Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 3, Pages 252-254, April 2017



# Passenger Information System with a Virtual Assistant

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*Article Received: 12 April 2017* *Article Accepted: 23 April 2017* *Article Published: 29 April 2017*

ABSTRACT

The Project is aimed to provide Real Time Tracking of the Public Buses and providing estimated time of arrivals and departures to the public by a mobile app with virtual assistant based on GPS system which is inbuilt in buses. The project aims for user friendly mobile application using the data provided earlier and increase the public transport share.

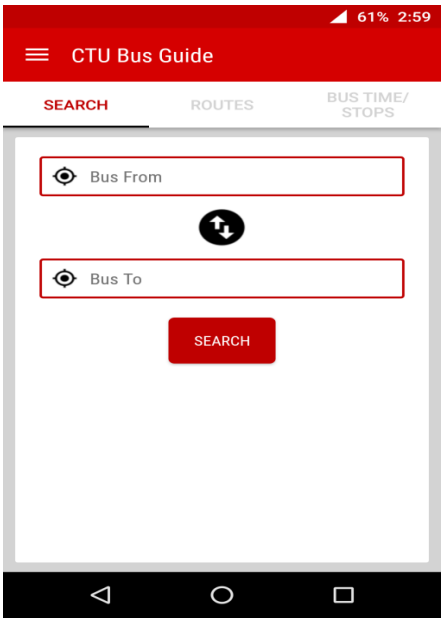
Keywords: Intelligent transportation systems, Passenger information system and Virtual assistant.

## 1. INTRODUCTION

The daily operations of public buses are having some uncertain conditions like traffic congestion, delay in time. Many people are late for their works as they wait for public buses instead opting for other mode of road transport. The conventional method of message sign showing the scheduled bus arrival time at bus stops is not helping the public as it was not of real time. The newer generation of smart phones should connect to public transport with real time data which is more user-friendly and increase the demand for public transportation with usage of virtual assistance in the app. With the use of GPS and GPRS, real time vehicle tracking can be possible. This virtual assistant can give voice help to the person instead of searching in the app for desired data. The same technologies are applied to public transport buses instead of predefined scheduled time tables. This Real Time Bus Tracking uses many technologies to track the location using GPS on real time and the data is used for prediction of buses to stops on route. When this information is given over wired or wireless media, the public can spend their time efficiently and can reach the bus stop just before the bus arrives. Moreover they can choose other means of transport if the bus is delayed and can plan their journey beforehand. This can make the public transport more effective and user friendly and usage of own and private vehicles can come down when we use public transport, which in turn reduces traffic and pollution.

## 2. USER INTERFACES

The most important thing in passenger information system is presenting the information which can be easily understood by the end user. To uncomplicate the complicated we introduced a virtual assistant which responds to the user voice queries. This virtual assistant is available on mobile application and on kiosk. We created set of new skills for mycroft, an open source virtual assistant. Initially set of words of specific instructions are feed into the assistant and a python program is written to accomplish it. Upon asking a question to the assistant it connects to a web service and receives the information in JSON data format and then it is converted into voice and spoken out. Every bus is equipped with an on board computer which has GPS, GPRS device. When this device boots up it starts sending the real time information to the server. Each bus also has specific routes feed into it, upon reaching the shelter its sends a trigger to server that it has been reached to bus shelter. This data is used to for calculating the ETA's and stored in database. Web and mobile application have a common end point for interaction with the processed data which is stored in database. So a web service model was created which can serve all these requests. Apart from virtual assistant the mobile application has a simple web-interface which can be easily understood by the user.




### *A. Main interface*

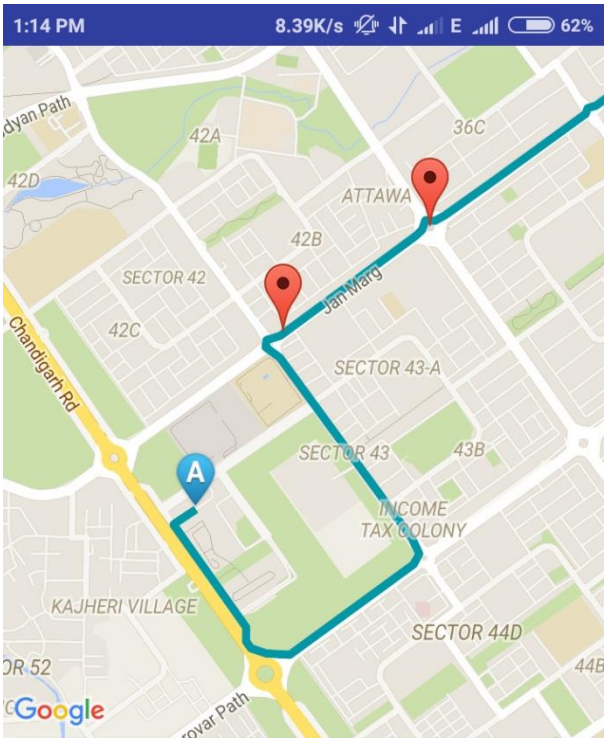
The primary interface is a mobile application which has registration and login, routes, trip planner, real time information about a bus shelter and reminders. Real time information about bus shelter has list of buses including

estimated time of arrivals and departures which will be very useful to the passengers waiting at that particular bus shelter. Routes option is used to check all the available routes .Trip planner is useful for the people who are new to the city all they need to do is enter origin and destination and the list of buses are show which passes in that specific location. The most frequent locations for the user are allowed to pin and reminders are allowed to set.

## 3. ALGORITHM

### *A. Creating Route*

For route creation an automated method is used by an android application which can store every latitude and longitude of a point on the path in which the bus is traveling along with the app makes the route creation for any particular route. Route created using this application is very accurate that we will even record the turning and the route obtained is highly accurate and the exact path travelled by the bus.




### *B. Data Receiving*

In a cloud VPS server or self-hosted VPS server is installed with linux os. Using some latest coding languages (Nodejs, Python etc.,) we start listening to a port for data from the bus. The received data is stored with an identifier which is unique for each bus in a NoSQL DataBase.

The sample format of the location data received by the server from the bus is:

Vehicle identification:

```
{"vehicle_identification":{"id":"7057","version":1}}
```

Location data:

```
{"gps_gpgga":"GPGGA,085648.000,3041.4616,N,0765
1.5966,E,1,10,1.00,314.0,M,,M,,0000"}
```

Route data:

```
{"route":  {"route_number":42, "stop_number" : 28 }}
```

### *C. Data Processing*

The stored data is subjected to the processing. In this we get the data from the DB which is stored in the above mentioned process and the data is converted as per our requirement and store in the NOSQL DB. For this data we convert in such a way that we can easily use the GraphQL query.

### *D. ETA Calculation*

In order to calculate the ETA for the bus arrival to the next stop for the first one or two weeks we have used Google Distance Matrix API to calculate the ETA and we do this calculation for every 1 min and store the data in the DB for further usage. The ETA calculation after two weeks time is based on the average of the two week ETA that we stored earlier. So the ETA obtained using this process have a max. delay of 10 - 20 sec.

### *E. Android Application*

Nowadays the most common mode of communication is Android Device. In present world 95 out of 100 people are using smartphone for the daily communication. So we are developing android app for the project so the end user can easily access the data. In order to make this project more user friendly, we have developed an android application with user friendly screen, in android application we will display the realtime location of the bus, ETA (Estimated Time of Arrival) of the bus to the next stops and the user can plan his trip by sitting in his home.


### *F. Web Application*

We also have built a web application which can be accessible for the user on any browser same as it works on the app showing the ETA and real time position of the bus on the website with more features.

### *G. Virtual Assistant*

Like siri, cortana and alexa this assistant works the same. It takes query in voice format from the user and decode the voice to the text and search for the appropriate solutions by querying the text to the API. Obtained result is converted to

the voice and will be read, so that the user can easily access the data using his/ her voice easily.

### 4. DATABASE AND WEB SERVICES

The latest upcoming NoSQL DB which can be able to handle Big Data very efficiently. Among all the NoSQL DBs mongoDB is found more flexible and easy to access DB. Database stores the document in JSON format which is a easy to understand format. In order to communicate between the Database and virtual assistance, mobile app and web app we have built a REST API which acts as a mediator between the application and the Database.

### 5. PERSONALIZATION

Mobile application and virtual assistant collects the regular information such as most travelled route, bus shelters automatically gives the alerts related to them. If users want to get notifications of particular route, bus shelter they can pin these locations and set reminders. Virtual assistant.

### 6. REPORTS

Giving the product only for end user is not enough for a project or any company to maintain. To use the product efficiently we need to provide the some reports which will be helpful to the product makers of the government by generating reports.

| Delay | Stop | Bus no | S. No |
|---|---|---|---|
| 1 min | Aroma | 7057 | 1 |
| 2min | ISBT 17 | 7001 | 2 |
| 1 min 30 sec | Rose garden | 5303 | 3 |
| 50 sec | Secretariat | 5355 | 4 |

### 7. CONCLUSION

The objective of the project is to help the public to track bus and increase the public transport share for any STU.

### 8. FUTURE SCOPE

We have implemented the whole project in Chandigarh Transport Undertaking. In addition to this we are planning to implement e-wallet liked with a card for digital payments also planning for RFID card for automatic payments.

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