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Implementation of Identifying Operational ATM and Optimization of Cash Management using Mobile App

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Abstract: Automated Teller Machine (ATM) is mostly used by the bank customers as it allows withdrawing the cash quickly. For this purpose, sufficient cash should be available in ATM in order to meet customer's requirement. Now-a-days, many people are searching the location of ATMs through Google Maps but unfortunately peoples are wasting their time in search of working ATM. We have proposed a system which consist of mobile application and web module which will help users to find the nearest working ATM and to check the availability of cash in that ATM using mobile application. The web module is designed for bank admin which analyses the frequency of users dispensing the cash of each ATM and notifies CIT (Cash-in-transit) vehicle to perform the specified actions. The CIT Vehicle is responsible for transferring cash from low frequency cash withdrawal to high frequency cash withdrawal.

Keywords: Cash Management, Google Maps, Cash-in-transit, ATM.

I. INTRODUCTION

ATM is an electronic telecommunication device that allows the bank users to perform financial transactions without the need of a clerk, human cashier or bank teller. Now-a-days, users are habituated to find out the nearest ATM through Google Map. But unfortunately most of the ATM is either nonfunctioning due to hardware issue or the cash is not available in that ATM. There were some efforts to work on this problem for eq. Adria GUIDE application has specially designed for Rijeka city. It guides the tourist people and also provides the information related to ATM Locator. However, after selecting a language on welcome screen, the application gets crashed. On the other hand, Bankomati HR offers ATM locations of all Croatian cities but it fails to provide the navigation to chosen ATM [6]. Recently during demonetization period in India, people faced lot of problems like standing in a queue for long time, also after visiting ATMs they came to know that ATMs were running out of cash. By understanding this issue which was very critical specially during demonetization period , encouraged us to develop the system (web as well as mobile) which will help user not only for nearest working ATM but also the cash availability of the ATM. The mobile application is specially designed for user which will help them to find the ATMs quickly and easily.Cash Logistic is a key service which bank has to deal with. In terms of Logistics the cash chain is considered as supply chain with only cash involved in it. Following are the agents involved in this chain: - Central Bank System, Cash-in-transit, ATMs and commercial banks. The Central Bank System supervises the entire supply chain, the Cash-in-transit (CIT) companies which are generally third party agencies, transports the cash between the bank central repository and the ATMs or between two banks through the armored vehicle, commercial banks provides the cash to the bank users through banks or through the ATMs. The final recipients of cash are the bank users or customers [1].The existing CIT vehicles takes more time in transportation of cash as cash is transferred from the banks central repository to the actual ATMs.Our system is designed for bank admin which sends notification to CIT vehicle to transfer the cash from low frequency cash withdrawal to high frequency cash withdrawal.

II. RELATED WORK

Jorge López Lázaro et al. [1]explains that cash logistics is key operation of the bank to optimize the logistic. The cash logistic is followed by the different branches of a bank. It guarantees the cash logistics operations using Machine Learning and Robust Optimization techniques. Rajib Chandra Das et al. [3] write how automated teller machine (ATM) plays an important role in day-to-day life because it allows user to perform monetary transactions without human-cashier or bank-teller. Sometimes there is the situation where people need money in emergency, but location of ATM booth is not known. The same problem may be faced by tourist or new-visitors in that area. Considering above difficulties, LBALS(Location Based ATM Locator System) has been proposed in this paper. This system has designed for some specific region of Bangladesh and it is an Android based application which locates nearest ATM booths using Open Street Map(OSM).

In [6] Mario Lončaret al. proposed an android based application which helps the users to find the ATMs quickly. This application gives the location of various banks in Rijeka, Croatia. It also gives the shortest path of those particular ATMs from the user's current location. Also it gives the helpful tips for the users regarding the ATM where they can withdraw the money. The main components ATM applications are searching the geo-location of the user, working with maps, and calculating the shortest path to the selected ATM.

Prashant Roy et al. proposed a system where Cash deposit at ATM machine is done by the embedded system. [4] Now-a-days ATM provides the facilities like cash withdrawal, details of the users account, transaction details. This proposed system is being installed in the ATMs which are already available and will help the bank users to deposit their cash without visiting the nearby banks. The system has currency counter, currency recognizer, and user interface. This system will help the bank customers to deposit the cash into the nearby ATM. [2]

Seyma Batı and Didem Gözüpek aim was to optimize the ATM network in terms of cash. Optimization problem is being formulated as an Integer Linear Program(ILP) which gives the information about when should we visit the ATM, how much amount of cash should be transferred to which ATM and which route should be followed to deposit the cash to the respective ATMs. Polynomial-time heuristic algorithm was proposed and it was compared with the formulation of Integer Linear Program. After comparing ILP and heuristic algorithm, it can be said that heuristic algorithm is best for the practical implementation.[5]

Girish Krishnan et al. have proposed the simulation model of an ATM .This simulation model has been installed for ATMs which are present in southern part of India. This model is specially designed for student community level and gives information about availability of cash before the student enter the system. The model has proved useful in statistical as well as by comparing simulation results of the model, thus improving the productivity and beneficial of the ATM.

III. DISADVANTAGES OF EXISTING SYSTEM

- A. The existing google map does not specify the working condition of ATM.
- B. Also the existing google map does not specify the whether the cash is available or not in that particular ATM.
- C. The limitation of some of the mobile application is that the application for searching the location of ATMs is designed only for particular city.

IV. PROPOSED SYSTEM

By having the overview of the existing system mentioned in literature review, most of the existing system of ATM locators only shows the number of ATM's on the Google Map but unable to show the working and non-working ATM. This leads to lot of time and other resource wastage. .As we all have realized the importance of ATM during demonitization period by standing in queue for hours and hours and searching for working and cash availability ATM. We are addressing this issues and further developing the system according to need of an hour for finding out working ATM's.

The proposed system consist of two modules i.e. mobile application module and web module. The mobile application is designed for bank customers whereas web module is designed for bank admin. The proposed system will help the bank customer to access the mobile application which will allow them to search the ATMs which provides the information about the working condition of ATM and also whether the cash is available or not in that particular ATM on google maps. The advantage of proposed system is that it will save the users time instead of wasting the time in search of working and cash available ATM.

The second module is web module which is designed for bank admin. This module helps bank admin to analyze the all the transaction related to ATM.

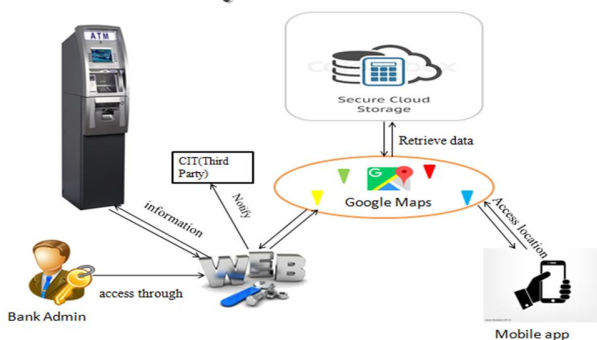


Figure 1: System Architecture

V. MODULES

Our proposed system will be having two modules namely:

A. Description of Modules

1) *Mobile Application Module*: The mobile application for bank customers will help the customers to find out the nearest working ATM and whether the cash is available or not.

We will be using the marker to show the working status and availability of cash on Google Maps which will be indicated by the different color.

Following will be proposed color code combination which we will be using for ATM location markers.

WCA- Working ATM, Cash Available- **Green**

NWNC- Non Working ATM, No Cash Available- **Red**

CANW- Cash Available but ATM is not working- **Yellow**

WCNA- ATM is working but no cash Available **Blue**

2) *Web Module*: Another module which is developed using web technology is designed for the bank admin who will be analyzing the entire data related to the ATM and cash transit. The bank admin will get a dashboard where he will get all information in one click through Google Map with same above color code mechanism about the status of working and non-working ATM's which will help him to take further actions.

VI. METHODOLOGIES

ATM Locator is android application as today's era is the age of android users. We had developed android application as well as web module. The reason behind developing android application is rapidly growth of android users. Developers found very easy and flexible platform for developing android application. As per Global Smartphone Virtual Assistant Penetration, in 2018 Android OS secured 51%. Figure 2. shows the Global Smartphone Virtual Assistant Penetration as compared to other OS. So, Android platform is very flexible for implementing location based applications.

Global Smartphone Virtual Assistant Penetration - 2018

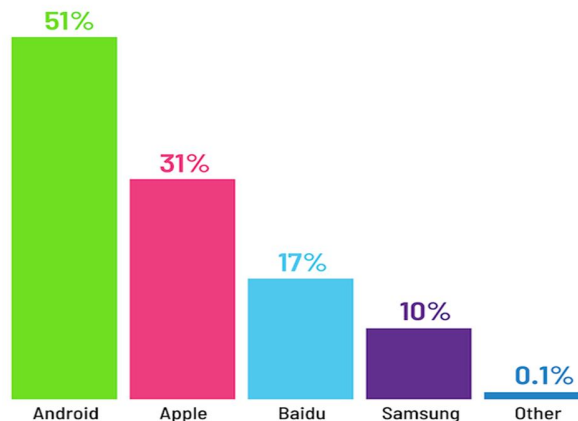


Figure 2: Global Smartphone Virtual Assistant Penetration-2018

ATM Locator is developed on Google Maps as it is user-friendly and editable as compared to other maps. Google Maps, launched on February 2005 provides an API that helps the third-party to use Google Map on their websites or android application. Google Maps provides Javascript API for website application and android API for android application. The Maps JavaScript API allows us to customize maps with our own content and imagery for display on websites and android devices. With the help of Maps SDK for android, we can easily add maps to our application. The API directly access to Google Maps servers, data downloading, map display, and response to map gestures.

A. Description of ATM Locator Application

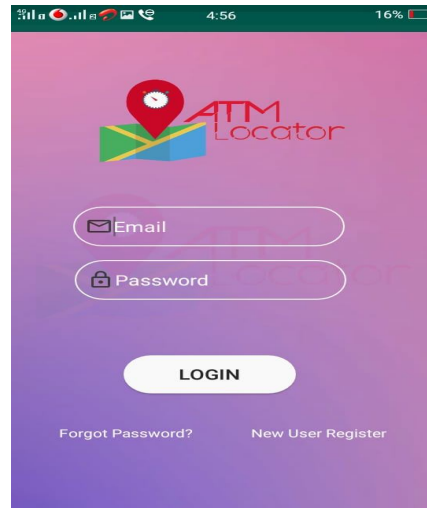
ATM Locator, an android application which uses Google Maps, has been tested in various random areas of Pune City for finding working and cash available ATM. An android application is prototype module. The system supported platform and features of ATM Locator App of our system have been studied below:

B. System Supported Platform

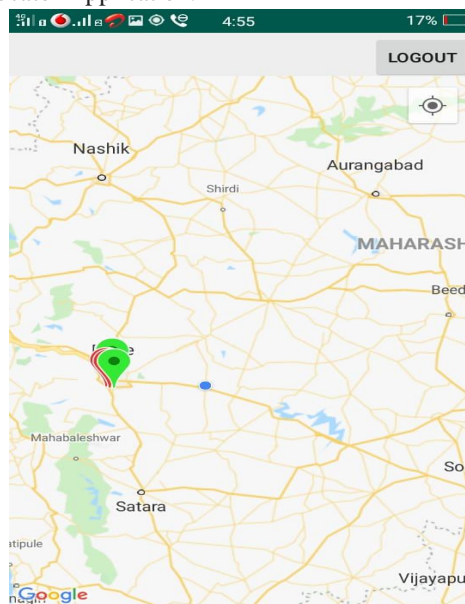
- 1) Initially, internet connection is necessary for loading Google Map. The android phone must have GPS to trace the current location of user.
- 2) The ATM Locator application is designed for android user which supports Android 5.0 version

C. Features of ATM Locator Application

Initially, user need to install the ATM Locator App on android phone. After installing the app, the new user needs to register first. The user identity is authenticated by using firebase authentication.



Firebase Authentication allows us to save the users data securely on cloud and to avoid the spam registration of users. By registering into application, the verification link will be send to email id of valid users. After receiving verification link, the user need to click on this link which allows access to ATM Locator Application.



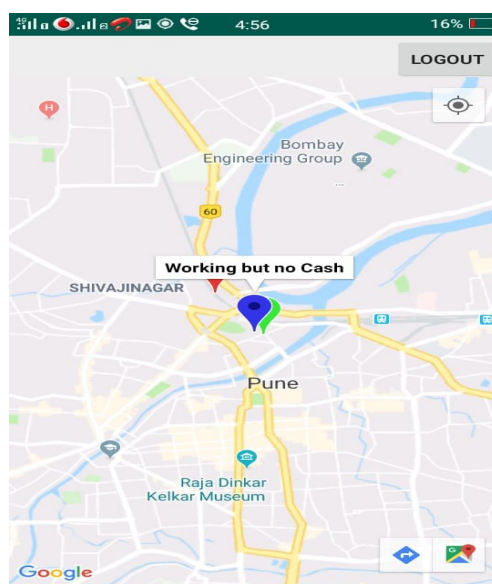
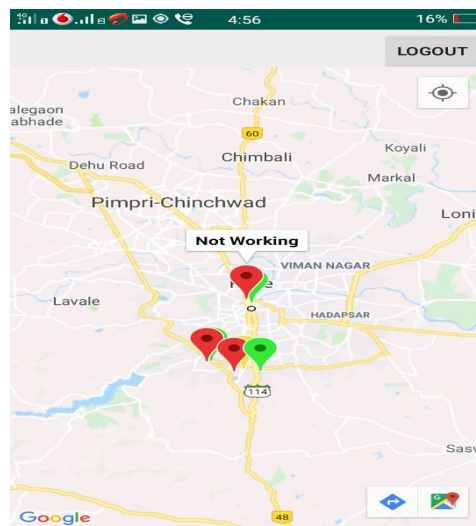
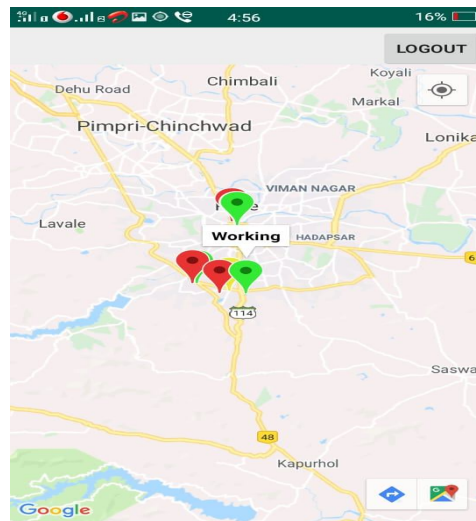
Following will be the proposed colorcode combination of markers which indicates the current status of ATMs.

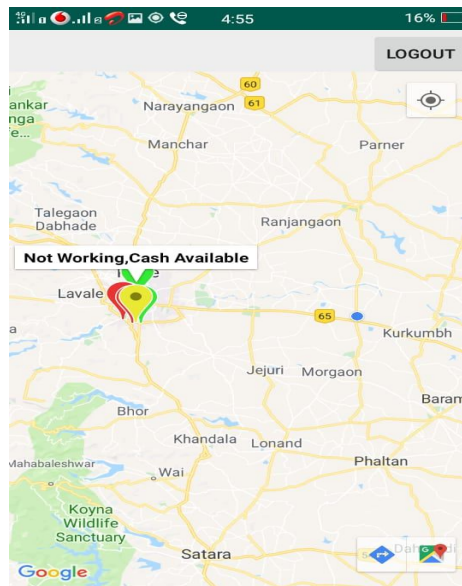
WCA- Working ATM, Cash Available- **Green**

NWNC- Non Working ATM, No Cash Available- **Red**

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The proposed system will be more efficient than existing system because it saves user time by knowing the current status of ATMs.

VII. CONCLUSION

We had made the initial review of the existing system and tried to find out the limitation of the existing system of functioning of ATM's. Our objective of the work is find out all the operational and non-operational ATM's for better customer satisfaction .We are proposing this model with different markers on Google Map and we will be able to provide time and resource optimized system for better customer satisfaction.

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