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Real- Time Analysis And Simulation ofEfficient Public Transport Monitoring System

Masthan M[1],MdMosahid Raeen[2],Mirza NasimAkhtar Begg[3], Veeresh Patil[4]

[1,2,3,4]Department of Computer Science, East West Institute of Technology, Bengaluru, India

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Abstract— This project proposed a method for safety measures which are necessary while driving vehicles. Road safety rules can be useful up to some extent to get away from accidents. If any misbehaviour occurs in vehicle due to driver, then a message will go to nearest police station along with the problem specification. That particular message includes the location of the bus where it is occurred. Our system can also detect alcoholic person who has been entering into bus. The alcoholic person may be driver or may be passenger. In our Project MEMS sensor is used to identify whether an accident takes place or not. If an accident takes place, a message will go to nearestpolice station.This project focuses on the implementation of a Real-Time bus Tracking System (RTBTS), by installing GPS (Global Positioning System)-module devices on buses which will transmit the current location on the GPS Receiver.We are using RFID based authentication for both passengersand driver. Fire sensor is used to monitor the fire in the bus if fire occurs in the bus send intimation to the owner and fire station. If this misconception occurs, then that message will go to nearest police station. In this way, we are indirectly providing safety to passengers and bus.

Keywords—RFID based authentication,real-time information, Real-Time Bus Tracking System (RTBTS), GPS module.

I. INTRODUCTION

The GPS based system combines GPS technologies. It is widely used in many applications and millions of users are benefitted by it every day. The product is mainly intended to increase the security and safety amongst the transportation system. This vehicle-tracking device can be installed in any vehicle to prevent thefts or to monitor the route of the vehicle. Whenever a vehicle is stolen or is lost, the device will send the coordinates of latitudes and longitudes that will help to locate the vehicle on user‘s mobile. The tracking system covers most of the highways, major cities, towns and most of the accessible villages and works efficiently in areas with better mobile connectivity. This paper explains an embedded system, which is used to know the location of the vehicle using the popular and readily available technologies like the Global Positioning System (GPS) and Global System for mobile communication (GSM). The main feature of our design is that it proposed to use a development board, which will have GPS and GSM module not as a separated module but closely linked with a microcontroller as in TanotisGboard Pro GSM/GPRS SIM900 Development Board ATmega328 Microprocessor. The advantage of using that development board is that it will reduce the size of whole system and it will reduce the power loss in terms of heat through external wirings used for the connection of GPS module with the microcontroller. Along with that, it will also increase the durability of the entire system. The ATMega328 microcontroller will provide the interfacing to various hardware peripherals. To know the location of vehicle, the mobile user has to click on the Track location button in the android app.

When it comes to public transportation, time and patience are essential. In other words, many people using public transport buses have experienced time loss because of waiting at the bus stops. Millions of Peoples need to travel from one place to another every day.

In this paper, smart bus tracking system has been proposed that when any Passengerenter into bus the RFID will check the Authentication massage will updates to IOT and also arrival times, buses current locations, and bus routes on a map can be easily found out with the help of IOT. GPS (Global Positioning System) and Google maps are used for navigation.

Each RFID tag has an information about and individual Passengers which was sensed by an RFID reader transmit the corresponding information to IOT. The outputs of this controller board are given to Wi-Fi module and LCD display. This Wi-Fi modem can sends the information to IOT according to the received data.

The proposed system shows that the RFID tracking technology is a practical option for monitoring and tracking the Passengers during their trip to and from source to destination. The GPS Module is used for Live Tracking of the Buses and alerting if fire accident occurs and send a link to android app.This system also gives an alert if fire occurs in the bus.

II. RELATED WORK

Paper 1:"Real Time Bus Position and Time Monitoring System" IJSTE-International Journal of Science Technology Engineering, Volume 1, Issue 10, April 2015.
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 traveler 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

Paper 2: M. B. M. Kamel, "Real-time GPS/GPRS based vehicle tracking system," International Journal Of Engineering And Computer Science, Aug. 2015"
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 it to 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.

Paper 3:"Real Time Availability System" International Journal of Advanced Research in Computer Engineering Technology (IJARCET) Volume 4 Issue 3, March 2015,
This Paper is a survey to implement a method that makes 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 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. These methodologies 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. METHODOLOGY

The objective of this proposed system is to develop an application which will help to provide security for peoples. This allows relations to check the status of secure smart bus by using Iot. The proposed system will provide various facilities like check drunk and drive, Fire Detection, accident emergencies, panic button, logistic management etc.

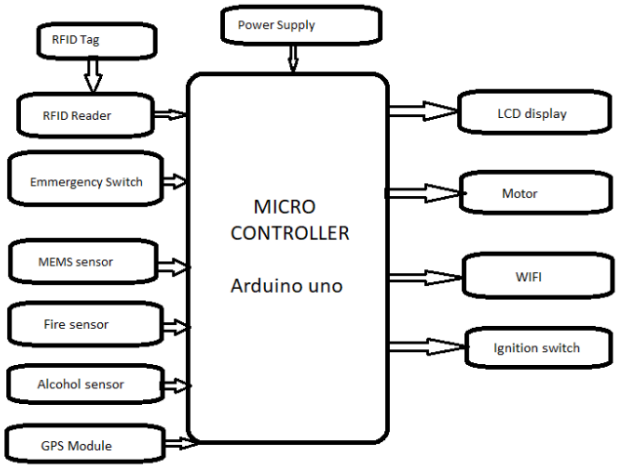


Fig1:Block Diagram

In this system Arduino microcontroller has been used. Bus unit consists of RFID Reader, different sensors and GSM module to issue the alert messages to parents when their children boards or leaves the bus. Fire sensor will be placed within the bus unit to detect fire and issues alert messages by giving the location of the bus using IOT.

In this system fire sensor is used to detect the fire accident. If there any fire accident occurs, the sensors receives a physical signal and transmit a digital signal to a Wifi module. The alert message will be send to the Relations with the help of IOT. Each Passenger consist of an individual RFID tag with the help of RFID tag, IOT.

The information of RFID tag is read by RFID reader. The reader transmits the corresponding information. RFID tag is used to send an alert message like the location of a person, speed of the bus to their respective Relations and departments.

LCD stands for Liquid Crystal Display is a flat panel display technology commonly used in TVs and computer monitors. It is also used in screens for mobile devices, such as laptops, tablets, and smart phones. The backlight in liquid crystal display provides an even light source behind the screen. This light is polarized, meaning only half of the light shines through to the liquid crystal layer. The liquid crystals are made up of a part solid, part liquid substance that can be "twisted" by applying electrical voltage to them. They block the polarized light when they are off, but reflect red, green, or blue light when activated.

A DC Power Supply Unit (commonly called a PSU) deriving power from the AC mains (line) supply performs a number of tasks: It changes (in most cases reduces) the level of supply to a value suitable for driving the load circuit. It produces a DC supply from the mains (or line) supply AC sine wave. It prevents any AC from appearing at the supply output. Power supplies in recent times have greatly improved in reliability but, because they have to handle considerably higher voltages and currents than any or most of the circuitry they supply, they are often the most susceptible to failure of any part of an electronic system.

GPS is a satellite navigation system used to determine the ground position of an object. Each GPS satellite broadcasts a message that includes the satellite's current position, orbit, and exact time. A GPS receiver combines the broadcasts from multiple satellites to calculate its exact position using a process called triangulation.

The proposed Bus Monitoring system has six modules are as follows:

1. Arduino UNO

The arduino Uno is a microcontroller board based on the ATmega328, It has 14 digital input/output pins, 6 analog input, a 16 MHZ crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The Uno differ from all preceding boards in that it does not use the FTDI USB to serial driver chip.”UNO” means one in Italian and is named to mark the upcoming release of arduino 1.0. The Uno is the latest in a series of USB Arduino boards and reference model for Arduino platform. The Arduino Uno can power via the USB connection or with external power supply. External power can come either from an AC to DC adapter or battery. The board can operate on an external supply of 6 to 20 volts. If supply with less than 7v, however, the 5v pin may supply less than five volts and the board may be unstable. The Ttmega328 has 32 KB of flash memory for storing code .It has also 2KB of SRAM and 1KB of EEPROM. The Arduino software includes a serial monitor which allows simple textual data to be send to and from the Arduino board, The RX and TX LEDs on the board will flash when data is being transmitted via the USB to serial chip and USB connection to the computer.

A Software Serial library allows for serial communication on any of the UNO’s digital pins, the arduino software includes a wire library to simplify use of the I2C bus. Arduino is open source hardware and software, which are license under the GNU lesser General public license, which is permitting the manufacture of Arduino board and software distribution by anyone.

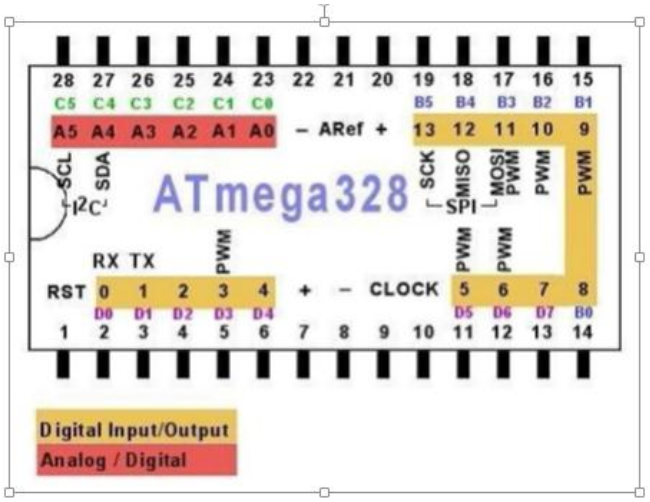


Fig 2:Atmega328 Micro controller

The Arduino are programmed using a dialect of feature from programming language C and C++. In addition to using traditional compiler tool chains, the Arduino provide integrated development environment (IDE) based on processing language project [1].

2. DC MOTOR:
DC motors are used to physically drive the application as per the requirement provided in software. The dc motor works on 12v. To drive a dc motor, we need a dc motor driver called L293D. This dc motor driver is capable of driving 2 dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can also provide the back EMF protection suit by connecting 4 diode configurations across each dc motor.

3. SENSOR:
MEMS Sensor gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose. MEMS Sensor is used to detect Earthquakes, to check whether the machine is working properly or not and gas shutoff.

In our Project MEMS sensor is used to identify weather the vehicle is safe side or met an accident. Private Travel Buses contains actuators. We will attach MEMS sensor to this actuators. When these actuators behavior is somewhat different from routine one then MEMS sensor will get activated and the corresponding status signal will goes to ARDUINO.

4.ALCOHOL SENSOR:
This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

In our project Alcohol sensor detects, weather the driver is alcoholic or not. If driver is in alcoholic state then alcohol sensor sends this status to ARDUINO. Then ARDUINO sends corresponding error message to IOT through WIFI Module. This alcohol checking takes place after swiping RFID card.

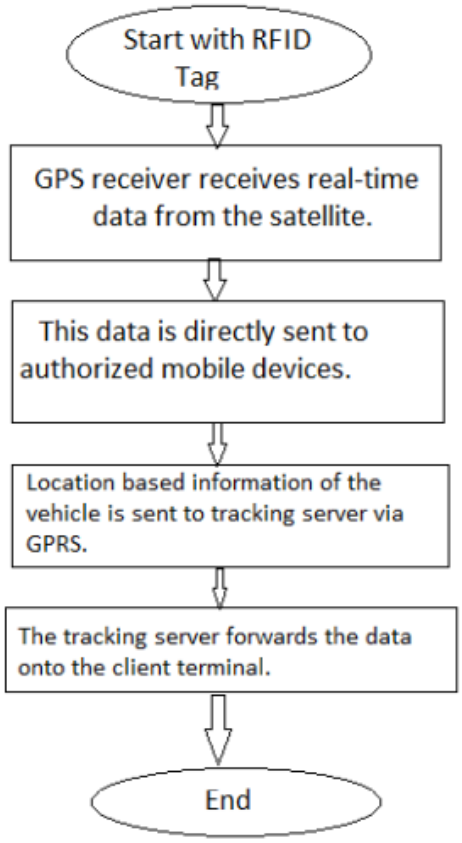
5.RFID(Radio Frequency Identification):
Radio-frequency identification (**RFID**) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by-electromagnetic induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader and may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

1) Tags
RFID tags having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user.
RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory.

2) Readers
In our project, RFID tag is used for authentication purpose. To activate our entire system, we have to swipe RFID tag near RFID reader. If Tag details persists in the database of ARDUINO, then micro controller allows the driver to pass vehicle through 1st tollgate. After reaching 2nd tollgate, we have swipe the same RFID tag once again at Tollgate 2. Here, time difference between two stations will be calculated. If time difference between two stations is more than 1hour, then there is no problem. That means, driver is driving the vehicle with safe speed. If time taken from tollgate1 to tollgate2 is less than 1hour, then we can said that driver is driving vehicle with over speed. Like this the same process repeated for every 100km distance. Because of this, driver does not sleep while driving.

6. LCD Module:
LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:
The declining prices of LCDs. 2.The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.

1. **Flow Chart:**



Algorithm 1: Bus Tracking Algorithm

Input:

Routing Table entries:

Node ID:

Longitude:

Latitude:

Output:

step1:start

step2:Get longitude and latitude values using GPS module and send it to Microcontroller

step3:microcontroller send this information to GSM module.

step4:GSM module send this message to mobile device.

step5:stop.

Algorithm 2: Fire Sensor

- Input:

  Flame temperature:

  Environment temperature:

Output:

- Step 1: start
- Step 2: if(Ft > Et)
- Step 3: alarm on and send message to nearest police station and hospital through GSM module.
- Step 5: stop

IV. RESULTS AND DISCUSSION

It should include important findings discussed briefly. Wherever necessary, elaborate on the tables and figures without repeating their contents. Interpret the findings in view of the results obtained in this and in past studies on this topic. State the conclusions in a few sentences at the end of the paper. However, valid colored photographs can also be published.

V. CONCLUSIONS

In this papers, we develop the "Real Time Analysis and Simulation of Efficient Public Transport Monitoring System" in that mainly we focused on the accuracy of location and calculations of time, coordinates and simple user interface. This system save the time and increase the work efficiency of end users because it reduces the user's efforts to travelling for work and avoid the wastage of waiting time for bus. It also consider the points that is Robust, Reliable and efficient for travelling in city.

The functionalities are better more accurate than those provided by the arduino based systems as notifications can be instantly cleared whereas GSM systems spam the information.

VI. FUTURE SCOPE

This software could be modified and developed for future use. Provisions for detecting theft, restricting entry and verifying assigned passenger list on id can be added.
The RFID can be replaced with a better reader or more reliable identification methods like biometric identification.

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Authors Profile

Mr Masthan M is pursuing his 8 semester B.E. in Computer Science & Engineering at East West Institute Of Technology, Bengaluru, India. His area of interest includes Internet of Things(IOT),Web Development,Big Data.

MrMd Mosahid Raeen is pursuing his 8 semester B.E. in Computer Science & Engineering at East West Institute Of Technology, Bengaluru, India. His area of interest includes Internet of Things(IOT),Python and Java.

Mr Mirza Nasim Akhtar Begg is pursuing his 8 semester B.E. in Computer Science & Engineering at East West Institute Of Technology, Bengaluru, India. His area of interest includes Internet of Things(IOT),Big Data and Machine Learning.

Mr, Veeresh Patil got M.Tech degree in Computer Science, Bengaluru, India. He is currently working as Assistant Professor in the Department of CSE, EWIT.His area of interset includes Image processing,Machine Learning.

