Smart Tracking and Route Information of Public Transport

Sai Aravindhan. C. P¹ & Monaswarnalakshmi. S. R²
1, 2 Department of Computer Science and Engineering, SNS College of Technology, Coimbatore, Tamilnadu, India.

Abstract: Internet of Things (referred as IoT) was coined up by RFID in the year of 1999. It is a technology where the electronic devices connected to Internet can communicate to each other with the help of physical address assigned to them. It is a way to simplify our work and life just in a ease of access case. Depending on to whom we explain, IoT can be explained in many ways. IoT, a logical and intelligent system helps to enhance its extension in the area of education, health, business etc. IoT is cloud based storage system, all the data gathered, is stored in cloud which can be accessed easily to refer the data and to further process the information with the help of data retrieved. Considering the key term of SMART CITY which has coined up already, many research and ideas have evolved up till now. IoT can help in improvement of transmitting information about the status of a vehicle which is pinged by the user. This is achieved with the help of Intelligent Transport System(ITS). Implementation of vehicle status transmission system is possible thereby which majority of the people will be helped through by not wasting their time by waiting in the bus stands.

Key term: RFID, IoT, ITS.

1. INTRODUCTION

IoT is a concept which was initiated 18 months ago. IoT concept can be explained by term ‘device to device communication’. The device can sense, communicate and connect to other devices which is connected to internet by recognizing the physical address assigned to the devices and can also share information between them. IoT is a rapidly developing technology on which the future life will rely upon.

Imagine that all the devices connected to internet will share information and communicate between them to do the simple and complex task of a human. By doing so, this will make the human life simple and easy and also will lead a life to live in a different way.

IoT can assist in integration of communication, control and information processing among various transportation system. Considering the system which is followed in railway station and in airport, the passengers can book their tickets and they don’t need to wait for the arrival of vehicle for a long period of time, because the arrival time and the departure time will be provided, so the customers can go to the station or airport just before the vehicle arrives and can take their booked seats. Well, this concept can be implemented in our daily local bus system in which thousands of passengers depends, and travel. People who are transporting by means of local bus system has to wait in bus stand for a long period of time for the arrival of the bus. There are many bus stands (hereafter referred as bus stop) in the city. People who need to travel from one place has to wait for the respective bus in the bus stop for a long period.

This project will be helpful in improving the regular system for bus transportation in India. It aims to reduce the waiting time of people in bus stands and also helps to reduce the crowd in public places.

This implementation can be done with the help of mobile phone app which will be helpful for the passengers to know the current status of the vehicle (i.e., which local transport vehicle travelling in what route info will be provided by the app). This implementation can be done by linking the mobile app with maps, so that the current status of the vehicle can be tracked.

1.1. Mobile App Information

The mobile app is a very simple one by which the passenger have to install it and it is a centralized app (online app) through which the passenger can enter the “current station” and “destination station” in the text fields which appear in the first page and then the background process will be take place (background process is nothing but fetching the information of the vehicle and its current location) and the bus which is travelling through that will be displayed in the maps. After seeing this the user can get the required information of the bus and can avoid inconvenience in the station by reducing the crowds and thereby also saving their time by not waiting for the local transport vehicle for a long time.

1.1.1. Features if IoT:

- Device to device communication.
- Real-Time data management.
- Security and access control.
- Tele health.
- Transportation management system.
- Traffic control system.
- Environmental monitoring and control.

1.1.2. Advantages of IoT:
- The work load of human is reduced.
- Automation process will be helpful so that the work to be done, can be finished automatically by the End devices.
- Less man power is needed.
- Smart manufacturing.
- Smart transportation.
- Smart city.
- Smart energy buildings.

2. LITERATURE REVIEW

2.1. Technology overview

Beacons- A beacon is a small device (approx. 3cm x 5cm x 2cm) that constantly sends out radio signals to nearby smartphones and tablets, containing a small amount of data. The signal strength and time between each signal can be configured to give a desired coverage. Mobile apps can listen for the signals being broadcast and, when they hear a relevant signal, can trigger an action on your phone. Note that beacons only operate/talk in one direction (i.e. they can broadcast data but cannot read things off your phone). For the majority of current beacons, the data that they transmit is hard coded and doesn’t change frequently (i.e. set it once when configuring the beacon) and they rely on the device which is listening to do something intelligent with the data – in the future this is likely to start changing.

Beacon Give your users better location and proximity experiences by providing a strong context signal for their devices in the form of Bluetooth low energy (BLE), beacons with Eddystone, the open beacon format from Google.

all modern phones can support BLE but you have to turn on Bluetooth for anything to happen.

In the same way as BLE uses 1-20% of the power of full Bluetooth in the beacon, it uses much less power on your phone. Leaving Bluetooth running on a BLE enabled phone should typically use 1-3% of a phone battery over the course of a full day – though if you are using standard Bluetooth at the same time.

2.2. Overview of Smart Transport System around the word

Many advanced bus transport systems have been designed around the world namely Bus Rapid Transport System which has been implemented in various countries such as Brazil, Australia, south America and few other parts of Asia. In Singapore, bus transport system use GSM technology. It is a built in SMS system through which the information will be given by the telecom provider. The subscriber can also know the bus route by alerting them through the SMS.

All these smart functionality for transportation is provided by “ITS(intelligent transport system)” . it is enabled with GPS to keep off the track of vehicle and to maintain transport controlling system. ITS follows a architecture mentioned in below diagram.

Figure 1. ITS Architecture.

Intelligent Transport Systems (ITS) describe technology applied to transport and infrastructure to transfer information between systems for improved safety, productivity and environmental performance. This includes stand-alone applications such as traffic management systems, information and warning systems installed in individual vehicles, as well as cooperative ITS (C-ITS) applications involving vehicle to infrastructure and vehicle-to-vehicle communications.

2.3. Method of using ITS

To illustrate the usage methods of Intelligent Transport system lets consider the transportation method implemented in Australia

Active Traffic Management—technology is used to smooth traffic flows by coordinating ramp signals and introducing lane-use management systems such as variable speed limits and variable message signs.

Driver information—current GPS systems can provide information to drivers on traffic and road conditions as well as their primary purpose of giving directions. In some cases manufacturers have combined to share information to build a real-time model of traffic flows from the data provided by individual vehicles.
Telematics—this is an ITS technology that allows monitoring of an individual vehicle’s movements and can record the speed, location and mass of a vehicle. This technology is already being used by transport companies and can be used as a regulatory tool, for purposes such as road user charging, compliance and enforcement.

Rail management—by using ITS technology, controllers will be able to run more efficient schedules due to better information on the location, speed and length of trains using the network.

3. PROPOSED WORK

As illustrated above, all the smart transportation system uses ITS for implementing the technique of smart transportation whereas an alternate method for implementing smart transportation can be achieved by use of beacons. These beacons are very small in size so it is compatible and can be fixed easily anywhere. It also consumes 1-3% of the battery power for its function. It can also transmit the location up to 70m which can also be extended by using Bluetooth radiation extenders in roads sides for a specific range to transmit the signal.

The main reason for developing the concept of smart vehicle status transmission system is to ensure that all the people who take general transportation must be able to use the facility in a safe manner and also to ensure that there is no disturbance for the others by avoiding the crowds in the bus stations and also if more number of people began to follow and use the public transportation, the emission of carbon monoxide and other pollution causing agents which is hazardous to our health and environment will be considerably reduced.

This work consists of a BLE transmitter which is fixed in the public vehicle (Bus) and is given a power supply from the battery which is already available in the bus and as already stated the BLE does not consume more energy from the battery. During the motion of the bus, we have to track and send the location details of the bus to the passenger who is waiting for the required bus at their particular station. Similarly, many passengers will be waiting in their different station, so there will be a huge conflict that may occur. To avoid these conflicts each bus is assigned a unique ID which will be denoted to indicate the travelling route of the bus.

All the bus will not travel to all the area in a city. So our idea is to generate a unique ID for each area in the city. Not all the bus will travel the whole area in a city, each area will have a fixed number of bus which will be rounding the area 24x7. So our main aim is to develop a unique id for each area in the city.

For example, if the area name is ‘xxx’—the starting id of that area will be 01sds

That ID will be assigned to a single bus, similarly, 01sdx, 01fte, 01tre ID will be generated and will be assigned to each bus travelling in that particular area.

NOTE: the above mentioned ID is only demonstrated for example purpose, a unique ID can be generated in any method.

Figure 2: Transmission Diagram

If a passenger wants to catch a bus, using the mobile app they will type the source and destination area and will click the ‘find’ button. Once clicked, the data is sent to the server. And the information of the bus travelling in the particular area requested by the passenger is identified. The location of the bus is identified by the Beacon BLE, and the information about the bus is sent back.

Though Beacons can sense and transmit signal only up to 70metres, it can be extended by Bluetooth signal extenders or by keeping a transmitter to recognize the status of the bus in streets signal and in the post which will be available for every 70 to 100metres in the road which will be useful to track the bus and can easily send the status of bus to the server.

Figure 3: Data Flow Diagram
3.1. Working of Mobile App

As already stated the Mobile App is a centralized, so it will require internet connection and Bluetooth connection for app to run properly. Once connected to internet the passenger can be able to use the functionalities of it.

First, the passenger will be able to see a page which consists of the text fields, in which the passenger can type the source and destination area.

![Figure 4: Sample screen of the App](image)

Second, the data entered by the passenger will be sent to the server.

The data sent to server is processed and by identifying the area, the ID allocated to the beacons to that particular area is recognized and then the total number of public transport vehicle running in that area is tracked by the help of beacons.

![Figure 5: Work flow.](image)

Once the public transport vehicle is identified, the information is passed back to the server and the server indeed pass the information to the passenger who has requested to the server.

Many passengers can use this system if the number of passengers exceeds the server cannot handle all the users at the same time. So to avoid this conflict the server can be placed in each area so that the information of the vehicle of that particular area can be loaded and tracked easily and the time taken to response will be also done quickly.

3.2. Advantages:

- Time can be considerably saved.
- Reduces the crowd among the station.
- Will lead to a new era for the transportation system.

3.3. Use of this concept:

- Will help the people to consistently reduce the time of waiting in the bus stops.
- Will promote to a new development in transport sector.

4. CONCLUSION

This system reduces the waiting time for bus. The system involves the tracking of bus at any location at any time. All the current data is stored to the server and it is retrieved to remote users via IoT based application. The system is easy and simple for user to get information via mobile phone. So by using this application, user can just wait or they may reschedule their journey according to bus availability. So this paper presents a system which provides high practical value in the modern scenario. The system has high practical value and is cost efficient.

5. REFERENCES


[4] IMPLEMENTATION OF INTERNET OF THINGS IN BUS TRANSPORT SYSTEM OF SINGAPORE


Research of Intelligent Transportation System Based on the Internet of Things Frame Yuqi Wang, Hui Qi


[10] Yuqi Wang, Hui Qi, “Research of Intelligent Transportation System Based on the Internet of Things Frame”


