ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 3, March 2018

Bus Arrival Time Prediction System Based on Participatory Sensing with Smart Application

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ABSTRACT: In the modern Era Smart cities provide easy modes of transportation through the use of technology. Buses are an important means of transportation in cities. The problem with bus transportation is that there are huge lines of people waiting for buses, buses have become overcrowded and some buses have very few people who board them. Bus passengers find it difficult to board the bus they need due to non-availability of the buses. A web application is proposed such that a person who is waiting for the bus stop can request for a bus. If the number of requests exceeds more than a certain limit, it is forwarded to the control room and the particular bus is sent to the location of the request. Many numbers of people in multiple bus stops can request a bus. Classification algorithm will be used such that the system will be trained to automate request response mechanism. The proposed system uses an affordable, integrated bus monitoring system that will provide increased security by providing remote tracking and monitoring capability. This system works on GPRS tracking which is installed in the bus. It sends the real arrival time of bus to a web application. The passengers will be able to easily see the time the next bus is going to arrive. This system helps the passenger to take decision whether to wait for bus or not. It provides the passenger relevant information regarding all bus time with their bus numbers. We propose to use Raspberry pi with a gprs module installed on each bus. The gprs sends real time location of the bus to the web application through which the exact arrival time of the bus can be calculated.

KEYWORDS: GPRS, Raspberry pi, Web Application, Location Tracking

I. INTRODUCTION

In the way people move around their communities' public transportation systems is the main problem which play an increasingly important role. Due to cause of heavy traffic and roadwork etc., most of the buses are delayed in time. The bus passenger has to face the problem of bus waiting and also passengers don't know about the exact time required to reach next bus. The passenger finds it difficult to decide whether it would be better to wait for next bus or to walk and hire a cab or rickshaw to reach the destination. Many passengers are often late to work, students are late for classes because they decide to wait for the bus instead of just simply using an alternate transportation. Our proposed system can fetch request that will arrive from the passenger/user for the specific bus. Once this information is uploaded in the server and then the passenger can access the information via the web based application using internet even at their homes or any work place. Additionally, our system also provides a web based application which is interfaced with Google Maps which displays all transmitted information to the end user along with location of the bus on the map. The passenger can take a decision whether to wait for the bus or not depending upon the location of the bus. It provides the passenger relevant information regarding all bus time with their bus numbers [1].

II. RELATED WORK

Lin and Zeng [1] proposed a set of bus arrival time prediction algorithms for a transit traveller information system implemented in Blacksburg, Virginia. Four algorithms were introduced with different assumptions on input data and were shown to outperform several algorithms from the literature. Their algorithms, however, did not consider the effect

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of traffic congestion and dwell time at bus stations. Kidwell presented an algorithm for predicting bus arrival times based on real -time vehicle location. The algorithm worked by dividing each route into zones and recording the time that each bus passed through each zone. Predictions were based on the most recent observation of a bus passing through each zone. This algorithm couldn't work in large cities where both travel time and dwell time could be subject to large variations.

This proposed is [2] the Real Time Bus Monitoring system is a standalone system that displays the real-time location(s) of the buses in Mumbai. This system, designed to be deployed at various bus stops around city, is comprised of a power source, a battery, a microprocessor, LEDs, and RF Transceiver. The RF Transceiver will be used to poll a signal from the systems installed on the buses that contains GPS data of each bus's location. The data will then be processed by a microprocessor connected to the RF transceiver and used to display on the LEDs (control unit) that will represent each bus's location and on the LCD screens on the bus stops. This system will assist pedestrians in making the decision of whether to wait for the bus or walk.

This proposed is [3] a considerable amount of money is spent on IT-based applications such as real-time, at-stop displays on public transport, but actual knowledge about the behavioral effects these have on customers or potential customers in real life is quite sparse. This paper presents a review of relevant literature, focusing specially on user response to public transport information via telephone, mobile devices, the Internet and at-stop displays. A number of studies have been initiated in the past to address the bus arrival time prediction problem.

This proposed is [4]many passengers are usually late to work, students are late for classes as a result of they decide to anticipate the bus rather than simply merely using another alternate transportation. A variable message shown on the web which will be real time info regarding the bus showing the time of arrival at a particular bus stop might scale back the anxiety of passengers expecting the bus. With the advent of GPS and also the ubiquitous cellular network, real time vehicle tracking for higher transport management has become attainable. These technologies can be applied to conveyance systems particularly buses, which are not ready to adhere to predefined timetables owing to reasons like traffic jams, breakdowns etc. The increased waiting time and the uncertainty in bus arrival build conveyance system unattractive for passengers. The real-time bus position and time observance system uses GPS technology alongside totally different application to fetch knowledge and with code that displays the information online on with different buses on a special route to the user. When this info is conferred to the traveller by wired or wireless media or online internet media, they can use their time with efficiency and reach the stop simply before the bus arrives, or take alternate means of transport if the bus is delayed. They can even arrange their journeys long before they really undertake them. This will build the general public transport system competitive and passenger-friendly. The use of personal vehicles is reduced when additional individuals use transit vehicles, which in turn reduces traffic and pollution.reduces traffic and pollution.

This proposed is [5]the Real Time Bus Monitoring and Passenger Information bus tracking device will serve as a viable notification system that will effectively assist pedestrians in making the decision of whether to wait for the bus or walk. This device is a standalone system designed to display the real-time location(s) of the buses in Mumbai city. The system will consist of a transmitter module installed on the buses, receiver boards installed on the bus stops, LED embedded map of the BEST bus transportation routes at the centralized controller. It will also have passenger information system software installed at the bus stops, which will provide a user the relevant information regarding all the bus numbers going for his source to destination along with the route details and the cost. Assembly of these modules will enable the tracking device to obtain GPS data from the bus locations, which will then transfer itto the centralized control unit and depict it by activating LEDs in the approximate geographic positions of the buses on the route map. It will also transmit its bus numbers and route names continuously as soon as the bus comes within the range of the receiver at the bus stop. In addition, the device will be portable and sustainable; it will not require an external power source, which will eliminate long-term energy costs.

This proposed is [6] a survey to implement a method that make transport much convenient for individuals who commute daily using the public bus transport of the city, for effective time management and making it trouble-free, not just for the commuters but the Transport Department to create an efficient public transport system. There are applications available in the market today which specifies the route and the timings, predict arrival times of different buses But the survey presented here aims to build an application that takes it to the next step by making information

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about the vacant seats and the current location of any bus in Real-Time, accessible to the daily commuters with a novel and economical wireless system. This methodology offer incremental improvements in bus system to meet the capacity requirements of different size cities and presents a review of strategies which can be employed to satisfy public transport demands of different city sizes. Their aim is to build a flexible, comfortable, easily available and reliable bus service which may encourage shift from private vehicles to public transport.

III. PROPOSED ALGORITHM

The main objective of this project is to reduce the difficulties of rush and less frequency of the bus. A web application is proposed such that a person who is waiting for the bus stop can request for a bus. If the number of requests exceeds more than a certain limit, it is forwarded to the control room and the particular bus is sent to the location of the request. This system works on GPRS tracking which is installed in the bus. It sends the real arrival time of bus to a web application. The passengers will be able to easily see the time the next bus is going to arrive.

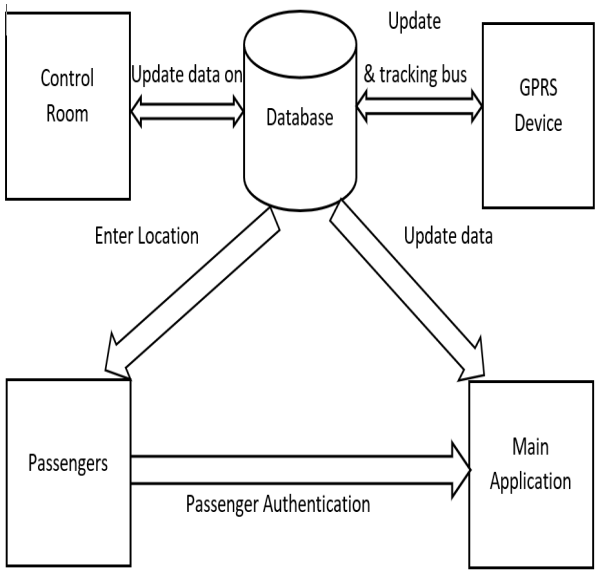

Figure 1-: Architecture of proposed system.

According to the Fig.1

This proposed system has consisted of two modules:

1) Web application
2) GPRS module

1) Web application: It has various functionality like register, login, etc. In order to use web application passenger has to be registered with the system after this we can raise the request for the bus. Once the request is raised data is send to the control room after number of request for specific bus crosses certain limit appropriate action which is taken.

2) GPRS module: Now use the GPRS module is to track and update location and time arrival of bus. So that user can take appropriate action. This GPRS module update location details into database and this location details are send to the user/passengers.

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FLOWCHART:

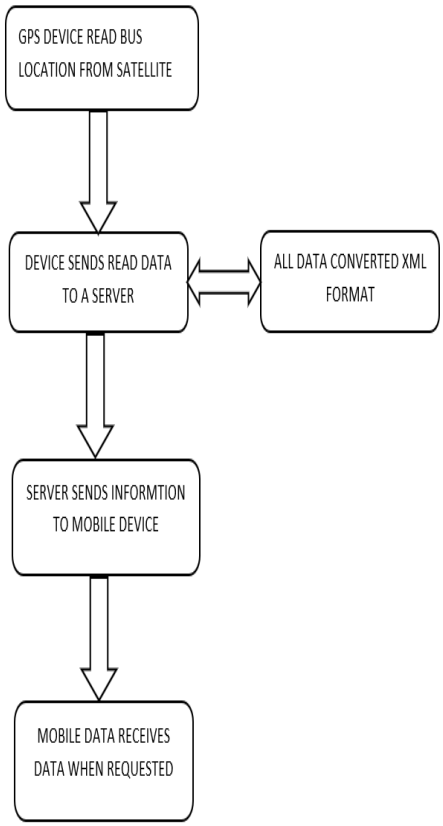

Figure2-: Flow chart

In this project GPS device will fetch the bus current location from the satellite and it will pass it to control room server. All the data will be converted into XML (Extensible Markup Language) file. This information/data will be send from control room server to the user /passenger mobile device. This information/data will be received to the user/ passenger whenever he/she request for it.

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IV. SIMULATION RESULTS

Hardware part inside the bus:

Figure3-: SIM 808 GPRS (GSM & GPS)

GPRS SIM 808 is used in the bus which is used for bus tracking or mapping the root on the Google map

Figure4-: GPS ANTENNA

It receives the signals by the antenna and also sends the signals.

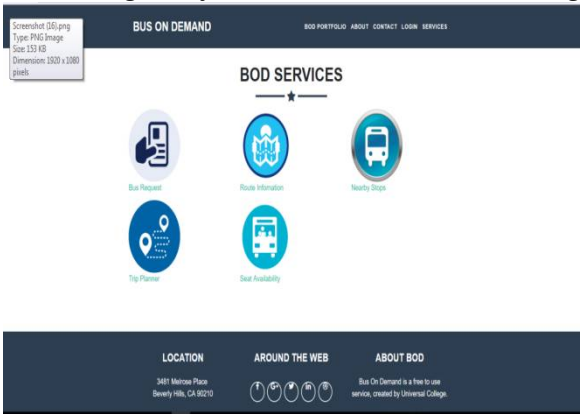

Figure 6: BOD Service page

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In fig.6 BOD service provider's the services for the commuters such as bus request for specific bus, trip planner, bus location etc.

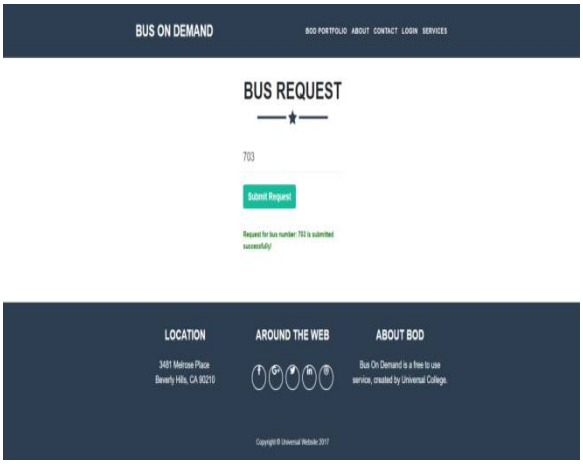

Figure 7: Bus Request Page

In fig.7 It takes the request for the specific bus of the register user.

Figure 8: Route Information page

In fig.8 route information is provided for commuters.

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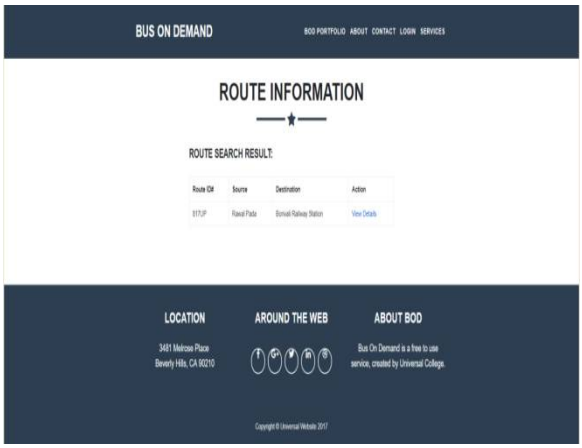

Figure 9: Display the route search details

In fig.9 it helps the unknown user to track route details.

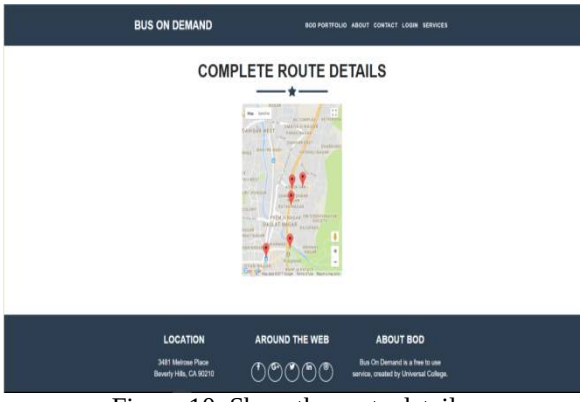

Figure 10: Show the route details

In fig.10 it shows the bus stops in the map for specific route.

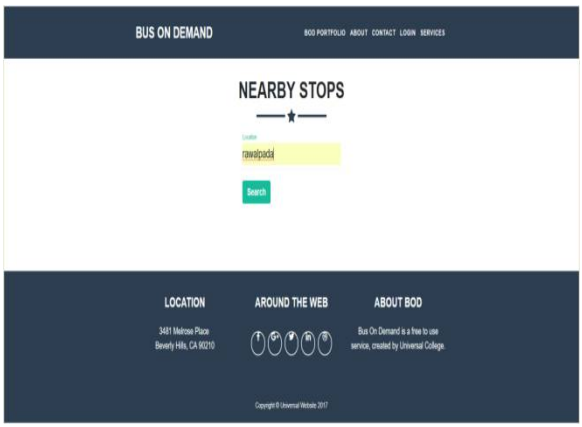

Figure11: Nearby Stops page

In fig.11 it shows the near stops for user from given destination.

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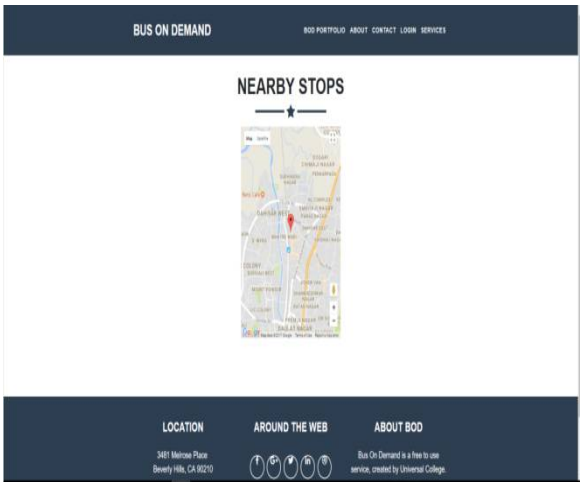

Figure 12: Show the nearby stops

In fig.12 it shows the result for the nearby stops.

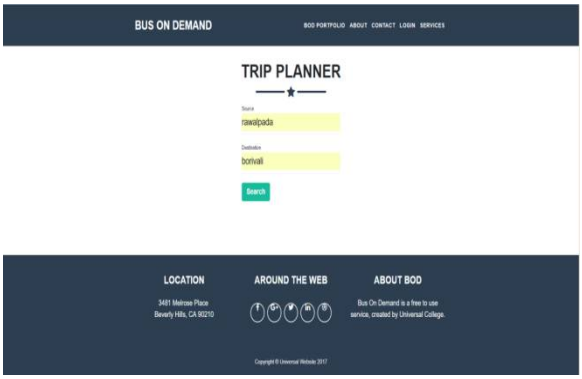

Figure 13: Trip planner page

In fig.13 it provid source and destination for the trip planner by the user.

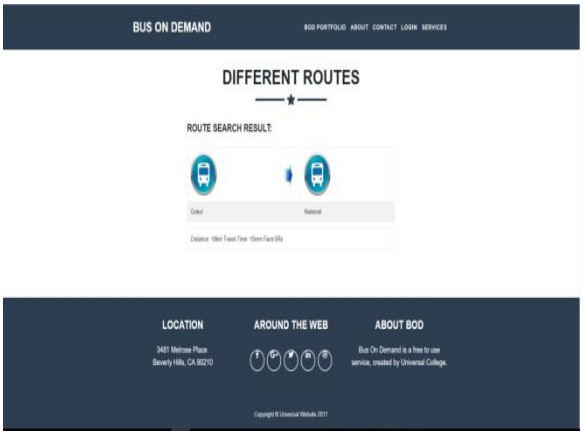

Figure 14: Show the different routes
In fig.14 it shows the different route for the user.

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V. CONCLUSION AND FUTURE WORK

With the implementation of the project, a complete track can be kept of the buses from bus stop. The display at the passenger's end acts as a time saver. The client /user/passenger request for bus then that request will be send to server. Server is connected to the satellite; the GPS is connected to the satellite. GPS server is connected to FTP server for transfer of mail to the control room. After all process requesting calculation then it sends notification. In future enhancement the application will work according to implementation the real-time location detection of buses. One of the limitations of this application is that, there is no real-time location information on buses. In the future, bus companies can provide their vehicles location data to public, then bus arrival prediction could be done with ease.

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