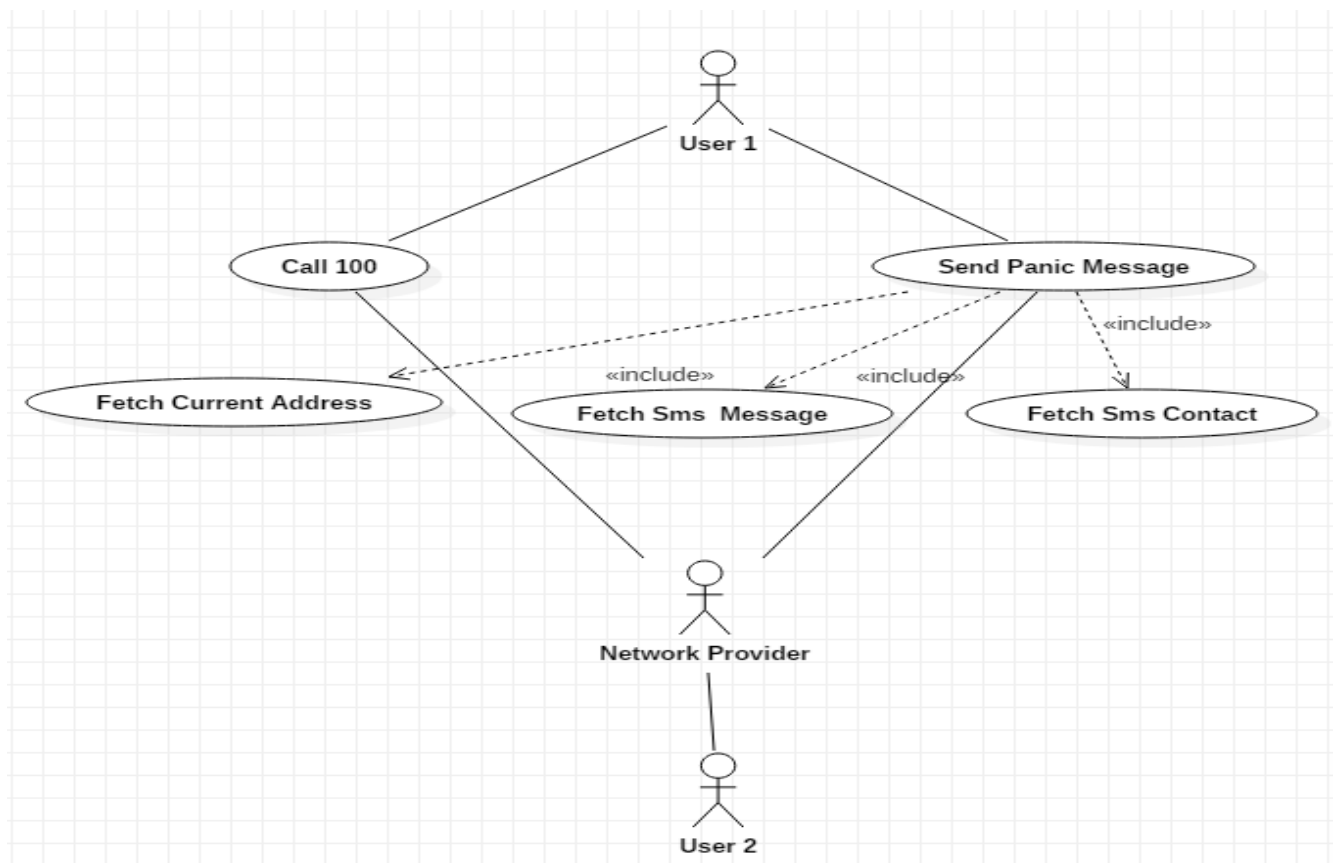
**What It Does:** First, you select six loved ones to be in your "Circle," then you can press the Car, Phone, or Chat icon to tell them you need a ride, that you want them to call you, or you want them to text you. Or you can press the Danger button, which rout you to hotlines for victims of sexual or domestic abuse.

**The Verdict:** The fact is that the Danger button doesn't actually alert the authorities, just one of two hotlines, seems dangerous. And since it's designed for college students, it's probably more appealing to a younger subset.

### 3. WORKING OF PROPOSED MODEL

- **Login or Sign-up:** - Login is a Basic authentication process for the user. It checks the User Id and Password if it is correct then it will take user to Main Activity Page.
- **GPS:** - GPS stands for global positioning system. GPS is used to track the device. GPS gives a position of device in terms of latitude, longitude and altitude. GPS is used to track moving devices using satellite signal. When GPS is used, there is a communication between GPS transceiver and GPS satellite.
- **Send Short Message:** The recent mobile location change activity details are sent as SMS to a stored nearby location contact. In addition, in an emergency situation user can press a power button thrice, this app sends the as SMS to the corresponding mobile numbers.
- **Panic button:** Panic Button is the service provided to user so when he presses button, message is sent to its friends when number has been registered.
- **News update:** We are giving the Top News Channel Link in the Main activity. So that people using our application get the latest news about their locality.
- **Primary kit:** It will help user to survive on primary basis till the help reaches.

### 4. WORKING MODEL



### 5. FUTURE ENHANCEMENTS

The project provides a best assistance in the network based regime. It allows adding up the following facilities in future

- Automatic pre-recording call to owner.
- Take photo from camera and send it to owner.
- Implement website with integration of app.
- Integrate with loud speaker to alert theft message to people.

## **6. CONCLUSION**

This project target on providing security to users which includes location-based services, SMS services, GPS services and system Architecture. Throughout the development of the Starting phase of the project, we have learned much more new skills ranging from vital experience in working as a team and the new technologies. The application eliminate the manual communication difficulties currently faced by the user. It is built in a user-friendly manner since the application is developed using Android. The application is very fast and any activity can be process across the network. Error messages are given at each level of input of single stages. Concurrently the application can be executed since the database is Firebase and capable of processing more client connections. The database is required to be installed in server space only in encryption Form.

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- <https://itunes.apple.com/us/app/circle-of-6/id507735256?mt=8>
- [https://en.wikipedia.org/wiki/Watch\\_Over\\_Me](https://en.wikipedia.org/wiki/Watch_Over_Me)

## HYDROGEN REVOLUTION

Reetik Jena<sup>1</sup> and Amraja Shivkar<sup>2</sup>

Student<sup>1</sup> and Assistant Professor<sup>2</sup>, Vidyalankar School of Information Technology, Wadala (E) Mumbai

### ABSTRACT

*It's an inevitable fact that Hydrogen is the fuel of the future. But is the common man ready for this leap? Carbon emissions are at an exponential rise and the average global temperatures are already showing their effects on the polar ice-caps. And even if we somehow don't think of any of those issues, the most common source of energy i.e. fossil fuels will go dry very soon leaving us with a demand for electricity that cannot be met. This highly abundant energy carrier is the only way through which we can achieve the long sought-after goal of Zero Emission and get rid of fossil fuel dependency. But a revolution cannot happen overnight. So how do we change the public's perception about the most abundant element in nature? We should start with something they are familiar with.*

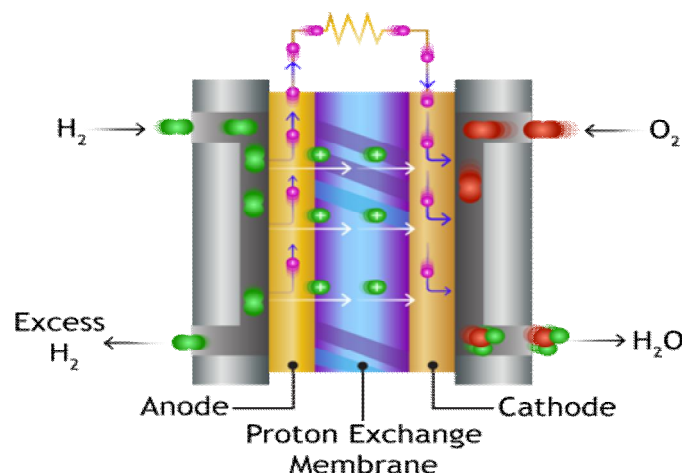
**Keywords:** Hydrogen: the fuel of the future, curbing carbon emissions, fossil fuel dependency, zero emissions, public perception.

### 1. INTRODUCTION

The most recent survey for the total no. of passenger vehicles registered in India exceeds 210 million in the year 2015 and the number has only been increasing ever since. [1] India is one of the very few nations in the world where passenger vehicles are seen using varieties of fuels like CNG, LPG, Petrol, Diesel and some powered by electricity as well but the sad truth is none of these vehicles are able to achieve the golden Zero Emissions standard. The only fuel that is capable of achieving Zero Emissions is hydrogen power. But the current infrastructure used for the production and the use hydrogen is not cost effective what-so-ever. Steam reforming of CH<sub>4</sub>(g) still stands to be the most popular method to produce hydrogen, but the method is still quite expensive and its use of coal defeats its purpose of being Zero Emission. But the reason why investors don't invest into better techniques of hydrogen production is its lack of demand. This is where HICEV's will come to play.

### 2. HYDROGEN AS A MEANS OF PROPULSION

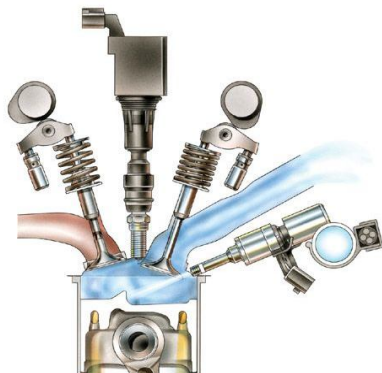
#### 2.1) PEM(Photon Exchange Membrane)



Vehicles that use the PEM technologies are extremely efficient as they use the electricity produced by passing hydrogen through the anode to charge up a small battery pack that then powers the electric motors. This technique is so efficient that 1kg of hydrogen used in this application can make the Toyota mirai travel upwards of 100 kms. The only disadvantage of this is that the car itself is expensive to purchase currently priced at \$57,500 base (upwards of 40 lakh rupees). [4] As a result it is very difficult to expect the Indian

buyer to invest in a car that costs that much and is powered by a fuel he has no clue about. But we can convince the Indian motorist to upgrade their existing car's engine to be able to run on hydrogen.

## 2.2) HICE (Hydrogen powered Internal Combustion Engine)



(Was used in the BMW 750hi and Mazda RX8)

This is where HICE comes into the picture. A normal internal combustion engine (previously running on petrol/diesel/CNG) can be very cheaply modified to run on hydrogen fuel with these key changes: hardened valves and valve seats, stronger connecting rods, non-platinum tipped spark plugs, a higher voltage ignition coil, fuel injectors designed for a gas instead of a liquid, larger crankshaft damper, stronger head gasket material, modified (for forced induction) intake manifold, direct injection conversion, and a high temperature engine oil.[5] All these modifications shouldn't cost more than 40,000 rupees and a 7kg hydrogen tank will cost about 12,000-15,000 rupees. But directly using hydrogen in these engines comes with an issue: The theoretical maximum power output from a hydrogen engine depends on the air/fuel ratio and fuel injection method used. The stoichiometric air/fuel ratio for hydrogen is 34:1. As a result, the energy content of this mixture will be less than it would be if the fuel were gasoline. Since both the carbureted and port injection methods mix the fuel and air prior to it entering the combustion chamber, these systems limit the maximum theoretical power obtainable to approximately 85% of that of gasoline engines. For direct injection systems, which mix the fuel with the air after the intake valve has closed (and thus the combustion chamber has 100% air), the maximum output of the engine can be approximately 15% higher than that for gasoline engines. Therefore, depending on how the fuel is metered, the maximum output for a hydrogen engine can be either 15% higher or 15% less than that of gasoline if a stoichiometric air/fuel ratio is used. However, at a stoichiometric air/fuel ratio, the combustion temperature is very high and as a result it will form a large amount of nitrogen oxides (NOx), which is a criteria pollutant. Therefore to overcome that with the use of variable valve timing, at slow engine speeds a lean air: fuel ratio can be used where the power output will be low but the engine will run a lot cooler resulting in zero NOx emission, but when the driver requires more power a more fuel rich air: fuel mixture can be used and the resulting NOx emissions can be filtered out by a 3 way catalyst now standard in most BS4 vehicles. Also if the vehicle supports any kind of forced induction (i.e. turbocharging or supercharging) the engine will run more efficiently. Another issue that might arise is the issue of pre-ignition, as the temperatures in a hydrogen powered engine are extremely high, hotspots in the combustion chamber can result in hydrogen burning before the compression stroke is complete, to deal with that instead of running the engine on spark ignition, it is advised to run the engine on the principle of compression ignition like in the case of diesel engines. After these modifications not only is the engine now more efficient and eco-friendly, also the life of the engine is prolonged and service intervals come down as the engine will never have any carbon deposits, hydrogen powered engines can for hundreds of thousands of kilometers and will still look pristine from the inside. Also as hydrogen is the smallest element in the universe, hydrogen can be compressed more i.e. the piston of the engine can travel a lot closer to the head of the engine block and when the combustion does happen the flame spread is extremely rapid, as a result of these hydrogen powered engines can run on higher than usual RPM. Also for safety concerns blow off valves can be installed near the tank and near the engine, in case of a leak, the lighter than air element can be vented out of the car and away from the people very quickly making it safer than any other fuel out there.

Some of the cars those were commercially sold in this format were the 2007 BMW 760hi and the Mazda RX8.

### 3. PRODUCTION OF HYDROGEN AND THE ISSUES FACED

Now that we have convinced the buyers into the fact that upgrading their existing engines into hydrogen power is a feasible and logical idea, the sale of hydrogen on fuel pumps across the country will definitely spur up interest in people who are looking to upgrade as well as pushing the auto manufactures to design cars to directly run on hydrogen, and once there are enough cars on the roads running on hydrogen, oil companies and new companies will be pushed to develop new technologies in hydrogen production thereby reducing the cost. Right now there are lot methods through which one can produce pure gaseous hydrogen. Some of these methods are:

Table 2a – Various Methods to Produce Hydrogen		
Method	Process	Implementation
Steam reforming of methane gas	In presence of nickel catalyst & at 700 – 1100 °C: $\text{CH}_{4(g)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{CO}_{(g)} + 3\text{H}_{2(g)}$  Next reaction at lower temperature: $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{CO}_{2(g)} + \text{H}_{2(g)}$	Current major source of hydrogen
Hydrogen from coal (Gasification)	At high temperature and pressure: $\text{Coal} + \text{H}_2\text{O}_{(g)} + \text{O}_{2(g)} \rightarrow \text{syngas}$ $\text{Syngas} = \text{H}_2 + \text{CO} + \text{CO}_2 + \text{CH}_4$	Current method of mass hydrogen production
Electrolysis of water	Electric current passed through water: $2\text{H}_2\text{O}_{(l)} \rightarrow 2\text{H}_{2(g)} + \text{O}_{2(g)}$	Not in widespread use due to cost of electricity
Solar – Hydrogen system	Electric current passed through water: $2\text{H}_2\text{O}_{(l)} \rightarrow 2\text{H}_{2(g)} + \text{O}_{2(g)}$	Not in widespread use due to cost of renewable energy sources

[6]

Table 2b – Various Methods to Produce Hydrogen		
Method	Advantages	Disadvantages
Steam reforming of $\text{CH}_{4(g)}$	65 – 75% efficiency Economical (least expensive method) Established infrastructure	Nonrenewable resource Produces $\text{CO}_2$ emissions
Gasification	Large supplies of coal Inexpensive resources	Produces $\text{CO}_2$ emissions Carbon sequestration would raise costs 45% efficiency
Electrolysis of water	Depend on electricity source	Input into production may require more energy than released Produces $\text{CO}_2$ emissions if coal is energy source
Solar – Hydrogen System	No emissions 65% efficiency	Expensive

[6]



#### 4. IMPROVING HYDROGEN PRODUCTION TECHNIQUES

The primary reason to switch to hydrogen is to curb our carbon emissions, so in the long term it makes no sense to use the currently popular methods of hydrogen production; instead we to look more into methods of production itself which has zero emissions and is not dependent on the use of fossil fuels.

Electrolysis is a great way; it is the easiest and oldest way of hydrogen production but is not suitable for variable renewable sources like wind, hydro and solar energy. This is where PEM or proton exchange membranes will change the entire infrastructure. The same technology used in the latest generation hydrogen power vehicle, this tech can be reversed to create hydrogen. This also paves a path to a new kind of energy storage concept. All the electricity that is generate by our current electricity sources are mostly sored in lithium batteries which are extremely expensive to make in large scale and also nickel mining (primary material in batteries) causes immense levels of land and air pollution causing acid rains, and the countries from which these elements are mined from are under-developed and thus mining of such corrosive materiel is also extremely bad for the health of the underprivileged miners working in these mines. So instead of using batteries, the electricity generated can be directed to these PEM based facilities that will convert electricity to hydrogen which can then be stored safely and more efficiently. This will solve our energy storage dilemma and at the same time the surplus/ some dedicated portion of the hydrogen can be used for fueling vehicles. The use of PEM will also eradicate the use of conventional methods for the transportation of hydrogen. Shell corp. one of the leading producer and distributor of hydrogen has solved this issue by installing a small hydrogen production facility just behind the fuel station they retail the hydrogen at. This facility has the ability to produce more than 80kgs of hydrogen everyday buy using electricity generated by renewable sources. [3]

#### 5. THE NEED FOR GOVERNMENT REFORMS

By achieving these technological milestones in India, hydrogen prices will fall down to a reasonable level, but for that technology to develop the government also has to create reforms in this sector to attract international investors form Asia Pacific countries where the demand of hydrogen is already increasing. If we become the first country to have a well-established network of hydrogen production (a feat that has never been achieved by any country till date), we are looking at global recognition and investment which in turn will help in the nations GDP. India has been steadily increasing central government subsidies on electricity transmission and distribution (T&D), while reducing subsidies on oil and gas over the past three financial years, the report said. Subsidies for T&D increased from INR 403 billion in 2014 to INR 649 billion in 2016, becoming the main recipient of energy subsidies. Although T&D subsidies are neutral to the energy source, they benefit mostly coal because of its dominance in India's electricity generation at around 66%. In addition, these sums do not include the even larger volume of state government subsidies that have been provided through the government's UDAY programme to bail out state-owned power utilities, which were provided an additional INR 1.7 trillion over 2016 and 2017. An inventory of energy subsidies provided by the central government in India shows that the total value of such incentives has declined substantially to INR 1.3 trillion (USD 20.4 billion) Subsidies to renewables have also significantly increased from INR 26 billion in 2014 to INR 93 billion in 2016. [2]

This is a huge concern as with investment like this we are being conceived as a fossil fuel dependent nation. If the country could invest some of its oil and gas capital into hydrogen, we can be the world's first hydrogen economy and set an example to other countries to follow our footsteps. Hydrogen export can play a pivotal role in our GDP development.

#### 6. CONCLUSION

The best way through which we could make the people familiar with hydrogen powered vehicles is with implementing these technologies with the existing infrastructure of cars and the way we use them, majority of the vehicles used in India are powered by piston driven internal combustion engines, so it is only logical to upgrade this architecture at first before eradicating it all together, once the public is used to hydrogen as a new fuel and the people trust this fuel enough to make a big investment on, advanced technologies like PEM's will gain popularity because of their improved efficiency and dynamics. This will not only curb pollution but will also reduce our dependency on fossil fuels. And in a future where majority vehicles are driven by hydrogen it is only logical to change the way we create and store energy and gravitate towards

hydrogen based forms of energy storage. This will embark the beginning of a NEW ERA, an era where fossil fuel dependency becomes a thing of the past, the fear of running out of an energy source won't ever be a concern, all because everything we will see around us will be powered the most abundant resource in the universe: HYDROGEN.

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## INTELLIGENT PATIENT MONITORING SYSTEM

**Vaikunda Vasagam Nadar and Shubham Keer**

Student, Department of BSc, Vidyalanakar School of Information Technology, Wadala (East), Mumbai

### ABSTRACT

*Patient Monitoring System is a process where a Doctor could monitor more than one patient at a time in remote place. In general, a compact sensing element, is used to monitor the heartbeat of the patient So, we will be connecting heartbeat sensor to monitor the patient's condition.*

*Keywords: Raspberry pi, Heart Rate Pulse Sensor (SEN-11574), MCP3008 ADC Convertor (Analog To Digital Convertor), Internet of Thing (IOT).*

### 1. INTRODUCTION

A portable easy to use monitoring system for doctors the objective of developing this project is to make a smart medical device, so that it can be processed through computer or mobile. we will be connecting heartbeat sensor on the patient's body. It can be operated by anyone and it is user friendly. This project is cost effective & can be customized as per the requirement. The system utilizes affordable and commonly available technology

The software's are created on the purpose of replacing all the paperwork done for medical purpose. All the devices that are used now a days under the human power can be replaced using internet of thing (IOT). Devices that are created under IOT are made to improve the system.

The flowchart [Fig 1] of our project is describing the general flow of data that is how the data is converted from analog to digital using ADC converter. how data is stored on the database

### 2. HEART RATE PULSE SENSOR

As Biometric Heart Beat Sensor is expensive and not available in India, so we are using low cost Ambient Heart Beat Sensor (SEN-11574) which is cheaper compare to that. It is a well-designed plug-and-use (SEN-11574) heart-rate Analog sensor for Arduino. It does not provide a digitally readable signal. As we are using raspberry pi only read digital signal. In order to be able to read the analogue signal, an ADC converter is required. Pulse sensor power supply range is 3.3V to 5V [Fig 2] (<https://components101.com/sensors/pulse-sensor>, n.d.)

### 3. RASPBERRY PI

We are using Raspberry pi model 3 it has 40 digital pins. It does not have in built ADC so that analog signals from the sensors are converted into digital signal using MCP3008 ADC converter [Fig 3] (Felix, n.d.)

### 4. FIGURES

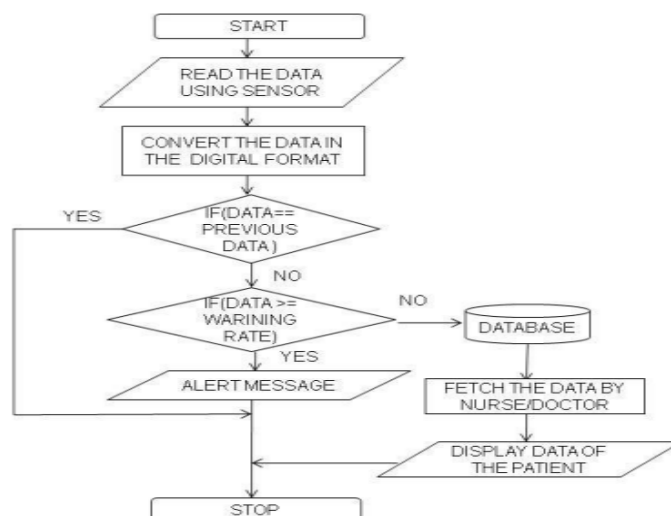


Fig-1: Flowchart

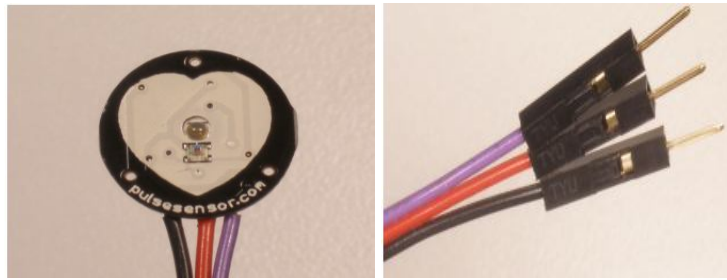


Fig-2: pin diagram of SEN 11574 Heart Rate Pulse Sensor

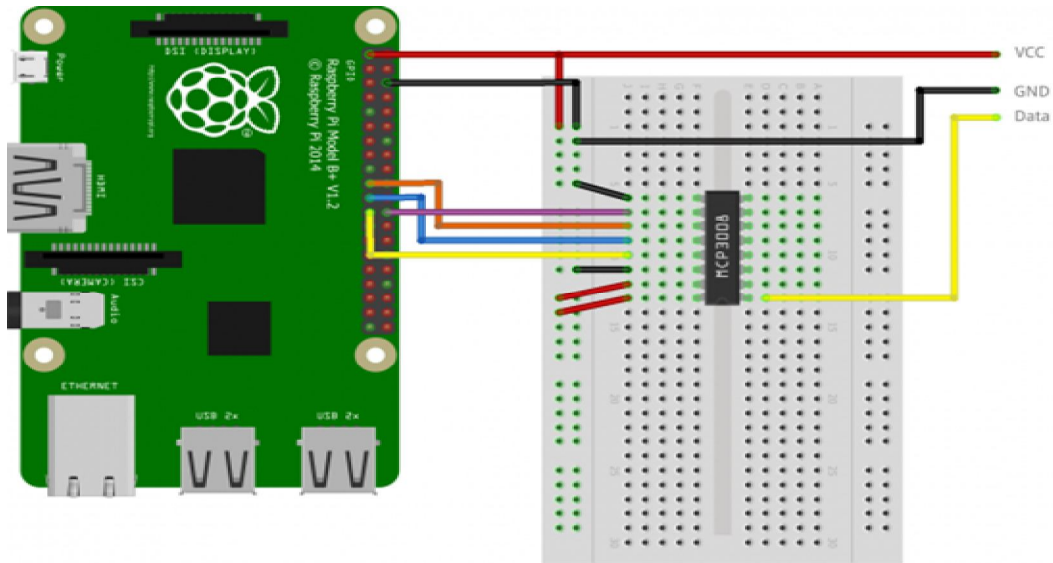


Fig-3: Hardware Interfacing

## 5 CONCLUSION

More sensor can be included as controlling parameters in the future. Patient monitoring System which will be successful with the help of smart medical equipment

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## A NON-INVASIVE DEVICE FOR GLUCOSE MEASUREMENTS

**Siddhesh Ghag and Kunal Jadhav**

Student, Department of BSc, Vidyalanakar School of Information Technology, Wadala (East), Mumbai

### ABSTRACT

*Keeping the healthy blood glucose concentration levels is advantageous for the prevention of diabetes and obesity. Present day technologies limit such monitoring to patients who already have diabetes. The purpose of this project is to suggest a non-invasive method for measuring blood glucose concentration levels and Such a method would provide useful for even people without illness, addressing preventive care.*

*This project implements near-infrared light of wavelengths 1550nm using light emitting diodes and measures transmittance through solutions of distilled water and d-glucose of concentrations 50mg/dL, 100mg/dL, 150mg/dL, and 200mg/dL by using an InGaAs photodiode, Transmittance results were observed when using near-infrared light of wavelength 1550nm. As glucose concentration increase and output voltage from the photodiode also increases. The relation observed was linear. No transmittance results were obtained with the use of 2050nm infrared light due to high absorbance and low power. The use of 1550nm infrared light provides a means of measuring glucose concentration levels.*

*Keywords: Light emitting diode, glucose, blood, photodiode, photodetector, transmittance, spectroscopy*

### INTRODUCTION

The rigorous increase in global population in advance to the expected increases in global obesity and diabetes – more in North America - suggests that there is need to be an increase in doctors or health practitioners. Because health care practice is a highly specialized profession that requires many years of study, such an increase in the number of physicians to accommodate patients may not be easily feasible.

In health sector, there are many instrumentation products that diagnose patients and these diagnostic devices allow for better implementation of corrective medical devices and methods of dealing with a wide variety of diseases and disabilities. However, the increasing global population and the poor ratio of doctors per capita.

Biotechnology involves the development of products that benefit society. Biomedical engineering focuses on products that are most widely used in health care with a purpose of providing efficient and accurate patient diagnoses and care and the purpose of this engineering project was to address the idea of preventive care as oppose to corrective or supportive care. The goal was to provide suggestion for a product that could possibly be recommended within the health care society that allows patients to monitor their health, preventing them from overeating or avoiding high sugar foods. This may aid in preventing diabetes or obesity and thus improving their quality of life.

The project finds possible method of measuring glucose level using near-infrared light by emission from light emitting diodes. The project aims to find a relation between the absorption of near-infrared light and various glucose level. This is a non-invasive method of measuring glucose levels may become a more popular choice for diabetics and in being non-invasive its uses may extend to the general public. In having a large majority of populations able to monitor their blood glucose levels and it may prevent hyperglycemia, hypoglycemia, and perhaps the onset of diabetes.

## SURVEY OF TECHNOLOGY

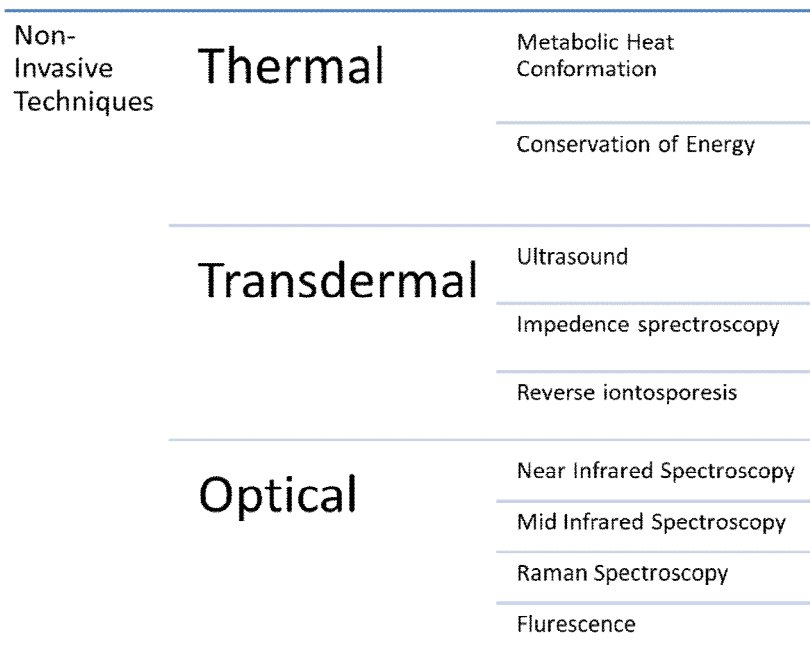


Figure-1: Non-Invasive Techniques

**NEAR INFRARED SPECTROSCOPY**

It is a spectroscopic method which uses radiation in the near infrared (NIR) region of the electromagnetic spectrum (750- 2500 nm). There are mainly three bands in NIR range: combination overtone band (2000-2500nm), first overtone band (1400-2000nm) and second or higher overtone band (750- 1400nm). It allows the glucose measurement under the skin to a depth of few mm in range. The penetration of light into the skin decreases with the increase in wavelength. As the light interacts with tissue, it is partially absorbed and scattered due to interaction with chromophores within the tissue. The combination and the first overtone regions are dominated by glucose absorption information while shorter wavelength region mainly carries scattering information.

NIR light transmission or reflectance has been studied through an ear lobe, finger web and finger cuticle, skin of the forearm, lip mucosa, oral mucosa, tongue, nasal septum, cheek, and arm. NIR diffuse reflectance measurements performed on the finger showed a correlation with BG but predictions were often not sufficiently accurate to be clinically acceptable.

The technique has serious limitations as it is affected by physicochemical parameters such as changes in body temperature, blood pressure, skin hydration, and concentrations of triglyceride and albumin. Moreover, it is sensitive to environmental variation in temperature, humidity, atmospheric pressure and carbon dioxide content. The measurement is also affected by the thickness and thermal properties of the skin, and the disease states such as hyperglycaemia and hyperinsulinemia.

**RAMAN SPECTROSCOPY**

Raman spectroscopy used laser radiation source from visible to Mid-IR, when some portion of scattered light shows a different wavelength from that of excitation beam, the effect is known as Raman effect. When scattered light has a higher wavelength and lower intensity (10-3 times) than the original signal.

**OPTICAL COHERENCE TOMOGRAPHY**

The optical coherence tomography (OCT) allows the real time and precise non-invasive glucose monitoring. OCT uses low coherence light source, an interferometer and a photo-detector to measure the interferometric signal. The interferometer consists of reference arm, sample arm and a moving mirror. Light returned from the reference part of the interferometer is combined with the backscattered light from tissue. The resulting interferometric signal is detected by a photo-detector. The delay in back scattered light or the changes in scattered light due to variation in glucose concentration is used for measurement of blood glucose.

### BIOIMPEDANCE SPECTROSCOPY

The first study of non-invasive continuous glucose monitoring system involving impedance spectroscopy was published by Cardiff's group in 2003. As result from this research, the company pendragon developed a wrist glucose monitor called Pendra. The equipment gathers information of a LC resonance circuit from 1 MHz until 200MHz, with the skin working as dielectric from the capacitor. One limitation of this research is that it requires an equilibration process, where the patient must rest for 60 min before starting measurement.

### FLUORESCENCE SPECTROSCOPY

This technique is based on the generation of florescence by human tissues when excited by lights at specific frequencies. In the case of glucose, one study demonstrated that when a glucose solution is excited by an ultraviolet laser light at 380nm, fluorescence can be detected at 340,380,400 nm, with maximum at 380nm. It was also proved that fluorescence intensity was dependent upon glucose concentration in the solution. Also light in the visible spectrum can be used, but this is more adequate for studying fluorescence of tissues rather than that of solutions. In tissues, the use of ultraviolet light could lead to strong scattering phenomena, in addition to fluorescence. Moreover, even when using different wavelengths, the fluorescence phenomenon can depend not only on glucose, but on several parameters, such as skin pigmentation, redness, epidermal thickness.

### CURRENTLY DEVELOPED NON-INVASIVE DEVICES

Device	Technology	Target Area
<ul style="list-style-type: none"> <li>• Glucowatch G2 (USA)</li> <li>• Pendra(Switzerland)</li> </ul>	<ul style="list-style-type: none"> <li>• Reverse iontophoresis</li> <li>• Impedence spectroscopy</li> </ul>	<ul style="list-style-type: none"> <li>• Wrist Skin</li> </ul>
<ul style="list-style-type: none"> <li>• OrSense (Israel)</li> </ul>	<ul style="list-style-type: none"> <li>• Occlusion Spectroscopy</li> </ul>	<ul style="list-style-type: none"> <li>• Wrist Skin</li> </ul>
<ul style="list-style-type: none"> <li>• GlucoTrack (Israel)</li> </ul>	<ul style="list-style-type: none"> <li>• Thermal, Ultrasonic &amp; Electromagnetic</li> </ul>	<ul style="list-style-type: none"> <li>• Fingertip Skin</li> </ul>
<ul style="list-style-type: none"> <li>• SugerBEAT (UK)</li> </ul>	<ul style="list-style-type: none"> <li>• NIR Spectroscopy</li> </ul>	<ul style="list-style-type: none"> <li>• Earlobe Skin</li> </ul>
<ul style="list-style-type: none"> <li>• MediWise GlucoWise (UK)</li> </ul>	<ul style="list-style-type: none"> <li>• Radiowave Spectroscopy</li> </ul>	<ul style="list-style-type: none"> <li>• Arm, leg &amp; abdominal</li> <li>• Skin between thumb and forefinger</li> </ul>

Figure-2: Non-Invasive Devices  
Source internet\*\*

### PROJECT IMPLEMENTATION

As a final year project our aim is to make a similar non-invasive device which will measure the blood concentration. We are using Near Infrared (NIR) Spectroscopy technique to measure the blood concentration as this technique is properly explained and the components which are used for making the product are available. The main two products are InGaAs photodiode (Receiver) & 1550nm IR led (Transmitter).

NIR Spectroscopy says that the correlation between the photodiode output voltage and the glucose concentration is directly proportional to each other. So, by using Polynomial Regression we can predict the glucose concentration value by passing the voltage value to the equation. Here we are using scilab software for the regression process. The initial voltage reading is derived by Multimeter.



Figure-3: Prototype



The general formula for the polynomial regression is :-

$$y = b_1 + b_2x + c \quad (\text{Here the polynomial is of degree 2})$$

Here,  $y$  is glucose concentration

$x$  is output voltage of photodiode

$(b_1 + b_2)$  &  $c$  are determined to fit the data in the least square fit

For the correlation of glucose concentration and photodiode voltage, Data Acquisition is carried out. Initially the glucose measurement is taken by traditional technique and respective voltages are taken from 20 test subjects. So, we get adequate data for further regression analysis. The more test subjects and polynomial regression helps to decrease the error up to 10 to 20 %.

**Table-1: correlation table**

Test Subjects	Glucose Concentration (mg/dl)	Voltage (mV)
1	146	110
2	116	104
3	115	106
4	107	104.3
5	140	108

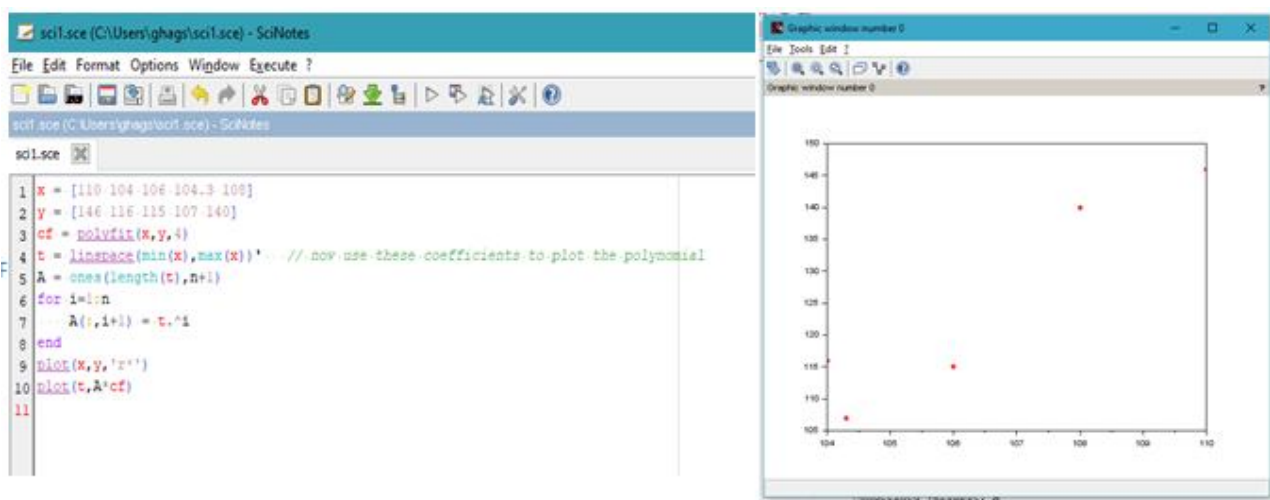


Figure-4: Scilab formulation

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**PROTECTING WEB APPLICATION'S VULNERABILITIES FROM SQL INJECTION ATTACK****Sadaf Shaikh<sup>1</sup> and Ujwala Sav<sup>2</sup>**

Student<sup>1</sup> and Assistant Professor<sup>2</sup>, Department of BSc, Vidyalanakar School of Information Technology,  
Wadala (East), Mumbai

**ABSTRACT**

*Security and privacy of database-driven web applications are extremely multifaceted against web intruders. One of the most dangerous cyber-attacks is the SQL-Injection, which simply creates huge loss to the organization and commercial vendors. SQL is a code injection technique used to attack data-driven applications, in which malicious SQL Statements are inserted into an entry field for execution. Since an SQL Injection vulnerability could possibly affect any website or web application that makes use of an SQL-based database, the vulnerability is one of the oldest, most prevalent and most dangerous of web application vulnerabilities. By leveraging an SQL Injection vulnerability, given the right circumstances, an attacker can use it to bypass a web application's authentication and authorization mechanisms and retrieve the contents of an entire database. SQL Injection can also be used to add, modify and delete records in a database, affecting data integrity.*

*To such an extent, we need to protect the web applications from vulnerabilities of SQL injection with the help of data encryption techniques. This research paper proposed web application protection from SQL injection attack by using master key and AES algorithm.*

*Keywords: SQL Injection Vulnerabilities, Database Security, Encryption, AES Algorithm.*

**1. INTRODUCTION**

SQL injection is a basic attack that can be used either to gain unauthorized access to the database or to modify the database illegally. This is the most common attack used to retrieve the confidential information from the database such as Credit card details, etc. SQL injection happens when a hacker or an attacker inserts malicious data in the input field. The main reason for SQL injection attack –end user input string is not validated properly and is passed to the database without validation [10]. SQL injection attacks are too much vulnerable that it can bypass any security levels such as Firewall, encryption, and traditional intrusion detection system. Basically, a web application is three tier architecture, the Application tier at the user side, Middle tier which converts the user queries into the SQL format, and the backend database server which stores the user data as well as the user's authentication table. SQL injection attack is application level security vulnerabilities. Most of the web Application used over the internet or in the enterprises is vulnerable to the SQL injection attack. Although the vulnerabilities that lead to the SQL injection attack are due to the lack of effective technique for detecting and for preventing them. Programming practices such as defensive programming and sophisticated input validation techniques can prevent some vulnerability. A novel idea to prevent SQL injection is to use encryption algorithm. An encryption algorithm can be used to encrypt all the user data that has to be sent over the network to the database.

**2. LITERATURE REVIEW****2.1 SQL INJECTION**

SQL Injection is one of the many web attack mechanisms used by hackers to steal data from databases. It is perhaps one of the most common application layer attack methodology used today. It is the type of attack that takes advantage of improper implementations of your web applications that allows hacker to inject SQL commands into say a login form to allow them to gain the access to the data held within your database [12]. In essence, SQL Injection arises because the fields available for user input allow SQL statements to pass through and query the database directly. Web applications allow legitimate website visitors to submit and retrieve data to and from a database over the Internet using their preferred web browser. Databases store data needed for websites to deliver specific content to visitors and render information to clients, customers, suppliers, employees and a host of stakeholders. User credentials, financial and payment information, secret passwords, company statistics may all be resident within a database and accessed by legitimate users through off-the-shelf and custom web applications. SQL Injection attack is the hacking technique which attempts to pass SQL commands through a web application for execution by the backend database. If not implemented

properly, web applications may result in SQL Injection attacks that allow hackers to view and collect information from the database.

Take a simple login page where a legitimate user would enter his username and password combination to enter a secure area to view his personal details or upload his comments and details in a forum. When the legitimate user submits his data, an SQL query is generated from these data and submitted to the database for verification. If valid, the user is allowed access the system. That is, the web application that controls the login page will communicate with the database through a series of planned commands so as to verify the username and password combination. On verification process, the legitimate user is granted appropriate access. Through SQL Injection, the hacker may input specifically created SQL commands with the intent of bypassing the login form barrier and seeing what lies behind it. This is only possible if the inputs are not properly implemented (i.e., made invulnerable) and sent directly with the SQL query to the database. SQL Injection vulnerabilities provide the means for an attacker to communicate directly to the database [12].

### 3. TYPES OF SQL INJECTION VULNERABILITIES

The SQL injection attacks can be done through various techniques. Some of them are specified below:

#### 3.1. TAUTOLOGY ATTACK

The main objective of tautology-based attack is to inject code in conditional statements so that they are always evaluated as true. Using tautologies, the hacker wishes to either bypass user authentication or insert inject-able parameters or extract data from the database [12]. A typical SQL tautology has the form, where the comparison expression uses one or more relational operators to compare operands and generate an always true condition. Bypassing authentication page and collecting data is the most common example of this kind of attack. In this type of attack, the attacker exploits an inject-able field contained in the "WHERE" clause of query. Attacker transforms this conditional query into a tautology and hence causes all the rows in the database table targeted by the query to be returned. **For example: - SELECT \* FROM user WHERE id= '1' or '1=1' - 'AND password= '12345'; "or 1=1" the most commonly known tautology.**

#### 3.2. LOGICALLY INCORRECT QUERY ATTACKS

By providing incorrect data in the input field, the database might return some important information about the database, its fields and the database name. Continuous usage of this attack might compromise the security of the database [10]. The main objective of the Illegal/Logically Incorrect Queries based SQL Attacks is to gather the information about the back end, database of the Web Application. When a query is rejected, an error message is returned from the database which includes useful debugging information. This error messages help attacker to find vulnerable parameters in the application and consequently database of the application [8].

##### For Example

1. Original URL: [http://www.toolsmarketal.com/veglat/? id\\_nav=2234556](http://www.toolsmarketal.com/veglat/? id_nav=2234556)
2. SQL Injection: [http://www.toolsmarket-al/veglat/? id\\_nav=223456](http://www.toolsmarket-al/veglat/? id_nav=223456)
3. Error message showed: `SELECT name FROM Employee WHERE id=223455\ ' .` From the message error we get the name of table and fields: name; Employee; Id by the gained information attacker can organize more perfect attacks. The Illegal/Logically Incorrect Queries based SQL attack is considered as the basis step for all the other attacking techniques.

#### 3.3. UNION QUERY

In this technique, attackers join injected query to the safe query by the word UNION and then can get data about other tables from the application.

**For Example:** Following executed from the server:

**SELECT name, phone FROM tbl\_user WHERE userid=\$id1**

By injecting the following Id value into:

**\$id1= 1 UNION ALL SELECT credit Card Number, 1 FROM Credit CardTable**

Then we will have the following query:

**SELECT name, phone FROM tbl\_user WHERE userid1 =1 UNION ALL SELECT creditCardNumber, 1 FROM Credit CardTable** This will join the result of the original query with all the credit card users to the attacker.

#### 4. RESEARCH METHODOLOGY

We propose a technique to prevent all the SQL injection attacks by using encryption techniques.

- Master Key Generation
- AES Algorithm

##### 4.1 SQL SERVER AND DATABASE ENCRYPTION KEYS

Encryption keys are used by SQL Server to help secure data, credentials and connection information that is stored in a server database. There are two kinds of keys: **Symmetric and Asymmetric** Keys in SQL Server. Symmetric keys use the same password to encrypt and decrypt data. Asymmetric keys use one password to encrypt data (called the public key) and another to decrypt data (called the private key).

SQL Server has two primary applications for keys: a service master key (SMK) generated on and for a SQL Server instance, and a database master key (DMK) used for a database. The Service Master Key is the root of the SQL Server encryption hierarchy. The SMK is generated automatically the first time the SQL Server instance is started and is used to encrypt a linked server password, credentials, and the database master key. Whereas, the database master key is a symmetric key that is used to protect the private keys of certificates and asymmetric keys that are present in the database. It can also be used to encrypt data.

##### 4.2 CREATE MASTER KEY

**CREATE MASTER KEY ENCRYPTION BY PASSWORD = '23987hxJ#KL95234nl0zBe';**

The following example creates a database master key for the current database. The key is encrypted using the password '23987hxJ#KL95234nl0zBe'. The master key is encrypted by using the AES\_256 algorithm and a user-supplied password.

##### 4.3 AES ENCRYPTION

AES or Advanced Encryption is a cipher i.e. a method of encrypting and decrypting information. Since 1977, the US government used a cipher called DES (Data Encryption Standard) to protect sensitive, unclassified information. A replacement for DES was needed as its key size was too small. With increasing computing power, it was considered vulnerable against exhaustive key search attack.

The AES algorithm was ultimately selected and declared a Federal Information Processing Standards or FIPS standard by the NIST (National Institute of Standards and Technology) in 2001. AES belongs to a family of ciphers which is known as block ciphers. A block cipher is an algorithm that encrypts data on a per-block basis. The size of each block is usually measured in bits. AES, for example, is 128 bits long, which means AES will operate on 128 bits of plaintext to produce 128 bits of ciphertext. AES requires the use of keys during the encryption and decryption processes. AES supports three keys with different lengths: **128-bit, 192-bit, and 256-bit keys**. The longer the key, the stronger the encryption. So, AES 128 encryption is the least strong, while AES 256 encryption is the strongest.

##### 4.3.1 HOW IS THE AES ENCRYPTION ALGORITHM USED IN SECURE FILE TRANSFERS?

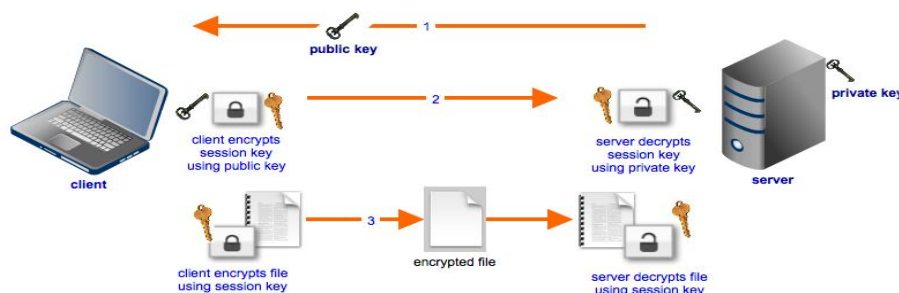


Figure-1: Source: <https://www.jscape.com/blog/aes-encryption>

### 4.3.2 FEATURES OF AES

- Symmetric key symmetric block cipher
- 128-bit data, 128/192/256-bit keys
- Stronger and faster than Triple-DES
- Provide full specification and design details
- Software implementable in C and Java

### 4.4 STRUCTURE OF AES

AES is an iterative rather than Feistel cipher. It is based on 'substitution-permutation network'. AES performs all its computations on bytes rather than bits. Hence, AES treats the 128 bits of a plaintext block as 16 bytes. These 16 bytes are arranged in four columns and four rows for processing as a matrix – The number of rounds in AES is variable and depends on the length of the key. AES uses 10 rounds for 128-bit keys, 12 rounds for 192-bit keys and 14 rounds for 256-bit keys. Each of these rounds uses a different 128-bit round key, which is calculated from the original AES key.

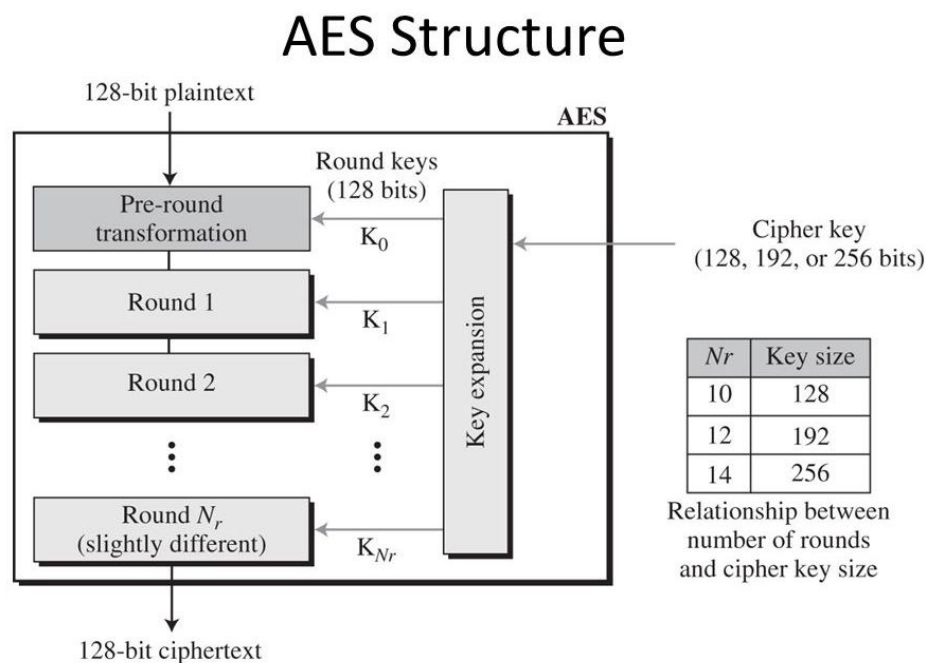


Figure 2: Source: <https://scanfreetree.com/cryptography/advanced-encryption-standard>

AES comprises three block ciphers: AES-128, AES-192 and AES-256. Each cipher encrypts and decrypts data in blocks of 128 bits using cryptographic keys of 128-, 192- and 256-bits, respectively. Symmetric (also known as secret-key) ciphers use the same key for encrypting and decrypting, so the sender and the receiver must both know -- and use -- the same secret key. All key lengths are deemed sufficient to protect classified information up to the "Secret" level with "Top Secret" information requiring either 192- or 256-bit key lengths. There are 10 rounds for 128-bit keys, 12 rounds for 192-bit keys and 14 rounds for 256-bit keys -- a round consists of several processing steps that include substitution, transposition and mixing of the input plaintext and transform it into the final output of cipher text.

For encryption, each round consists of the following four steps:

- **Substitute bytes:** SubBytes mean substitution of byte of the state array by searching in lookup table which is called substitution box or S-box. S-box is a 16\*16 lookup table and it contains 256 different values. The S-box table contains all possible values for 8-bit sequence that means in decimal 0 to 255. Each byte of the state array is the input of this SubBytes step and the input byte is alternated by a corresponding value. The AES S-Box is shown in the Table below.

	0	1	2	3	4	5	6	7	8	9	0a	0b	0c	0d	0e	0f
0	63	7c	77	7b	f2	6b	6f	c5	30	1	67	2b	fe	d7	ab	76
10	ca	82	c9	7d	fa	59	47	f0	ad	d4	a2	af	9c	a4	72	c0
20	b7	fd	93	26	36	3f	f7	cc	34	a5	e5	f1	71	d8	31	15
30	4	c7	23	c3	18	96	5	9a	7	12	80	e2	eb	27	b2	75
40	9	83	2c	1a	1b	6e	5a	a0	52	3b	d6	b3	29	e3	2f	84
50	53	d1	0	ed	20	fc	b1	5b	6a	cb	be	39	4a	4c	58	cf
60	d0	ef	aa	fb	43	4d	33	85	45	f9	2	7f	50	3c	9f	a8
70	51	a3	40	8f	92	9d	38	f5	bc	b6	da	21	10	ff	f3	d2
80	cd	0c	13	ec	5f	97	44	17	c4	a7	7e	3d	64	5d	19	73
90	60	81	4f	dc	22	2a	90	88	46	ee	b8	14	de	5e	0b	db
a0	e0	32	3a	0a	49	6	24	5c	c2	d3	ac	62	91	95	e4	79
b0	e7	c8	37	6d	8d	d5	4e	a9	6c	56	f4	ea	65	7a	ae	8
c0	ba	78	25	2e	1c	a6	b4	c6	e8	dd	74	1f	4b	bd	8b	8a
d0	70	3e	b5	66	48	3	f6	0e	61	35	57	b9	86	c1	1d	9e
e0	e1	f8	98	11	69	d9	8e	94	9b	1e	87	e9	ce	55	28	df
f0	8c	a1	89	0d	bf	e6	42	68	41	99	2d	0f	b0	54	bb	16

Figure-3: [https://www.commonlounge.com]

- **Shift rows:** The ShiftRow function performs byte wise circular shifts on last three rows of the state. In this function, first row is not rotated, but second, third, and fourth rows are rotated by one, two, three bytes respectively. This rotation provides diffusion property of the AES algorithm.

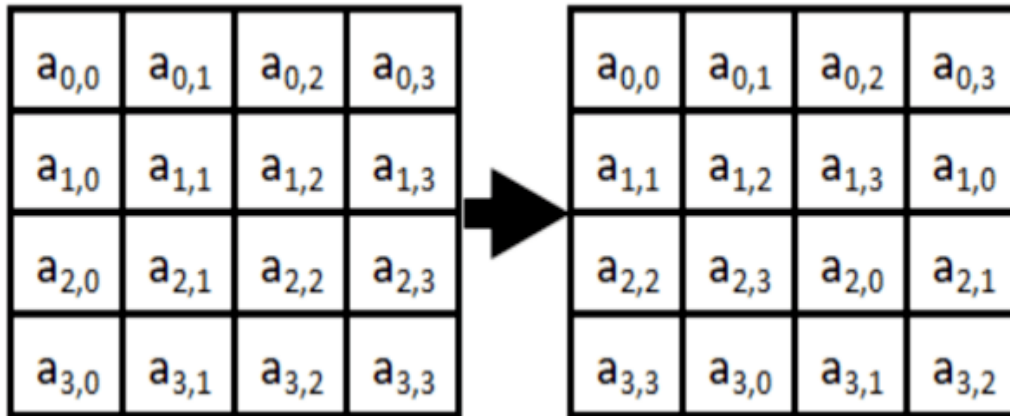


Figure-4: [https://www.commonlounge.com]

- **Mix columns:** From the Mix Column operations, there is a transposition of linear transformation made to join the 4-byte in each column. The task of this step is to take 4-byte as input and outputs 4-byte, where every input bytes have an effect on all the output 4-byte. Each column is transformed using fixed matrix operations; this is composed of multiplication and addition of the entries.

$$\begin{bmatrix} a_{0,0} & a_{0,1} & a_{0,2} & a_{0,3} \\ a_{1,0} & a_{1,1} & a_{1,2} & a_{1,3} \\ a_{2,0} & a_{2,1} & a_{2,2} & a_{2,3} \\ a_{3,0} & a_{3,1} & a_{3,2} & a_{3,3} \end{bmatrix} \times \begin{bmatrix} 2 & 3 & 1 & 1 \\ 1 & 2 & 3 & 1 \\ 1 & 1 & 2 & 3 \\ 3 & 1 & 1 & 2 \end{bmatrix} = \begin{bmatrix} b_{0,0} & b_{0,1} & b_{0,2} & b_{0,3} \\ b_{1,0} & b_{1,1} & b_{1,2} & b_{1,3} \\ b_{2,0} & b_{2,1} & b_{2,2} & b_{2,3} \\ b_{3,0} & b_{3,1} & b_{3,2} & b_{3,3} \end{bmatrix}$$

Figure-5: [https://www.commonlounge.com]

- **Add round key:** For every round in the AddRoundKey step, a subkey is generated from the main key by means of Rijndael's key schedule. The subkey is inserted by combining every byte in the state with it related byte in the subkey by means of bitwise XOR. For the first word of the round key, the value used in the exclusive-or is the result of passing the last word of the previous round key through the g function.

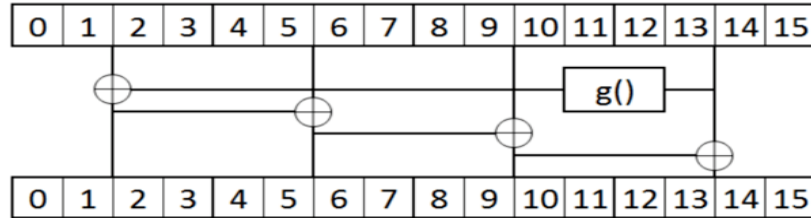


Figure-6: [https://www.commonlounge.com]

## 5. RESULT AND ANALYSIS

In this research, smartsniff tool is used to protect web applications from SQL injection attack. If the data is in plain text format, it becomes easier for the hacker to exploit the data, but, if the data is in Encrypted format (Cipher) it is unreadable. Using **Smartsniff** tool, all the active Unencrypted packets were captured and the details were displayed in the separate window.

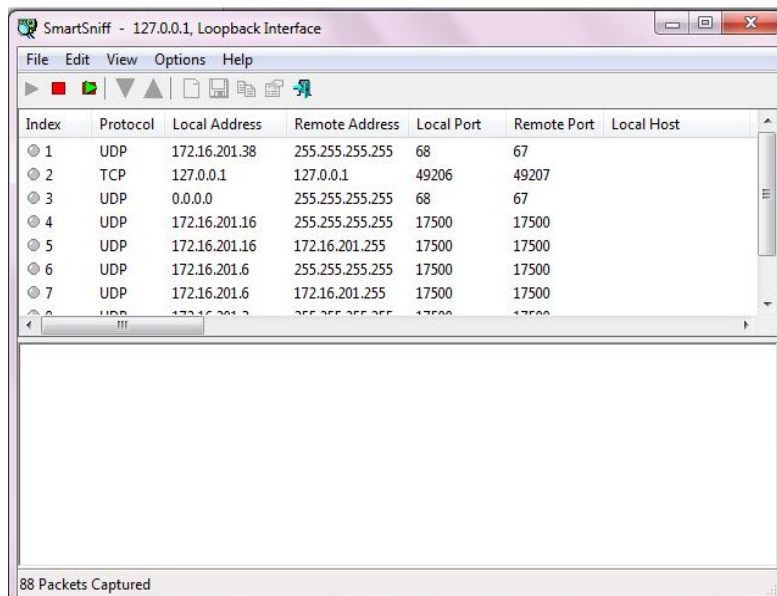


Figure-7

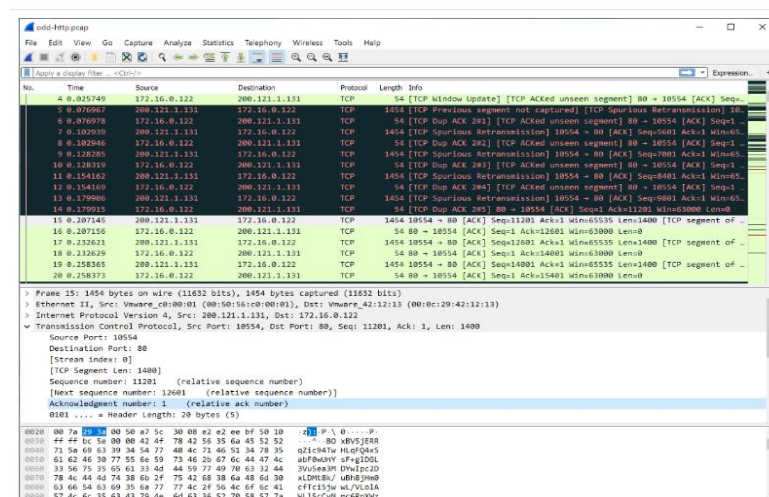


Figure-7.1



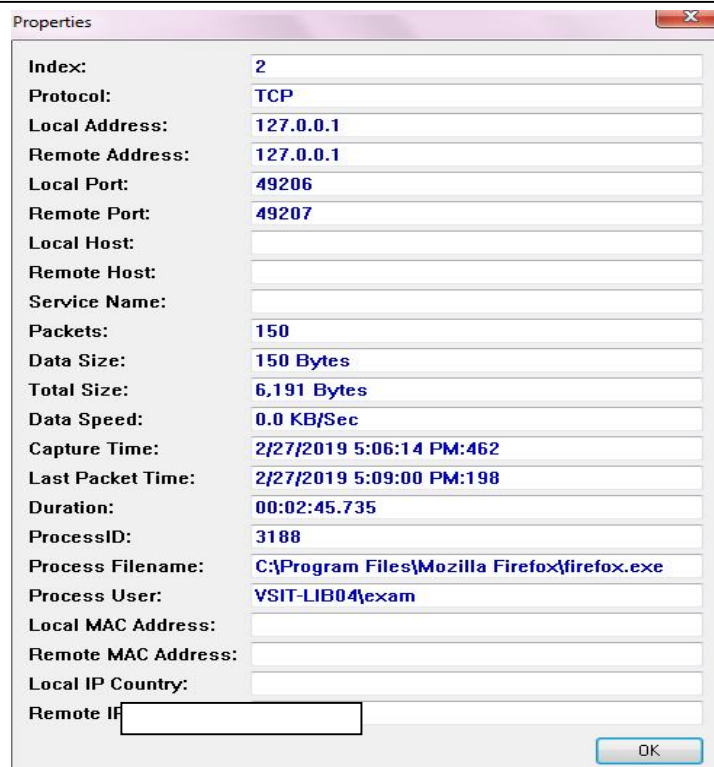


Figure-7.2: [Information about the captured TCP packet]

## CONCLUSION

We have studied the existing Advanced Encryption Standard and its implementation. We have also done the analysis and comparison of the captured unencrypted packets over the network using various tools. Many methods have been used to avoid SQL Injection attacks but no feasible solution is available. Encryption algorithms play important roles to protect original and confidential data from unauthorized access. This paper covered the different types of vulnerabilities and most powerful and widely supported AES algorithm for SQL Injection prevention.

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## ONE TAP HELP

**Ashwini Patil, Kavita Jain and Dr. Sarika Chouhan**

Student and Assistant Professor, Vidyalankar School of Information and Technology, Wadala, Mumbai

### 1. ABSTRACT

*The basic idea behind this project is to send the victim's location on the click of the button to the nearest police station /authorities. The victim's location will be sent to the nearest police station. As soon as the message is sent to the police app, the police will receive a SMS by the victim that she/he is in danger along with this the location will also send in URL form. Now, in the police app the victim's location will be tracked on the google map.*

*This application will help to inform and update your close ones if you are in an unsafe place. The app is the fastest and easiest way to update your close ones about your location and other details. With just a tap of a button, the app sends*

*Notification to a nearest police station along with your location.*

*Keywords: Mobile Application, Android Application*

### 2. INTRODUCTION

It is an accepted fact that brutal crimes against women are occurring in India daily.

Now many Indians do not deny away from conversation relating to eve-teasing assaults or rape.

Even the common man's conversation on the streets often steer towards the escalated and horrendous attacks on women.

Android is the most widely used mobile OS.

The current system is developed on the basis of android platform.

This system will notify to the authorities on the click of the button along with this the location will also be send.

Many unfortunate incidents have been taking place in woman's case. Problems may come from any direction such as women walking on the road after the work, going to super market or many other reasons for which they go alone. People at home are not sure of their return safely.

This is the best app to inform and update your close ones if you are in an unsafe place. The app is the fastest and easiest way to update your location and other details. With just a tap of a button, the app sends an SMS to a nearest police station along with your location.

Provide safety to women from sexual abuse and crime by use of Information technology. The project idea is to have a software technology layer between all the people and place department.

In order to overcome such problems faced by women the Safety (women security apps) mobile based application is not only necessary to use but also plays a pivotal role with android software.

The purpose of this app is to provide complete security to the Women's.

It will call the nearest on duty police in charge to help the women in any situation.

It Ensures quick response from the police when called.

User does require to choose the technology:

>A Smart Phone having GPS.

### 3. SURVEY OF TECHNOLOGIES

#### a) Android Studio



Fig-2.1: Android Studio

All it uses a java code. The police app is a background service which keep running at background and collecting user's location (latitude, longitude) at interval of specified seconds.

Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smartphones and tablets. In addition, Google has further developed Android TV for televisions, Android Auto for cars, and Wear OS for wrist watches, each with a specialized user interface. Variants of Android are also used on game consoles, digital cameras, PCs and other electronics

#### b) Firebase



Fig-2.2: Firebase Realtime Database

It's a BaaS (Backend as a service)

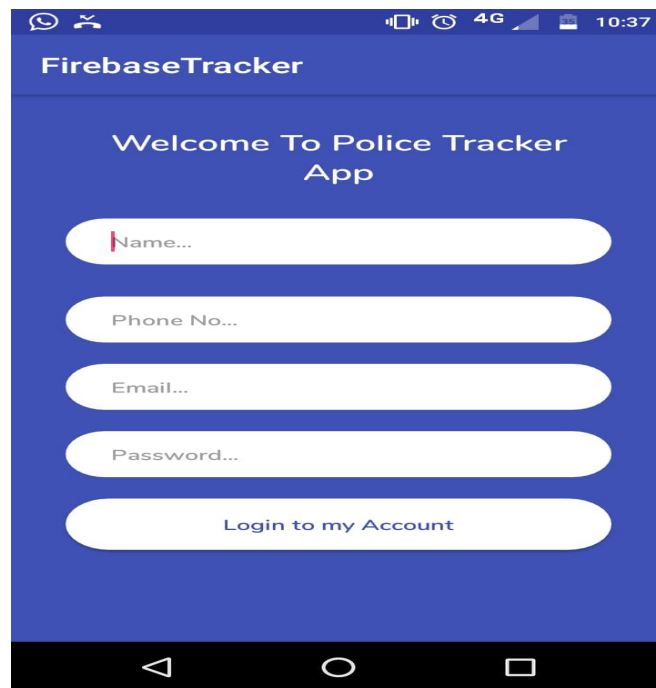
Store and sync data with our NoSQL cloud database. Data is synced across all clients in real time, and remains available when your app goes offline.

Firebase is platform which allow to build web and mobile applications without server-side programming language. You can store user's data on its real-time database which sync data among user's data in no time.


The firebase has a notification system too.

On changing location, it updates the data in the app.

Firebase is a google product which offers so many useful features.

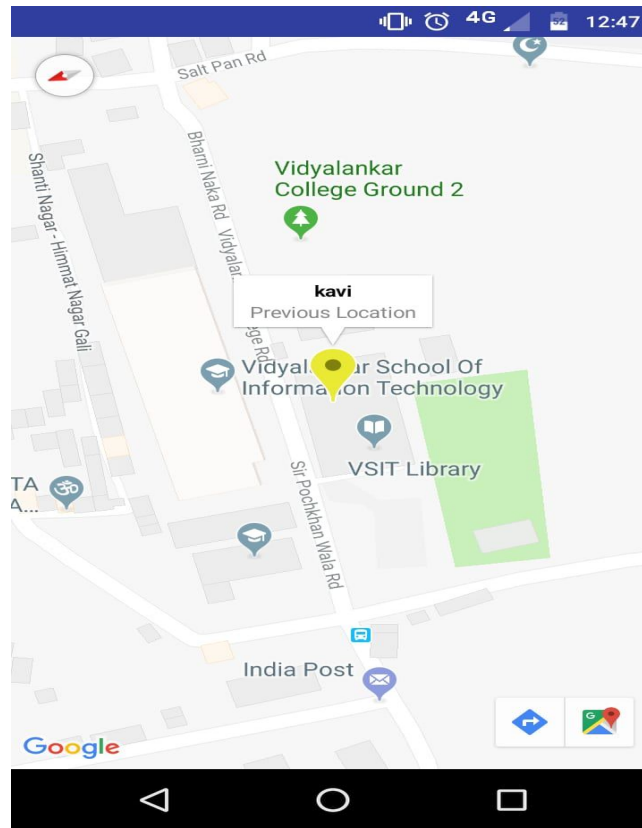
**4. USER INTERFACE DESIGN****A.**

The screenshot shows the FirebaseTracker app interface. At the top, the status bar displays icons for signal, battery, and time (10:37). The app title "FirebaseTracker" is at the top of the screen. Below it, the text "Welcome To Police Tracker App" is centered. There are four input fields: "Name...", "Phone No...", "Email...", and "Password...". Below these fields is a button labeled "Login to my Account". The bottom of the screen shows the Android navigation bar with back, home, and recent apps buttons.

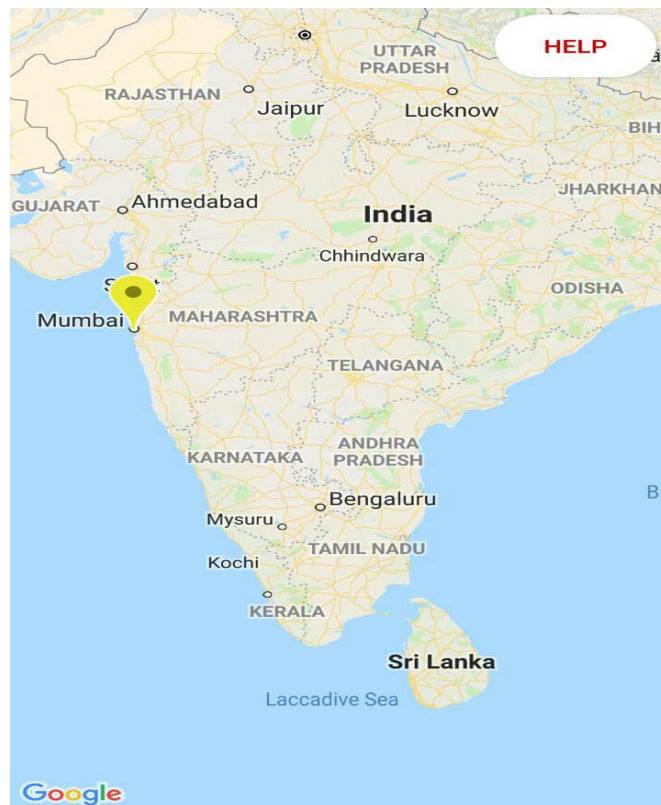
**B.**

The screenshot shows the FirebaseTrackerViewer app interface. At the top, the title "FirebaseTrackerViewer" is displayed. Below it, the text "Welcome To Police Tracker App" is centered. There are two input fields: "Email..." and "Password...". Below these fields is a button labeled "Login to my Account".

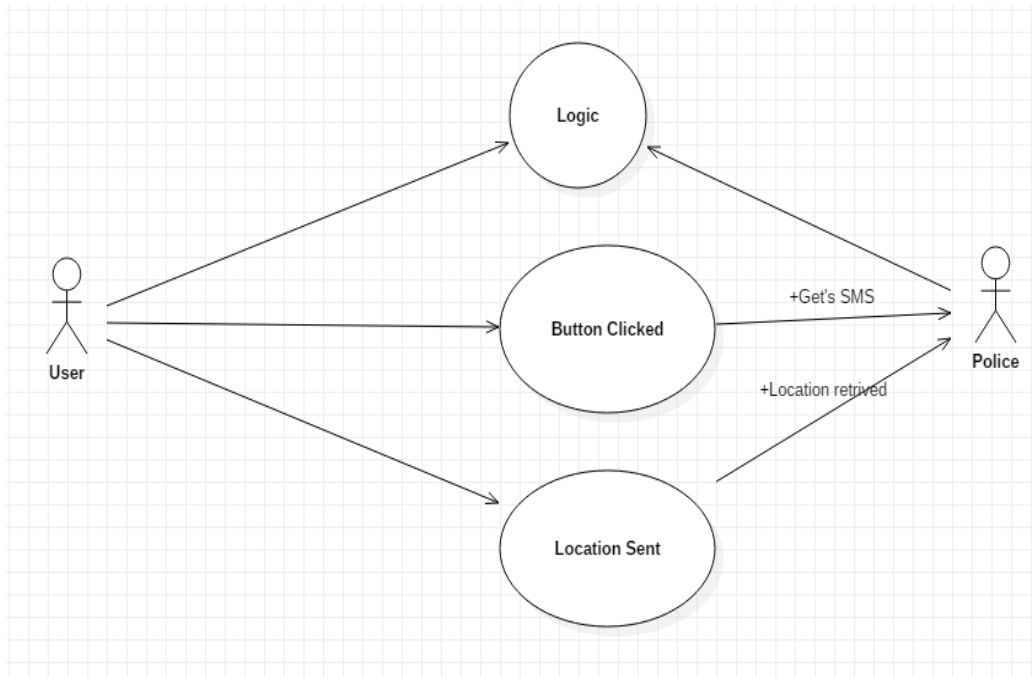
C.



D.



## USE CASE DIAGRAM



## CONCLUSION

The idea behind our application is to provide help for women who stay out of home. Women safety has become the utmost priority of the Indian government considering the increasing cases of crime against women.

The purpose of this app is to provide complete security to the Women's.

It will call the nearest on duty police in charge to help the women in any situation.

It Ensures quick response from the police when called.

In order to overcome such problems faced by women the Safety (women security apps) mobile based application is not only necessary to use but also plays a pivotal role with android software.

Provides necessary first-aid measures that should be taken at the time of some dangerous situations..

An app is a small, specialised software program, easily downloadable and installed onto mobile devices such as Smartphones.

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## ARTIFICIAL INTELLIGENCE AND INDIA

**Jitesh Jain, Milan Dharaviya and Dr. Amita Jain**

B.Sc. IT, Vidyalankar School of Information Technology, Vidyalankar College, Wadala-East, Mumbai

### ABSTRACT

*The future of a sixth of the world's population lies in the future of India. the role of Artificial Intelligence (AI) in shaping India's development and growth is bound to be substantial as the Artificial Intelligence (AI) revolution sweeps through societies and enters daily life. Artificial Intelligence (AI) holds promise as a catalyst for India to accelerate progress, while providing mechanisms to deal with traditional hurdles such as poor infrastructure and bureaucracy. Last June The NITI Ayog, India's national think-tank, released a discussion paper on the transformative potential of AI in India that said the country could add \$1 trillion to its economy through integrating AI into its economy. The key fields likely to benefit from AI are Healthcare, financial services, monsoon forecasting, retail and. This paper aims to provide an overview of Artificial Intelligence in India with the perspective of discussion paper of NITI Ayog.*

**Keywords:** Artificial Intelligence, monsoon forecasting, education, healthcare.

### INTRODUCTION

According to the father of Artificial Intelligence, John McCarthy, AI is “The science and engineering of making intelligent machines, especially intelligent computer programs”. It is a way of making a computer, a computer-controlled robot, or a software think intelligently. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

If the computers can, somehow, solve real-world problems, by improving on their own from the past experiences, they would be called ‘intelligent’. Thus, the AI systems are more, have the ability to “think” and are more flexible. Intelligence, is the ability to acquire and apply the knowledge. Knowledge is the information acquired through experience. Experience is the knowledge gained through exposure(training). Summing the terms up, we get artificial intelligence as the “copy of something natural (i.e., human beings) ‘WHO’ is capable of acquiring and applying the information it has gained through exposure.

AI is an amalgamation of technologies that enable machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act. Thus, computer vision and audio processing can actively perceive the world around them by acquiring and processing images, sound and speech. The natural language processing and inference engines can enable AI systems to analyze and understand the information collected. An AI system can also act through technologies such as expert systems and inference engines or undertake actions in the physical world. These human capabilities are augmented by the ability to learn from experience and keep adapting over time. AI systems are finding ever-wider application to supplement these capabilities across enterprises as they grow in sophistication.

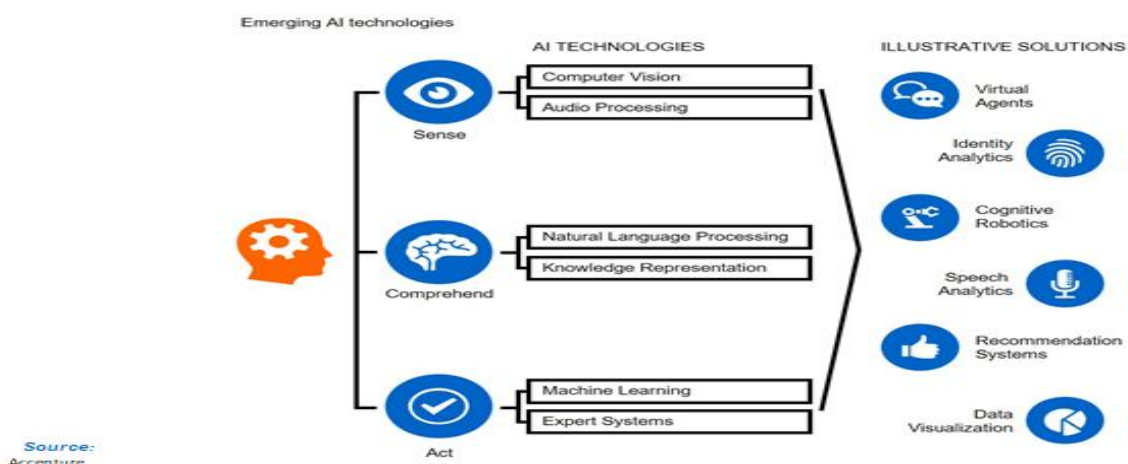


Fig-1: Artificial Intelligence: What is Artificial Intelligence (1)

**What Contributes to AI?**

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology, Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving. Out of the following areas, one or multiple areas can contribute to build an intelligent system.

High-profile examples of AI include vehicles such as drones and self-driving cars, creating art (such as poetry), medical diagnosis, proving mathematical theorems, playing games (such as Chess or Go), search engines (such as Google search), online assistants (such as Siri), image recognition in photographs, spam filtering, and targeting online advertisements. Other applications include Healthcare, Automotive Finance, Video games etc.

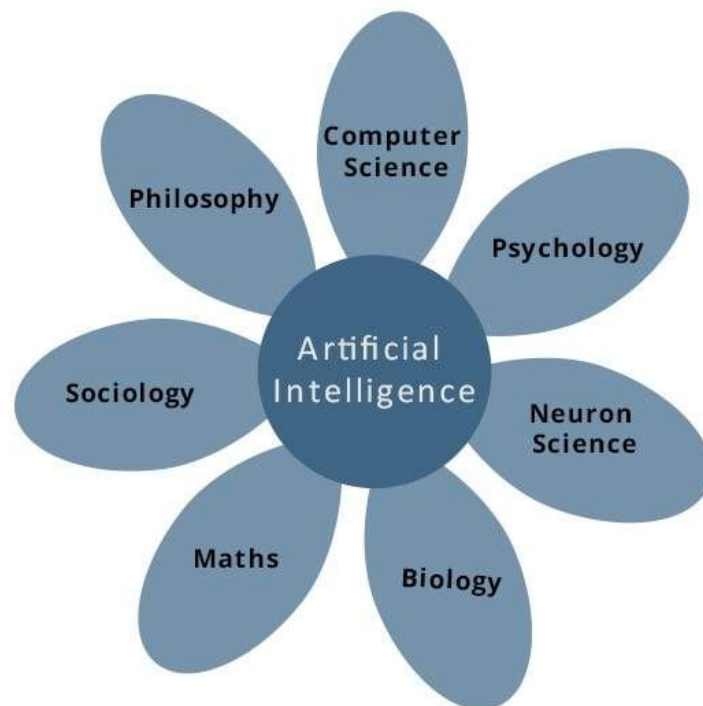


Fig-2: Artificial Intelligence: Sectors (1)

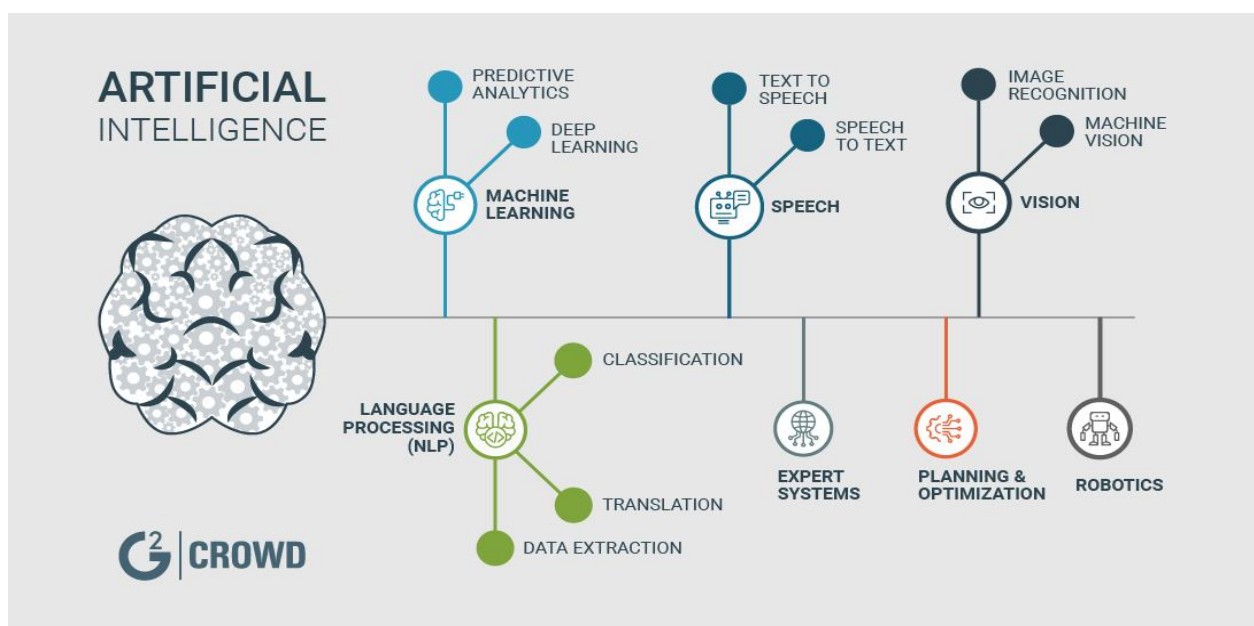


Fig-3: Artificial Intelligence: steps (2)

## RESEARCH METHODOLOGY

It is based on secondary data of National Journals, government reports, articles and newspapers covering wide collection of academic literature on 'Artificial Intelligence'. Main Research objectives of the study are to understand the concept of 'Artificial Intelligence', to examine the features of 'Artificial Intelligence', to evaluate the opportunities and challenges with special reference to 'India'.

### Artificial Intelligence: Major Initiatives Taken by The Government

Finance Minister Arun Jaitley on Feb. 01, delivering his budget speech, told parliament that the government think-tank, NITI Aayog, will spread a national program on AI, including research and development. The intent showed in the numbers: Budget allocation for Digital India, the government's umbrella initiative to promote AI, machine learning, 3D printing, and other technologies, was almost doubled to Rs3,073 crore (\$477 million) this year. "It's extremely encouraging to see the government recognize the need for research in cutting-edge technologies," Subrat Kar, CEO and co-founder of Noida-based video intelligence platform Vidooly, told Quartz. NITI Aayog's support will allow us to indigenously develop technologies on par with our Silicon Valley counterparts, and reduce dependency on them," Kar said. By NITI Aayog, led by CEO Amitabh Kant, has been a key promoter of various digital campaigns in the country, including the massive biometric program, Aadhaar, and the India chain project, which is creating blockchain infrastructure to support India Stack, a set of codes developed around Aadhaar. That's why the AI initiative has charged up tech companies in India, AI has only just begun to make its way into classrooms, and a lack of qualified professors is not helping at all. Moreover, large-scale, real-world applications of AI will take time to emerge. And initially, it is likely to be restricted to laboratories

### Artificial Intelligence Industry in India – The Current Status

A news report published in October in The Economic Times said, "Start-ups witness 108% growth in funding in India in 2018." The news report further mentioned that Artificial Intelligence was among those domains which witnessed fastest adoption among industry sectors. Currently there are about 400 start-ups working on AI and machine learning domains. About \$150 million dollars is invested in India's AI sector by private players alone and the number has been growing since 2016. Though there has been growth, India lags far behind countries like US and China in terms of investment. With a copious pool of STEM talent and with growing population of youngsters, India will be banking on AI for its economic growth and improvement in quality of life of its citizens. There are several start-ups that are based in cities such as Bengaluru, New Delhi, Mumbai and Hyderabad which work on artificial intelligence principles to serve consumers better. Their product range vary from multi-lingual chat bots to online shopping assistance and automated consumer data analysis. The companies have been working in areas such as e-commerce, healthcare, EdTech, fintech etc. Though in their nascent stage, the performance of these companies has been promising.

### Artificial Intelligence – The Road Ahead

The National Strategy for Artificial Intelligence which was put together by government of India through NITI Aayog, sets the roadmap on how to develop AI in the country. The report points out to how AI will help the country grow, what are the strengths and what are the challenges on the way. The government has identified few areas where it thinks AI will play a crucial role as far as India is concerned. The role of AI few prime areas have been listed below.

#### Healthcare

India is potentially developing in healthcare sector. According to a report by the CIS India published earlier this year, AI could help add USD 957 billion to the Indian economy by 2035. Of the USD 5.5 billion that was raised by global digital healthcare companies in July-September 2017 quarter, at least 16 Indian Healthcare IT companies received funding, the report said. State governments are also providing support to AI start-ups.

Various healthcare challenges in India have been improved. The technological innovation is proving to be beneficial in diagnosis procedure, monitoring of chronic conditions, assisting in robotic surgery, drug discovery etc. Among several companies that are exploring various uses of AI in the healthcare segment,



Major initiative has been taken by Microsoft is along with Apollo and other hospitals to expand its use in several segments like cardiology, eye-care, diseases like Tuberculosis, HIV etc.

#### Smart Infrastructure and Smart Mobility

The growing migration of population towards the cities has posed a great challenge to India. The cities' civic bodies have been struggling to provide quality infrastructure and reduce transportation woes in India's large metropolis. AI can bring about a major change in cities of the future. With the ripe data base and necessary applications in place the principles of AI can help reduce congestion on roads, aid civic bodies in addressing citizen grievances, timely repair and maintenance of public property, thereby improving the quality of life of city dwellers.

#### CONCLUSION

The two main pillars that are required for the establishment and growth of any sector are Capital and qualified towards manpower. India is home to a large talent pool of Science, Technology, Engineering and Math graduates. Companies such as Google, Intel and Microsoft have been offering short term training programs to computer program developers which help them upskill in the area of AI programming. On the other hand, AICTE, the government body which governs and regulates professional education in India, recently added AI, IoT, Machine Learning and few other subjects as mandatory subjects in its curriculum of B. Tech programs. Changes in curriculum and content are further expected in the days to come. The start-ups have been working towards developing various AI based products and services. With conglomerates having a lion's share in India's market, there is huge scope for AI based enterprise solutions in the country. The increasing demand for products and services can attract more investment towards R&D in AI sector.

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## ARTIFICIAL PHOTOSYNTHESIS: BEST FORM OF RENEWABLE ENERGY

Arfhad Shaikh

IEEE-VSIT SB Chairperson, Vidyalankar School of Information Technology, Wadala (East), Mumbai

### ABSTRACT

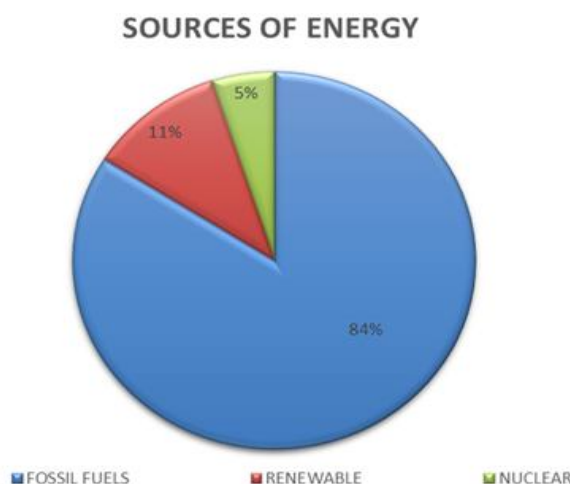
*This project is intended to develop interest in global developments in the field of renewable energy also, highlighting its contributions towards green computing. It describes the potential of artificial photosynthesis, which could make a substantial contribution to our future energy supply. Photosynthesis is the process by which green plants use sunlight to synthesise foods from carbon dioxide and water. Artificial photosynthesis is a process that makes use of sunlight to produce hydrogen, oxygen, and carbon as by products. Hydrogen, Oxygen and Carbon can be used to generate energy of various forms – electrical, fuel etc. The energy can be easily stored and used whenever required.*

*Keywords: Artificial Photosynthesis, Hydrogen fuels, greenhouse gases, electricity generation, water splitting, artificial leaf.*

### 1. INTRODUCTION

If the smartest energy source is one that's abundant, cheap and clean, then plants are a lot smarter than humans. Over billions of years, they developed perhaps the most efficient power supply in the world: photosynthesis, or the conversion of sunlight, carbon dioxide and water into usable fuel, emitting useful oxygen in the process. What is photosynthesis? Photosynthesis is the procedure by which green plants use sunlight to blend sustenances from carbon dioxide and water. The oxygen that is delivered as a result of photosynthesis is what most animals and humans rely on to breath, so the process plants and trees fulfil on our behalf is critical to our survival. Therefore, plants are not only producing energy, but they also have the ability to store it.

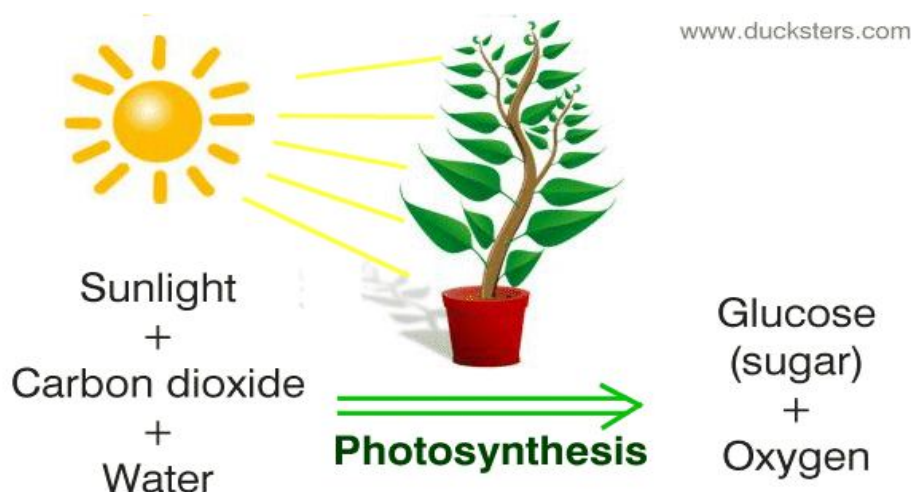
But why we need Artificial photosynthesis? With the rapid growing population in various developing countries, there is a need for new energy. These nations need energy which serves more people, with less environmental impact at a lower cost. Our two major current sources of energy are sunlight and various radioactive elements. But you might say that I don't use sunlight for cooking, or I don't use radioactive elements in my car but gasoline. Therefore, the energy that we majorly use is Fossil Fuels, like coal, oil or gas.



These fossil fuel were once plants and animals, basically biological materials. Therefore, whatever we all use are renewable sources of energy. However renewable sources of energy are like banks. They give us energy depending upon our needs but one day as we all know that, these substances will get extinct. Therefore, there is a need to store energy. In developed nations liken USA, they use electrical grids to distribute energy to various organizations and homes. But renewable energy isn't cooperative as fossil fuels. Because sometimes the sun doesn't shine, the wind doesn't blow and the tides don't crash.

So, what can we do in such a situation, we need storage, someplace where we can store this energy. But it is not a feasible option to build a largescale grid. So, we need something that is scalable to small sizes and large and affordable. These renewable sources are working great, they are stable, portable their infrastructure is developed. But they are finite (will go extinct) and also, they are climate altering. That means we should work like plants. Take sunlight and convert it into energy-dense fuels – PHOTOSYNTHESIS. Plants take water and carbon-dioxide, convert into compounds like sugar. But plants need available land, fertile soil, water and sunlight, which may not be always be available. Therefore, we need something artificial.

“Artificial photosynthesis is a chemical processthat replicates the natural process of photosynthesis, a process that converts sunlight, water, and carbon dioxide into carbohydrates and oxygen; as an imitation of a natural process it is biomimetic.” Artificial photosynthesis, a process that uses sunlight to produce hydrogen, oxygen, and carbon, has potential which Bill Gates calls "magical." If we can improve the efficiency of the process, we may produce ample clean fuel for the vehicles of tomorrow.



Fossil fuels are in short supply, and they're contributing to pollution and global warming. The direct conversion of sunlight to electricity in photovoltaic cells makes solar energy dependent on weather and time, which reduces its utility and increases its price. On the other hand, artificial photosynthesis could produce a fuel that can be stored.

In the case of plants as well as algae and some bacteria, "usable fuel" is carbohydrates, proteins and fats. Humans, on the other hand, are looking for liquid fuel to power cars and electricity to run refrigerators.

If we could artificially replicate the photosynthetic process of plants, we could reduce the concentration of carbon dioxide in the atmosphere and produce sugar that we could use for food and energy production.

However, the ultimate goal is to take and improve the natural photosynthesis process, making it more efficient and absorbing more light at a wider range of wavelengths, possibly even in the dark, to produce more energy.

## REVIEW OF LITERATURE

Current developments in shale gas exploitation seem to have given us access to large natural gas reserves at a low price. Our coal reserves will last a long time, and there are still plenty of uranium reserves.

However, burning fossil fuels leads to large amounts of carbon dioxide (CO<sub>2</sub>) emissions. This is one of the major greenhouse gasses that cause global warming, which leads to climate change and an increase in sea levels.

“With the help of the sun we could solve our energy problem. **Every thirty minutes the Earth absorbs enough sunlight to supply the whole world a year-long with energy. Every thirty minutes!** This is where our challenge is. We have to use this potential. This is where we can use the forces of nature to our advantage.” This statement, made by Willem Alexander, King of the Netherlands, at a seminar in Dresden in 2011 is very true. The sun's potential as a renewable energy source is vast. If we can develop systems to use solar energy to produce fuels on a large scale, this will transform our future energy options.

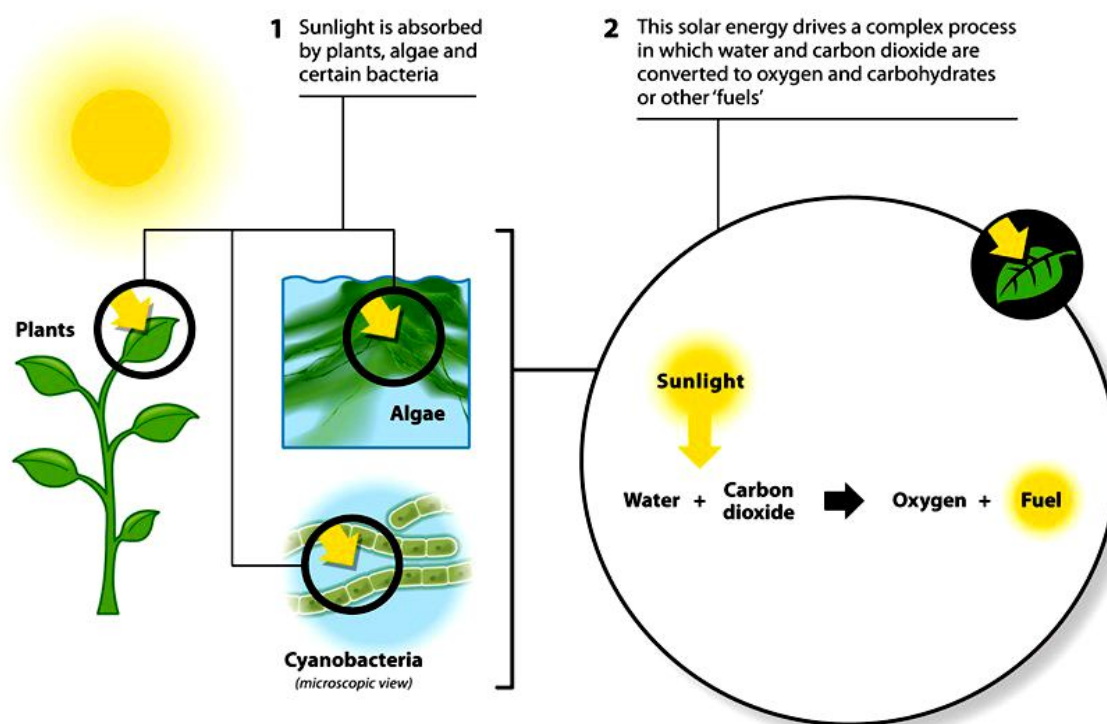
Photosynthesis is an essential natural process that keeps not just plants, but just about everything else on Earth alive — including us.

When plants convert carbon dioxide and water into carbohydrates, they feed themselves and emit oxygen for us to breathe. But what if we took a page out of nature's book, and figured out how to use sunlight to produce hydrogen for fuel? **“If it works it would be magical, because with liquids you don't have the intermittency problem batteries. You can put the liquid into a big tank and burn it whenever you want.”**

Photosynthesis involves four steps:

- Light Harvesting
- Charge Separation
- Water Splitting
- Fuel Production

### Photosynthesis: Nature's way of making solar fuel



© Royal Society of Chemistry

These carbohydrates act as fuels: They are either used by the plant for growth and maintenance, or eaten by plant-eating animals, or slowly converted and concentrated into fossil fuels with high energy density at high temperatures and underground pressures after the death of an organism. The ultimate source of all the fuel we use today is therefore photosynthesis.

Hydrogen produced by the first stage of photosynthesis, can be used directly as a fuel or stored for future consumption. Using Hydrogen to cover our energy demands is environmentally friendly, considered as one of the best alternative renewable sources of energy. The second stage of photosynthesis also has a great benefit which is that it reduces the amount of carbon dioxide in the atmosphere.

Artificial photosynthesis aims to divide water into hydrogen, oxygen and carbon components using sunlight in oceans and possibly even rivers.

Hydrogen produced by artificial photosynthesis is readily available in electric car fuel cells and can also be used to store solar energy.

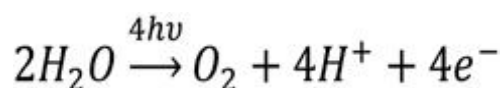
Liquid fuels such as hydrogen have a clear advantage over batteries because they are lighter and less voluminous. A carbon footprint is defined as the amount of carbon-dioxide emitted by an individual or an organization. As the carbon generated in this process is less, therefore the carbon footprint is reduced. Thus, reducing the effects of carbon footprint on global warming. It has an adverse effect on the acidity of the oceans. The acidity of the oceans was decreased by 0.1 on the pH scale since the beginning of the industrial era. Hydrogen fuel can provide motive power for liquid-propellant rockets, cars, boats and airplanes, portable fuel cell applications or stationary fuel cell applications, which can power an electric motor.

Liquid hydrogen can be used in hydrogen engines like gasoline. It could also be transformed into a fuel cell setup that would reverse the photosynthesis process and create electricity by combining hydrogen and oxygen into water. The ability to produce clean fuel without producing harmful by-products, such as greenhouse gasses, makes artificial photosynthesis an ideal source of energy for the environment. Mining, growing or drilling wouldn't be necessary. And since neither water nor carbon dioxide is currently lacking, it could also be an unlimited source, potentially less expensive than other forms of energy in the long run.

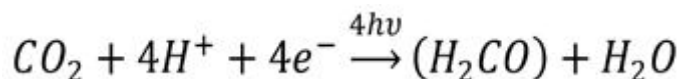
## 6. METHODOLOGY

The chemical reactions by which water is split and fuel is produced are as follows:

1. Water ( $H_2O$ ) is split into oxygen, hydrogen ions and electrons:

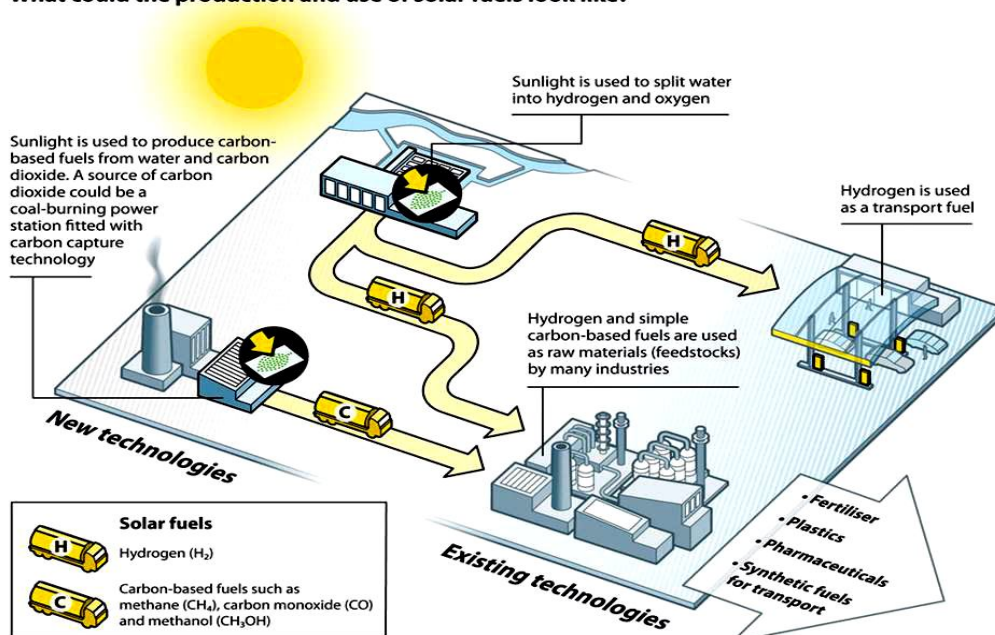


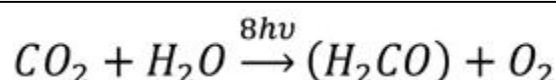
2. Carbohydrates ( $H_2CO$ ) are produced from carbon dioxide ( $CO_2$ ) and the hydrogen ions and electrons released by water splitting:



Those two half-reactions combine to make the complete photosynthesis reaction:

### What could the production and use of solar fuels look like?





In general, an artificial photosynthesis system must be efficient, robust and cost-effective to be a viable source of renewable energy. Two of these requirements are met by a number of existing systems, but none yet meets all three.

Efficient:

Durable:

- Cost-effective:

The main challenge presented by Artificial Photosynthesis is that photosynthesis in nature is inefficient. Plants convert only about 1 percent of carbon and water into carbohydrates. That efficiency has increased to about 10 percent in the lab, however, and researchers at Monash University in Melbourne, Australia, have hit a level of 22 percent efficiency.

### Benefits

- We are going some way to mimic nature's most effective process for creating energy rich products from simple input materials.
- Producing a new fuel that can power vehicles from naturally occurring input materials, CO<sub>2</sub>, water and Sunlight.
- It makes Carbon storage more economically viable as the CO<sub>2</sub> can be used to create a saleable product.
- If we are able to tap into existing big producers of CO<sub>2</sub>, such as power station exhaust we are able to use the CO<sub>2</sub> twice before it enters the atmosphere.
- There is no E-waste generated or no release of hazardous toxins and chemicals into the environment.
- As this process is synthetic and lab based, there is less power consumption.
- Artificial photosynthesis reduces Carbon footprint, in the environment, thus reducing global warming.
- It generates Oxygen in a higher and efficient level than normal. Efficiency is increased by 10%.
- Does not require much hardware materials, as it is lab based and synthetic in nature.
- It generates energy which is stored in energy banks, as they can be used when required and converted to various forms of energy.
- When it is ready for mass consumption it makes use of energy banks to provide energy.
- As there is no energy lost, due to storing them in the banks, the gap between the supply of energy and demand is filled.
- It is the best way of producing energy in rural areas, with minimal hardware, labour and cost.
- If there is excessive energy generated then it can be sold to the power companies, to make profit.
- It greatly helps in reducing Global warming.

## 7. EQUATIONS, FIGURES AND TABLES

'When a plant leaf absorbs sunlight and converts it directly into energy, photosynthesis is known. The invention closest to photosynthesis is a solar cell that can convert only 6% of the total sunlight. Artificial photosynthesis aims to recreate the photosynthesis process in many applicable forms in order to produce highly efficient energy.

The basic concept is to create systems for harvesting sunlight that can capture solar photons. These photons can oxidize water and form a liquid hydrocarbon such as methanol.



The hard part is splitting the water molecules to get the electrons necessary to facilitate the chemical process that produces the hydrogen. Splitting water requires an energy input of about 2.5 volts. This means the process requires a catalyst -- something to get the whole thing moving.

- **Manganese:** In the photosynthetic core of plants, manganese is the catalyst. A single manganese atom triggers the natural process of splitting water using sunlight. Manganese is a biomimetic approach in an artificial system - it imitates the biology found in plants directly.

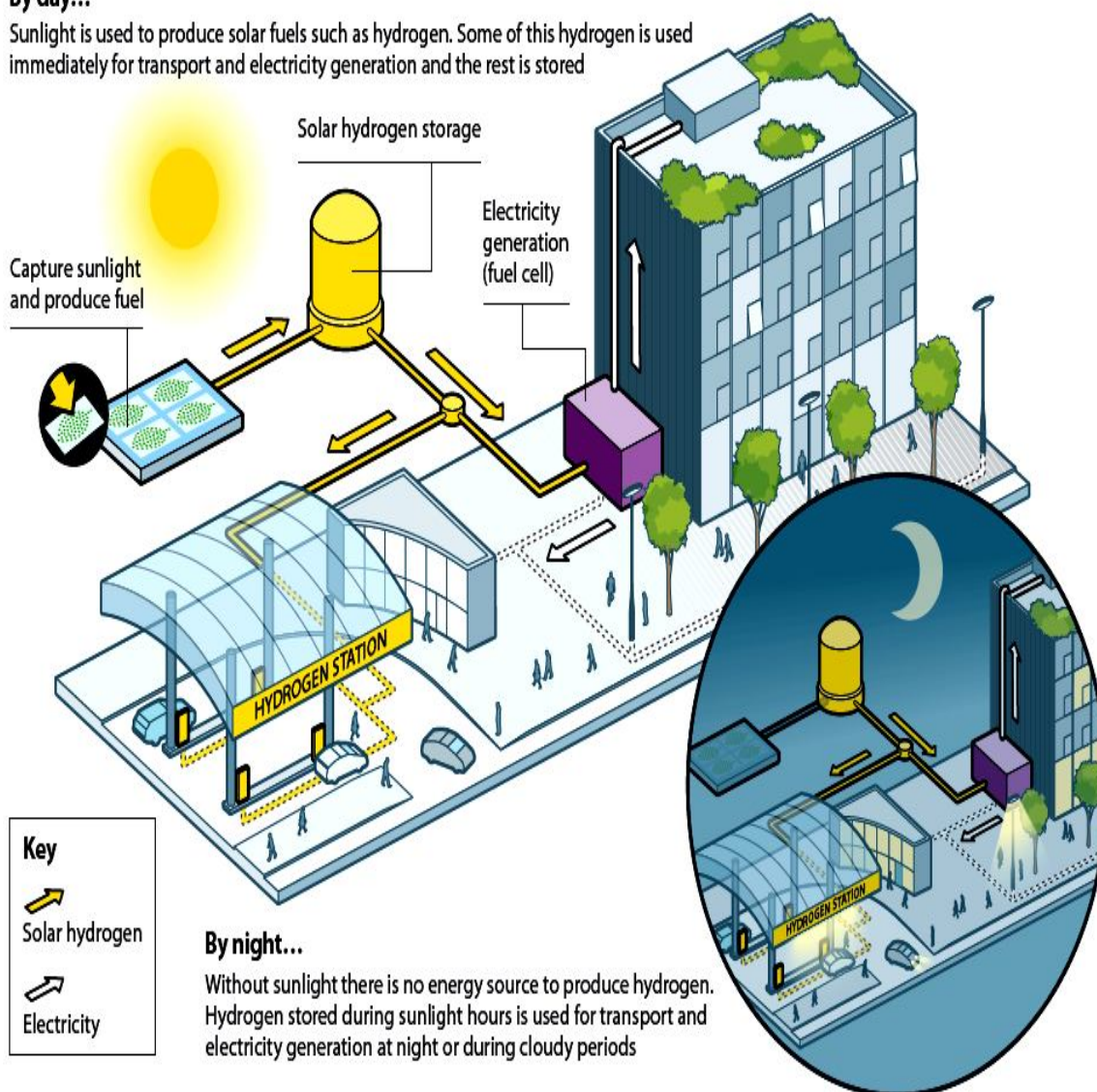
Titanium dioxide ( $\text{TiO}_2$ ) is a stable metal which can act as an efficient catalyst. It is used in a dye-sensitized solar cell, which has been around since the 1990s, also known as a Graetzel cell. In a Graetzel cell, the  $\text{TiO}_2$  is suspended in a layer of dye particles that capture the sunlight and then expose it to the  $\text{TiO}_2$  to start the reaction.

- **Cobalt oxide:** In an artificial photosynthesis system, one of the recently discovered catalysts, clusters of cobalt oxide molecules ( $\text{CoO}$ ) were found to be stable and highly efficient. Cobalt oxide is also a very abundant molecule - a popular industrial catalyst at the moment.

## Solar energy around the clock

### By day...

Sunlight is used to produce solar fuels such as hydrogen. Some of this hydrogen is used immediately for transport and electricity generation and the rest is stored



Artificial photosynthesis, gives us the opportunity to produce energy until the presence of sunlight. The energy produced by the end of day is a lot and therefore it can be used whenever required by the people. Since the energy is stored there is no loss of energy.

Even during the night, the stored energy can be transformed into electrical energy to power workstations, data centres, our homes and offices and malls.

This process is a bridge between the Supply and demand of electricity. Since a lot of energy can be generated in a day, it can be used to meet the demand and therefore filling the gap between the supply and demand.

Also, the extra amount of energy generated by artificial photosynthesis, can be sold to the power companies at certain rates this process is close to net metering.

Net metering is process when there is more energy generated than we require, so we can sell it back to the power company.

Oxygen levels are increased due to increased efficiency of 10%. Thus, making the process of artificial photosynthesis useful for reducing the carbon footprint and reducing global warming.

It requires minimal hardware and the cost is bearable. It can be implemented in the rural areas where there are power supply shortages. Such a method can be useful to them to have their own source of renewable energy which they can convert to various forms and not just electrical. It reduces the power consumption, as only there will be use of equipment's and not machines to generate energy to run the equipment.

### **Artificial Leaf**

Artificial leaves, sometimes known as solar fuel generators, can manufacture environmentally-friendly fuels by mimicking the natural processes plants use to generate sugars from sunlight, oxygen and water.

The new device created by the researchers consists of three parts — a photocathode, photoanode and membrane. Water is converted into oxygen, protons and electrons by the photoanode and the photocathode combines the subatomic particles back into hydrogen, which could be stored in fuel cells. The membrane serves to keep the two gases separated to prevent an explosion.

The artificial leaf is a thin sheet of semiconducting silicon -the material of which most solar cells are made - which transforms the sunlight energy into a wireless electricity flow within the sheet. The silicon is bound to a layer of a cobalt-based catalyst that releases oxygen, a material that Nocera and his co-authors discovered in 2008 to generate fuel from the sun.

The other side of the silicone sheet is covered with a nickel-molybdenum-zinc alloy layer that releases hydrogen from the water molecules.

### **CONCLUSION**

Plants take sunlight, water and carbon dioxide and make sugars using these simple ingredients. Scientists hope to imitate plants by designing a system that produces liquid fuel using the same set of ingredients. This approach is called artificial photosynthesis; and although it's still in its infancy, some researchers hope the technology will eventually play an important role in replacing fossil fuels.

Current energy sources, such as coal and oil, depend on non-renewable fuels. However, liquid fuels produced by artificial photosynthesis would only depend on the abundance of carbon dioxide, water and sunlight.

Since the production of artificial fuels would consume carbon dioxide while the combustion of these fuels would release it, the process would also be environmentally friendly, since the consumption of greenhouse gases would be recycled back into fuel through production.

### **Fuels**

Many other proposed renewable energy sources are incompatible with existing infrastructure. For example, your car should be changed before it can run on 100% ethanol. Electricity from wind farms and photovoltaic cells is also renewable, but if it is not electric, it cannot be used directly to power your car. By contrast, artificial photosynthesis would produce liquid hydrocarbon fuels that can be burned without alteration in modern car engines.



**Scalable**

In laboratories, researchers were able to produce hydrogen from water and sunlight on a small scale, but they must be practical on a large scale for these processes to work. No one has yet been able to design a system that is sufficiently robust for commercial deployment.

**Cost**

The cost of artificial photosynthesis is another major disadvantage. Catalysts, such as platinum metal, are not cheap and should be divided by sunlight. At present, researchers are working on cheaper catalysts and processes, but they are still in the experimental phase.

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- <https://www.youtube.com/watch?v=2EMIlfKBdNQ>
- <https://www.youtube.com/watch?v=sSo005x9hCc>
- <https://www.youtube.com/watch?v=J556uXwrjII>

**FINGERPRINT BASED ATM SYSTEM WITH OTP****Avina Naik, Laxmi Yadav and Farheen Shaikh**

Student, VSIT, Wadala (East), Mumbai

**ABSTRACT**

*Fingerprint Based ATM is a desktop application where fingerprint of the user is used as an authentication medium. The finger print minutiae features are different for each human being, so the user can be identified uniquely. Instead of using ATM card Fingerprint based ATM is safer and secure. There is no worry of losing ATM card and no need to carry ATM card in your wallet. You just have to use your fingerprint in order to do any banking transaction. The user has to login using his/her fingerprint and he/she has to enter the OTP provided by our software in order to do further transaction. The user can withdraw money from his/her account. In order to withdraw money user has to enter the amount he/she want to withdraw and has to mention from which account he/she want to withdraw (i.e. saving account, current account). The user must have appropriate balance in his/her ATM account to do transaction. User can view the balance available in his/her respective account. The system will provide the user to view last 5 transactions.*

*Biometrics technology is rapidly progressing and offers attractive opportunities. In recent years, biometric authentication has grown in popularity as a means of personal identification in ATM authentication systems. The prominent biometric methods that may be used for authentication include fingerprint, palm print, and handprint, face recognition, speech recognition, dental and eye biometrics.*

*Fingerprint based ATM are used for wide range of applications like for Banking, Coupons & Self-service ATM. Most of the ATM in the past have been using cards (such as credit or debit, or smart) to identify users but with the wide acceptance of Biometrics, a new generation of Biometrics ATM are being deployed for wide range of applications worldwide.*

**INTRODUCTION****Importance of the Project**

The Main Importance of Making Project of “**Fingerprint based ATM system with OTP**” is according to the study conducted by the overall commercial banks nowadays is that they faced security issues related to card and PIN system such as hacking the PIN number or lost card issues. In our project, the Finger Print is scanned at the time of creating account in bank and it is stored in bank’s database. The next time when user gives his impression in finger print scanner located in ATM, it will capture the finger image and compares with the stored finger print image of the user in database and if its matches then it will allow the user to access the account if it’s not matches then it will issue a warning message to re-enter the user name.

**Initial Investigation**

The current system starts by the registering the user by scanning his/her fingerprint into the software and storing the fingerprint into the database. After that, the user can login for performing any kind of financial transaction such as depositing amount, withdrawing amount as well as get a mini statement of all the transactions that were performed. This system will also reject the user with false fingerprint or improper PIN. There is an additional feature for increasing security which is the OTP (One Time Password). The user can enter mobile number into the system and get an OTP on his mobile phone.

**Need of the System**

The need of the system is to provide more security to the customers via using biometrics medium for banking transactions through ATM. A lot of criminals tamper with the ATM terminal and steal customers’ card details by illegal means. Once users’ bank card is lost and the password is stolen, the users’ account is vulnerable to attack. The prevailing techniques of user authentication, which involves the use of either passwords and user IDs (identifiers), or identification cards and PINs (personal identification numbers), suffer from several limitations. Passwords and PINs can be illicitly acquired by direct covert observation. When credit and ATM cards are lost or stolen, an unauthorized user can often come up with the correct personal codes.

**Solution**

The system can compare scans to records stored in a central or local database or even on a smart card. This technique is very useful in future for avoiding the fraud in ATM system.

The Fingerprint based ATM has a positive impact on society. The ATM allows people around the community to spend no more than 5 minutes at the bank when needing to deposit or withdraw cash. It also makes work easier for the people who work at the bank. They no longer need to manually deposit or collect the customer's money.

It is also safer for people that use Biometrics ATM, who need not worry about an ATM card that may get lost or stolen and even about the pin which may get hacked.

**REVIEW OF LITERATURE**

In the war of functionality versus security, the functionality wins more often. Security has always been viewed upon as an overhead or afterthought by software developers. But in the case of banking and money transactions, the security should hold highest priority. Increase in daily attacks on ATM and banking security the developers getting on right track and putting security their important aspect in developing projects. The multifactor authentication is an approach to authentication which requires the presentation of two or more authentication factors: a knowledge factor ("something only the user knows"), a possession factor ("something only the user has"), and an inherence factor ("something only the user is"). After presentation, each factor must be validated by the other party for authentication to occur. In present days the ATM holds only one thing (i.e. PIN) to secure the money saved in the bank if we are not considering the physical attacks.

In our system we are going beyond this level of security to enhance security of the ATM. We introduce the concept of One Time Password (OTP) in ATM banking. Our system will provide the second level of security using different factors to generate OTP. This will send over customer's mobile number stored in records. In secure ATM, user will have to register mobile and its IMEI number in bank system. When user puts/swipes card into machine, user get request to insert PIN (which is current way of ATM banking). In the proposed system user will get OTP on mobile. When user enters OTP to the system, he/she will be having access to the machine else no transaction can be made. In addition to the OTP for security the user will be having another option for second level security i.e. Biometric. Through biometric the basic problems (like loss or forgotten mobile device or currently not available with the authentic user due to some reason) can be resolved. So to enable this option the user have to register his/her biometric information at the time of opening the account or have to update the current information. At the ATM a scanner will be attached and that scanner will scan the fingerprint of the user which is compared with the database of the user.

After verification of the card owner and PIN, bank system will ask user to select one option among two that is One Time Password or Biometric. When user gets OTP code on mobile he/she has to enter that code on the screen in same way as PIN. But here circumstantial problem arises for example dead battery of mobile, no network coverage or delayed SMS delivery. To deal with problems like this, user will be having another option as Biometric which is as effective as OTP in terms of securing any system. If entered OTP is correct then ATM system will allow access to user for transaction.

When user selects Biometric option on screen, system will check and fetch information about that particular account on which card information is stored in the database, after PIN is successfully entered by user, user has to place his/her finger on dedicated scanner on ATM machine. That scanner will scan a fingerprint image of the user and that image will be matched with the database images. If a pattern of fingerprints matches then user is a legitimate user and access will be granted. If user fingerprint and database fingerprint does not match then ATM machine will show home screen and will ask to repeat swiping card procedure again.

**MODULES OF THE PROJECT****6.1.1 Registration**

For which the following details are to be provided.

Name

Phone Number

Residential Address

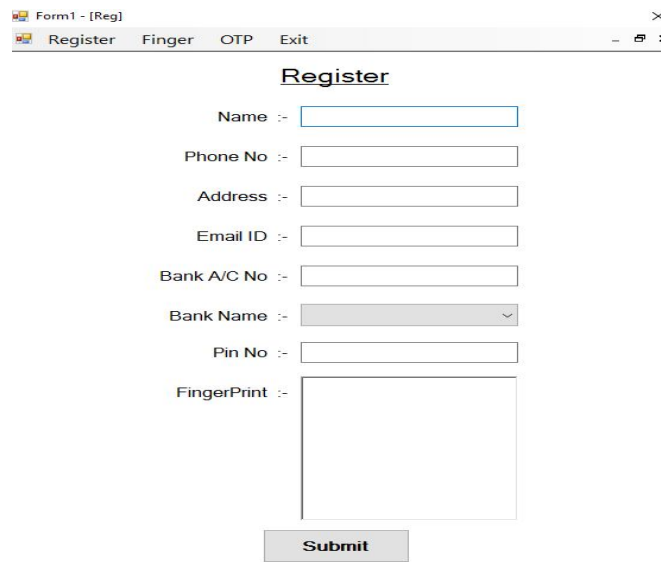
Bank Account Number

Bank Name

PIN

Fingerprint

**A registration screen will appear after opening the system:**



The screenshot shows a Windows-style application window titled "Form1 - [Reg]". It has a menu bar with "Register", "Finger", "OTP", and "Exit". The main area is titled "Register" and contains the following fields: "Name :-" (text box), "Phone No :-" (text box), "Address :-" (text box), "Email ID :-" (text box), "Bank A/C No :-" (text box), "Bank Name :-" (dropdown menu), "Pin No :-" (text box), and "FingerPrint :-" (large text box). A "Submit" button is located at the bottom.

Fig 1.5.3: Registration

### 6.1.2 Login Section

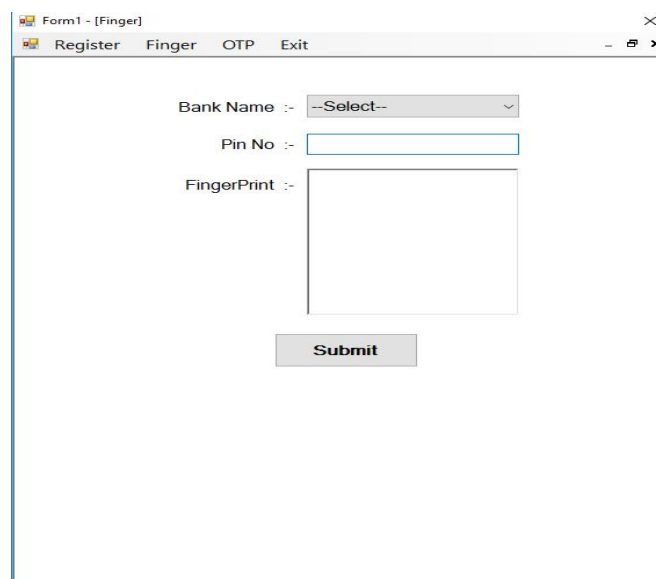
**It contains:**

Bank Name

PIN

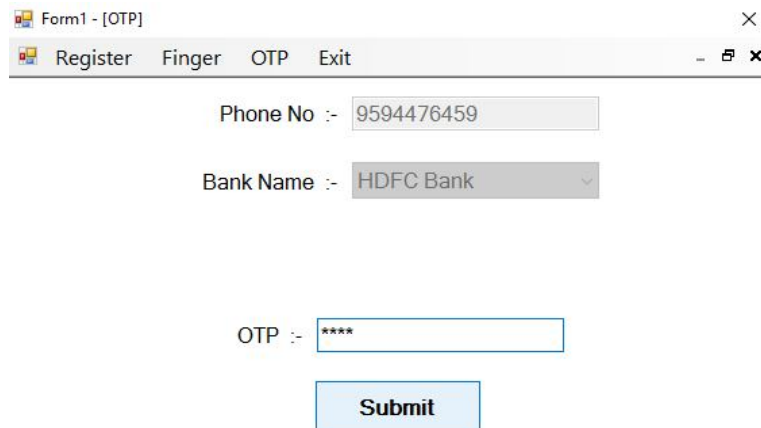
Fingerprint

**The login screen will appear after successfully registering the user**



The screenshot shows a Windows-style application window titled "Form1 - [Finger]". It has a menu bar with "Register", "Finger", "OTP", and "Exit". The main area contains the following fields: "Bank Name :-" (dropdown menu with "--Select--" selected), "Pin No :-" (text box), and "FingerPrint :-" (large text box). A "Submit" button is located at the bottom.

Fig 1.5.4: Login Section

**OTP SECTION**

Form1 - [OTP]

Register Finger OTP Exit

Phone No :- 9594476459

Bank Name :- HDFC Bank

OTP :- \*\*\*\*

Submit

When the user may not be able to login by using the fingerprint, there is another way the user can login that is OTP (One Time Password) generation. The user only needs to enter the mobile number he/she had entered while registering into the system. User also needs to enter the bank name which is dealing with all his or her financial transactions. Now, an OTP will be sent to the given phone number of the user and if the user enters the correct OTP, the system will ask for PIN.

**FUTURE SCOPE**

The special combination-based algorithm can be designed so that, if accuracy of one authentication goes below acceptable percentage, based on algorithm, the ATM can calculate the average authentication values based on other two authentication acceptable values.

The Scanner Device can be made accurate by improving the DPI of scanned images using software instead of using higher end scanner which will reduce the cost of bio metric devices used in ATM.

**CONCLUSION**

Human nature tends to search interesting and valuable concepts. This paper identifies a model for the modification of existing ATM systems to economically incorporate fingerprint scanning; and, outlines the advantages of using such system. It should be noted that the customers' perception cannot be generalized as it was highly affected by the tradition/culture of the users involves. As we know that fingerprints are the most acceptable biometrics all over the world in identifying a person. In this paper fingerprint are chosen for its uniqueness, ease of use and also convenience to user; as fingerprints can't be stolen, it is not transferable and the use don't need to remember. The security features were enhanced largely for the stability and reliability of owner recognition. The whole system was built on the technology of embedded system which makes the system more safe, reliable and easy to use.

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## A STUDY ON THE IMPACT OF CASHLESS BANKING TRANSACTIONS ON PEOPLE OF MUMBAI IN SION EAST LOCALITY

**Pandey Ankita Indramohan and Khushaboo Shyamsundar Gupta**

Student, Commerce Department, Guru Nanak College of Arts, Science and Commerce, Mumbai

### ABSTRACT

*The whole country is witnessing the effects of demonetization and with our prime minister hinting at cashless economy, many people are left in confusion. A cashless economy is defined as a situation where there is very little flow of cash in the society and thus much of the purchases are done by the electronic media. These media can be debit, electronic fund transfer, mobile payments, internet banking etc. Going cashless not only eases one's life but also helps authenticate and formalize the transactions that are done. This helps to curb corruption and the flow of black money which results in economic growth. The expenditures incurred in printing and transportation of currency notes is reduced.*

*Key words: Impact of cashless transaction, benefits of cashless transaction, cashless transaction as boost to economic growth.*

### I. INTRODUCTION

Throughout the 20<sup>th</sup> century the world and India have gone through many changes in culture, traditions, business practices and technological advances. Our economy is the 6<sup>th</sup> largest and fastest growing economy in the world with 7.7% GDP. For the further development of Indian economy, the RBI and government of India are making several efforts to reduce the use of cash in the economy by promoting the digital/payment devices including prepaid instruments and cards. effort to encourage these new varieties of payment and settlement facilities aims to achieve the goal of a 'less cash' society. Here, the term less cash society or cashless transaction economy indicate reducing the use of physical cash for payments. Instead of cash, digital payments are made to settle the payments. Cashless transaction economy doesn't mean shortage of cash rather it indicates a culture of people settling transactions digitally. In a modern economy, money moves electronically. Hence the spread of digital payment culture along with the expansion of infrastructure facilities is needed to achieve the goal. On November 8th, government withdrew rupees500 and rupees1000 notes- two highest denominations in circulation. Main objectives were to fight counterfeit money and black money. The action has given tremendous boost to cashless transactions as card based and digital payments were not hindered when all high denomination cash transactions suffered because of absence of high denomination currencies.

### II. STATEMENT OF THE STUDY

The effect of cashless banking transaction where clumsy to handle coins and notes are replaced by efficient electronic payment initiated by various types of plastic money. Cashless economy is not the complete absence of cash, it is an economic setting in which goods and services are brought and paid through electronic media.

### III. OBJECTIVES OF THE STUDY

1. To know what are the means of cashless transactions.
2. To understand Impact and importance of cashless transaction system.
3. To know the people's view for cashless transactions.
4. To let people, understand the benefits of cashless transactions.

### IV. RESEARCH METHODOLOGY

The research is based on primary and secondary data. The primary data is collected with the help of structured questionnaire and the secondary data is collected from forum bulletin, journals, reports and various internet websites.

## V. RANDOM SAMPLING TECHNIQUE

The size of the sample is 150 respondents; simple random sampling method was used to select the sample respondents were given free hand to give their opinion on the research topic with help of google forms. All the respondents were from the age group of 20 to 40 years and having knowledge of cashless payments.

## VI. LIMITATIONS OF THE STUDY

The period of the study is restricted to August 2018. The study areas are like Sion, Vashi, Panvel, GTB Nagar, Seawoods, and Pratiksha Nagar. The size of sample is 150. The study was conducted with lots of constraints like limited sample size, limited age group and literacy. The selected areas may not be the proper representative of whole Mumbai city.

## VII. OBSERVATIONS AND FINDINGS FROM THE STUDY

The profile of the respondent was also reflected with age, gender and education qualification. The detailed study shows the respondents' views about various aspects relating to cashless transactions.

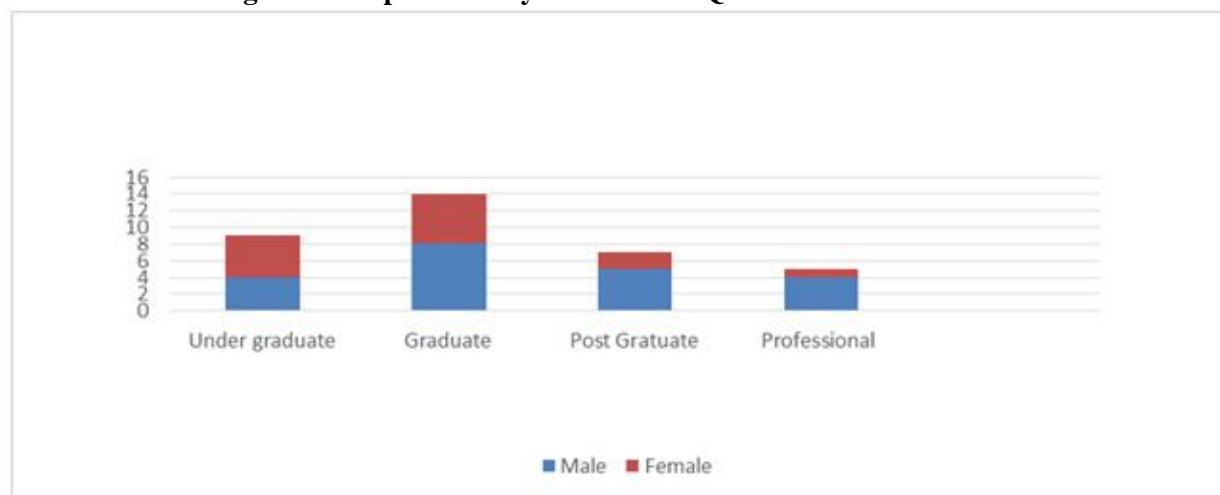
**Fig no-1: Respondent by Age (in years)**

Age group (in years)	Literate	Male	Female	Total
Between 20 to 25	100%	35	15	50
Between 25 to 30	90%	28	22	50
Between 30 to 35	90%	15	15	30
Between 35 to 40	80%	20	0	20
<b>Total</b>		<b>98</b>	<b>52</b>	<b>150</b>

Source: primary data

The above table says that the distribution of respondent by age and gender. Among 150 respondent majority male (35) respondent as well as female (15) respondents belongs to the age group of 20 years to 25 years.

**Fig no-2: Respondents by Educational Qualification with Gender**



Source: primary data

Educational qualification	Male	Female	Total
Under graduate	35	15	50
Graduate	18	10	28
Post graduate	10	3	13
Professional	0	5	5
<b>Total</b>	<b>63</b>	<b>33</b>	<b>96</b>

Source: primary data

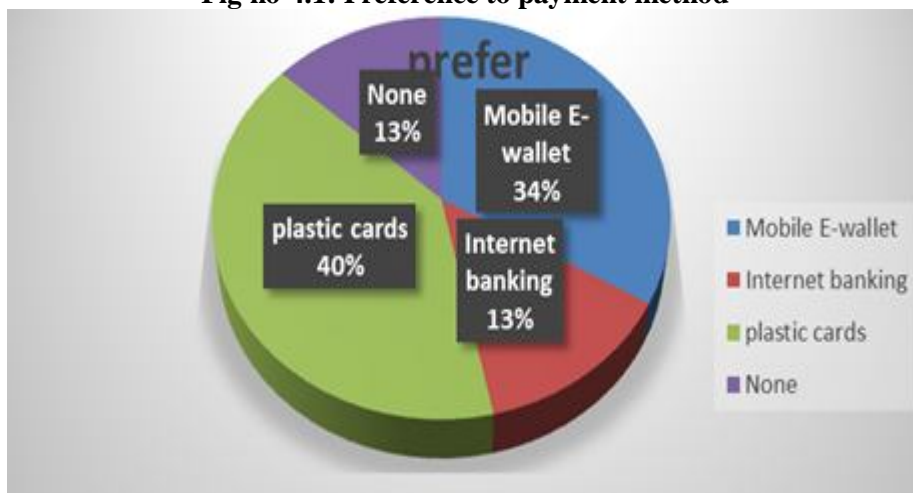
As shown in the above table and chart fig no.2 educational qualification of the respondents. Among 150 respondent male as well as female respondents are graduate and have access to digital media for any kind of cashless or online transactions.



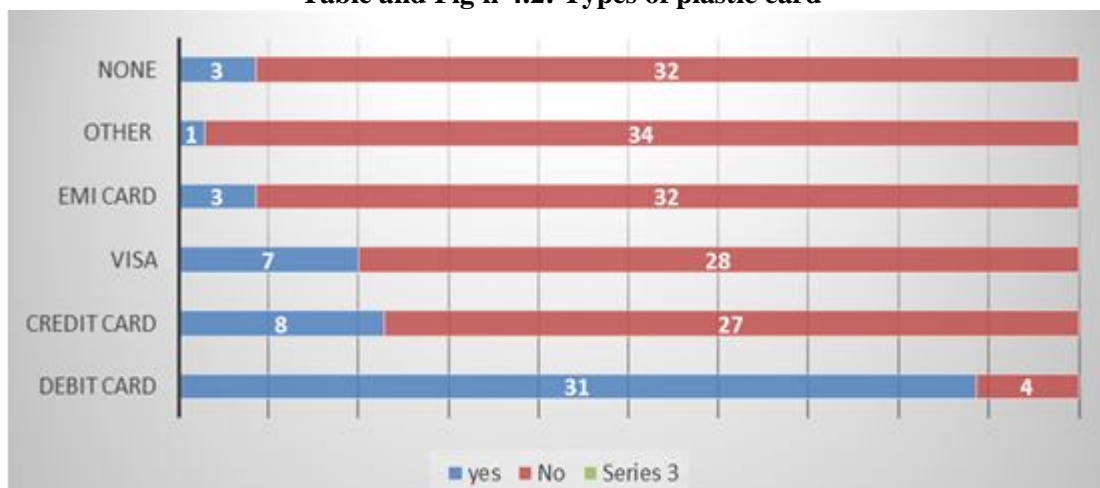
**Fig no-3: Respondents having Bank Account**

Source: primary data

As we can see this figure no.3 illustrates number of respondents having a bank account. This representing that 148 out of 150 respondents are having bank account and are using one or more than one type of plastic money for transactions.

**Fig no-4.1: Preference to payment method**

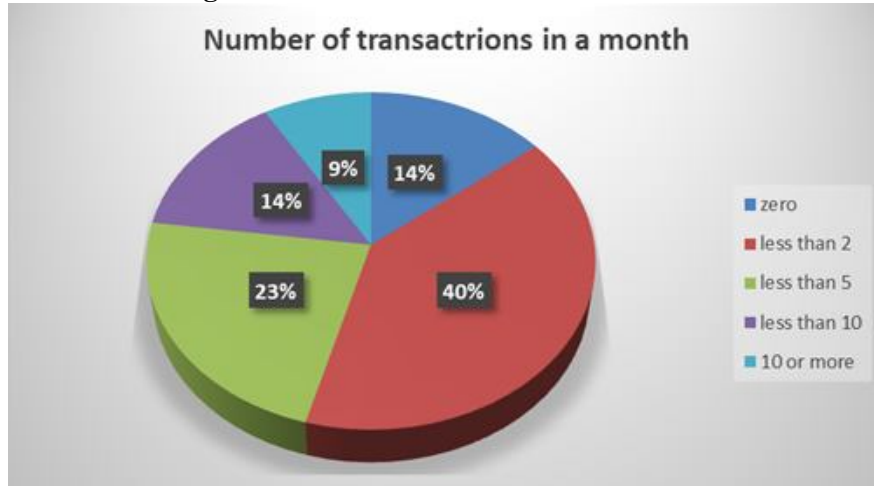
Source: primary data

**Table and Fig n-4.2: Types of plastic card**

Source: primary data

As we can see in the above figure no:4.2 illustrates count of type of plastic cards people are using for cashless payments. It represents that majority of the people are using debit card i.e. 88.57% whereas only 22.86% are using credit card for cashless payment.

**Fig no-5: Number of transactions in month**

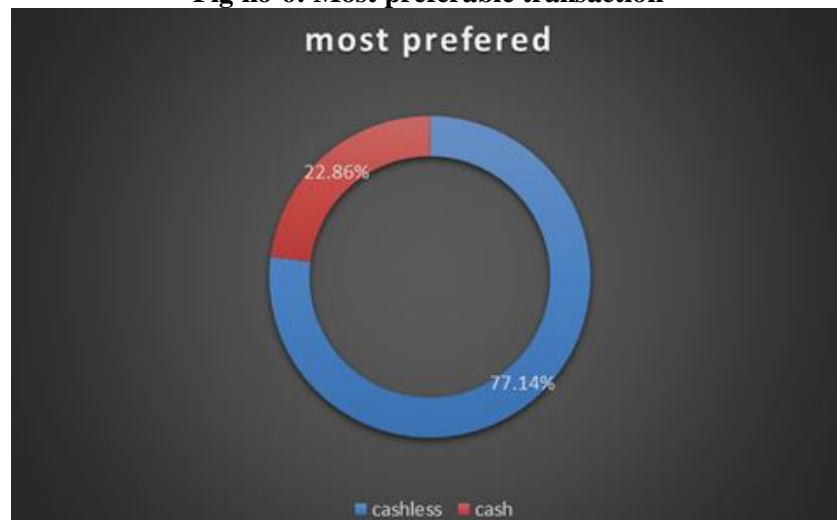


Source: primary data

As shown in the figure no:4 out of 150 respondents majority i.e. 137 of them make 2 or less than 2 cash less transaction in a month whereas only 9% i.e. 13 respondents make 10 or more than 10 cashless transactions in a month.

## VIII. OBSERVATION OF THE STUDY

**Fig no-6: Most preferable transaction**



Source: primary data

As the above figure no.6 depicts majority 77.14% respondents prefer cashless transaction as compared to cash whereas only 22.86% respondent prefer transaction with cash payment. With the help of above information, we can say people prefer more cashless as compared to cash payment.

### Following are the reasons to prefer cashless transactions:

1. Eliminates huge amount of cash carrying problem.
2. No hidden charges in cashless payment.
3. Transparency and accuracy in transactions.

4. Different offers for doing cashless transactions such as cashback, discounts, gift vouchers and other advantages.
5. Saves time as quick transaction is done in fractions of seconds.

Nowadays most of the banks provide proper record of transaction through SMS and mails and the option to assign maximum transfer limit to account is another security in cashless transaction.

## IX. CONCLUSION

However, the benefits of demonetization, digital India and several practices by government of India have now started trickling in with more and more people switching to digital modes of receiving and making payments. People in Mumbai are transitioning from a cash centric to cashless economy. Digital transactions are traceable therefore easily taxable leaving no room for the circulation of black money. The whole country is undergoing the process of modernization in money transactions, with e-payment, services gaining, unprecedented momentum. A large number of businesses, even street vendors are now accepting electronic payments promoting the people to learn to transact the cashless way at a faster pace than ever before. Going cashless is proving very good concept for a fast city like Mumbai and sub urban and urban area. In starting of demonitization there were so much increase in the cashless transaction and after the flow of cash in economy again it again came to cash transaction more as per current scenario in daily life.

## X. SUGGESTIONS

- RTGS, NEFT and other online banking sites can help the people to do transaction more safely.
- Mobile wallets like Paytm, oxigen wallet, Mobikwik, PayUmoney, Vodafone m-pesa, tez, and freecharge and many more mobile wallet can be used to cashless transaction.

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## E-LEARNING SYSTEM

**Pallav Madhusudan Chakraborty<sup>1</sup> and Trupti Kulkarni<sup>2</sup>**

Student<sup>1</sup> and Teacher<sup>2</sup>, Information Technology Department, ICLES' Motilal Jhunjhunwala College of Arts,  
Science and Commerce, Mumbai

### ABSTRACT

*The purpose of e learning system is to automate the existing manual system with the help of computerized equipment's and fully fledged computer software, fulfilling their requirements so that their data/information can be stored for a longer period of time.*

*It can lead to error free, secure, reliable and fast system. It is made for those busy executive who are always on the go. The e learning system comes with remote access feature, which allow you to manage workforce anytime, at all time. This system will ultimately allow you for better manage resources.*

*Keywords: Online Learning, Virtual Learning, Learning Management System, Computer Based Learning, Moodle*

### 1. INTRODUCTION

After invention of Internet and WWW, the world has become a global village. Earlier it was very difficult to spread knowledge globally. But today it is very easy to share and learn by using the Internet. Internet has helped education system a lot by introducing concept called e-learning based Learning Management System (LMS). Many institutes started using these systems for serving different department needs. Generally, a Learning Management System contains different components or modules. A course management module provides facilities of adding new courses, managing or updating existing courses, and other course related details. Student management module contains student enrolment, student registration for regular and elective courses. This is very important module in order for other module work properly with accuracy. Online examination module is generally used to automate the process of student evaluation and it is very helpful to a teacher as it saves lot of time. As no human intervention is required in this module, it provides 100% accuracy. In online assessment module, student can upload the assignment electronically so there is no need for submitting it by using paper. Therefore, it saves lot of papers. The admin can upload tutorials, videos and other useful materials using online course management module. By using this module student can view and download these materials for study. In feedback management module students are able to give feedback for each subjects and only authorized person can view the feedback. It provides prompt and efficient output as compared to manual feedback system. The e-learning based Learning Management system can be helpful in project management.

### 2. PURPOSE

The purpose of e-learning is to allow people to learn for personal accomplishment or to earn a professional degree, without physically attending a traditional university or academic setting. Applied for all levels of schooling from grade school to graduate degrees, e-learning is versatile enough to accommodate all learning styles. It may help in perfect data management in details. E-learning (also called electronic learning) is any type of learning that takes place through or with a computer and is primarily facilitated through the internet but can also be accomplished with CD-ROMs and DVDs, streaming audio or video and other media. The purpose of e-learning is to allow people to learn for personal accomplishment or to earn a professional degree, without physically attending a traditional university or academic setting. Applied for all levels of schooling from grade school to graduate degrees, e-learning is versatile enough to accommodate all learning styles

### 3. SURVEY OF TECHNOLOGIES

Some of the existing technologies are as follows:

- Udemy
- Khan academy
- Coursera

- W3 schools
- TedEd
- Codecademy
- Open culture

#### **4. REQUIREMENT AND ANALYSIS**

##### **4.1 Problem Definition**

Switching from traditional classroom and face to face instructor training to computer-based training in a virtual classroom makes the learning experience entirely different for students. Their resistance to change doesn't allow them to adapt to the online learning environment, whereas it takes time for them to get accustomed to Learning Management Systems (LMS) and the methods of computer-based education. Many students are not provided with the high bandwidth or the strong internet connection that online courses require, and thus fail to catch up with their virtual classmates. Lack of computer literacy is a major issue among students today. Time management is a difficult task for learners, as online courses require a lot of time and intensive work. Self-motivation is an eLearning essential requirement; however, many online learners lack it

##### **4.2 Functional Requirements**

**1. Login:** To authenticate user (the user must enter validate his/hers user id and password. To inform invalid password and user id

**2. Manage profile:** The user can update his/hers profile The user can view his/hers profile.

The user can view specific user profile

**3. Manage account:** Create new account. Delete exist account.

Update exist account

View details of account

**4. Manage courses:** Add course to lecturer courses. Delete course from lecturer courses.

Update course

View details of course

View course profile of students

View course syllabus/schedule

**5. Manage course:** Send materials (lectures and assignments) to the students Delete materials

Send references to the students

Send forums to the students

Send announcements to the students

**2. Manage assignments solutions:** Download assignments solutions that have sent by students.

**3. View course information:** Student can download materials (lectures and assignments) that have sent by lecturer.

View references that have sent by lecturer.

View forums that have sent by lecturer.

View announcements that have sent by lecturer.

View grade details that have sent by lecturer.

View lecturer profile

View course syllabus/schedule

**4. Submit assignments:** Upload assignments solutions to the lecturer

**5. Log out:** The user make log out of the system

#### 4.3 Non Functional Requirements

- Performance requirements: This software should perform the same way regardless to its operating system environments. Time taken for importing files and publishing the multimedia presentation should be minimum.
- Safety requirements: This requirement does not apply for our software as this is can't pose a threat in no way.
- Security requirements: As all the operations are to be done within a single system security is not an issue for this software.
- Quality requirements: Quality has a number of attributes some of the important attributes for this software are
  1. Portability: As this software is to work on multiple platforms portability is an essential attribute and we ensure this by using java as our programming language.
  2. User training: We assume that the users already have some previous experience in working with similar software's. So the users will not need any specific training for using this software.
  3. Testability: As a basic characteristic the software needs to be testable to ensure correctness.

#### 5. FIGURES

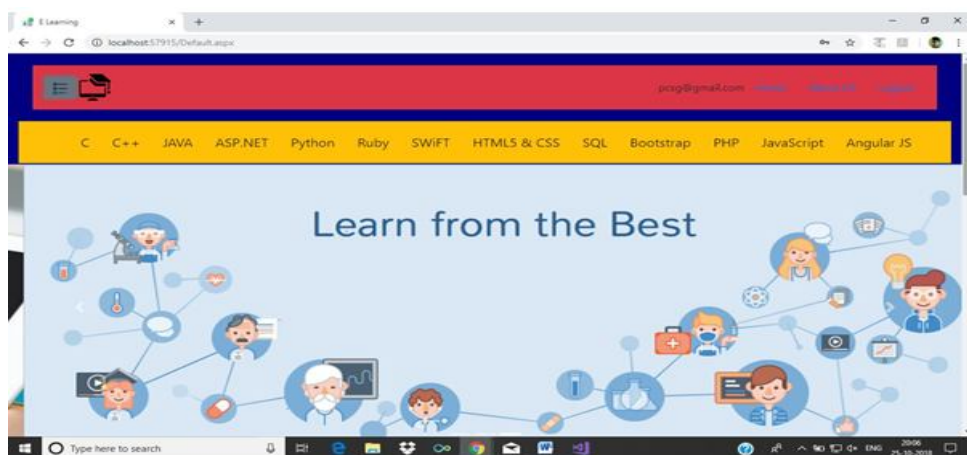


Fig-1: User Interface

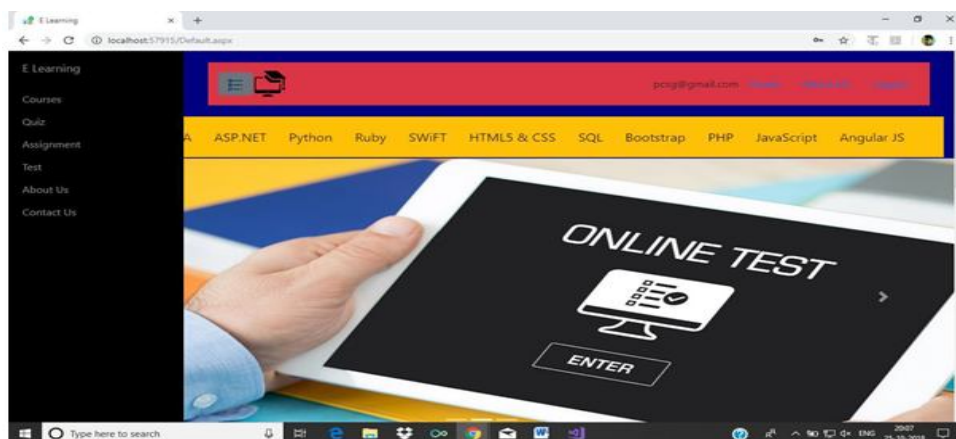


Fig-2: Menu option

## 6. CONCLUSION

The E-learning system is a humble venture to satisfy the needs to manage their project work. User friendly coding has been adopted. It shall prove a powerful package satisfying all the requirements. E-learning is not only just a change of technology; it is part of a redefinition of how we help knowledge, skills, and values to younger generations of workers and students. It is not intended to replace conventional methods and learning in classroom but it aims to create an augmented learning environment where technology is used to deliver a combined range of teaching and learning techniques.

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## INTERIOR DESIGNING USING AUGMENTED REALITY

Saurabh Rohidas Rewadkar<sup>1</sup> and Trupti Kulkarni<sup>2</sup>

Student<sup>1</sup> and Teacher<sup>2</sup>, Information Technology Department, ICLES' Motilal Jhunjhunwala College of Arts, Science and Commerce, Mumbai

### ABSTRACT

*Augmented Reality (AR) is an upcoming and growing technology used in various products and fields. Along with the dramatic progress of digital technology, augmented and virtual information techniques are also required for architectural projects. Thus, the brand new technology of Augmented Reality offers many advantages for digital architectural design and construction fields. This paper presents an application of Augmented Reality technology, which is a new design approach for interior design. It is an application that simulates an arrangement of furniture. This AR environment will allow the user to select from a range of furniture models and then display the virtual furniture selected on the real environment. The user can also modify the augmented furniture in real-time on the screen allowing the user to have an interactive experience with the furniture in a real-world environment. This will provide a better view of the furniture placement and simplify the process of interior designing for users to save their time and efforts. Finally, this paper proposes a new approach for applying Augmented Reality technology to interior design work, where a user can view virtual furniture and communicate with 3D virtual furniture data using a dynamic and flexible user interface.*

*Keywords: Augmented Reality, Interior design, Software Development Kit (SDK), Feature detection, AR.*

### 1. INTRODUCTION

Augmented Reality (AR) technology is widely used and well developed as an alternative to virtual reality on mobile devices. Design industries are extensively adopting AR to create meaningful user experience because AR allows companies to create applications that enables user to interact and visualize actual products. With the advancement in computer vision algorithms and cheap hardware, AR has finally become mainstream in the interior designing. Furniture buyers always had concerns regarding product returns because whenever they would buy furniture online, they were not sure if the piece of furniture would fit into a particular space. With an AR app, users can place an actual table or chair in their room to find out if it fits in the space and looks good. This idea drastically reduces the risks of returning of product and logistics cost.

Augmented reality has an ability to solve real life problems. Problems are mainly based on two factors, which are time and economy. This papers related on AR in the field of architecture and the ability to ease out the user's problem in decision making thus saving time and money was a motivation to implement an augmented reality application for interior designing. Augmented reality (AR) is a type of interactive, reality-based display environment that takes the capabilities of computer-generated display, sound, text and effects to enhance the user's real-world experience.

### 2. PURPOSE

In this paper, we are exploring how AR could be used for interior design and retail increasingly by employing different AR techniques. Furniture retail is significant aspect of the economy. However, most of the sales of furniture come from physical stores. Buying furniture from brick and mortar shops is inconvenient, cumbersome and time consuming. Augmented Reality has been seen as the technology that will boost furniture sales because AR enables users to visualize furniture. It also enables users to try out different interior designs to choose best out of it. As online shopping popularity increases, replaces brick and mortar stores. Therefore, it would never the worthless the effort to build solutions targeting interior design and retail.

### 3. PROBLEM STATEMENT

There are several problems induced for creating an interior design application in AR.

#### 3.1 Catalogue Complete Home Furniture

There are numerous catalogues for designing furniture and home decor. This catalogue contains the latest information about dining room, bedroom, bathroom, lighting, child, home organization, workspace etc.



However, there are some catalogues with printed 2D pictures with the description of the product which majority of the people do not want to read the content of the catalogue as there are too much information. That type of catalogue contains a lot of text and font size is small. However, some of the catalogue that is well design, which can deliver the appropriate information to the users whose production cost is high.

### **3.2 E-Commerce**

E-Commerce is an option, which many people go online shopping instead of traditional system. This is because there are many choices of products have been provided in those websites. By browsing those websites, user can gather information about products and prices. There are some problems of e-commerce website. Lack of product's information makes shopper not relieves to purchase the product especially for products like ornaments, clothing and furniture. People may worry the product is not suitable after buying and this is really wasting time and money.

## **4. REQUIREMENT AND ANALYSIS**

### **4.1. Unity**

Unity 3D is a strong, cross-platform 3D engine and a user-friendly development environment. Easy enough for the beginners and powerful enough for the experts. Unity uses its own C# compiler to compile your scripts. It automatically creates and maintains the Visual Studio file. Whenever somebody adds/renames/moves/deletes a file from Unity. You can add your files to your solution from Visual Studio as well. It will then import those new files, and the next time when Unity creates the project files again, it will create them with this new file included.

### **4.2. Vuforia**

Vuforia is a leading portal for AR application development that has a broad set of features. It is also categorized as one of the most used frameworks for developing AR applications, besides having an SDK for several development platforms. It is also capable of tracking planar, geo-located and multiple targets, texts and 3D objects. It recognizes multiple objects including boxes, cylinders and toys as well as images. It supports text recognition including about 100,000 words or a custom vocabulary. It provides a Unity Plugin. It supports both Cloud and local storage.

## **5. RESEARCH ELABORATIONS**

The proposed system is an augmented reality based system for interior designing by overlaying virtual furniture in a physical environment based on any device with android operating system. Therefore, it is expected that the proposed system will allow a broad range of users the system proposed in this paper includes additional functions for the user interface and an improved and optimized implementation. The user can interact with virtual furniture in real time, and change the colour, style, or covering of furniture in a real environment.

Augmented reality technology is categorized into two types:

### **6.1 Marker-based AR-**

Marker-based AR is AR application usually involve image recognition, the images that are to be recognized are predefined in the application. During runtime, the app analyses the camera stream and try to find marker (target). Once it detects the AR markers, they are used as the location for rendering the virtual objects.

### **6.2 Marker-less AR-**

Marker-less AR applications recognizes objects that were not previously defined. Application recognizes different features, patterns, colours etc. As there is no predefined image targets on the app. During runtime, the app has to analyse the different variables in camera frame to trigger AR actions. In marker less AR, the image is gathered through internet and displayed on any specific location i.e. by using GPS.

### **Markers**

The markers are 2D images kept usually bi-tonal (black and white) thus eliminating the problem of detecting different shades and the ambience. The purpose of these markers is to provide the required information by allowing the augmented reality system to track them and orient the information on them, and they do it properly. The markers that are in use are QR code and AR markers. The QR codes are not able to cover wider field of view and thus the capturing device has to be more accurate and enhanced image processing

may be required. However, augmented reality markers can cover a good field of view and can be easily and quickly detected.



Fig-1: AR Marker

The system architecture of marker-based system consists of five modules, which are as described below:

- **Camera:** The camera component ensures that every preview frame is captured and passed efficiently to the image-capturing module. The user only has to initialize the camera to start and stop capturing; the camera frame is automatically delivered in a device-dependent image format and size.
- **Image Capturing Module:** This module generates binary images, which is given as an input to the image-processing module. The input to Image Capturing Module is given via camera i.e. live video frame. This module analyses each frame and generate the binary image consisting of only two values for each pixel i.e. 0 for black and 1 for white.
- **Image Processing Module:** The binary images are processed using an image processing technique to detect the AR marker. Detection of marker is essential to determine the position, where to place the virtual object. Once the AR maker is detected, its location is provided as an input to the marker-tracking model. To place the object in the real world, marker position is determined.
- **Marker Tracking Module:** The marker-tracking module is “the heart” of the augmented reality system. It calculates the relative pose of the camera in the real-time. The calculated pose is provided as an input to the rendering module. The tracking module enables the system to add virtual furniture components as part of the real scene. The fundamental difference compared to other image processing tools and AR is that in augmented reality virtual objects are moved and rotated in 3D coordinates instead of 2D image coordinates.
- **Rendering Module:** The rendering module draws the virtual image on top of the camera image. In basic computer graphics, the virtual scenery is projected on an image plane using a virtual camera and this projection is then rendered. The trick in AR is to use a virtual camera identical to the system’s real camera. This way the virtual objects in the scene are projected in the same way as real objects and the result is satisfying.

## 6. CONCLUSION

The Augmented Reality Technology has become uproar in the field of computer vision technology, with its different user experience, slowly and deeply changing people’s life, which includes many different fields such as education, medical, advertising and so on. In this research paper, we examined how a marker based AR could be used for furniture sales in the latest growing world of technology. With advancements in computer vision technology and cheaper hardware, AR can only flourish strongly. AR has its unique advantages and is very good at tackling especially visualization many problems. In an AR environment, buying furniture could be convenient and simple while saving costs by completely lowering the risk of product returns.

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## MOTOFFT AN EVOLUTION IN CINEMATOGRAHY AND CAMERA EQUIPMENTS

**Ashish Jaiswal and Ashutosh Kolambkar**

Sudent, Vidyalankar School of Information Technology, Wadala (E), Mumbai

### ABSTRACT

*A camera, by the most basic of definitions, captures still photographs or video, either on film or digitally. The importance of the camera is not in the device itself, but in what it produces. Photographs and video have become vital to communication, education and preservation of history. Rather than a group of people handling the work of shooting and acting, it's much better that a person who is self financed can handle the camera himself. Acting and Shooting becomes much easier and accurate for a one man team. In this paper, we present an IOT architecture customized for Videographer, Photographer application. The proposed architecture will help the self financed media related person. The student researchers have concluded that the prototype will have an Android Application and A Bluetooth remote to access the tilt and pan control of the tripod head. Overall MOTO FFT is a device that will control the movement and rotation of the camera. A prototype of the proposed architecture has been built to demonstrate its performance advantages.*

### 1. INTRODUCTION

MOTOFFT stands for Motorised Follow Focus Tripod basically it is a device or equipment designed for the camera. For now, let's talk about a digital camera, a digital camera is a device which captures still images and records moving the object the data which is captured and recorded by the camera is stored in a digital memory. There are many different types of camera available in the market but all kinds of camera share the optical system, typically using a lens with a variable diaphragm to focus light on to the image sensor.

While taking any kind of picture or recording a video, there are some fundamentals to do it in the correct way. Like the camera angle should be proper, the focus on the object should be proper and the camera should not shake while capturing or recording.

### 2. PROBLEM DEFINITION

People are pursuing ever-growing high quality of their lives today. This leads to more and more facilities and home appliances poured into their surroundings.

The job of editing a video or shooting a video is difficult and time consuming. The now generation of youtubers and self production of media fail to deliver the high quality pictures or videos because of the handling of the camera.

We see self financed videographer or photographer who earn their wages by making videos and blogging about things that required handling the camera adjusting the focal length, the focusing power and the angles.

Common photography problems can really take the enjoyment out of taking pictures. As one of the more technical pastimes you can pursue, it can be pretty confusing at times.

Whether you're just starting out or have been taking pictures for a while, chances are you keep encountering the same nagging problem. Don't worry though - you're not alone and this is where we come in.

We've put together some of the most common photography problems you encounter and offered solutions to get around them, so you never have to be in doubt ever again! Camera shake is something that becomes more problematic with longer focal lengths.

The easiest way to avoid it is to use faster shutter speeds, even if this requires increasing your camera's sensitivity (ISO) setting.

A general rule of thumb is that the shutter speed should be faster than the focal length you're shooting at, so for instance, if you're shooting with a 200mm equivalent lens, you shouldn't shoot any slower than 1/250 sec or you risk camera shake ruining your shot

### 3. SURVEY OF TECHNOLOGY

In modern day and age, the camera technology now becomes handy to everyone, each and every one is having a digital camera in their smartphone, compact camera, laptop etc.

But the content creators for the online platform need more and better technology to work with, as the technology grows there are many compatible types of equipment being developed alongside. There are some of the camera and equipment which I would like to highlight,

1. Tripod
2. Motorized Tripod Head
3. Follow Focus
4. DSLR's

#### 1. Tripod

A tripod is camera equipment which is used to adjust the frame of the camera and to elevate on a certain height to capture steady pictures or videos.

There are many types of tripod available in the market but all the tripod has a common thing, which is all of them has only 3 legs which can be adjusted as per the requirement.

#### 2. Motorized Tripod Head

Every tripod has a head on which the camera is mounted. the head of the tripod is responsible for 2 motion which is the pan motion or you can say the head rotates along the Y-axis of the tripod and the tilt motion similarly to the X-axis of the tripod. the standard tripod head is controlled manually using thumbscrews and a stick which helps the user to adjust and the thumb screws secure the position of the camera so it won't move after the frame is set.

But we are talking about motorized tripod head which is not the same as the standard tripod head. The motorized tripod head does not have a stick to control the motion of the rotation and there is no thumbscrews to hold the frame of the camera. rather than the stick and the thumbscrews, there are motors and gears which control the motion of the tripod head, this motor are controlled using a built-in remote control or a rf controller made for the specific model or the product.

#### 3. Follow Focus

Follow Focus as the name says that this camera equipment deals with the focusing technology of the camera. In this modern age of technology, there are many different products from different companies. So, what exactly is Follow Focus? Follow Focus is a technology where a device is mounted on the camera lens this device has a gear which will control the rotation of the focus ring. The rotation of the gears is controlled using the button added on the device or the cameraman will have a controller based on radio frequency.

#### 4. DSLR's

Digital Single-Lens Reflex camera is a device which captures still images and records moving objects basically consists of the main body and a lens. The main body consists of a big sensor which captures the light passing through the lens. After capturing the light, the sensor further processes the data captured by the sensor and generates an image from it.

### 3.1 Software Requirements

#### Android Studio

The technology used is Java and Android Studio. The Project application is loaded in Android Studio. We used Android Studio for Design and coding of project. Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of

IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such as:

A flexible Gradle-based build system

A fast and feature-rich emulator

A unified environment where you can develop for all Android devices Instant Run to push changes to your running app without building a new APK

Code templates and GitHub integration to help you build common app features and import sample code.

The most commonly language used in developing android apps is Java. Java is a mature language, therefore more stable and predictable. The Java Class Library enables cross-platform development. It supports multithreading and offers multimedia and network support .Java has powerful development tools like Eclipse SDK and NetBeans which have debugging capability and offer integrated development environment.

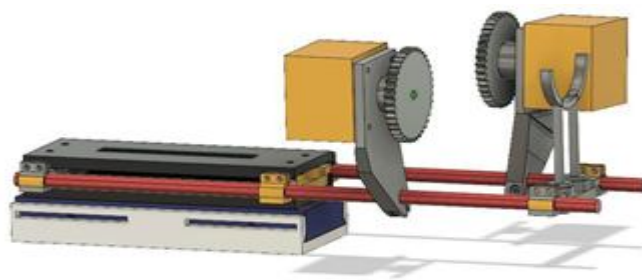
The alternatives to this technology is QT Creator, Apache Cordova, etc. Qt Creator is a cross platform C++, Js and QmL integrated development environment which is part of the SDK for the QT Framework. It includes a visual debugger and an integrated GUI layout and design forms. Apache Cordova is a set of APIs that allow a mobile app developer to access native device function such as the camera or accelerometer from JavaScript. When using the Cordova APIs, an app can be built without any native code from the app developer .There are many language used to create an android application like C, C++, Kotlin. Android Studio also supports C++ with the use of the Java NDK. This allows for native coding applications, which can be handy for things like games. C++ is more complicated still however. Kotlin was recently introduced as a secondary 'official' Java language. It is similar to Java in many ways but is a little easier to get to grips with. Arduino IDE

A program for Arduino may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio. The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java. A program written with the IDE for Arduino is called a sketch.] Sketches are saved on the development computer as text files with the file extension “.ino.”. Arduino Software (IDE) pre-1.0 saved sketches with the extension “.pde”.

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

### 3.2 System Design

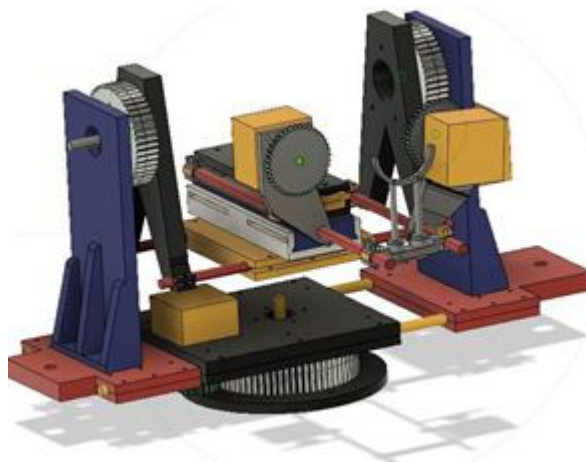
Follow Focus



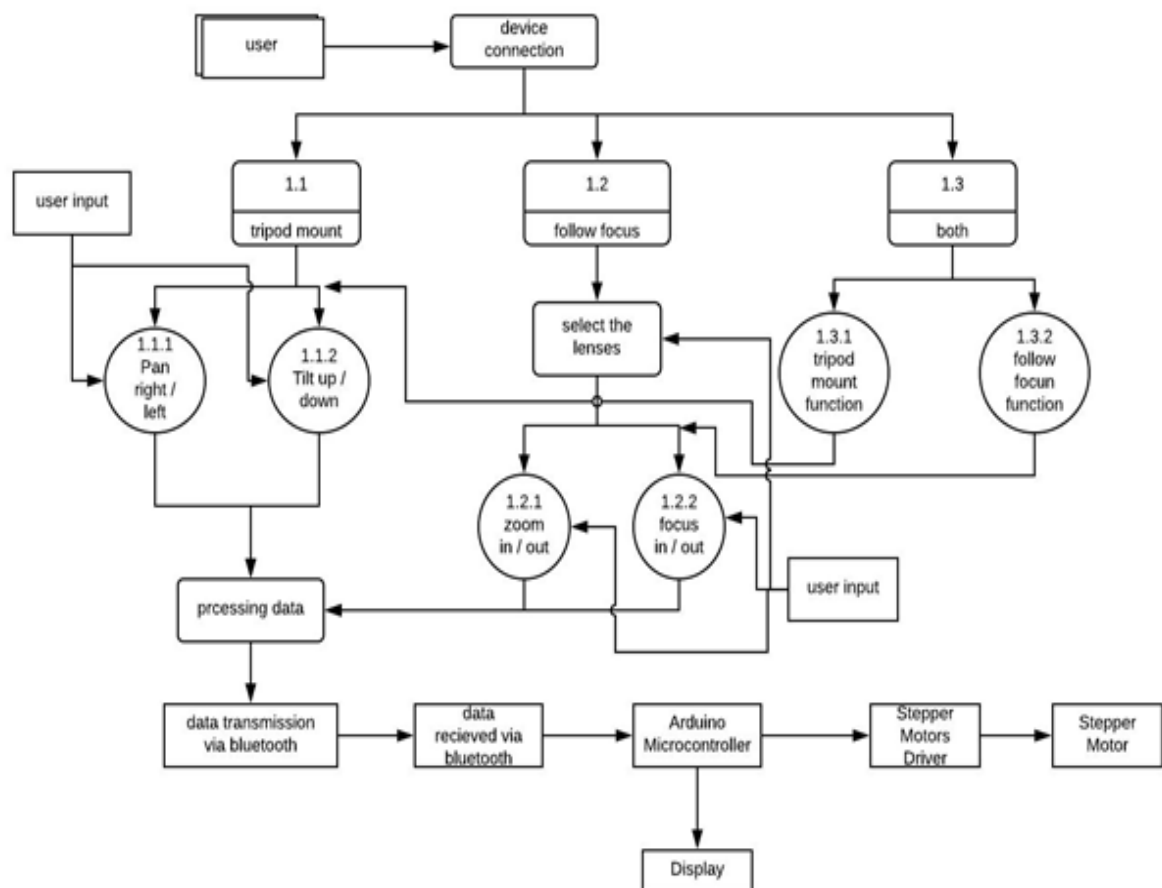
Motorized Tripod Head



## MOTOFFT



## 4. METHODOLOGY OF MOTOFFT ANDROID APPLICATION



## 5. CONCLUSION

The project Motorised Follow Focus Tripod is a prototype which will be used by the user who is in the field of movie making or making any type of visual content. There are different types of equipment's in the market for the camera like, motorised tripod head, follow focus, robotic arm, and so on, are available for the camera. So, the prototype consists of different functions like, there is a pan and tilt function in the motorized tripod head, and zoom in and plus focusing function in the follow focus system for the camera and its lens.

The pan and tilt function of motorized tripod head is used to make the camera mounted on to pan (to rotate the camera in Y-axis in clockwise or anticlockwise) and the tilt (to rotate the camera in X-axis in clock wire or anticlockwise).

The zooming and the focusing function of the follow focus system is used to make use of manual control of the camera lens without touching the camera. the zooming and the focusing make the camera lese zoom and focus ring to rotate on the user command.

The prototype gives the user the freedom to use both types of device at a time or separately, using the same controller which is connected to the android app via Bluetooth connection.

This project will help the people who manage all the work by themselves like a youtuber who acts alone shoots the video alone and edit alone. So, this prototype will help this kind of users to open a new way to use the camera controls using only one app.

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## AUGMENTED REALITY RESTAURANT MENUS AND FOOD APPLICATION

**Karan Gosai and Siddhanth Bangera**

Sudent, Vidyalankar School of Information Technology, Wadala (E), Mumbai

### ABSTRACT

*Augmented reality in which virtual content seamlessly integrated with displays of the real-world scene is a growing area of interactive design. The upcoming trend in restaurant marketing, Augmented reality Restaurant Menus and food Application. The Existing menus with digital contents are implemented to improve customer experience and Food Marketing.*

*AR food menus can also be to customers depend on lists of food item to help to evaluate, compare and view information.*

*Keywords: Augmented Reality, Virtual Reality, Real Environments, Mobile technology.*

### 1. INTRODUCTION

Augmented Reality (AR) is known as to add something which is existing from the real world which helps to combined real-world object and virtual components in a real-world environment.

The AR food menus are a crucial marketing tool for any restaurant.

The current systems which are available in the market are not feasible for the Indian audience. It could be game-changing in the restaurant business as in India this has not yet been developed or deployed in some restaurants.

The primary goal of the project to create a system which user cannot tell the difference between real and virtual Augmentation of it.

Augmented reality Restaurant Menus and food Application Supplement existing menus with digital content designed to improve customer experience and drive sales. Customers depend on lists to help them evaluate, compare and choose dishes.

The AR food application helps in improvise visibility and improve customer engagement. It could be game-changing in the restaurant business as in India this has not yet been developed or deployed in some restaurants.

Critical characteristics of Augmented reality:

- Mixing virtual images with the real world
- 2D&3D graphics and animation.
- Interactivity in the real world.

### 2. PROBLEM DEFINITION

As many of we know, most menus in restaurants don't usually come with pictures, especially those menus which have many items. In the best case scenario, you probably are going to get a short description of the food that as being served. Usually when we go to the restaurant, even when there is a description, we ask the waiter to tell me what the most recommended dishes in the restaurant area. Many people do not understand the menu, and they need to get the information: what are the ingredients, how is it cooked, is it spicy or not, nutritional information, the image of the item.

### 3. SURVEY OF TECHNOLOGIES

In modern day and age augmented reality is a handy tool for us as it helps us add virtual objects in the real world and view them using our mobile display. Augmented reality allows us to get a new perspective on the purpose that we are trying to get a proper look. Augmented reality and Virtual reality.

AR is similar to Virtual Reality in the following ways

- Technology: Augmented and virtual realities both are some of the same types of technology, and they each exist to serve the best they can.
- Entertainment: both technologies are the main view for gaming and graphics animations.
- Science & medicine: it either partially or fully replaces the original picture of an object with the newly augmented view of the same object
- Now let's look at the difference
- Purpose: Augmented reality enhances successive by adding different virtual components such as digital images, graphics and so on.
- Delivery Method E.g., Pilot learning.

#### **Difference between Augmented reality and Virtual Reality**

	<b>Augmented Reality</b>	<b>Virtual Reality</b>
Attribute	Mix Reality	Virtual
Environment	Real	Virtual
Most used for	ation, Construction so on.	Videos Game
Interactions	Move, rotate, scale and manipulate the 3d objects in the real world	Move, rotate, scale and manipulate the 3d objects in the virtual world

Table-1: Difference between Augmented Reality and Virtual Reality

#### **3.1 Software Requirements**

- c) **Unity** is cross-platform for game engine developed by unity technologies which are primarily used to create both 3- dimensional and 2-dimensional video games & graphics and simulations for computers and mobile device. Functionality and scripting using C#.
- ci) **Vuforia** - it is an Augmented Reality software development kit (SDK) for mobile devices that helps to create Augmented Reality application difference between unity and unreal engine.

#### **Why should we use the Unity Engine?**

- Platform support: it supports multiple platforms for gaming and unity also used for animations in 3D, 2D overlays annotations which can help for physical entity evaluations.
- IDE: -It is the integrated development, and it supports Java, c#, and it is the editor for the primary purpose for unity.
- Graphics:-The high-quality audio and visual effects are recommended for the development of applications and image quality.
- Documentation:-The easy-to-understand and detailed information about every topic.

#### **Why not another game engine?**

- Physics-because of non-functional which need to be added to advanced the development.
- License cost it is expensive, and hence it is not for beginners as well.
- The source code is challenging to trace error not stable and scalable system.
- Memory hogging required more memory locations and RAM. ➤ Difference between Unity and another game engine.

<b>Unity</b>	<b>Unreal Engine 4</b>
Great for 2D and 3D	Better-powered for 3D games
C#, unity Script, Boo	C++
No profiler for the free version	profiler
Limited graphics	Next generation Graphics

A better option for novices	Only for pros
Programmer and designer friendly	Designer friendly only
Supports multiple platforms	Only mac

Table-2: Difference between Unity and another game engine.

#### 6. Difference between Unity and another game engine.

Vuforia	Others SDK
Vuforia is open Source	They are not symmetry
Official partner of unity	They are only for big developer companies
No profiler for the free version	profiler
A better option for novices	Only for pros
Supports multiple platforms	Only mac

### 3.2 Printed vs Digital Menu

#### PRINTED MENU

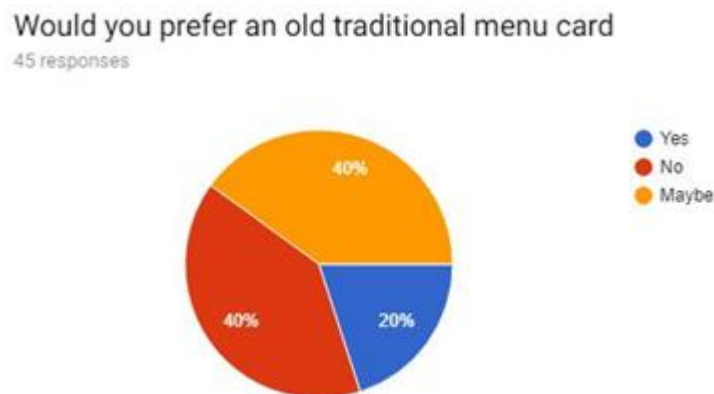


Figure-1: Survey of old digital menu

According to the study, we understand that most of the people are don't like printed menus because due to the clarification and concreteness. Some people are often to go to them, and some not in this case customer is finding a new place for their satisfaction what the restaurant serves. With the help of new AR Technology, we can help to evaluate their food ordering, and it will contribute to the customer for ordering the food.

#### DIGITAL MENU

With a digital menu, high-resolution and gorgeous 3D representation accompanies each menu item. Paper menus don't offer streaming news feeds, embedded social media functions, customer feedback submission, and custom ordering specification submission fields, digital menus certainly do. In the survey, we conducted we found out that (percentage of people) would prefer the digital list.

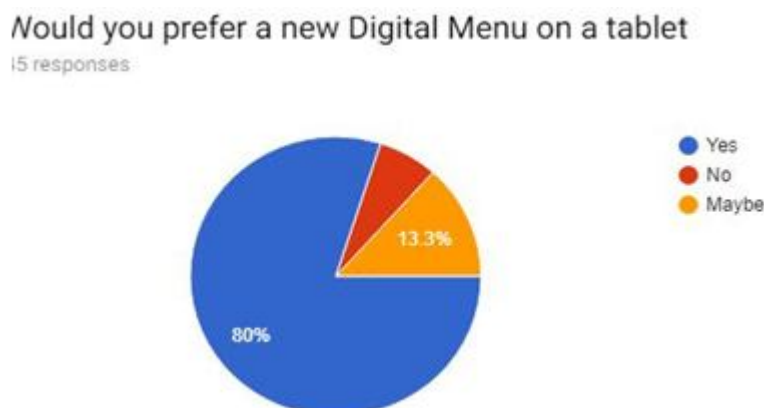


Figure-2: Digital Card Survey

### The AR application can help in different sectors are as follows

- Improving visibility: AR Food menus can be used to customize to show information about each food items, such as 3-D models, 360-degree visualizations, details of ingredients used, portion sizes, calorie and nutrition information.
- Upsell: types of food items AR can help to implement the Visibility
- Promotions: the Restaurant used for marketing purpose and provide too many benefits to the customers such as coupons, happy hours so on.
- Improve customer engagement: As many of we know, most menus in restaurants don't usually come with pictures, especially those menus which have many items.
- Gauge customer satisfaction: the AR can help to serve the food as per customer, and it is the tool to create communication between AR application and user interactive. AR Application can help the customer.

### 1. EQUATIONS, FIGURES AND TABLES

Usually Euclidean metrics is used, but another kind of metrics could be applied as well. In normalised cross-correlation the dissimilarity value is

$$D = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2} \sqrt{\sum_i (y_i - \bar{y})^2}},$$

Where x is mean of the marker's pixel values and y is the template's mean pixel value. As a system needs to match the detected marker against each template four times, it is clear that the larger the set of markers the system uses, Therefore, template markers are inefficient in practice if the system requires a large set of markers. By using smart algorithms and other sensors such as accelerometers and gyroscopes the device can keep the augmented elements aligned with the image of the real world.

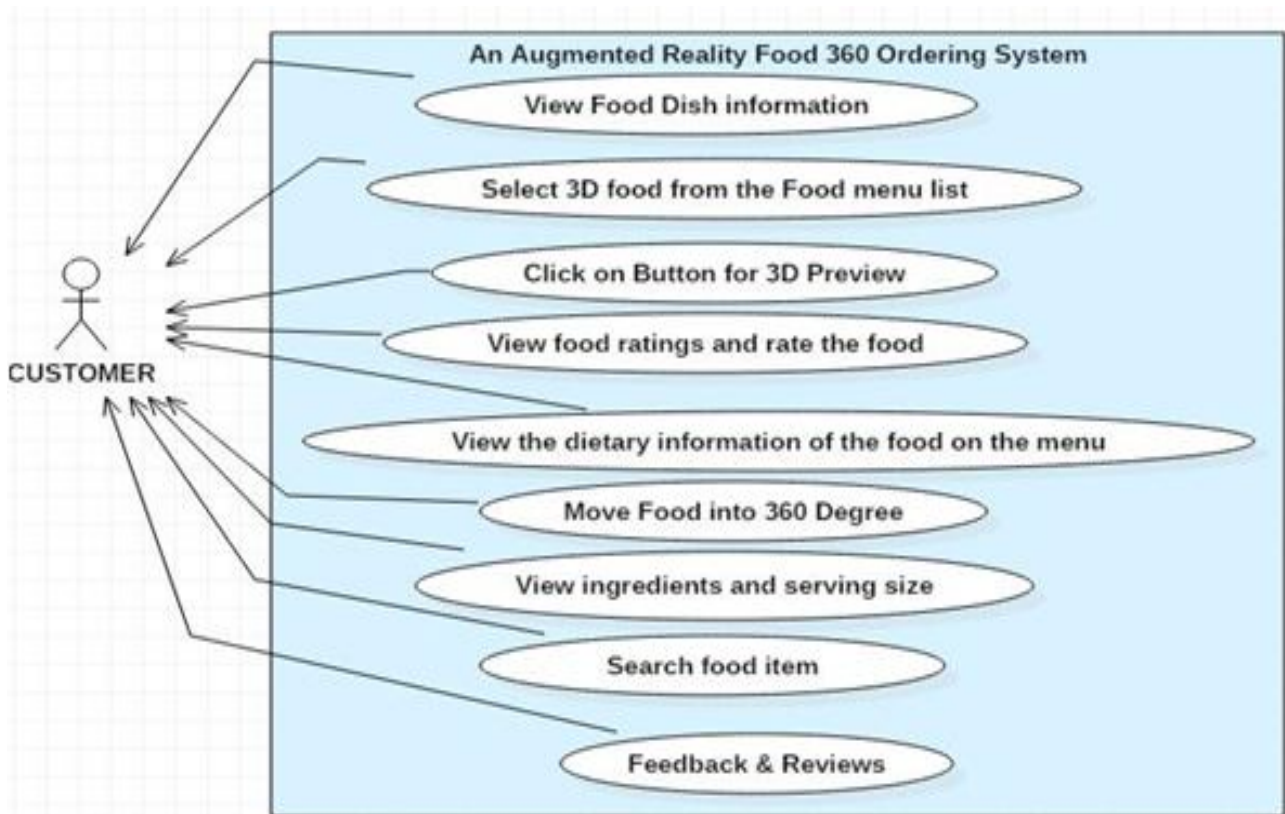
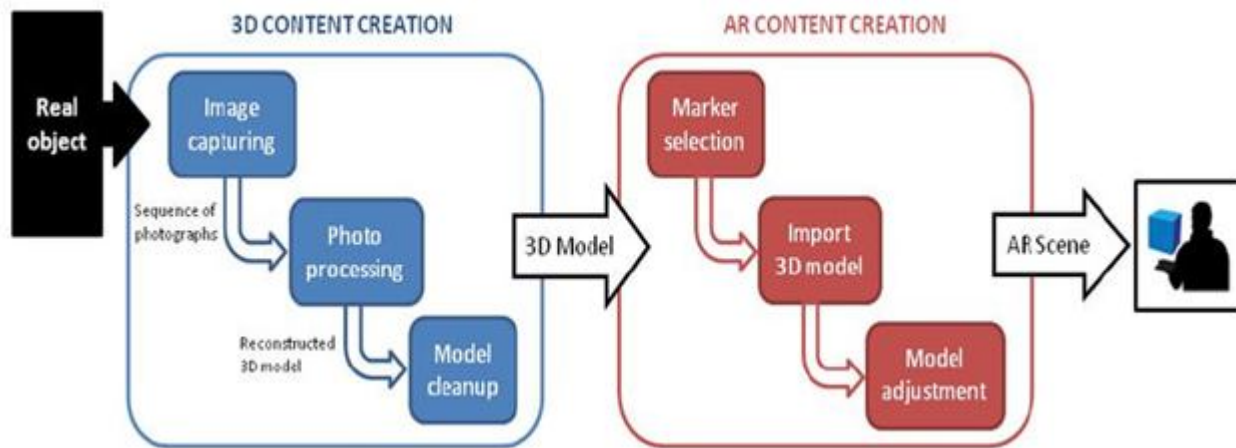


Figure-3: AR food 360 Overview

## Methodology of AR Food Application



## 5. CONCLUSION

AR food menus can also be designed with a range of other features to enhance customer experience. Augmented Reality (AR) is one of the upcoming thread trends in restaurant marketing, and we're seeing inspiring examples of its application popping up all over the world. It helps to the improved paper-based menu system.

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## SMART FIREARM USING BIOMETRIC AND RFID SECURITY

**J Yash Sakariya Jain**

Masters of Computer Application, Sardar Patel Institute of Technology, Mumbai

### ABSTRACT

*Smart firearm is an integration of technology and firearm to make firearms safer to have and sell. A smart firearm is a firearm which fires only if an authorized user is firing. The user can be authorized using different ways like using fingerprint, RFID tags, grip print etc. Even when the firearm is fired there is no record maintained of when the firearm is fired and where it is fired. This paper shows details of integrating GPS, GPRS, fingerprint and RFID to make firearms safer to access reducing accidental firing and firearm stealing also record of every shot fired will be maintained which can be helpful for regulation purpose. Integration of this technology into firearms will make sure that only licensed holder and owner of the firearm is firing the firearm reducing crimes and decreasing firearm theft. The firearm could be locked remotely which will ensure safety. Microcontroller, fingerprint sensor, GSM/GPRS module and RFID module is put in the firearm which will authorize the user and unlock the trigger by unleashing latch using a servo motor. Further, it will record time, location, and image when the fire is shot and store it offline and sync with the cloud which is managed and accessible by government authorities. The firearm can be manually overridden to work in RFID mode while the user is using gloves or if user's hands are dirty.*

*Index Terms: Smart firearm, Latch lock, Location, RFID, Fingerprint, Hybrid security*

### I. INTRODUCTION

33.69 lakh firearm licences have been issued till 2017 in India, and there have been many incidents where the firearms purchased using license are stolen and being used for criminal activities. As per Arms Act, 2016 only permissible arms can be used by licensed civilians and firearm should be fired only by the civilian under whose license the firearm was issued. Additionally the applicant has to abide by the rules mentioned in the Arms Act 2016 completely to acquire the license. Smart arms are firearms which fire only when authorized person fires and it keeps statistics of shots fired and provide data to the cloud. These smart arms can help in making arms regulation stricter and monitored also protecting from criminal and accidental activities.

In 2016, firearms were used to kill about 210000 people. A survey done in America showcase majority of firearm suicides occurs with the firearm of the people of someone known. 1.4 million Firearms were stolen. The smart firearm will help in stopping this catastrophe. There have been cases where officers have either being hurt or killed by their own firearm by self or under influence of other. But this is not the case in India where purchasing of a firearm and licensing is done in a strict manner and the smart firearm technology enhances safety further making it easier to implement the regulation. There is a high need to modernise and revolutionise firearm security so that the condition in India doesn't get as bad as it is in America.

### II. LITERATURE SURVEY

#### A. Smart Firearm

A smart firearm is a firearm which is equipped with sensors and actuators which senses and identify the person who is firing it and unlock and fire when the person is authorised. Further smart firearm keep the log of all the events and is connected to the network to share data.

#### B. Requirement for firearm

- 1) The only authorised person under whose licence the firearm is purchased should be able to use it.
- 2) The smart firearm should be reliable that is when an authorised person is firing the firearm it should fire without fail.
- 3) The smart firearm should operate in all environment and circumstances i.e. in a hot, cold and humid environment.
- 4) The smart firearm should be operational by both the hand.

- 5) The smart firearm has to be affordable.
- 6) The circuit should not affect the balance of the firearm and its working in an unintended way.

### C. Challenges for making firearm

- 1) The circuit should withstand the heat and tension created by the firearm when fired.
- 2) Making the firearm power efficient so that it works for a longer duration on one charge.
- 3) Placement of the fingerprint sensor so that it doesn't affect which hand is being used for operating the firearm.
- 4) Maintaining the size, balance and weight of the firearm i.e. circuits and battery shouldn't alter them to great extent.
- 5) The technology shouldn't affect the trigger pull standards.

### D. Existing work

Some advancement has been made in this technology in past.

The paper [2] designed a smart firearm wherein model consist of a microcontroller, fingerprint scanner, GSM/GPRS module and solenoid .the firearm can be fired only if the fingerprint is authenticated and when the firearm is fired the module store the current location of the firearm and sends it to the cloud storage. Mechanical mechanics of the firearm is replaced with the solenoid to fire bullet which is easily hackable and not reliable. It runs on battery. The user has to be pre-registered. Every time user wants to fire the firearm he or she needs to scan the finger, the microcontroller will authenticate and then note down the GPS, date and time and store it locally, send to cloud and then it fires the solenoid.

The paper [4] is a patent where the design for an external locking system for firearms.it is conventional lock which goes around the trigger and immobilizes it. The lock opens when a user scans finger on sensor and trigger can be moved and the firearm locks again when the user scans finger again on the sensor. A microcontroller, lithium battery and stepper motor mechanism to jam trigger and all this is encased in a titanium casing to prevent tampering.

The paper [5] designed a firearm authentication system using RFID technology. The firearm is equipped with the lock mechanism and an RFID receiver. There is an external token which has RFID transponder which unlocks the firearm when brought near to the Firearm and locks it back if the token is taken away from the firearm. Frequency-based coding is used to communicate between the firearm and the token which is the more efficient and secure way to communicate.

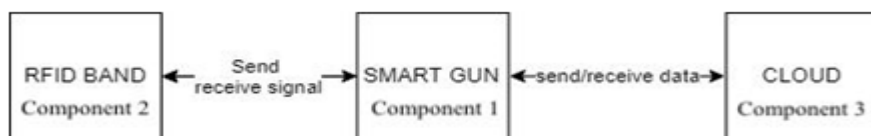


Fig-1: Proposed Architecture of Smart firearm ecosystem

### III. PROPOSED ARCHITECTURE MODEL

The smart firearm ecosystem is divided into 3 main module.

#### They are as follows

- 1) Smart firearm-component 1: This is the main module in the firearm which communicates with RFID band and Cloud system. This module takes care of locking and unlocking firearm and also logging date-time, location, and image when fired.
- 2) RFID band-component 2: This module is used to unlock firearm trigger when there is a need to override finger-print unlock in conditions when fingerprint sensor is not feasible to work with.
- 3) Cloud system-component 3: This is software hosted on the cloud which is accessible by government authorities. This system is used to register user to the particular firearm and also it maintains all data of the firearm fired. The system can be used by authorities to monitor and analyse activities related to firearms.



Existing system	Response Time and reliability	Environment	Multi-User	Cost	Tamper proof
Smart gun using biometric security selonoid	sometimes fingerprint sensor doesn't respond if wearing gloves or fingers are dirty	don't work in high temperature, static electric and humid environment.	can support multiple user.	it is costlier than any other system	Solenoid can be directly wired so it is not so secure.
External locking system	the lock has to be remove before firing and unlocking takes time but its reliable as it opens every time	work in all kind of environment	can support multi user but then password has to be shared with then all	its cost effective and cheaper than others.	it cannot be tampered without ruining the gun
RFID based smart gun	it is quick in response and is reliable as works in all environment. But signals can be disrupted causing failure	work in all environment only fails in high radiation environment	only one user at one time	costlier than external locking system but is cheaper than biometric system.	not easy to hack but can be cracked by bruteforce.

Table 1: Comparison of different existing work

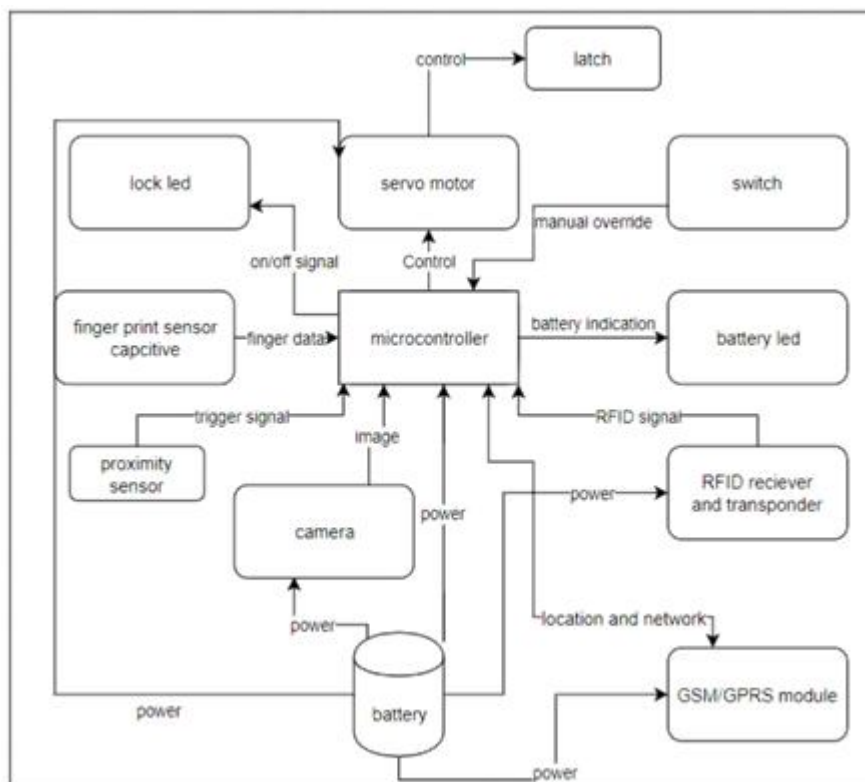


Fig-2: (component 1)Proposed Architecture of smart firearm

### A. Smart firearm (component 1)

The smart firearm consist of the following components:

- 1) Microcontroller: A microcontroller is a single board mi-crocomputer which can be programmed to do specific task. It can be used to control actuators through pin interface provided by it or can be used to gather data about its environment via sensors. It is the brain of a smart firearm. It controls all the mechanism in the gun following are the task carried out by the microcontroller:It takes fingerprint data



from fingerprint sensor and authenticates a user. It uses a GSM module to connect to the internet and communicate with a cloud server. It uses GPRS module to record the location of the gun. It uses a proximity sensor to check if the trigger is pulled. It controls servo motor to lock and unlock trigger. It controls LED to indicate whether the gun is locked or unlocked. It uses a camera to capture an image when the gun fired. It controls battery LED to indicate user about the battery status. It uses RFID receiver and transponder to communicate with the RFID band. It communicates with a cloud system, syncing users and reporting shots fired. There are multiple different types of microcontroller available in the market but the recommended microcontroller for the setup would be Raspberry Pi 3 as it is not only compatible with the other components but integrates with rest of the hardware seamlessly. Working with raspberry pi is very easy as there is huge community to support it and its very stable than any other microcontroller out there for the given use case. Raspberry pi 3 comes with a CPU 1.2GHZ, gpu 700MHZ, 1GB ram and for storage sd card is used.

- 2) Latch: It is the lock mechanism to jam the trigger and stop it from firing which is controlled by servo motor[7].
- 3) Servo motor: this motor is controlled by microcontroller and is used to move the latch which the locks or unlocks the gun. Robodo Electronics SG 90 Tower Pro Micro Servo

Motor is recommended as it is very light, has small foot print, consumes less energy and is durable. the torque created by this motor is 1.8kgcm which is suffice to lock and unlock the latch.

- 4) Switch: this is used to override gun from fingerprint mode to RFID mode or vice versa.
- 5) Lock LED: this LED is used to indicate whether the firearm is lock or open. Green indicates unlocked and red indicates locked.
- 6) Fingerprint sensor: this sensor is used to capture operators fingerprint which is then forwarded to the microcontroller to authenticate. The capacitive fingerprint sensor is recommended as it is fast and works in a wide range of the environment[6]. Robo India Fingerprint Scanner - TTL (GT-511C3) is recommended to be used as it is very fast using smackfinger 3.0 algorithm, it is compact and integrates well with raspberry pi 3 very well.
- 7) Battery LED: this LED is used to update battery status to operator.
- 8) Proximity sensor: this sensor capture trigger movement which is used to note when the trigger is pulled. RCWL-0516 Microwave Radar Sensor is recommended as it is cheap, has wide operating volt and has penetration detection capability.
- 9) Camera: this sensor is used to capture an image when the firearm is fired for reporting purpose. camera module v2 from raspberry is recommended cause it seamlessly integrate with pi 3 as it is made by same company as pi 3.
- 10) RFID receiver and transponder: this module is used to communicate with RFID band using radio frequency, receiver records radio waves generated by the RFID band. Transponder sends radio signals to RFID. RC522 is recommended to be used as it is reliable, cheap, can be directly used in the molds and is compatible with raspberry pi 3.
- 11) GSM/GPRS module: this module will record the GPS location of the gun and use the sim card to connect to the internet, wherein it can communicate with the cloud system[8]. sim 900A is recommended as it has dual band gsm support and provides GPS functionality. sim 900A provide support for GPRS, messaging and voice message functionality which can help.
- 12) Battery: used to power all the sensors, actuators and microcontroller. It is recommended to use Lithium-ion battery which last longer, compact and lighter. SAMSUNG ICR18650-26 F 2600mAh Li-Ion Battery is recommended as it has good capacity, is light weight and compact.

## B. RFID band

The RFID band will be a wristband which will be used to manually override fingerprint scanner for authentication purpose. The RFID band consist of the following components:

- 1) **Microcontroller:** this module will act as a processing centre, the following are the functionality performed by it in RFID band: Communicating with the Smart firearm through RFID receiver and transponder. Authenticating user password entered using Keypad. Control LED to indicate the status of the firearm whether it is a lock or unlock. recommended raspberry pi zero as it is compact.

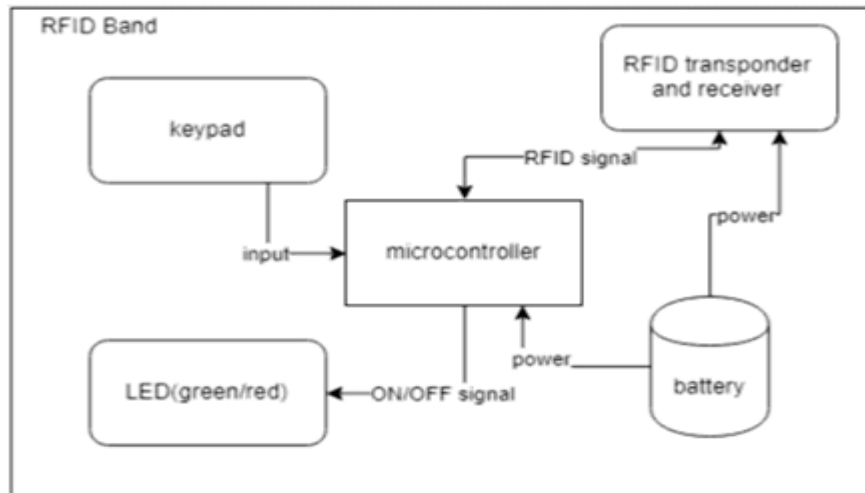


Fig-3: (component 2) Proposed Architecture of RFID band

- 2) **Keypad:** this will be a number keypad which will be used to enter a passcode to unlock the firearm. SunRobotics MEMBRANE 3X4 MATRIX KEYPAD is recommended as it is compact, cheap and durable.
- 3) **RFID receiver and transponder:** Communication with the smart firearm would be carried out with this module. RC522 is recommended.
- 4) **LED:** this will indicate whether the firearm is locked or unlocked and status of the battery. Green indicate unlocked, Red indicates locked, Yellow indicates low battery.
- 5) **Battery:** This will provide power to sensors and micro-controller. A lithium-ion battery is recommended. SAMSUNG ICR18650-26 F 2600mAh Li-Ion Battery is recommended.

### C. Cloud system

Cloud system is a software hosted on the cloud which will be accessible by government authorities. Following are the functions of cloud system in Smart gun ecosystem.

- 1) **Registration of user:** the Licensed user will be registered and the particular firearm would be assigned to the user. Then only assigned user can fire the particular firearm.
- 2) **Collection and storage of data from smart guns:** All the events logged by the firearms are submitted to cloud system which stored them in a central database.
- 3) **Report generation:** a cloud system can generate the report for various queries regarding the usage of firearm, location and user.
- 4) **Surveillance and monitoring:** Cloud system keep track all the registered firearm and monitor their activity as they are connected to the internet. It can check where the firearms are currently at and If it is locked or unlocked.
- 5) **Remote locking:** During emergencies, if the firearms are connected to the internet then cloud system can lock the firearm remotely.

### IV. WORKING OF PROPOSED SYSTEM

Smart firearm working is straightforward a latch is a mechanism which lock and unlock trigger. A latch is controlled by the microcontroller. The user first has to enrol and get registered by providing user gun license details, fingerprint, and RFID passcode to the cloud system. Then firearm is registered in the cloud system too and is assigned to the user, the assigned user (owner) details then are stored locally in the smart firearms

system. Every time user wants to fire user should scan his fingers on the scanner and on authentication latch will unlock the trigger, till the finger is placed on the fin-gerprint sensor and it is authenticated trigger remains unlocked or else it will lock automatically once the finger is moved from the sensor. Upon firing the shot the microcontroller will note down the date, time, location and image under the username and store it locally and sync it to cloud system once it is connected to the internet. If situation doesn't allow using of fingerprint scanner like if user is wearing a gloves then user can use RFID authentication to do so user has to wear an RFID band and turn manual override switch on and then enter passcode provided while registration which will unlock the trigger and it will be unlocked until the user is wearing the band and the firearm is within 15 inch vicinity of the band. The steps in working of the proposed system:

- 1) The firearm and the user will be registered on the cloud system by the respective authorities
- 2) The respective authorities will assign the firearm to the particular user
- 3) The cloud system will then fetch the user detail and will update it in the firearm. the firearm after that will unlock on successful authentication
- 4) The user can then unlock the firearm by scanning finger or entering password in to RFID band.
- 5) The firearm on unlocking will make a log and update the cloud about activity
- 6) On firing the firearm it will note the GPS location ,time,and photo then upload the details on the cloud .in case of no connectivity it will store it locally and then forward in to the cloud.
- 7) On receiving signal from the cloud the gun will auto-matically lock.

#### A. Description on Flow of the smart firearm working (Fig. 4)

The firearm is going to be in a lock state and by default in fingerprint unlock mode. the user can toggle the unlock mechanism to be used for authentication purpose ,the 2 unlock authentication mechanism are RFID based authentication and finger print authentication mechanism.based and the switch position the authentication mechanism will be used.on suc-cessful authentication from the selected mechanism the latch will unlock and a log of unlock will be made, then on changes in proximity sensor which means gun is fired the log of location,date,time and photo will be stored locally and will be uploaded on server when connected to internet.The firearm is locked again if the finger is moved from the sensor or the RFID band is moved away from the firearm more than 15 inches or the RFID lock button is pressed.The fire arm syncs the user detail from the cloud system and syncs it with the band associated with it.

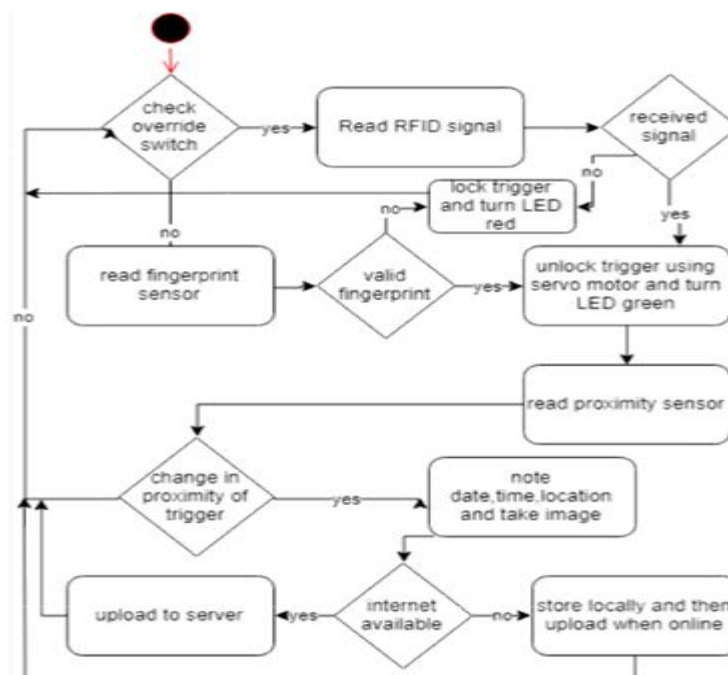


Fig-4: (component 1) Proposed flow chart of the smart firearm working

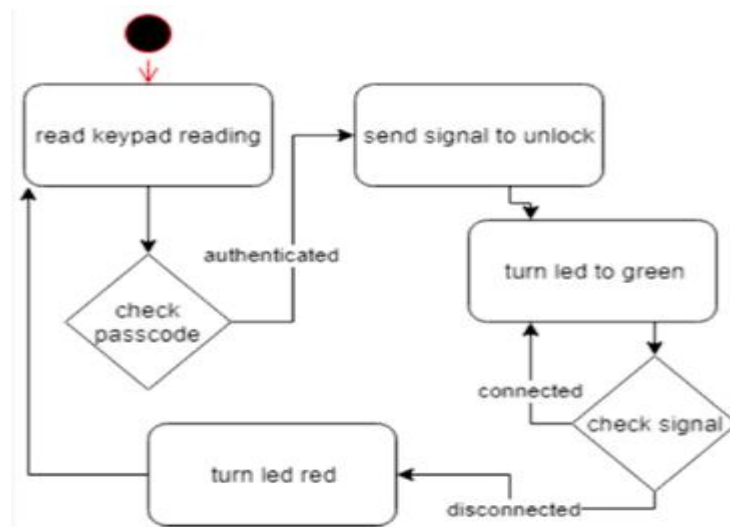


Fig-5: (component 2) Proposed flow chart of the RFID band working working

### B. Description on Flow of the smart band (Fig. 5)

The RFID syncs with the smart firearm and then reads the password from the user ,on entering right password it forwards the RFID signal to the firearm to be unlocked.The band also signals about the lock status through led.

### C. Description on Flow of the Cloud system (Fig. 6)

The cloud system starts with login page which on successful login will put front dashboard where the user can register licensed personal,register smart firearm,assign firearm to the personal,monitor and create reports for the usage statistics.the cloud system sends the information to firearm regarding the authorised personal that unlock it.It can also send signals to the firearm to lock it down.It also act as a storage place for all the log created by the firearm.

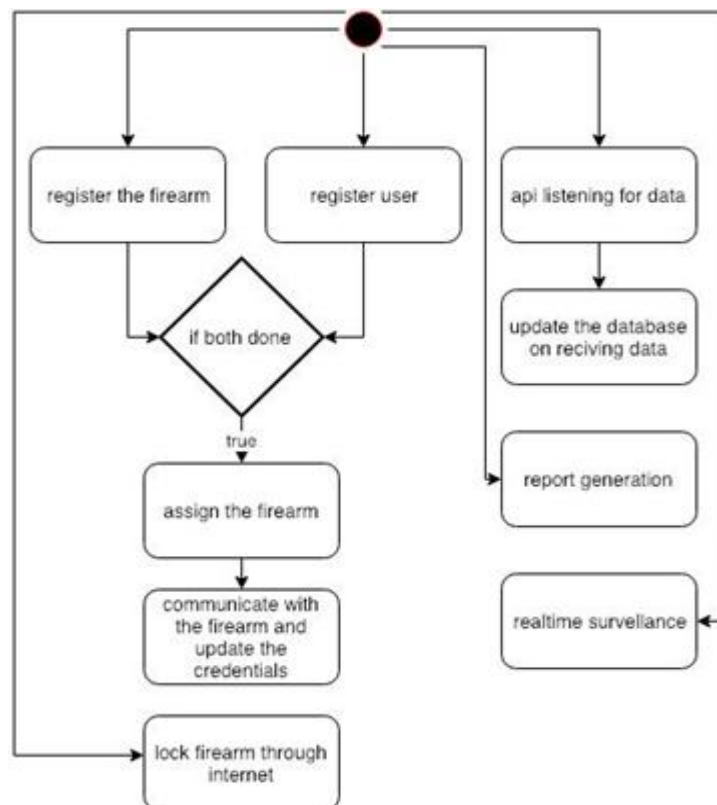


Fig-6: (component 3)Proposed flow chart of the cloud working working

## V. FUTURE WORK

People are still not ready to accept smart firearm technology due to the constraints it poses so unless the government takes certain measure to implement it in large scale. The smart firearm has huge potential and opens many possibilities. The smart firearm can be designed in such a way that it doesn't unlock when it is in no fire zone declared by the government. The whole cloud system can be integrated with blockchain technology so it becomes distributed in nature and is immutable making the database secure and transparent. The blockchain will maintain a log of user, firearms and activity log. Implementing piezoelectricity generator into firearm [9] which will charge the battery on every shot fired and make the firearm independent from charging of the battery. The generator will harvest energy from the pressure created by the blast when the bullet is fired. When the design is implemented into production firearms the whole circuit can be integrated into a single chip which will make it smaller, lighter and power efficient. Hence ensuring proper placement further low power battery would be required to power the whole circuit.

## VI. CONCLUSION

Firearms safety and monitoring have become a major concern for taking security into consideration. The impact that firearms create on the economy in a negative way and the impact it has on personal security and protection is to be balanced, the smart firearm ecosystem will make it possible for controlled distribution and monitoring of firearms. Crimes committed these days which involve firearms have circumstances where we can't identify who fired the firearm. This technology will reduce these events and help in reducing firearm robbery. Real-time surveillance and remote control of all the firearms would be possible. Implementation of this design on a wide scale would be the biggest challenge, the only way to implement it in an efficient way is if the government takes a step forward and make it happen. The paper is focused on implementing an ecosystem for the smart firearm with biometric and RFID hybrid authentication with provision to gather data about every shot fired and send data to a cloud system, hence making law enforcement easier.

## VII. ABOUT AUTHOR

J Yash Sakariya Jain is pursuing Masters of computer application from Sardar patel institute of technology, Mumbai. He believes if anything can change or revolutionise the well being of humans is the intervention of technology. He has worked as a full stack developer at education startup School Atlas for 2 years to improve the education system for children in rural areas of Maharashtra.

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## DATA MINING IN CHRONIC DISEASES

**Pooja Patel**

Masters of Computer Application, Sardar Patel Institute of Technology, Mumbai

### ABSTRACT

*Chronic diseases is one of the leading reason for increase in the death rate all over the world. This paper focuses on various chronic diseases such as Diabetes, Asthma and Heart Disease. The correlation between the chronic diseases and the corresponding diagnostic tests is analyzed, by using Data Mining techniques. Here, we have used Naive Bayes and K-Nearest Neighbor classification Techniques for analyzing chronic disease. In this paper, we have used Receiver Operating Characteristic (ROC) analysis as a mean of comparison between classification models and we also perform parallel study of the two classifiers and measure the performance based on precision and accuracy rate.*

*Keywords: { Data Mining, Chronic Diseases, Naive Bayes, K-Nearest Neighbor (KNN), Accuracy rate and Receiver Operating Characteristic (ROC) curve.*

### 1 INTRODUCTION

Chronic diseases is a condition which can be bought under self-control but not cured. The main cause of the chronic diseases is the way people choose to live their lifestyle. They opt poor habits such as teen or adult smoking, usage of alcohol, obesity, asthma, diabetes, heart diseases, reduction in their physical activities and deficient relief of chronic stress. They often play an important role in the progression and betterment of curable chronic diseases. Chronic diseases tend to become more common with age.

Now-a-days, Data Mining is becoming popular in health-care field. The health-care industry is information rich and thus medical related data and information keep growing on a regular basis. The health-care association is establishing larger attention on the need of data sources to boost up the kind of care delivered to the victims [5]. Data Mining is one of the most compelling and encouraging area of research. The primary purpose of data mining is to find relevant information from huge data sets.

Data from the WHO ( World Health Organization ) shows that chronic disease is the root cause of immature increase in the death rate around the world [3]. It is mostly observed in the places where communicable disease are uncontrollable. As reported by Centers for Disease Control ( CDC ), chronic disease is foremost source of death and injury in the United States of America leading to 70 percent of deaths.

The paper is branched into few categories. Section II serves various Data Mining techniques. Section III consists of detailed description about tool used i.e. ORANGE and its features is dictated. Section IV embodies implementation of data mining techniques and parameters.. This section also gives the detailed explanation of the processes undertaken to obtain an optimum solution among the techniques used. Simulation results are represented and compared in the Section V. Section VI includes conclusion and various additional analysis in future. The Section VII consists of references used and Section VIII includes appendix from where the dataset has been referred.

### 2 TECHNIQUES USED

Some of the various data mining techniques that helps to create optimal results are discussed below.

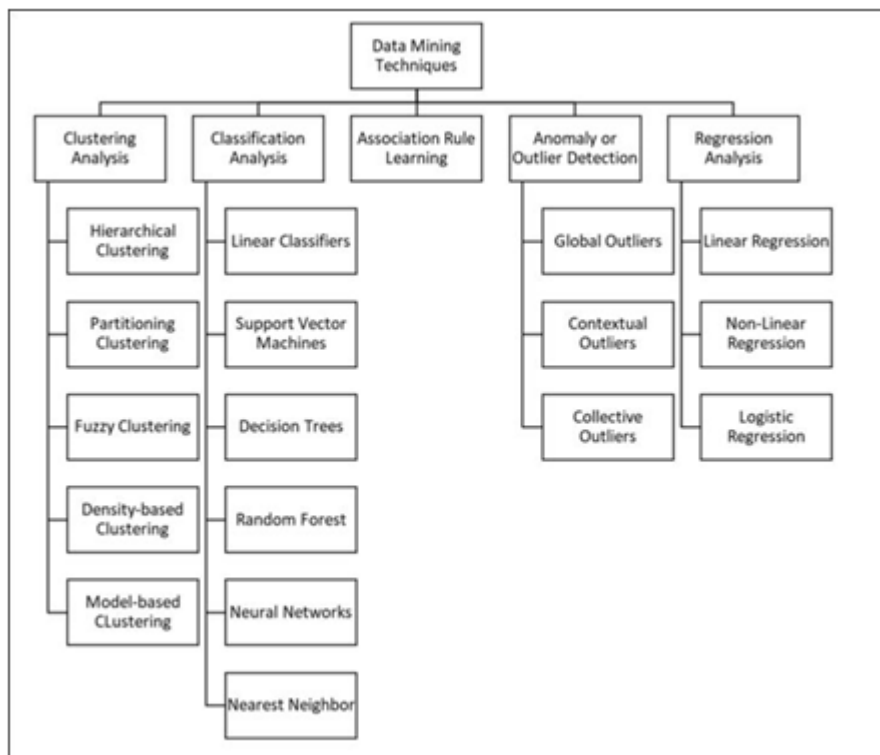


Fig-1: Classified data mining techniques.

### 2.1 Clustering Analysis

In Clustering Analysis, the cluster is combination of data objects. These objects are identical within the similar cluster. That is a particular group includes similar kind of objects and dissimilar objects are include in another group or in different cluster.

### 2.2 Classification Analysis

Classification Analysis is a standardized process for gaining critical and relevant information about data, and meta data. The classification analysis aids to identify the categories the data belongs [8]. Classification analysis is related to cluster analysis as it can be used for clustering data.

### 2.3 Association Rule Clustering

Association Rule Clustering is perhaps the most preferred and genuine data mining technique. It identifies different patterns between the correlation of two or more elements of the same type. Association Rule Clustering also helps to unload the hidden patterns to find out the concurrences of distinct variables that emerges very often in data set.

### 2.4 Anomaly or Outlier Detection

Anomaly or Outlier Detection examines the data items in a data set that don't match with an familiar pattern or behavior [6]. This technique is also noted as outliers, oddity, buzz and exceptions. They also provide demanding and prosecutable information.

### 2.5 Regression Analysis

Regression analysis identifies and evaluates the link between variables. It also identifies distinct variable from the existing variables. Regression analysis defines the dependencies among the variables.

## 3 ABOUT THE TOOL

The name of the tool used in this paper is "Orange". This tool helps in performing simple data analysis with expert data visualization. It helps in analyzing demographics, box and scatter plots, or provides wider overview of decision trees, clusters, heat maps and so on . It produces collective data exploration for rapid qualitative analysis with clean visualizations.

This tool allows GUI to target the preparatory data analysis rather than coding. Orange makes quick model of data analysis work so immensely smooth [4]. It helps in placing appliances on canvas and then join them and bundle your data sets and results the insight!.

External data sources mines various add-ons which are available with the tool [9]. They perform NPL ( Natural Language Processing ) and handles text mining, manages network analysis and do association rule mining.

## 4 DATASETS AND METHODOLOGY

### 4.1 Datasets

This paper implements various data mining techniques on data set for analysis of chronic diseases. Based on the various attributes furnished in the data set i.e. the name of disease, year, gender, race/ethnicity and the value, various predictions are executed. Various attributes have been powerful in composing the decisions. Data sets which were implemented are correlated in terms of area under Receiver Operating Characteristic (ROC), classification accuracy and precision calls .

### 4.2 Methodologies Adopted

The knowledge exploration mechanism involves various steps. Data is gathered from different sources, processed and then transformed into appropriate format [1]. Data mining techniques are applied on the prepared data for classification and information is extracted for further discovery and analysis. The flow diagram of the paper is shown in Fig 2.

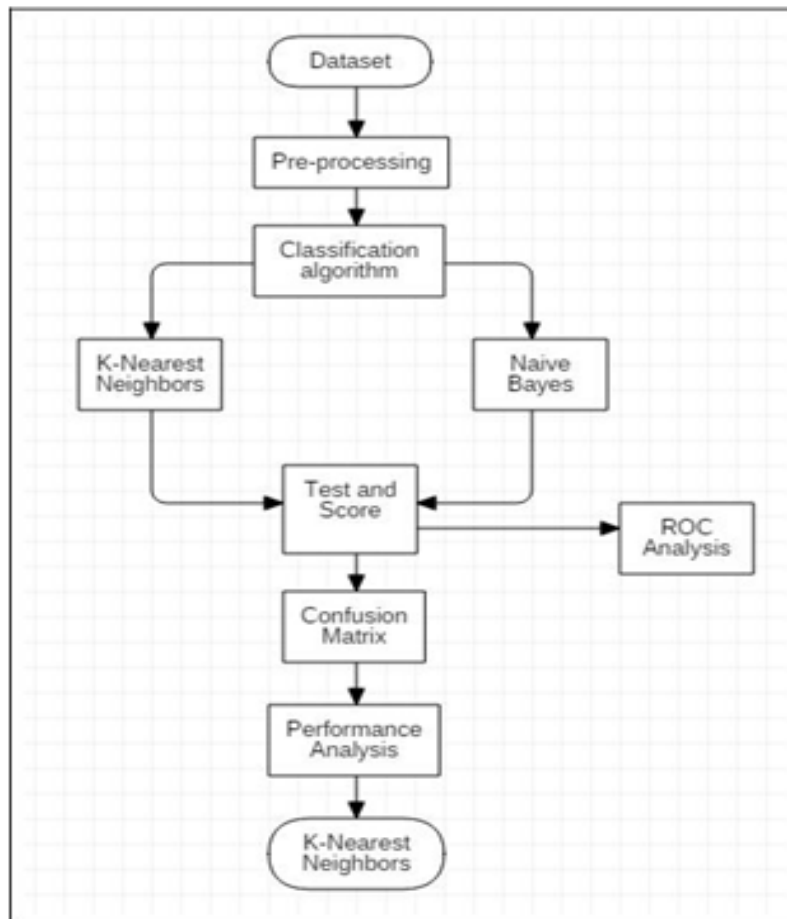


Fig-2: Flow Diagram

After the data from the data set is preprocessed, classification algorithms are implemented on the set. Test score and confusion matrix are computed and compared for the outstanding performance. In this work, K-Nearest Neighbors (KNN) and Naive Bayes (from Bayes) classification algorithms have been used to exercise their classification accuracy, area under ROC and their performances past the Chronic Diseases data set.



### K- Nearest Neighbors

K-Nearest Neighbors ( KNN ) is a supervised learning algorithm. It is specially designed for classification. It gathers all feasible cases and according to the superiority from its k neighbors, KNN segregates new cases. This algorithm is effective if the training data is large and it is robust to noisy training data.

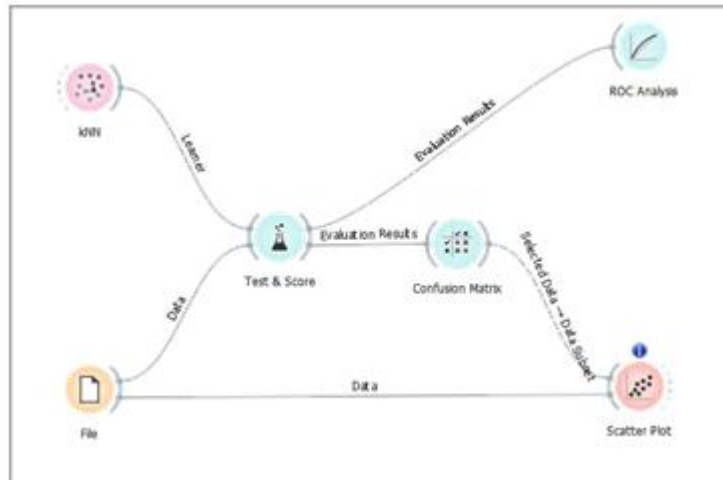


Fig-3: K-Nearest Neighbor flow diagram

The above figure i.e. Fig 3. represents the flow of data of KNN algorithm. The Test Score is determined based on the inputs received from learner (where dataset is imported) and KNN algorithm. Area under ROC analysis is dependent on Test Score for its output. Confusion Matrix includes matrix of actual value Vs the predicted value and later on scatter plot is generated using the various fields of dataset.

### Naive Bayes

Naive Bayes classifiers is a compilation of classification algorithms. It is a family of algorithm where all algorithms share a familiar principle i.e. every feature is independent of the other [7]. It assumes that each feature makes independent and identical contribution to outcome.

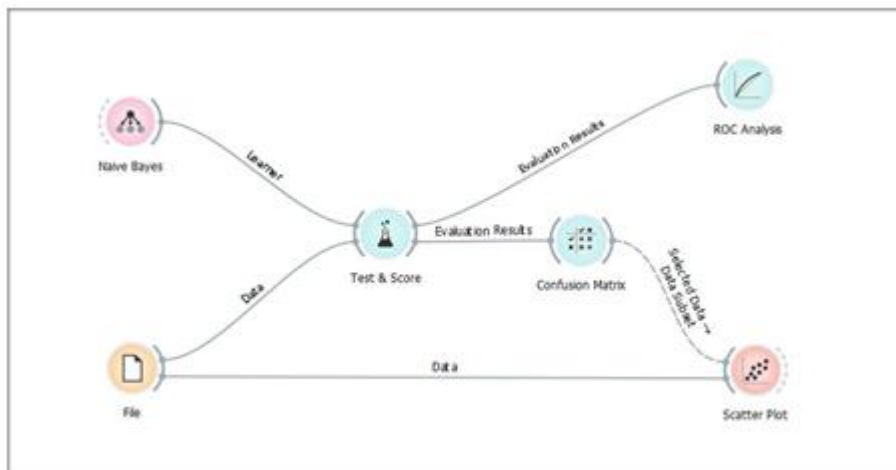


Fig-4: Naive Bayes flow diagram

The above figure i.e. Fig 4. pictures the flow diagram of Naive Bayes algorithm. The process is same as that of K-Nearest Neighbors. We load the dataset in File and along with Naive Bayes we send to determine Test Score.

The ROC analysis is based on inputs received from Test Score. Confusion Matrix is generated by taking actual value Vs the predicted value of the dataset. The scatter plot is designed using the various fields of dataset.

## 5 COMPARING RESULTS

The following tables show the Evaluation Results (Test Score) of the classifiers used.

Evaluation Results					
Method	AUC	CA	F1	Precision	Recall
Naive Bayes	0.514	0.391	0.361	0.339	0.391

Fig 5. Evaluation Results of Naive Bayes

Evaluation Results					
Method	AUC	CA	F1	Precision	Recall
kNN	0.910	0.803	0.796	0.792	0.803

Fig 6. Evaluation Results of K-Nearest Neighbors

From the Fig 5. and Fig 6., we observed that the Area under ROC ( Receiver Operating Characteristic ) i.e. AUC for K-Nearest Neighbors is 0.910 and that of Naive Bayes is 0.514. This means that the true positive rate for K-Nearest Neighbor is more than that of Naive Bayes.

The Classification Accuracy (CA) for K-Nearest Neighbor (0.803) is greater than Naive Bayes (0.391). We can even figure out from the above diagrams that the proportion of true positives among instances i.e the Precision for K-Nearest Neighbors (0.792) is higher than that of Naive Bayes (0.339).

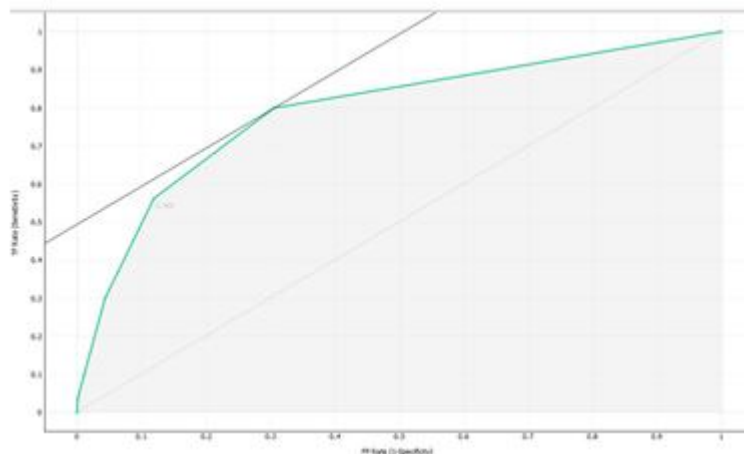


Fig-7: ROC value of Asthma using K-Nearest Neighbors

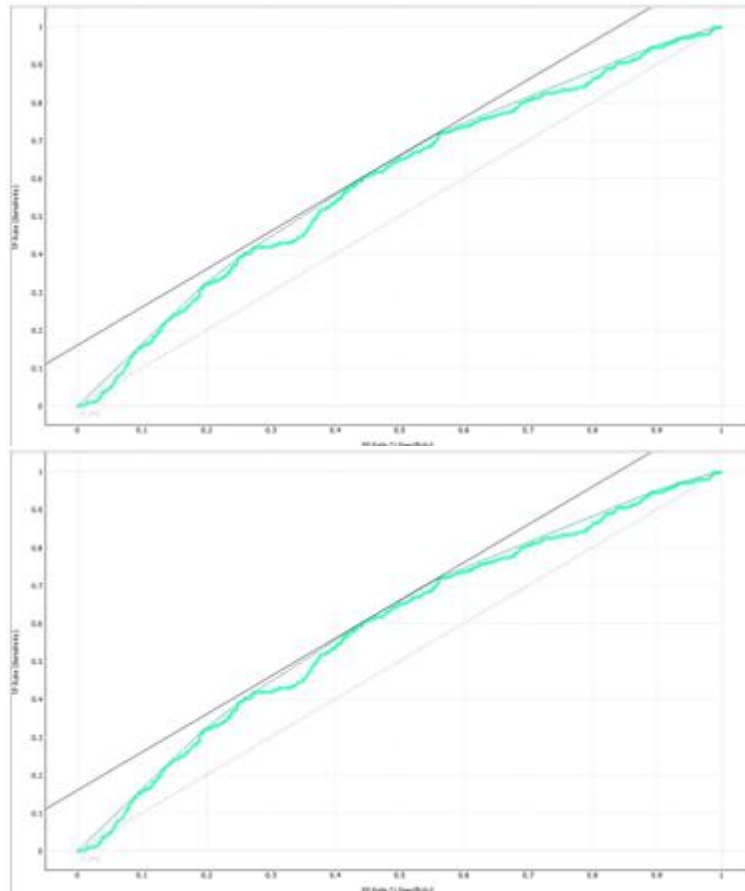


Fig-8: ROC value of Asthma using Naive Bayes

The Fig. 7 and Fig. 8 represents the ROC graph of Asthma for KNN and Naive Bayes respectively. From the graph we can make out that ROC value of Asthma for KNN is 0.400 while that of Naive Bayes is 0.243. Thus the value obtained by KNN is more than that of Naive Bayes.

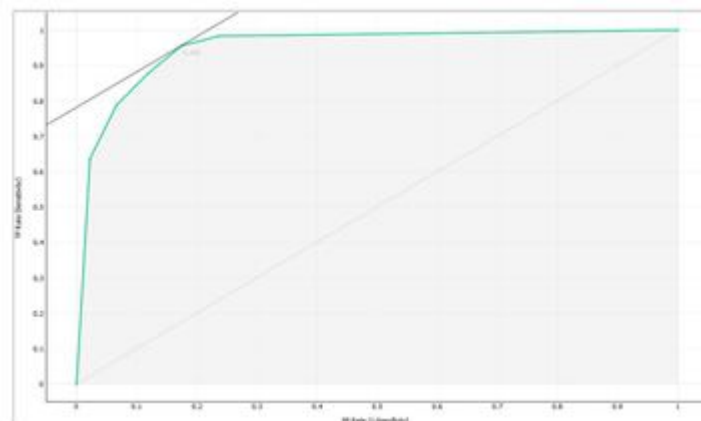


Fig-9: ROC for Diabetes using K-Nearest Neighbors

The Fig. 9 and Fig. 10 represents the ROC graph of Diabetes for KNN and Naive Bayes respectively. From the graph we can make out that ROC value of Diabetes for KNN is once again 0.400 while that of Naive Bayes is 0.299. Thus the value obtained by KNN is more than that of Naive Bayes.

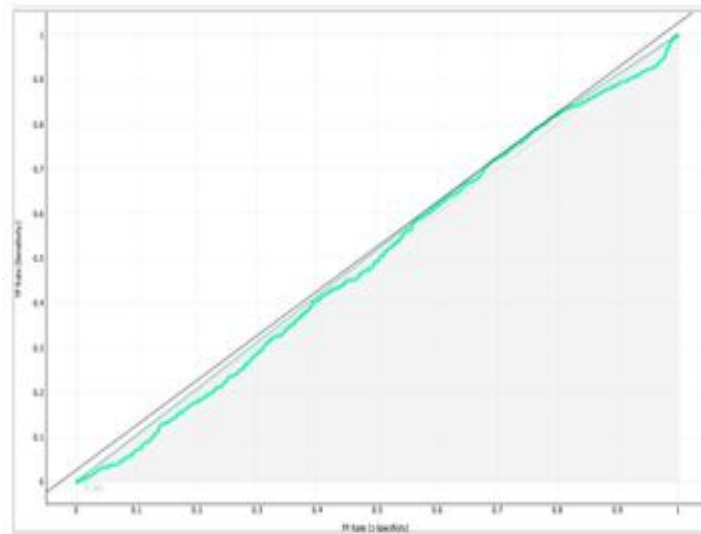


Fig-10: ROC for Diabetes using Naive Bayes

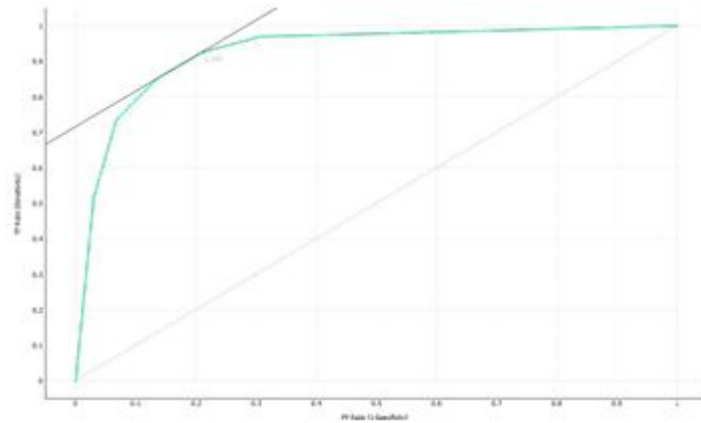


Fig-11: ROC for Heart Diseases using K-Nearest Neighbors

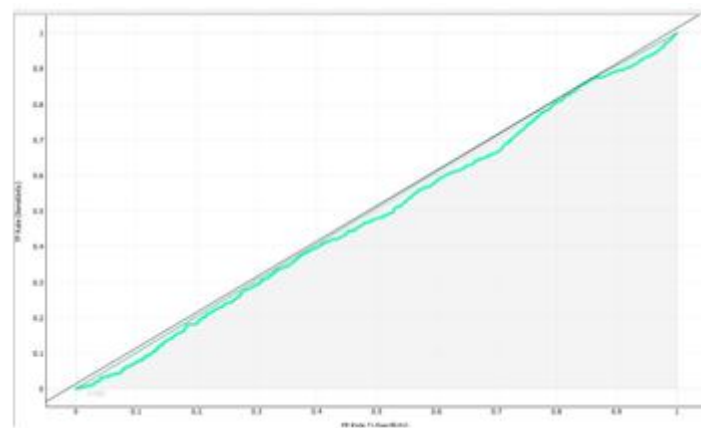


Fig-12: ROC for Heart Diseases using Naive Bayes

The Fig 11. and Fig 12. represents the ROC graph of Heart Diseases for K-Nearest Neighbors and Naive Bayes respectively. From the graph we can make out that the ROC value of Diabetes for K-Nearest Neighbors is again 0.400 and that of Naive Bayes is 0.200. Thus the value obtained by K-Nearest Neighbors is more than Naive Bayes.

Algorithm \ ROC Value	Asthma	Diabetes	Heart Disease
Naïve Bayes	0.243	0.299	0.2
K- Nearest Neighbors	0.4	0.4	0.4

Fig-13: Comparison Chart of ROC values

Fig 13. summarizes the ROC values of the chronic diseases i.e. Asthma, Diabetes and Heart Diseases for K-Nearest Neighbor and Naive Bayes Algorithm.

Thus we observed that, Naive Bayes can only have linear, elliptic, or parabolic decision boundaries, and that makes the exhibity of K-Nearest Neighbor's decision boundary a huge advantage.

## 6 CONCLUSION

The paper predicts the chronic diseases for Diabetes, Asthma and Heart Diseases. Naive Bayes and K-Nearest Neighbors are the two algorithms that have been used for experiments. ORANGE tool was implemented for analyzing the classification accuracy achieved after executing algorithms. The results are correlated on the basis of area under ROC, precision and classification accuracy achieved.

The results displays that K-Nearest Neighbors classifier exceeds Naive Bayes classifier in all aspects.

Thus, K-Nearest Neighbors classifier is the best prediction algorithm for chronic disease diagnosis. In future we may examine more classification algorithms as per their behavior and analyze their performance with the same or different data sets.

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## Appendix

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## E-RATION - SMS BASED PUBLIC DISTRIBUTION SYSTEM

**Geeta Sahu<sup>1</sup>, Yash Yadav<sup>2</sup> and Hasan Abbas Sorathiya<sup>3</sup>**

Assistant Professor<sup>1</sup> and Student<sup>2,3</sup>, Information Technology, Vidyalankar School of Information Technology, Wadala (E)

### ABSTRACT

*Ration card is an official and important document issued by state governments in India to the people who are eligible and entitled to buy the ration/food grains and fuels at a very minimal cost from the Public Distribution Centre. The manual system consists of the information about the user and purchase history written manually about the entitlement of ration. This manual process of updating a ration book is time consuming more over many fraud entries are being done. The ration/grocery sellers are indulging in forgery by not distributing the entitled quantity of food grains to the beneficiaries. Thus this paper talks about the future rationing system where the ration card (book) will be linked with Aadhar with the bank account details in confidential manner. The user's details along with the entitled details will be stored in the government database which would be linked via Aadhar Card. Every Month when government sanction the ration to the public distribution centre, immediately one message will reach the user via SMS mentioning the details - date, time and venue from where the ration will be availed. The user is supposed to avail that facility, if user does not reach on that slot then automatically government database will send a new date and time slot to the user again.*

*Keywords: Aadhar Card, QR Code, Beneficiaries, Subsidy, Food grains, Short Message Service (SMS), Authentication.*

### 1. INTRODUCTION

Ration card is an official and important document issued by state governments in India to the people who are eligible and entitled to buy the food grains (wheat, rice, sugar, pulses etc.) and fuels at a minimal cost from the Public Distribution System Centre under the National Food Security Act (NFSA). This scheme was started in 1st June, 1997. National Food Security Act is established to provide food, nutrition and security to poor and needy people of the nation, by ensuring access to adequate quantity of quality food at affordable prices. Under the NFSA, the poor and needy people are entitled to receive food grains at 5 kg per person per month with the price of Rs. 3.00, Rs.2.00 and Rs. 1.00 kg for rice, wheat and grains respectively.[1]

Under the minimum common need programme by the government of India, the poor and needy families in the state categorized as –BPL ration card holders were provided with the food grains at subsidized rate. Below Poverty Line (BPL) families whose annual income of more than Rs. 15,000 and less than 1 lakh these people are entitled and have yellow ration card entitled with 35 Kgs food grains and Above Poverty Line(APL) people have Saffron ration card can entitled with 15 Kgs of food grains to it. The ration store uses a ration card which is a booklet, used for identification of customers and contains a purchase history. There is large number of fake ration cards. And at the same time, many poor families have no ration cards yet. Ration shop owners and government officials divert the large amount of food grains and fuels in the black market without being provided to the beneficiaries and mending money out of it. The large number of ration cards is created by fake/forgery/bogus held under the false names wherein the person does not exist, or the person is no more.[2]

The central government, through Food Corporation of India (FCI), has taken the responsibility of obtaining, storage, transportation and bulk allocation of food grains in the warehouse to the State Governments. The responsibility includes allocation of food with the distribution centre within state, identification of those families who are eligible for it, issue of ration cards and under this scheme.[2]

### 2. CURRENT SYSTEM

The current manual system consists of the information about the user and purchase history written manually about the entitlement of ration. This manual process of updating a ration book is tedious and fake.

### 3. PROBLEMS WITH THE EXISTING SYSTEM

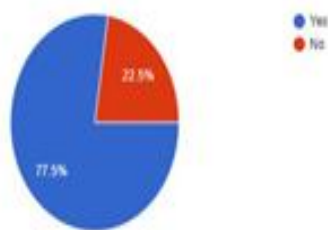
- Lack of transparency between the people and government distribution centre

- Lack of accountability in the ration card system.
- It helps corruptions and exploitation of people by retailers.
- Updating a ration book is tedious.
- Waiting in a long queue to avail the ration every month.
- Ration along with the fuels are usually stolen every month from ration shop for money purpose.
- The retailer creates forgery by not selling the assigned quantity of food grains and fuels to the entitled and deserving people.

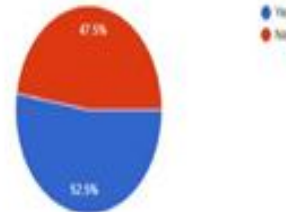
#### 4. LITERATURE REVIEW AND SURVEY

Primary and Secondary Data Collection: A set of questionnaire was prepared:

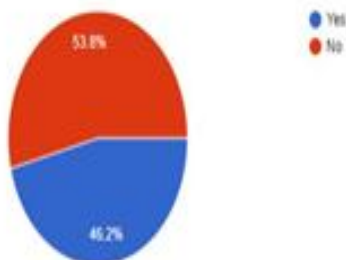
Do you think the "Ration card" is an ideal identification technique if linked with Aadhar ?



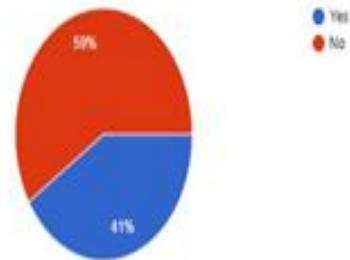
Does the shopkeeper stamps the fake bill onto the ration card for some little discounts?



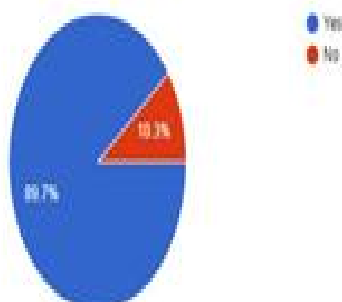
Do you get the entitled ration items available at the ration store ?



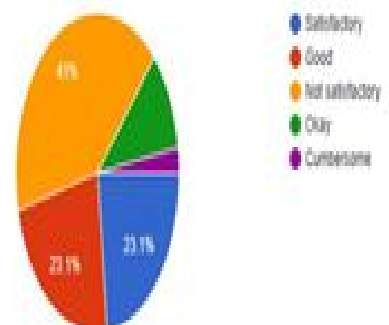
Are these items provided on time without delay and shortage ?



Would you prefer digitalization to take over the current rationing services?



How do you rate the task of waiting in a queue to buy ration?



**5. OBJECTIVES**

- Monitor the flow of food grains supply from government to supplier, from supplier to grocery/retail/ration shop and finally to the entitled people.
- To send purchase details to customers through SMS using SMS Gateway.
- To be able to successfully authenticate the user.
- To achieve transparency in public distribution system by ensuring that only genuine and eligible beneficiaries get the benefits of this entitlement, providing them timely and accurate information about the supply of their entitlements every month.
- Eliminate fake and duplicate ration cards.
- Avoiding malpractices in distribution of food grains.
- Reduce the waiting time standing queue.
- Avoid delay

**6. PROPOSED SYSTEM**

All beneficiaries should possess Aadhar Card before entitlement of the ration. Beneficiaries have to register into this system with the valid documents with unique password, ration card ID, personal details. Then the government database keeps all the details of all the beneficiaries. At the starting of every month government will send a SMS automatically to all the ration card holders/beneficiaries of that particular area informing the arrival of the food grains and fuels with the date and time to collect the ration. Beneficiary has to approach the distribution centre with the ration card or Aadhar card to take the benefit. Once the beneficiary reaches the ration distribution centre the online authentication is done by sending Aadhar number and fingerprint to Unique Identification Authority of India (UIDAI) and to the government database server. Then the One Time Password (OTP) or Personal Identification Number (PIN) is generated which is send to beneficiary's mobile number and after the entering OTP/PIN by the distribution centre which will be valid only for 15 minutes and if the authentication is done then the quantity would be displayed and the beneficiary sees the details. It provides printed bill to the beneficiaries. After authentication the ration/grocery distributor enters the details of commodities. The bill is displayed and a Short Message Service will be sent to the beneficiary saying the quantity of ration taken for the particular month, and amount would either be deducted from Aadhar linked bank account or cash payment can also be done.

This device records all transactions along with time stamp and sends the data to the government database centralised server. This data can be used by the government servant and beneficiaries who will act as a backup by the consumer on this ration card account and shopkeeper cannot lie to the consumer. This system will ensure transparency in the system and helps in prevention of the corruptions and exploitation of beneficiaries.



## 7. FLOW CHART

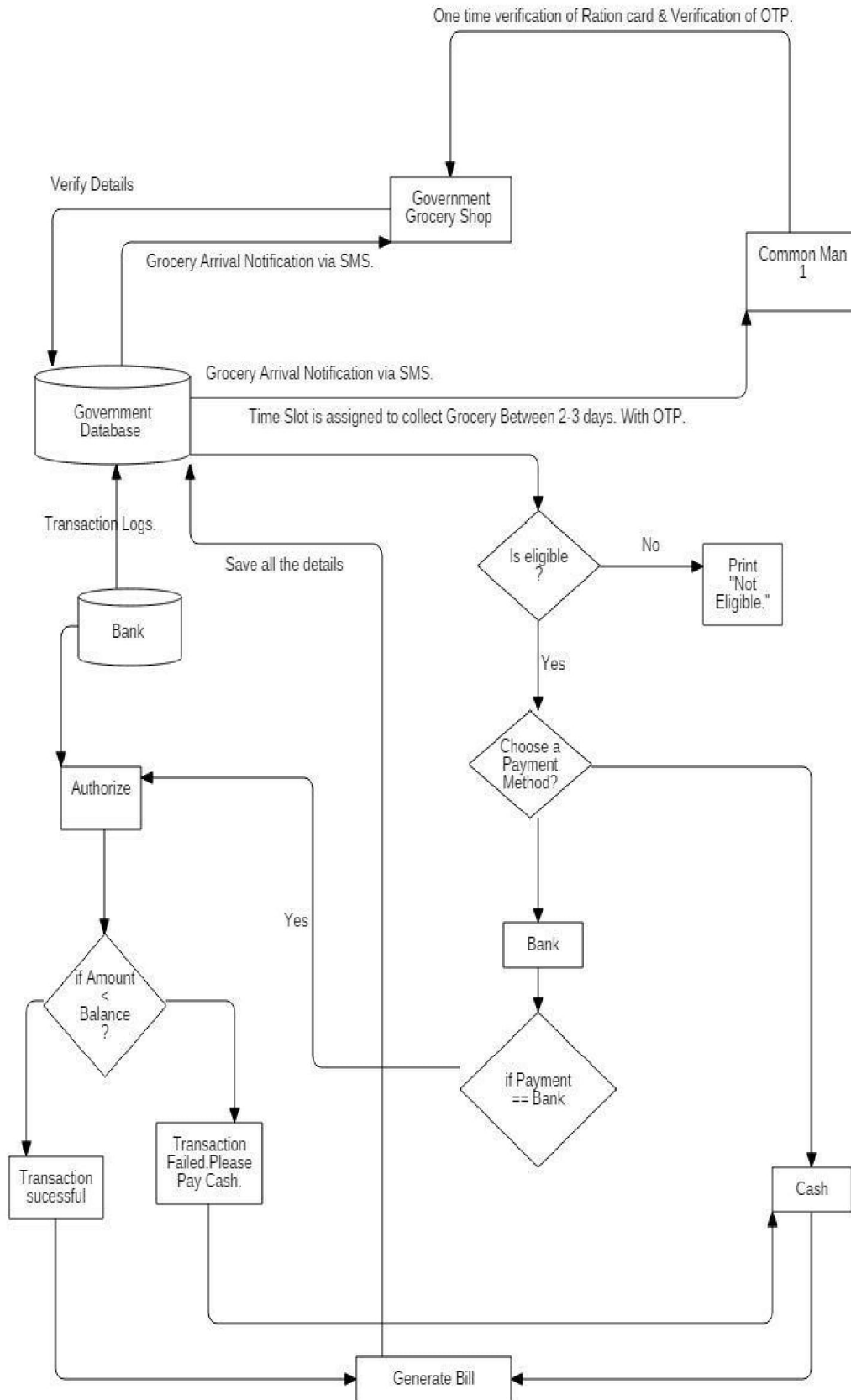


Figure-1: Working of E-Ration - Sms Based Public Distribution System

## 8. WORKING

The process initially begins with the customer receiving a text SMS notifying him the availability of rationing goods at the shop in the first week of the month. This message is also received by the Shopkeeper. Thus, preventing any manner of piracy and mal-practices that could be an intention to use the goods in a different manner.

### 8.1 THE BUYING PROCESS

The Common Man who would likely wish to buy these goods will initially visit the Rationing Shop and Verify his identification using the Aadhar card-based biometric (Fingerprint/Retina) credentials. Once the authorization is successful in the government database, the system will show a message that the User is eligible to use the Services enlisting the amount and types available for the category. If the user is not eligible the system will simply print the message "Not Eligible". The process follows up ahead after the Common Man has bought the goods and list is prepared to mention all the items bought by him that is fed into the system. The amount is then calculated and displayed. Here the user can pay using the bank account or the cash payment approach. If the User decides to pay using cash, the system prints the bill and sends the necessary information to the government database. These details include the amount of the goods bought along with details such as Name, Time, Date, Amount, etc. keeping the government database updated. If the User decides the e-banking method, where the bank account could be linked to the Aadhaar Card or by Signing in using Bank details. If the authorization is successful, the system will check and debit the amount from the account automatically and generate a bill, thus storing the information in the database. If the authorization is unsuccessful, the user can proceed by paying cash and receive a bill accordingly.

The entire process aims to provide a better aid to rationing services.

### 8.2 COMPLAINT PROCEDURE

If a consumer has a problem related to the services or with the goods, The call service will be provided to solve the issues. Problems can include like Misbehave of the practitioner, Mismatch of goods with total bill, Defect of goods, Low-quality of goods, Technical error related to Eligibility etc.

## 9. CHALLENGES

Availability of devices and the presence of a good network in rural areas is a major concern for the smooth functioning of the project.

## 10. CONCLUSION

This proposed system will help in avoiding corruption in rationing system to a large extent by providing transparency at each level from beneficiaries to government databases. The data or the record will not be stored manually either in books or register, all the data will be stored in government database. Hence it becomes easy for higher authority to cross check the data at any point of time. So implementing this will be really helpful to the poor and needy people. This system can support the beneficiaries by providing them the facility to register under this scheme where an Aadhar card will be linked during its registration process of Aadhar only. This would help in simplifying processes for existing card holders as well. This system also reduces the manual work and corruption by the shopkeeper.

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## AUTO-POWER GENERATION FROM TYRES

**Pragya Godre<sup>1</sup>, Izna Qureshi<sup>2</sup>, Prakhar Godre<sup>3</sup> and Kaustubh Bhagat<sup>4</sup>**  
 Student<sup>1,2,3</sup> and Assistant Professor<sup>4</sup>, Tolani College of commerce, Mumbai

### ABSTRACT

*Electricity is a vital resource to every nation. Vehicles use batteries to suffice their electrical needs. The system discussed in this paper will help suffice the power requirements of the vehicles. This study seeks to explore the idea of harvesting energy which is wasted through the friction of tyres on the road. The system works with piezoelectric materials by drawing electrical power, from the vehicular movements on the roads. The present study tries derive a working prototype for generating electricity from the vehicular movement.*

*Keywords: piezoelectric material, auto-power generation.*

### 1. INTRODUCTION

Energy harvesting is process of capturing energy which is readily available and converting it into useable electrical energy [4]. With the rapid development of society, the increasing energy consumption leads to the shortage of energy resources. The increase in dependency on non-renewable sources decreases these sources day by day, which in near future it may get exhausted. Hence it is required to shift dependency on renewable sources. Some of the renewable sources include wind energy, solar energy, thermal energy, tidal energy[1].

One area of energy lost is through the repeated deformation due to the weight of the vehicle. A vehicle in motion is vibrating permanently and these vibrations are vectors of mechanical energy. This mechanical energy can be recaptured, and convert into electrical energy by using electromechanical transducers, such as piezoelectric materials. Thus, electrical energy produced can resolve the problem of electricity. Piezoelectric materials produce electrical energy under mechanical stress [7].

#### 1.1 PIEZOELECTRICITY

In piezoelectric materials, the charges in piezoelectric crystal are usually balanced, though they are not even symmetrically arranged. There is no net charge on crystal faces due to effect of charges because they exactly cancel out. The charges tend to go out of balance if the crystals are squeezed. Due to squeezing of the crystal, the effect of the charge does not cancel each other, which results in positive and negative charge appearing on opposite crystal faces.

Hence a voltage is produced and that's piezoelectricity. By storing this power, it can be used to supply power to on-board devices [7].

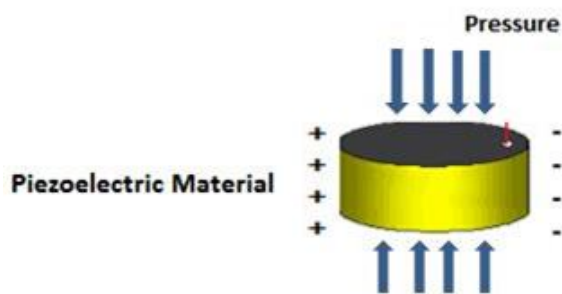


Figure-1: Piezoelectricity



Figure-2: Piezo Material

## 2. STUDY

### 2.1 LITERATURE REVIEW

Bengaluru-based Indian Institute of Science has given the study that when electrical fields are applied to the piezo materials, they will change their shape. So, this concept can be used to make piezo according to the shape of tyre. [1]

Hallway *et al* (2017) piezo tiles were installed in the entrance to the Fujisawa City Hall in Kanagawa Prefecture. As people enter and exit the building, they tread upon Power-Generating Floor tiles [2].

Vibration-power generators have been installed on the Goshiki-zakura Ohashi Bridge on the Tokyo Metropolitan Expressway, each containing a piezoelectric device fitted with a pendulum. Vibrations from passing vehicles cause the pendulums to swing, creating electricity that helps power the bridge's lights after dark [3].

Piezoelectric materials are attached in shoes which further are used to charge the battery of mobile[4].

### 2.2 METHODOLOGY

Peizo electric material was tested to develop a prototype for generation of electricity through tyres when vehicles in motion.

### 2.3 MATERIALS USED:

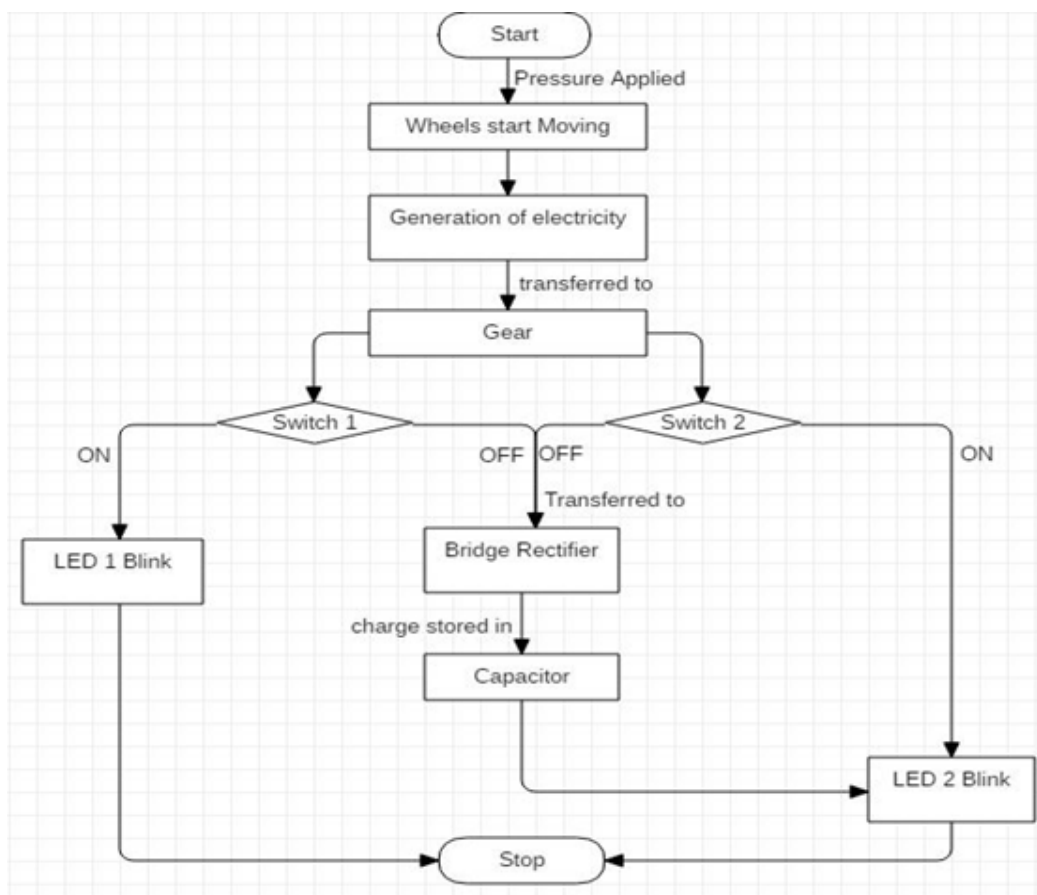
#### 2.3.1 PIEZO ELECTRIC MATERIALS

Piezo electric material is the main element in prototype, it is used to convert mechanical energy into electrical energy. Piezo is made up of PZT (Lead Zirconate titanite).It is an organic compound with the chemical formula  $Pb\{Zr_x Ti(1-x)\}O_3$ . It is a ceramic material, which is used for piezo electric effect [6].

#### 2.3.2. BRIDGE RECTIFIER

Bridge Rectifier is used to convert AC voltage into DC voltage with the help of 4 diodes and capacitor.

## 3. ARCHITECTURE



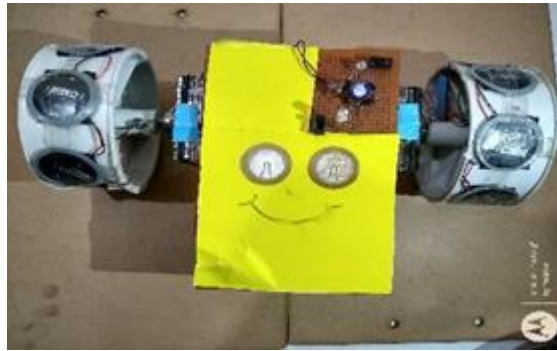


Figure-4: Final Prototype

#### 4. ANALYSIS

No. of Piezo/tyres	Estimated Power	Estimated cost
	generated(volts)	(Rs)
1 Piezo	2	5
6 Piezo(One tyre)	12	30
12 Piezo(Two tyres)	24	60
Table-1: In Prototype		
No. of Piezo/tyres	Estimated Power	Estimated cost
	generated(volts)	(Rs)
1Piezo	2	5
60 Piezo(One tyre)	120	300
120 Piezo(Two tyres)	240	600
240 Piezo(Four tyres)	480	1200

Table-2: In an average sized tyre (Size=31.6cm, Width=22.5cm)

According to the data calculated, it is analysed, for a two-wheeler vehicle approximately 240 volts of electricity can be generated by mounting 120 peizo (60 on each tyre) at the cost of about 600 Rupees. And by a four-wheeler vehicle, approximately 480 volts of electricity can be generated by mounting 240 peizo(60 on each tyre) at the cost of Rupees 1200

#### 5. CONCLUSION

The piezoelectric device works as a cost-effective energy conversion device. Energy generated by a piezoelectric harvester is renewable energy. This produces clean energy, thus would accommodate the needs of the future generation when the energy crisis would occur. The normal forces on the tyre contact patch of the vehicles are efficient enough to power the on-board electronics and able to recharge the batteries of electric vehicles, if designed in an efficient way. By focusing on Parameters like- weight on tyre, speed of tyre, diameter and type of piezo material, the amount of electricity produced can be increased.

#### 6. FUTURE SCOPE

1. To deduce the total amount of power generated, using piezoelectric device.
2. Convert the available heat energy which is produced at the time of tyre rotation due to friction of tyres on road into electricity using thermoelectric material.

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## CONTACTLESS PAYMENTS USING BLE BEACONS

**Tanisha Mahajan<sup>1</sup>, Khush Gandhi<sup>2</sup> and Amraja Shivkar<sup>3</sup>**

Student<sup>1,2</sup> and Assistant Professor<sup>3</sup>, Vidyalankar School of Information Technology, Vidyalankar Marg, Wadala (E), Mumbai

### ABSTRACT

*Over the past few years due to the onset of smartphones and better network services as well as advancements in the field of technology contactless payment modes are being adopted by a larger audience. Contactless payment involves use of credit, debit or such smartcard and attempts to overcome the vulnerabilities of the classic magnetic stripe (magstripe) technology. Approaches such as NFC, QR code used to facilitate these payments, have advantages as well as disadvantages, depending upon factors such as the type of data to be exchanged, field of communication, deployment area, infrastructure, etc. While there are no pressing issues related to their efficiency and security, these current standards can be improved upon. Through this research paper, we propose integrating Bluetooth Low Energy Beacons (BLEs), for these payments. BLEs consume less power and increase the effective range of transmission while decreasing the data consumption, which leads to a rise in efficiency in transmission. Through the paper we highlight how in the field of contactless payments, Bluetooth Low Energy (BLE) beacons have a good potential to improve upon the existing modes of data transmission by greatly compensating for existing drawbacks in the currently employed technologies and adding to its utilities.*

*Keywords: BLE, Bluetooth, contactless payments, NFC, Wi-Fi*

### 1. INTRODUCTION

Smart Cards such as the Octopus Card in Hong Kong; is a single card facilitating transactions in multiple avenues such as paying for public transport, shopping, etc.[1] It uses two technologies to bring this about namely the Near Field Communication (NFC) and FeliCa.[2] Another example is the ATVM card deployed by Indian Railways for transactions through dedicated ATVM machines installed at railway stations.[3] Tech giant Paytm has adopted a different approach by using Quick Response (QR) Codes.[4] More traditional approach is transactions over the internet. All these approaches to smart transactions have advantages and disadvantages of their own. Octopus Card and ATVM card require a separate physical card for accessing various resources, as well as a dedicated reader to read the card. QR code requires a separate code to be generated for each of the resources and the vendors providing the resources. The integration of Bluetooth Low Energy Beacons (BLEs), proposed in this paper will ensure efficient transmission and help overcome the need of an additional card.

### 2. NEED OF THE STUDY

The existing contactless payment mechanisms use a physical device such a smart card. The cards have to be read through a dedicated reader. During rush hour, it leads to long queues to read the card, resulting in waste of time. Maintaining multiple cards for payments for different resources is burdensome. Moreover considering the increased usage of smartphones and availability of bluetooth, it is imperative to offer a solution that eliminates the need of a physical card, long queues. The methodology suggested targets this need, and offers a easy to use solution.

### 3. FEASIBILITY STUDY

The transaction method suggested through this paper needs a network of BLEs and connection to the main server. In the year 2017 Google installed almost 2000 BLE beacons across railway stations in India.[5] These beacons are built on Google's open source Eddystone platform. Being open source makes application development easy.

These beacons at present are used only to direct the user to the WiFi setup page. But with the necessary infrastructure consisting of beacons and WiFi already in place, these beacons can be used for the transaction method suggested. This infrastructure can be replicated elsewhere for other applications. Bluetooth being a default service in smartphones as well as platform independence of the Bluetooth technology will help reach out to a wider audience.

#### 4. OBJECTIVES

The paper proposes a methodology that aims to eliminate the current need of a physical card in a contactless payment, by using a smartphone app, BLE and server. The solution aims to offer a convenient, easy to use, time saving method of making contactless payments.

#### 5. WORKING

A Bluetooth beacon is a small radio transmitter; a battery powered device capable of sending and receiving Bluetooth signals. It consists of three components namely a small ARM computer, a Bluetooth Smart module and batteries. The antenna attached to the CPU transmits electromagnetic waves of specific frequency and length. Data transfer is by the means of data packets [6]

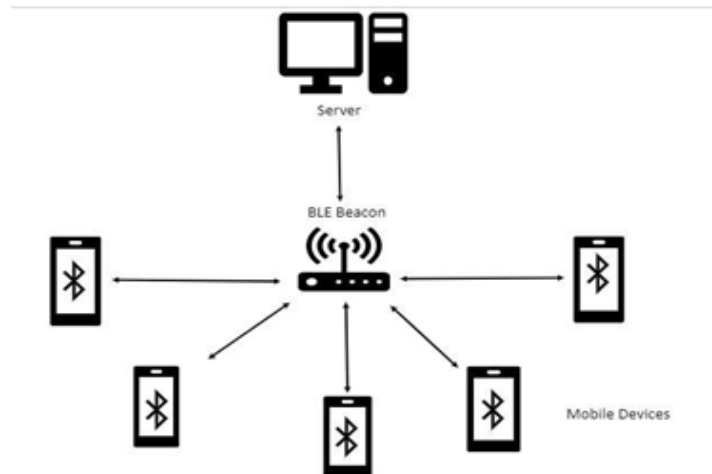


Fig.-1: Block Diagram Connections

##### 5.1 Implementation of BLE

While employing BLEs there can be two approaches. The first approach is going entirely wireless (Fig.2) and the other approach is going partially wireless (Fig.3). The complete wireless approach needs a Wi-Fi or similar wireless standard and a cloud server while the partially wireless approach uses an on-location server thus eliminating the need for Wi-Fi as the connections can be wired.<sup>[7]</sup>

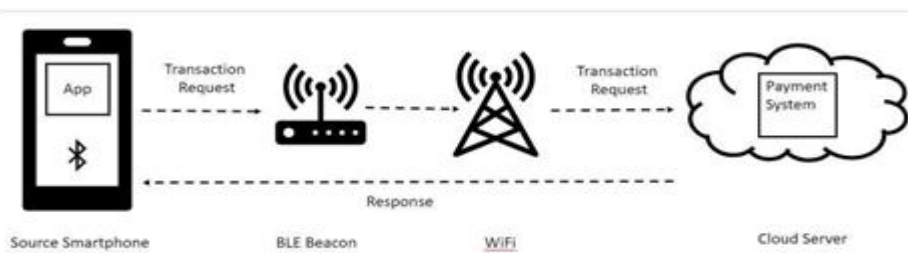


Fig. 2: Entirely Wireless Approach

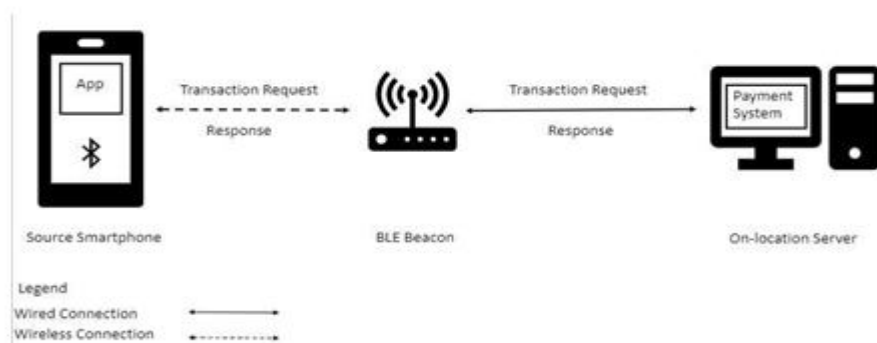
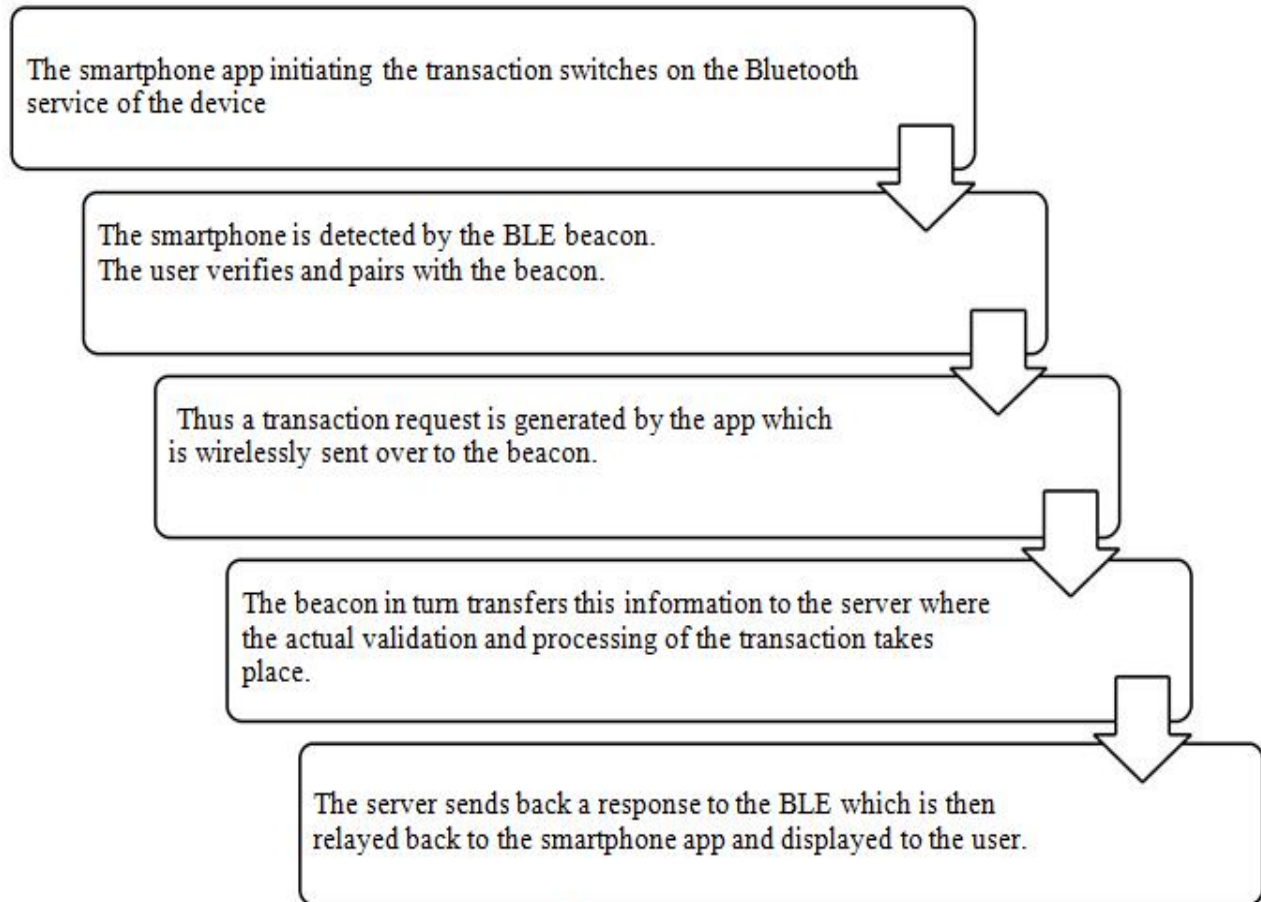


Fig. 3: Partially Wireless Approach



### 5.1.1 Transaction Process



*Fig. 4: Transaction Process*

### 5.1.2 Smartphone Aspect

The smartphone with the user should have Bluetooth service and a compatible app. BLEs are platform independent they by themselves do not have any OS specifications. The user in order to initiate the payment for any resource such as ticket will use the app, which in turn will enable the Bluetooth service on the phone. The user via Bluetooth will detect the BLE and pair with it. On successful pairing, the app will send transaction request with details such as user details, the resource for which payment is made and the payment amount. On receiving a positive response from server, the app completes the payment transaction.

### 5.1.3 BLE Aspect

The BLE beacon emits Bluetooth signals at its pre-programmed frequency to check for Bluetooth compatible devices in its vicinity. Depending on the area of coverage different types of beacons can be used. Class 2 beacons offer a range of 50 feet while Class 1 offer a range of 300 feet. A long-range BLE module (BLE121LR) has a range of up to around 1,500 feet, while Bluetooth Classic long-range module (WT41) gives a range up to 3,000 feet. BLEs use mesh networking to expand their range and offer connections of upto 65,000 devices.[8]

Since Bluetooth technology works on proximity basis, only those devices within its signal range will be detected. Once a connected device moves out of range, that device will no longer be connected to the particular beacon. On successful connection, the BLE will forward the transaction request from the app to the server. Similarly, the response from the server is forwarded to the user's app.

### 5.1.4 Server Aspect

The server receives a transaction request from the source via the BLE, which is validated and processed as required. The server then sends a notification back to the source through the BLE beacon.

## 6. COMPARISON WITH CURRENT TECHNOLOGIES

### 6.1.1 BLEs vs NFC

The range for NFC data transfer is less than 4 centimeters while that of BLEs is 10-30 metres. Both offer the same security but NFC requires physical contact between devices while Bluetooth is entirely wireless. Another drawback of NFC transactions is that at a time only one connection is supported while beacons support 20 connections at a given time. Use of BLEs over NFC will facilitate hands free transaction, eliminate the need of a scanner device and avoid long queues. [9].

Also, penetration of the Bluetooth technology in the smartphone market is higher than that of NFC making it a widely available standard.

### 6.1.1 BLEs vs Wi-Fi

Wi-Fi is more suitable where large files have to be transferred or the range of transfer is out of the scope of Bluetooth connectivity. Wi-Fi takes more power as compared to BLEs and have a more complex infrastructure which is harder to set up and maintain. Also Wi-Fi allows users to connect to the internet in general which may lead to its misuse. BLEs on the other hand are very specific and can be employed for targeted purposes only. Both offer comparable levels of security and support encryption standards. [10]

## 7. FUTURE SCOPE

Through this paper we are proposing payments using BLEs on user request generation. In future this technology could replace cashiers or personnel involved in accepting payments. If integrated with other technologies such as bar codes or QR codes, it can be implemented in stores to completely replace store staff as consumers will be able to shop and pay on their own. BLEs also are a very good tool for marketing purposes to send personalized notifications to the users.

## 8. CONCLUSION

Among the various contactless payment technologies available today, using BLEs is an innovative option as it offers multiple advantages over the others while maintaining efficiency and security at the same time. There may not be any significant issues with the current systems of NFC and RFID, but using BLE's will definitely improve the scope of usage. This will, in turn, eliminate the requirement of carrying multiple cards as well as the need of card readers. Thus the event of losing any such cards will not arise and it will further improve its security. Also, it will discourage the use of plastic used to manufacture cards as well as the need of paper receipts.

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## BENEFITS OF CLOUD ARCHITECTURE IN E-GOVERNANCE

**Raju S Jogdankar<sup>1</sup> and Dr. Amita Jain<sup>2</sup>**

Student<sup>1</sup> and Assistant Professor<sup>2</sup>, Vidyalankar School of Information Technology, Vidyalankar College  
Marg, Wadala-East, Mumbai

### ABSTRACT

*As an application of Information and Communication Technology (ICT), Electronic governance or e-governance is basically associated with carrying out the functions and achieving the results of governance through the utilization of Information and Communications Technology. Through e-governance, government services are made available to citizens in a convenient, efficient, and transparent manner. The three main target groups that can be distinguished in governance concepts are government, citizens, and businesses/interest groups. The cloud is not a physical entity instead it is a global network of servers around the world which are dedicated together and designed to work as a single system. Cloud computing provides a way to access servers, storage, databases and application services over the Internet. The main objective of this paper is to provide a clear idea about the Cloud computing using E-governance models and outlines the problems and requirements for understanding the E-governance paradigm.*

*Keywords: E-governance, Cloud computing, Information and Communications Technology (ICT), cloud storage.*

### INTRODUCTION

Electronic governance is an important pillar of 'Digital India' initiative launched on 2 July 2015 that has transformed our country into an empowered economy. E-governance is the integration of Information and Communication Technology (ICT) in all the processes of government, with the aim of enhancing government ability to address the needs of the community. The main purpose of E-governance is to simplify processes for government, citizens, businesses, etc. at National, State and local levels. It provides various government services to citizens in a convenient way, such as:

- Efficient government management [1]
- Better provision of government services
- Improved interaction with different groups
- Citizen empowerment through access to information

### OBJECTIVES OF E-GOVERNANCE:

The objectives of E-Governance is to provide a SMART Government. The Acronym SMART refers to Simple, Moral, Accountable, Responsive, Responsible and Transparent Government.

### SCOPE OF E-GOVERNANCE

e-Governance is all about the flow of information between the Government and Citizens, Government and Businesses and Government and Government. E-Governance also covers all these relationships as follows:

- A: Government to Citizen
- B: Citizen to Government
- C: Government to Government
- D: Government to Business

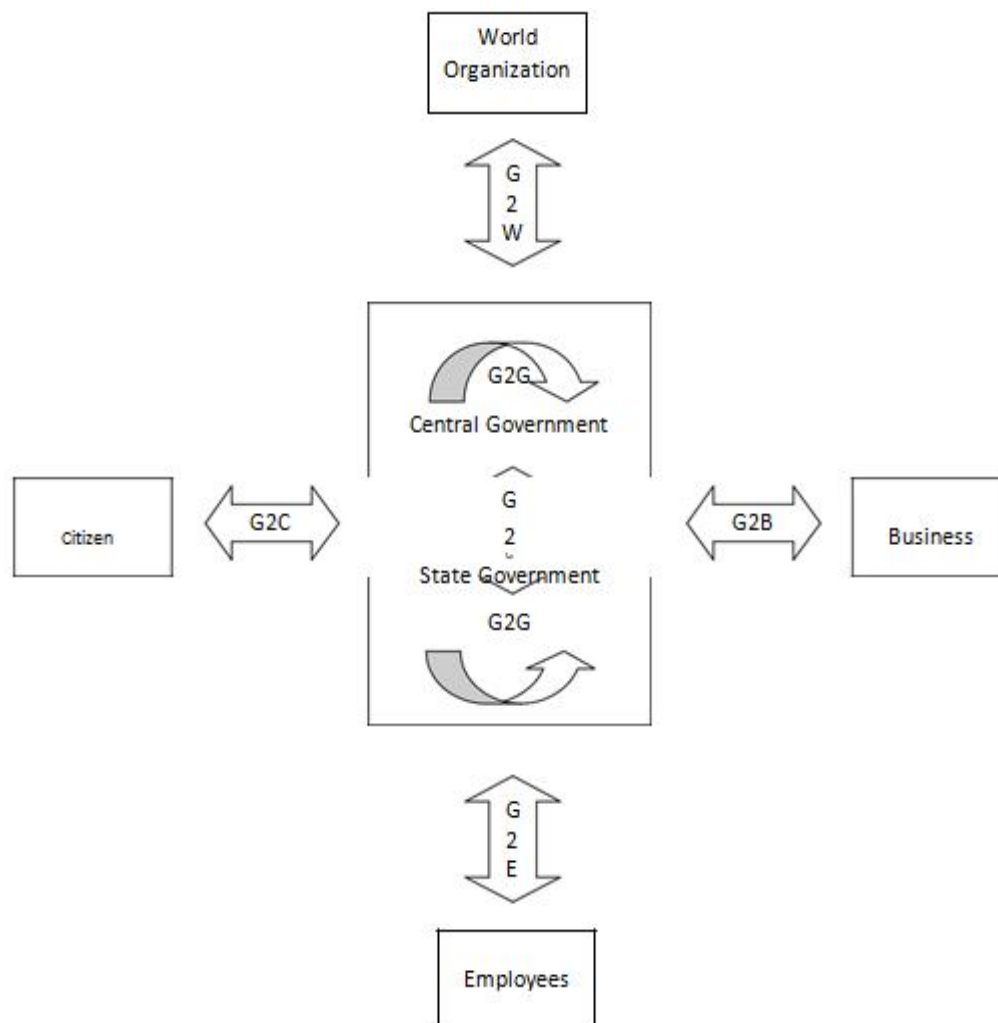
In the present scenario every organization wants to implement Cloud computing to fulfil their computing needs. Cloud computing is a term that has gained popularity over the last few years. With the exponential growth in data use that has accompanied society's transition into the digital 21st century, it is becoming more and more difficult for individuals and organizations to keep all of their vital information, programs, and systems up and running on in-house computer servers. The solution to this problem is cloud computing that has only recently gained widespread application for businesses. Cloud computing is the vision of computing

as a utility, where users can remotely store their data into the cloud and enjoy the on-demand high quality applications and services from a shared pool of configurable computing resources [2].

Due to the rapid advancement in ICT, most of the companies including government organizations are running their applications on the cloud. For past few years cloud computing has become one of the most significantly achieved development in the IT industry to achieve high performance, more scalability, reliability, and relatively low cost as compared to other distributed computing infrastructure.

We can achieve various business advantages of cloud computing in e-governance like cost savings, security, flexibility, mobility, increased collaboration, quality control, disaster recovery, loss prevention. automatic software updates, competitive edge, and sustainability.

### E-GOVERNANCE APPLICATION OVER CLOUD



- G2G (Government to Government): G2G is the electronic sharing of data and information systems between government agencies, departments or organizations.
- G2C (Government to Citizen): G2C is the relationships between government and the citizens of the country.
- G2B (Government to Business): G2B is the relationships between government and the business.
- G2E (Government to Employees): G2E is the relationships between government and employees.
- G2W (Government to World): G2W is the relationships between government and world.

Cloud infrastructures support environmental proactivity, powering virtual services rather than physical products and hardware, and cutting down on paper waste, improving energy efficiency, and reducing commuter-related emissions. Government will provide citizens services and other facilities like customer relationship, web management and business support through its government cloud. In this way, the government cloud is also responsible for standardization of the services.

### **RESEARCH METHODOLOGY**

This paper is based on secondary data of National & International Journals, books, articles, newspapers and magazines covering wide collection of academic literature on 'Benefits of Cloud architecture in E-governance'. Being an explanatory research, descriptive research design is adopted for achieving more accuracy. Main Research objectives of the study are to understand the concept of E-governance, to examine the features of 'Cloud architecture', to evaluate the opportunities and challenges with special reference to 'Cloud architecture'.

### **BENEFITS OF CLOUD BASED E-GOVERNANCE SYSTEM**

E-governance utilizes capabilities of advanced internet technologies. Ability of cloud computing to scale up services at any instance gives strength to e-governance projects. Cloud offers the ability to handle time related computing. Cloud reduces the maintenance cost, infrastructure cost and energy consumption. Cloud computing provides full control over access mechanism. It provides different access mechanism for different type of users. Some benefits of cloud computing are:

- 1) Scalability: Resources of cloud computing such as CPU, servers, hard drives can be purchased automatically in any quantity at any time to fit growing number of users.
- 2) Availability and Accessibility: Cloud computing applications and information are hosted online therefore citizens can use them anytime and anywhere.
- 3) Cost Saving: Cloud computing systems do not need to purchase and install the ICT equipment and software on their own building, because these will be available on cloud server.
- 4) Backup and Recovery: Since all the data is stored in the cloud, backing it up and restoring is much simpler than traditional way.
- 5) Unlimited Storage. Storing information in the cloud gives you almost unlimited storage capacity.
- 6) Green technology: Cloud computing is relatively good in energy consumption and provides eco-systems through virtual services. It will provide the way to save the resources for future.

### **ISSUES AND MAJOR CHALLENGES**

Despite of various advantages of cloud computing to E-governance, several issues and challenges need to be addressed. The main issues and challenges for adopting cloud computing for the E-governance are:

- 1) Security and privacy: Security requirements must be fulfilled on several layers where the Implementation of cloud computing includes advanced security technologies.
- 2) Data protection and compliance: Some data protection regulations do not allow the storage of sensitive data in other countries, which is basically not accomplished by most cloud service providers.
- 3) Interoperability and data portability: There are lack of standards in implementing cloud computing services. Users should be able to change between cloud service providers with a minimum of risk and cost, so governments may need to adopt open standards policies for the cloud.
- 4) Identity and access management: Speed and availability will be an issue because cloud computing services relies completely on the availability and speed of the Internet as a carrier between consumer and service provider.
- 5) Auditing: Cloud providers currently do not offer detailed auditing possibilities. But in some situations where compliance to specific regulations or policies must be verified the auditing becomes essential.
- 6) Low level of literacy and shortage of skilled employees

Various technical challenges are also there on the way of e-governance with cloud computing like Data scaling, auditing and logging, rolling out new Instances, replication and migration, disaster recovery, policy management, system integration and legacy software, obsolete technologies and migration to new technologies.

### **FUTURE OF E-GOVERNANCE WITH CLOUD COMPUTING**

Presently it is accepted that with the cloud computing, e-governance has a bright future. A very popular project in India for providing a unique ID to every citizen of India is Unique Identification project which is based on “e-governance cloud platform,” that is assembled using open architecture and components. Providing UID application overview and requirements, the authority observes that cloud computing is fast emerging as the next generation computing paradigm to build and deploy Internet applications targeting large sets of geographically dispersed users. Further, the utility of cloud computing is in that it facilitates these applications to be deployed and managed in distributed systems across data centers and provide clean abstraction for low level resource and application management. Typically, these deployments are highly virtualized and help business to use processors, memory, disks and network in an optimal way. The authority says next generation applications should be architected and deployed over such a computing platform to take advantage of scale and elasticity of the cloud [3].

### **CONCLUSION**

E-governance and cloud computing is not a one-day affair, but the entire system should work together and make plans and strategies to implement it. It will result in decreased corruption, increased trust in government, transparency in government activities, citizen engagement, growth in GDP, expansion in government reach and so on. Moreover, it accentuates internal government inconsistencies. The better e-governance services can be available to the users if the services are available through cloud infrastructure that will be more scalable, reliable, high performance and relatively low cost as compared to other distributed computing infrastructures. Though e-Governance is the application of ITC to enable and exchange the information between the G2G,G2C,G2B,G2E modality of society, the main challenge is the security and protection to both government and the citizens.

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## DIET MANAGER

**Priti Bharat Kadam<sup>1</sup>, Suraj Vishwanath Juvele<sup>2</sup> and Aasha Mahadev Vanve<sup>3</sup>**

Student<sup>1,2</sup> and Assistant Professor<sup>3</sup>, Vidyalkar School of Information Technology, Wadala Mumbai

### I ABSTRACT

*The diet manager is completely made for the people who find difficulties in following a diet or unable to follow a healthy eating lifestyle. It becomes very difficult to follow a diet in our daily busy life, basically we know we have to eat healthy, but we don't know what to eat at what time. Due to the lack of knowledge we eat what is available rather than going for a healthy option. Most of the things which seems to be healthy for us actually are not healthy for us. For educating everyone regarding eating healthy and mindfully we came up with this application. This application gives you a diet plan and track your progress. User just have to follow the diet plan until they reach their goal, after that if they want to take their fitness to another level they can set another goal and the application will provide another diet plan to reach the latest goal. But to get optimum results, one should also have to follow an exercise routine because its always 80% of the nutrition and 20% of the exercise which gives you 100% of results. The diet plan provided is totally based on the research and studies, which makes this application result oriented. When an individual is physically fit it boost his/her confidence, that makes them more efficient in working and improve their overall performance. To avoid growing diseases like Cardiovascular diseases, hypertension, Diabetes one have to adapt to a healthy living, because by eating healthy you cure 90% of the diseases.*

*II Keywords: Diet plan, Healthy eating habits, Progress tracking, Expert Guidance, Nutrition, Diseases, Result oriented, Mindful eating.*

### III INTRODUCTION

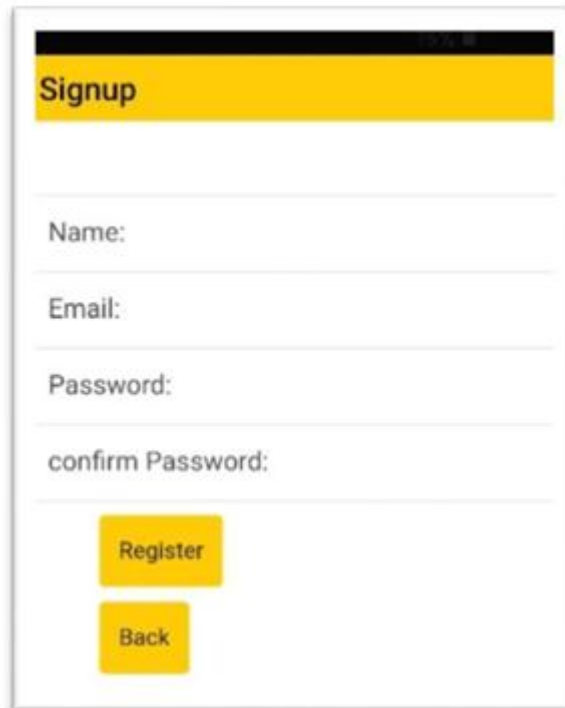
It is very difficult to find whether a person is healthy or not by just looking at them. But there are few parameters by which we can divide them in categories like Fat, Obese, Muscular, and Skinny. To achieve your Ideal Body Composition(IBC) our application helps you to follow healthy eating habit which take cares of your nutrition part, you just have to focus on exercise part.

There are different methods by which you can find your Ideal Body Composition(IBC) BMI (Body Mass Index)-It is a ration between height and weight to calculate your overall physique. BMR (Basal Metabolic Rate)-The amount of energy used by your muscles at the resting stage is BMR. IBM(Ideal Body Mass)- Ideal Body Mass deals with the amount of weight to be sustained by the height of the person.

### VI SOFTWARE IMPLEMENTATION:

The application is based on ionic platform using Angular JS. The purpose of using ionic was to target maximum amount of users across the globe. A huge amount of world population is using Android phones while the rest are using Apple iPhones. To target both the users we chose ionic due to its platform in dependability.

**Figure-1: Login page**

**Figure-2: Registration page**

A mobile app registration form titled 'Signup' in a yellow header. It contains four text input fields labeled 'Name:', 'Email:', 'Password:', and 'confirm Password:'. Below the fields are two yellow buttons: 'Register' and 'Back'.

**Figure-3: User inputs**

A mobile app form for user inputs. It features eight input fields: 'Name', 'Age', 'height(in cms)' (with a value of 0), 'weight(in kgs)' (with a value of 0), 'Gender', 'Diet Type', 'Activity Level', and 'Fitness Goal'. Each of the last four fields has a dropdown arrow. Below these are two more fields: 'Lactose Tolerance' and 'Any health issues', each with a dropdown arrow. At the bottom is a yellow 'Submit' button.

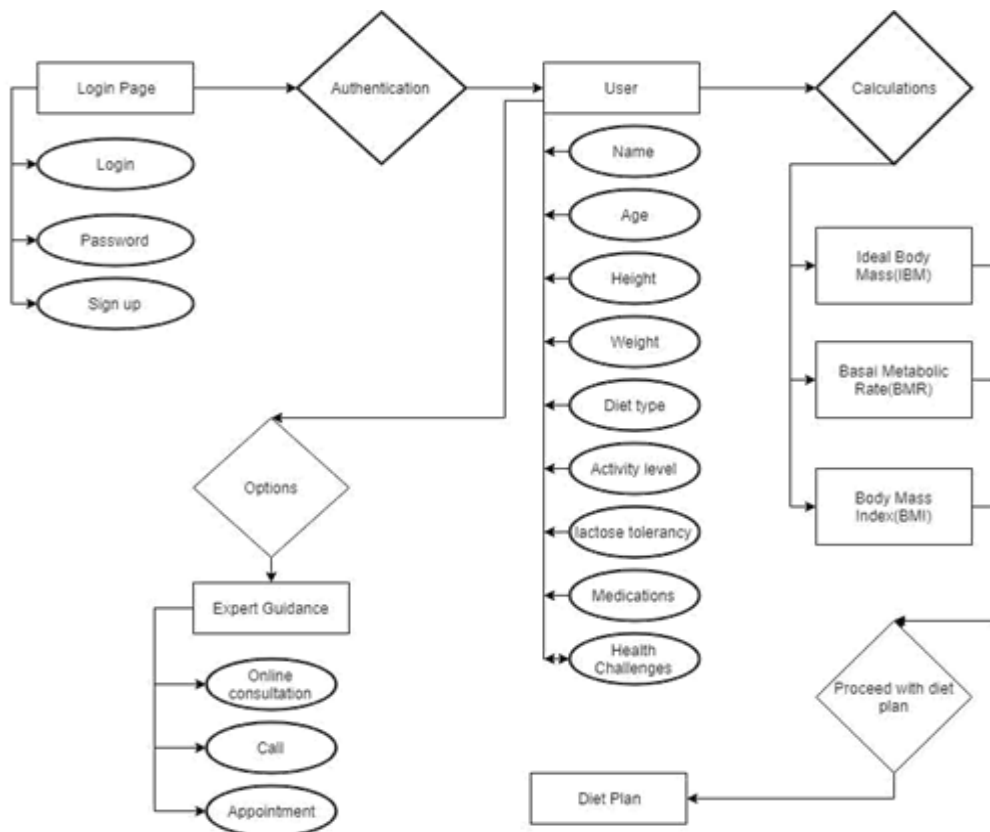


## V LITERATURE SURVEY

There are various fitness applications which gives you an exercise plan but they don't give a proper eating plan. Some applications keep the track of your calories you consume. Some applications gives you a blur diet plan where they give you any plan for your goal which may not be suitable for your somatotypes. But there is no such application which actually gives you a diet suitable for your body only. The purpose of our applications is to make people follow a healthy routine a get the results naturally, keeping the consistent amount of work in exercise and in healthy eating.

## VI METHODOLOGY

To begin with this application, user should download and run it. After downloading the application shows a login screen where there are two options, Login or Sign up. If the user is using it for the first time then they need to sign up first. While signing up we store the credentials of the user to the data base where later while logging in the data is authenticated and the user is authorized for the use of application. After logging in the user need to fill the parameters like name, age, height etc. This is necessary because the calculations required for the diet plan is based on these parameters. After filling every parameters there is a submit button, which when clicked stores the information in the data base. Then after calculating the data the application responds with a diet plan.



## VII FUTURE IMPLEMENTATIONS

- The exercise part will be included. There will be programs for different somatotypes for example Weight gain series for women, Muscle gain program for men, strength training program, fat loss program for men and women.
- The user can access videos of few recipes for making the tasty and healthy meals.
- User can access the nearby dietitian or nutritionist, the consulting nutritionist will be given some ratings on their work experience and their results and fees they charge so that user can choose which one for the consultation.
- Special discount for the users if they visit a dietitian with the reference of this application.

**VIII CONCLUSION**

Currently there are many applications which are based on just common knowledge about fitness. This application is based on the scientific aspect of the fitness, it is based on studies and researches done by the experts. The results are for sure only if the user do not cheat with their eating. If you visit any dietitian for a meal plan the charges are too high to be afforded by the common people. To save your money and focus it on your food we have made this application.

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**Dr. N. Lakshmi Kavitha**, holds the Degrees of M.Com, MBA(Finance), M.Phil and ICWa (Inter). Her specialized area is capital market and Cost Accounts. She has a teaching experience of more than 10 years. Currently, she is the HOD of BFM course in Vidyalkar School of Information Technology, Mumbai.

She has published more than 15 research papers in various National and International Journal. She has written Five books in the area of Capital market, Accounts, Banking and Financial Services.



**Ms. Mithila Satam** has done her Masters in Information Technology from Kishinchand Chellaram College, Mumbai. She is the Asst. Professor in the department of IT, Vidyalkar School of Information Technology, Mumbai. She has published papers in National and International Conference on the topics like Artificial Intelligence, ICT and its uses in education and many more.

She has a teaching experience of 6 years and has taught various subjects in course of Computer Science and Information Technology. She has guided various projects which are currently deployed to improve the efficiency in the administration working.



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