Bus Tracking System using IoT

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Abstract— Due to increase in population the burden on public transportation is increased. So the remote user needs a smart system which provides the information about the bus; the information such as a current location of the bus and route between the stops. To overcome all the problems of our traditional transportation, we introduced our proposed system called as "Bus Tracking System Using IoT". This system is based on a newly evolved concept of IoT. We implemented a Raspberry pie kit along with a GPS receiver into the bus which sends the current location of the bus to the server and also we have an android application for showing that location on map. Raspberry pi is low cost device with the higher performance. Now a day's most of the peoples are familiar with android smartphones. The remote users can easily access the location and route information from anywhere and reach to their stops before the arrival time of the bus. It reduces the waiting time of the users or passengers for their buses.

Keywords: Real-Time Bus Tracking System, GPS Module, Web Server, Google Map, Raspberry Pi & IoT

I. INTRODUCTION

When it comes to the public transportation buses or college/school buses, time is the most important thing to consider. In other words, many peoples are using the public transport buses for travelling from one place to another and most of the time it happens that they experienced the time loss because they are waiting for their buses at the stops. Millions of children's travels from home to school and vice versa with the school buses. Parents are afraid about the safe transportation of their children. Also the college students use their college buses as well as public transport buses for travelling from home to college and vice versa. In all situations there is a need for one smart system which provides all information about the bus to the users before they reach to their stops.

The movement of buses is affected by many of the uncertain conditions like heavy traffic, unexpected delays by the tire puncture or from any other engine failure etc. In such cases many of students, staff members or job persons are getting late to their work because they decide to wait for their buses instead of any other alternative transportation. If the bus does not reach the stops at the given time, the students will not be able to attend the classes on time. The system needs to alert their users in such situations. To reduce this inconvenience and confusion, location shown in Maps GUI on our android application which provides the certain information regarding the arrival time of bus and route between the stops. With the use of GPS technology, real time vehicle tracking becomes possible. This technology can be applied to transport systems especially to the bus transportations which do not follow the predefined time tables due to the improper situations. In such a situation the driver of the bus has the authority to send alerts to the users and administrative peoples to inform that the bus will not arrive at a predefined time. It helps to choose alternative options for travelling and for better time management.

II. LITERATURE SURVEY

– "Vehicle Detection and Tracking System IOT based" - International Research Journal of Engineering and Technology (IRJET) (Volume 05, Issue: 08, Aug 2018)

Main purpose of the vehicle tracking system is to provide security against the thefting of the vehicles. It helps in finding out the stolen vehicles which provides the benefit of vehicle anti thefting. The newly evolved term IoT is used in this system which helps in data sharing over the internet using various devices. Nowadays this system is used either instead of car alarms to protect or monitor the movements of vehicles in real time. The location coordinates are sent to the vehicle owner, from which they can monitor and track their vehicles. This system is used for the private vehicles like cars which are higher in cost. When the car is stolen by any thief, the location coordinates are sent to the police as an alert and after receiving the location information then they can make actions to prevent it. Other applications are such as to block the car's doors or engine to protect the car.

– "Bus Tracking Using Raspberry PI" - International Journal of Pure and Applied Mathematics (Volume 119 No. 15, 2018)

This paper defines a Smart Public Transport System which collects all the essential information required and displays it to the passengers from which user will decide to wait for a bus or to take another option to travel. The aim of this project is to introduce an electronic device which includes the system to track the current location of public transport buses. This device is implemented on all buses. This system is totally standalone as the display screens are placed on the bus stops. Passengers present on the bus stops are able to access the real time location of bus and all other information.

– "Real-Time Bus Tracking System" - International Research Journal of Engineering and Technology (IRJET) (Volume 04, Issue: 03, Mar -2017)

This paper defines the real time bus tracking system which helps users to find out the current location of the bus from which they want to travel towards their destination. In this project, the GPS device is attached to a bus which sends the longitude and latitude values to the intermediate server. Each bus has its own ID from which the bus is identified. The received values are stored into a database along with their ID's. This database also contains real time bus information like bus routes, actual arrival/departure time and real time location of the bus. On the user side the system provides the web based application which provides various services and functions to the user. The user needs to provide two values from their side; first is a source that indicates wherever the remote user is now and second is the

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destination towards which user wants to travel. From the source and destination values, server provides the list of available buses which are going from users requested route. After choosing any of the bus number, the current location of that bus is shown to the user's screen.

– "Real Time Web Based Bus Tracking System" - International Research Journal of Engineering and Technology (IRJET) (Volume: 03, Issue: 02, Feb - 2016)

Most of the peoples use public transportation buses in their daily life. Day-by-day burden on the public transportation is increases. This paper is based on the technology which provides the information to the user such as arrival time of buses, current location and the expected waiting time. It helps in reducing the time wastage of user for the bus. User has the web portal on which user can check real time information of bus. In any web browser search specific url to open the tracking system. User needs to search for the destination and then the system will provide all information to the user. Tracking is getting better with the maps activities

III. Overview of the Proposed System

A. Problem Statement

Many of the peoples waste their time by standing on the bus stops. Most of the times, bus not reaches on the stops in predefined time schedule. The same problem occurs with the public transport buses and college buses. All the passengers and students are not aware about the arrival time of buses. If the bus is not arrive on time there will be chances occurs for students of getting late to the college.

B. Solution

Our systems aim is to overcome all the bus transportation problems and design an android application for the users who want real time information about the appropriate bus. The Raspberry pi 3 b+ kit implemented into bus along with GPS receiver. This GPS technology helps in tracking the real time information of the bus such as current location and route between the stops. With the bus engine starts, the device starts working and continuously updates the location of the bus. It sends location coordinates in the form of longitude and latitude values to the server. We developed an android application which is very easy to handle and use. This application can be used by the users, administrative peoples and drivers of those particular buses. Admin and drivers has to provide the login credentials for some authorization decisions. Users not require any login information to use our application; simply open the application, go the user section and select their bus number to get current location of that bus and also the route.

C. Architecture of Proposed System

"Bus Tracking System Using IoT", as the name suggests, this system is fully developed on the IoT terminologies. IOT comes with the combination of algorithms and computation, software; hardware that makes it smart. Ambient intelligence in IoT provides its capabilities which facilitate the things to respond in an intelligent way to a particular situation and supports them in carrying out specific tasks. Raspberry Pi, interfaced with a GPS module and it is used for developing an advanced real-time navigation application. Incorporating the Pi's web interface capabilities along with the GPS data we can develop advanced navigation schemes for real-time tracking system.

Modules needed for hardware implementation:

a) Raspberry pi-3 b+
b) GPS Module
c) Connecting Wires
d) Power supply (5v 100mA)

1) Block Diagram

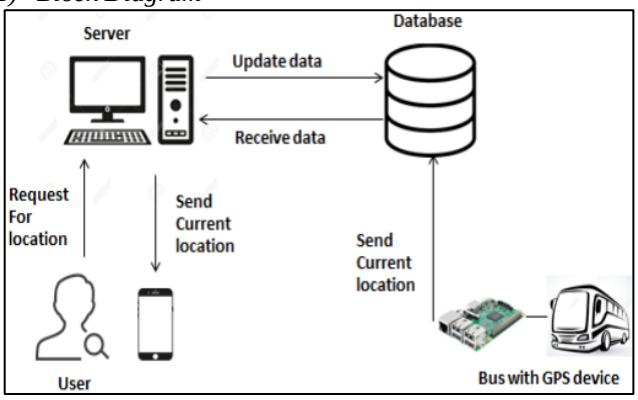

Fig. 4: System Architecture

We have implemented "Raspberry pi-3 b+" kit into bus which continuously updates bus location in database. With the Raspberry pi kit we have used the GPS module which helps to finding the location. For providing the power supply we connected this kit directly to bus's switch. When engine starts, this kit will starts the working and once the bus reaches at the destination, the Raspberry pi kit automatically shuts down and stops working. Raspberry pi kit has the Raspbian operating system on which we write our GPS program and we apply auto-run mechanism to this program. This program is written in a Python language. We also develop a small android application which provides GUI to user. It is easy way to find out the current location of bus. By using our android application user can request for the current location of bus. Then server checks into database and returns the current location of bus to user on Map through android application.

D. Bus Tracking Modules

– Location Information

Fig. 1: Location

We use the Raspberry-pi 3 kit and the GPS Module for updating the location of the Bus continuously. By using the GPS module we should update the location by sending

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longitude and latitude values to the database. The location will be set and displayed according to this both values.

– MAP

Fig. 2: Maps Activity

The MAP is responsible for showing the route and current location of the Bus. The location update of the bus is get from the database and shown to the user. Map will also show the stops on the route on GUI interface. The user can see the route, stops and the location on MAP easily through our android application. The MAP should show all the information about the Route and Location on the GUI interface.

– Bus Route/Information

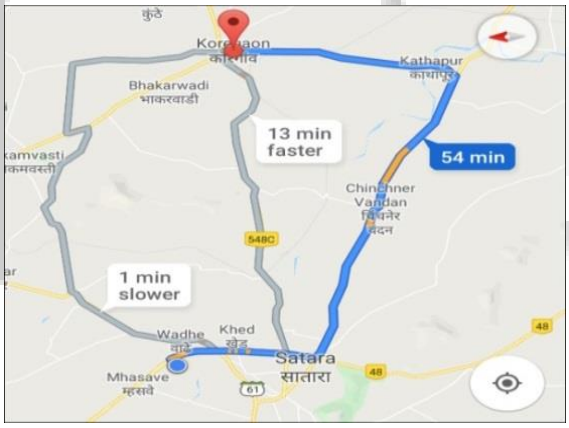

Fig. 3: Route Information

User can get information about the Bus number, Driver of Bus and Route of that Bus. The route of Bus from source to destination is highlighted on Map. There are several stops on the highlighted route, so students can easily identify their nearest stops.

IV. Experimental Setup

A. Hardware part inside the bus

B. Software: Android Application

We have developed a small android application for tracking and monitoring the bus location and other information. The same application is used by the user, admin, and driver. Users simply needs to opens the application and then select the bus number which they want to track. After that the MAP activity will open and displays the current location of selected bus and route among the stops. Administrative peoples and Driver has their login credentials to access their services. Admin has the authority to access location of all buses, add new bus, update the bus information and to add the driver. And the admin also checks the alert log generated by the driver in an improper situation. Driver access location of the bus and has the authority to send alerts to the admin and all other users in appropriate situations like-

– Tyre Puncture
– Heavy Traffic
– Engine Failure
– Network Failure

The administration management can ensure drivers are efficiently driving their buses that they are observing speed limits and that they are staying on their scheduled routes.

V. Conclusion

Our system reduces the waiting time of remote users for bus. The system tracks the bus at any location at any time. All the current information of bus is stored to the server and it is retrieved to remote users via android application. GPS tracking keeps track of buses in real time, notifying parents of children's the specific arrival times that uses the bus transport. This reduces the amount of time student have to wait for buses to arrive, minimize their exposure to inclement weather and various other danger situations they can be faced while waiting for a college bus to arrive. With the implementation of the project, a complete track can be done of the college buses. The application at the passenger's end acts as a time saver. Due to this, an ideal system of bus transport is developed by us for college bus and public transport purposes. By implementing our system, a passenger can plan their journey better before the waiting time at the bus stops. This system also draws highlighted routes on the MAP to show the roads of the buses on which the bus is travel. The main features of this system are the efficient usage of time, real-time location and other information on the availability of buses and commuter satisfaction.

Acknowledgement

We take this opportunity to thank all the individuals for their guidance, help and timely support which made us to complete the project in stipulated time. It gives us a great pleasure and immense satisfaction to present this project paper on "BUS TRACKING SYSTEM USING IOT",which is the result of unwavering support, guidance and focused direction of our guide whom we express our deep sense of gratitude and humble thanks, for his valuable guidance throughout the project work. The success of this project has throughout depended upon an exact blend of hard work and unending co-operation and guidance, extended to us by the superiors at our college.

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