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MAULI BUS TRACKING SYSTEMNilesh M. Verulkar^{*1}, Sumit G. Agrawal², Mahesh V. Kulkarni³, Gopal G. Dhage⁴ & Sneha R. Belasre⁵^{*1} Assistant Professor, ^{2,3,4,5}UG StudentsDepartment of Electronics & Telecommunication Engineering, Mauli Group of Institutions,
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ABSTRACT

It is seen that more than 50% of the students prefer the transport service provided by the institution due to the safety and security reasons. Without knowing the exact location of the buses most of the students, staffs are waiting for long time in bus stop and also have a chance to miss the buses. With the new advancement in technologies and with increased number of satellite dedicated for navigation purpose the tracking system has evolved. The recommended system will demonstrate the implementation of Location Monitoring System using a Raspberry Pi, Global Positioning System (GPS) module and server for recording positions and defining and displaying the same on an android application provided to the user.

In recommended system the GPS device is connected to Raspberry Pi through which the exact location of bus will be send on a server in a form of latitude and longitude. Android device will directly fetch the exact location of particular bus from the server with the help of android application which is been developed specially for the recommended system. The exact location of bus will be displayed in mobile application which is in android device in a form of red marker. It will also calculate the distance and time taken to covered the distance between user and bus. For that, the user must have active internet connection and GPS location. In that way, this project will help to save the time of students, staff or users also to detect the exact position of bus

Keywords: GPS, Raspberry Pi, Tracking, Position.

I. INTRODUCTION

A Mauli Bus Tracking System is nothing but a system that will monitor the location of bus and will send the updates about the location to the user. In the urban areas, human help is somewhat difficult in providing the database of tracked bus. In this system, the system provides a fully automated tracking and monitoring of the bus which is helpful for school bus, their owners, and student's safety and also it provides accurate arrival time of the bus at particular location or stop. And hence using accuracy in time, student can spend more time in studying, sleeping, or relaxing rather than waiting for a delayed bus. Spending less time waiting for a bus improves comfortable and effective time management of the student as well.

The system consist hardware like Raspberry Pi, GPS module, SD card, WIFI router and 9v power supply. In this system the GPS device is connected to Raspberry Pi through which the exact location of bus will be send on a server in a form of latitude and longitude. Android device will directly fetch the exact location of particular bus from the server with the help of android application which is been developed specially for the proposed system. The exact location of bus will be displayed in mobile application which is in android device in a form of red marker. It will also calculate the distance and time taken to covered the distance between user and bus. For that, the user must have active internet connection and GPS location. In this system the continuous internet supply will be provided to Raspberry Pi so that it can trace the exact position of system and send it to the server and if in case the active internet connection or power supply will loss then this system will show its last location on android application.

II. LITERATURE SURVEY

“GSM-based Notification Speed Detection for Monitoring Purposes” by Elia Nadira Sabudin, Siti Zarina Mohd Muji, Mohd. Helmy Abd Wahab, Ayob Johari, Norazman Bin Ghani. In this paper they used GSM module is used for the location of the vehicle using SMS based system. In this system, GSM module sends sms of longitude and latitude on the users mobile. In this model, there are lot of drawbacks like is not show live location because of sms based system. [1] “Design of Vehicle positioning System Based on ARM” by ”Zhang Wen, Jiang Meng”. In these system the vehicle tracking system is a total security and fleet management solution. It is the technology used to determine the location of a vehicle using different methods like GPS and other navigation system operating via satellite and ground based stations. This system is an essential device for tracking car any time the owner wants to monitor it and today it is extremely popular among people having expensive cars, used as theft prevention and recovery of the stolen car.[2]Land Vehicle Tracking Application on Android Platform’ by ’Ramesh Chandra gadri, Ankita Chavan, Reema Sonawane, Sujata Kamble’. In this system vehicle tracking sytem determining the position of land cover with embeded GPS receiver or PCS phone and display the position on digital map. [3]“Real time bus monitoring system using GPS,” by Dr. Saylee Gharge, Manal Chhaya, Gaurav Chheda, Jitesh Deshpande. In the given system they used receiver unit on bus stop and used decal map to show location of bus. Software is designed and developed so as to provide the passenger with all the necessary information as to which buses from the source will go to his destination along with their routes, ticket prices etc. [4]“R.Ramani1, S.Valarmathy, Dr. N.Suthanthira Vanitha, S.Selvaraju, M. Thiruppathi R.Thangam, “Vehicle Tracking and Locking System Based on GSM and GPS”. This proposed work, a novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into sleeping mode while the vehicle handled by the owner or authorized person otherwise goes to active mode, the mode of operation changed by in person or remotely. If any interruption occurred in any side of the door, then the IR sensor senses the signals and SMS sends to the microcontroller. [5]

“GPS/GSM Based Bus Tracking System (BTS)”, by Christeena Joseph ,A.D.Ayyappan , A.R.Aswini, B.Dhivya Bharathy. The tracking device consists of the GPS, GSM modem and the microcontroller. Location name and GPS coordinate values are stored as a LUT (Look Up Table) in the microcontroller. As soon as the GSM modem receives SMS request for location, the microcontroller checks for a closest location match inside the LUT with the received GPS coordinate data. [6]“Availabilty and handling of data received through GPS device: in tracking a vehicle”, by Kumar,R.; Kumar,H. In this system, Micro controller:This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written. [7]‘Smart on-board transportation management system Geo-Casting featured’, by Tarapiah, S.; Atalla, S.; Alsayid, B., The proposed approach would get controlled with the support of Raspberry pi which placed throughout the vehicle. The GPS/GPRS/GSM SIM900A module get keep up a correspondence with raspberry pi utilizing USB interface. Also proposed system provides student’s safeguard with the support of DS18B20 temperature sensor and gas leakage sensor MQ6. These sensors get interface with raspberry pi. If the temperature within the vehicle crosses the targeted value or LPG gas get leakage within the vehicle then the alert message will sent to the vehicle’sowner. Likewise protection mechanism provided by method. [8]“Advanced Vehicle Monitoring and Tracking System based on Raspberry Pi” by Prashant A. Shinde , Prof. Mr. Y. B. Mane. In this system, Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written. The system is useful in much application such as surveillence, security, tracking, which may be installed in cargo trucks, cars, motorcycle, and boat. The system can be used in many applications. [9]“Location Monitoring System using Raspberry PI” by Priyanka Pendam, Jeeshant Khan, Raksha Solanki, Prof. Randeep Kaur Kahlon. With the new advancement in technologies and with increased number of satellite dedicated for navigation purpose the tracking system has evolved. The hardware costing of a commercial tracking system makes it difficult to a make available for use for the masses mostly in the developing countries. In the proposed system, the concerned user can define its own boundary.[10]

“Bus Tracking System and Li-Fi System” by Malathi.R, Raveena Ragavi. G, Gopal. K, Dhanasekar. J in this that project we have made 2 modules with 3 kits. On the first module we are using only one kit which is in the bus. It uses RFID card system. On the second module we are using 2 kits. First kit is in the bus and the second kit is in the bus stop. This is used to know that what bus is arriving in that particular bus stop. We first planned to use AVR board to display a voice message of the coming bus. But do to our cost, now we made this kit with LCD display. [11]“Raspberry Pi Based Vehicle Tracking And Security System For Real Time Applications” by D.Santhoshi Rani, K. Radhika Reddy. In this system. The proposed system hence made good use of Smartphone technology by providing safety and secure traveling to the traveler using wrong path alert mechanism. The proposed system plays an important role in real time tracking and monitoring of vehicle by updating vehicle real time information on the server side after certain interval of time in order to monitored vehicle continuously. Whenever driver drives vehicle on the wrong path or in case of vehicle’s accident situation occurs, the proposed system provides the vehicle’s current location, speed to the vehicle owner’s mobile. Gas detectors measure and indicate the concentration of certain gases in an air via different technologies. [12]“College Bus Tracking Android Application using GPS” by G.Kiran Kumar, C. B. Aishwarya , A. Sai Mounika. In this proposed system This android application uses the help of GPS, GPRS, GSM and the Google maps in order to track and locate the college bus. This application successfully shows the location of the bus through the Google maps. This system can be further extended for multiple applications as Anti-theft system for cars and bikes. Managing of public transports likes buses and trains. [13]Sulaima Lebbe Abdul Haleem and Samsudeen Sabraz Nawaz “Real Time Bus Tracking and Scheduling System Using Wireless Sensor and Mobile Technology”. The proposed bus scheduler basically has the two major part. One is web based interface system, second is sensing unit. Here along the road, there are number of bus halts hut which will consist RFID reader and have serial connection with Arduino. Arduino will provide the identification processing power to RFID reader. The reader will sense the tag’s data from font unit and departure of the bus from on the platform, which will be transferred with the timestamp and ID over the GPRS by the GSM/GPRS shield to Central bus scheduler. Over the Internet, anyone can access the bus movement details for their personal usage. Bus units will have the two parallel active RFID sub units, one in the front and second in the back side. So this paper presents a system which provides high practical value in the modern fast era. TProcessed information transferred into google fusion as the cloud tool to show the visibility as a moving objects in real time to see anyone over the internet on google map. The system has high practical value and cost efficient. [14]Supriya A Salunke, Vitthal B. Jagtap, Avinash D Harale “Vehicle Tracking System for School Bus by Arduino” The main objective of this project is to develop a vehicle location tracking system for tracking purpose. The signal received from satellite is sent to hardware devices for further processing and finally the signal is sent to the PC for displaying on the Google Map.. [15]

Jessica Saini, Mayank Agarwal, Akriti Gupta, Dr. Manjula R “Android App Based Vehicle Tracking Using GPS And GSM” The microcontroller 8052 is used for interfacing the hardware peripherals. There is serial interfacing between the 8052 microcontroller and the GSM Modem and GPS receiver. The working of the system involves taking the input from the GPS. This input is then sent to the RS232. It is then sent to MAX232 where the data is formatted so that it could be sent to the receiver pin (Rx) of the microcontroller. After this, the data is stored in the microcontroller buffer and then sent to the MAX232 via the TX (Transmitter pin). The data is sent into GSM via the RS-232 protocol by MAX232. On demand that is by pressing the _Track location‘ button in the android app, it will send the location of the device to the registered mobile user. The location of the vehicle will be shown to the user on the designed android app. The code for the device is written and tested in Arduino IDE. The Arduino IDE is a cross-platform application where the code is written, debugged and tested. The android app is designed in android studio. In today’s world, the security of the vehicles is at stake. The incidents of theft are common. This compels the consumer to install a tracking device, which will help them to know the location of their lost or stolen vehicle. The vehicle-tracking device provide the user to know his/her vehicle’s location in real time. The product designed is user-friendly anyone with a little knowledge of smartphone can use the system. It is easy to install the system in the vehicle and it require low maintenance. The coordinates received show the correct location on the google map using the android app. Also, the size of the device is compact since the GSM and GPS modules are not present as separate module.[16]R. Abhishek , K. Goutami, K. R. Gurudath, M. Nesar and S. R. Deepa “School Bus Monitoring System Using Raspberry Pi”. In this proposed system, a. Intimating the parents about the pickup and drop off activities of the children through an E-mail and SMS alert. b. Informing students’ parents in case of emergencies with the corresponding messages in SMS and an E-mail along with the attachments of location and a picture of inside

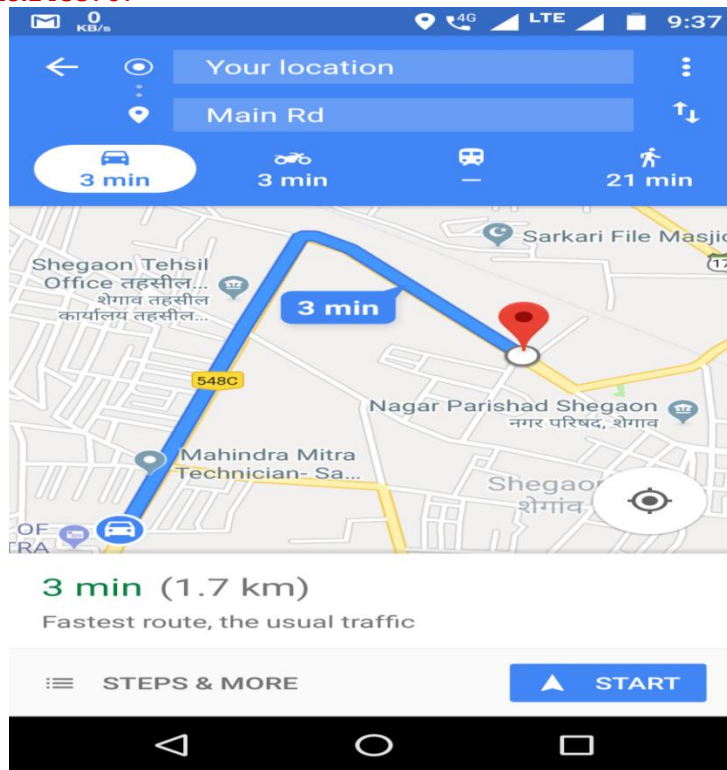
environment in the bus will be sent to the parents. c. Intimating school authority in case of rash driving carried out by the driver at a particular point of time convenience to public. [17]Yadnesh A. Gandre, Prof. S. K. Bhatia “Bus Tracking Using Raspberry Pi Platform” In this proposed system used, Raspberry pi board:Raspberry Pi is a credit-card-sized single board computer developed in the UK by Raspberry Pi foundation with the intention of stimulating the teaching of basic computer science in schools. It has two models; Model A has 256Mb RAM, one USB port and no network connection. Model B has 512Mb RAM, 2 USB ports and an Ethernet port. The foundation provides Debian and Arch Linux ARM distributions and also Python as the main programming language, with the support for BBC BASIC, C and Perl.MCP3204The Microchip Technology Inc. MCP3204/3208 devices are successive approximation 12-bit Analog-to-Digital (A/D) Converters with on-board sample and hold circuitry. The MCP3204 is programmable to provide two pseudo-differential input pairs or four single ended inputs. [18]Neha Shinde, Saniya Ansari “Intelligent Bus Monitoring System” In this system, the design and implementation of smart public transport system for smart cities is proposed. A detailed survey concluded for implementation of various features to the system prototype. Features such as; smart application for user friendly use, GPS/GSM system interface, emergency and bus fail switch, etc included. This system consist of ARM cortex, GPS/GSM modem, DC motor, Switches, PIR sensor and a smart phone. The microprocessor based embedded system gives many different features such as high performance, cost sensitive, architectural simplicity and low power consumption. The system has an alcohol sensor which checks the level of alcohol taken by driver through is breath. This helps to prevent accidents caused due to ‘drinking and driving’. The implementation of the system is to be done for bus. The system designed is secured and smartly assisted for public. ARM cortex processor is used as controller to control the whole processing of the system. [19]Pranjali Jumle; Suresh Gohane “Intelligent Bus Tracking System based on GSM and GPS” . In this system, methodology is based on idea of real time. When the authorized user wants the location of bus then he has to call on the number of sim which is in the tracking system. After 2 rings call will automatically be disconnected. User will receive text SMS containing latitude and longitude co-ordinates through GSM then with the help of google maps user will get the location of the busGPS tracker for school bus consists of a microcontroller, GPS module, GSM module, LCD and a keypad. GPS Modem: After GPS module connected to minimum required satellites, it will find co-ordinates of its location and sends those data to microcontroller. Microcontroller: Then the microcontroller sends data to LCD display and GSM module. LCD Display: LCD displays shows longitude and latitude of location. GSM Modem: GSM module sends data via SMS to user.. vehicle recovery. [20]

III. RESULT & DISCUSSION

Below image is an actual screen shot of Mauli Bus Tracking Application. In which the actual and live position of bus is been showed. The red marker is nothing but the position of Mauli Bus.



The following figure is about showing the distance between the user of application and bus. This image is also the actual screen shot of Mauli Bus Tracking Application taken in real time basis. As the image shows at Agresan chowk which is near to Nagar Parishad Shegaon and the user is about 1.7 km away. The application not only calculates the distance between user and bus but also calculate the time taken to cover that particular distance.



Following image is about bus Time-Table, it provides accurate arrival time of the bus at particular location or stop. And hence using accuracy in time, student can spend more time in studying, sleeping, or relaxing rather than waiting for a delayed bus. Spending less time waiting for a bus improves comfortable and effective time management of the student as well.



o	Stops	PickUp Time	Drop Time
	Murarka	9:15	5:30
	Shivneri chowk	9:20	5:25
	Gandhi chowk	9:25	5:20
	Agrasen chowk	9:35	5:15
	MSEB chowk	9:40	5:10
	Watika	9:45	5:05
	Kashelani Petrol pump	9:50	5:00

With the help of implemented system we have taken some readings for students and parents in two situations

- 1) With using Application
- 2) Without using Application

Here are some readings taken for Students

FOR STUDENTS

Sr. No.	Condition	Students Name	Day	Boarding stop	Bus Timing	Time Calculated without using app reach at stop T1	Time Calculated with using app reach at stop T2	Difference between T1& T2	Remark
1	Bus Running Late by 2 min	Student 1	Day 1	Watika	9:45 AM	9:40 AM	9:45 AM	5 min	
2	Student Running late by 2 min	Student 2	Day 1	MSEB Chowk	9:35 AM	9:37 AM	9:35 AM	0	Bus Miss
Sr. No.	Condition	Students Name	Day	Boarding stop	Bus Timing	Time Calculated without using app reach at stop T1	Time Calculated with using app reach at stop T2	Difference between T1& T2	Remark
1	Bus Running Late by 4 min	Student 1	Day 2	Watika	9:45 AM	9:40 AM	9:47 AM	7 min	
2	Student Running late by 4 min	Student 2	Day 2	MSEB Chowk	9:35 AM	9:39 AM	9:35 AM	0	Bus Miss
Sr. No.	Condition	Students Name	Day	Boarding stop	Bus Timing	Time Calculated without using app reach at stop T1	Time Calculated with using app reach at stop T2	Difference between T1& T2	Remark
1	Bus Running Late by 5 min	Student 1	Day 3	Watika	9:45 AM	9:40 AM	9:48 AM	8 min	
2	Student Running late by 5 min	Student 2	Day 3	MSEB Chowk	9:35 AM	9:40 AM	9:35 AM	0	Bus Miss

In above table there are two conditions. In first condition the bus is running by 2 minutes and in second condition student is running late by 2 minutes. As we know the fix timing of bus at stop Watika is 9:45 Am and student use to reach their near about 9:40 am. Now if the bus is running late by 2 min the bus will reach at given stop at 9:47 am so without using application near about 5 minutes of student is wasted but if student is using application then he or she will come according to time and near about 5 minutes will be saved. On the other hand in other condition when student is running late by 2 minutes without using application, when student will reach at stop then he or she may come to know that the bus is missed. But with using application student can track the bus and rush toward the particular stop to catch the bus or student may already arranged private vehicle as they knows the bus is already missed. Same process the followed with other timings and each and every time more than 5 minutes is been saved with using application.

FOR PARENTS

Sr. No.	Condition	Students parent	Day	Boarding stop	Bus Timing	Time Calculated without using app reach at stop T1	Time Calculated with using app reach at stop T2	Difference between T1 & T2
1	Bus Running Late by 10 min	parent	Day 1	Watika	6:05 PM	5:55 PM	6:10 PM	15 min
1	Bus Running Late by 5 min	parent	Day 2	Watika	6:05 PM	5:55 PM	6:05 PM	10 min
1	Bus Running Late by 4 min	parent	Day 3	Watika	6:05 PM	5:55 PM	6:04 PM	9 min

For parents there is only one condition but still with using application it saves more than 9-10 minutes of parents when bus is running late by 10 minutes at the time of dropping the student from college to particular stop. So instead of waiting at stop parent can come on accurate time to pick up his/her child.

IV. CONCLUSION

The implemented system is intended to play an important role in real time monitoring and also intended to provide safety and secure solution to the students, staff and parents. The implemented System provides information of a bus like distance, position and time through a GPS module. The system is useful in much application such as surveillance, security and tracking. After the use of implemented system we observed that the system will save the maximum time (more than 5 min) of user as it is showing the exact location of bus. From all the observations we concluded that, the accuracy level of implemented system is more than adaptable ones.

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