GSM Based Bus Location Identification System

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Abstract

The goal of this paper is to provide the current bus status to the people without accessing the internet. Currently, bus route timetables are available inside the buses and at the bus stop, but many users forget the timings when they need. An innovative system to provide the location of the buses in and around the city is presented in this paper. This system proposed to know the status of the bus in anywhere by using GSM TECHNOLOGY. GSM (Global System for Mobile Communication) is widely used for alerting system. Alerting system is essential for providing the location and information about vehicle to passenger and also provides the information during the emergency periods. RF transceiver (Radio Frequency) is used for monitoring.

Keywords: Global System for Mobile Communication, RF transceiver, ATMEL Microcontroller

I. INTRODUCTION

Transport is one of the important infrastructures of any country. The major issue in our fast developing environment is population because of that the usage of vehicle is increasing day by day. The public transportation plays a very important role in day to day life. The main use of using the public transport is uncertainty of waiting at bus stops[4], due to traffic jam or any other issues the bus will get stuck, out of all these the public people will be affected. This paper helps to overcome all these issues. To avoid the waiting time for bus many people use their own vehicles for travel. It leads the increasing of pollution and also traffic problems. In the existing system, different tracking techniques are used such as integration with Google maps and using RFID. In this system RF transmitter and receiver is used in bus stop and bus. The input section consists of data, transmitted from the RF transmitter, sensors, control switches and message from GSM. The output section consists of reply message to user. Radio Frequency Identification is wireless identification technology that has been used in many fields. Alerting system uses GSM for sending information to user about the exact location of vehicle. The system takes advantage of wireless technology in providing powerful management transportation engine. The use of GSM technology allows the system to track vehicle and provides the most up-to-date information about ongoing trips [3]. This system finds its application in real time traffic surveillance. Additionally, this has some features as that send the information to several control rooms during the emergency periods (if accident, fire, traffic jam or breakdown happens). Main advantage of this system is access the whole system without using internet and also time efficient.

II. LITERATURE SURVEY

Tracking of a vehicle can be expressed as continuously monitoring the vehicle. One of the possible reasons for people preferring the private vehicles over the public vehicles is that a passenger normally does not have exact information about the public vehicle arrival timing at their stops. By providing reliable public vehicle arrival information to the passengers at predefined stops, it is expected to improve the public vehicle occupancy. This is beneficial to both the passengers and public transport corporations. Tracking of buses can be useful for the automation of existing transportation systems [2]. By the use of tracking the information about bus-arrival timing can be easily provided to the passengers. The different wireless technologies available today have resulted in the reliable and faster communication. GSM is an open, digital cellular technology used for transmitting mobile voice and data services [6]. It operates at either the 900 MHz or 1800 MHz frequency band, in addition there are two others frequency bands but most common are mentioned above. The transmission rate of GSM is 270 kbps. The GSM modem utilized the GSM network to send the location of the accident. The modem can be controlled by the microcontroller [7].A wireless radio frequency (RF) transmitter and receiver can be easily made using HT12D Decoder, HT12E Encoder and ASK RF Module. Wireless transmission can be done by using 433MHz or 315MHz ASK RF Transmitter and Receiver modules. In these

modules digital data is represented by different amplitudes of the carrier wave. Hence this modulation is known as Amplitude Shift Keying (ASK). Radio Frequency (RF) transmission is more strong and reliable than Infrared (IR) transmission due to following reasons:

- Radio Frequency signals can travel longer distances than Infrared.
- Only line of sight communication is possible through Infrared while radio frequency signals can be transmitted even when there is any obstacle.
- Infrared signals will get interfered by other IR sources but signals on one frequency band in RF will not interfered by other frequency RF signals.

III. EXISTING METHODOLOGY

Existing method is based on safety of children traveling through school buses [1]. The ARMSTM32 controller is used to control the GPS and GPRS. Main operation of this system is to access the children's fingerprint by using the biometric sensor. Through the internet connection, all information's like location of the bus, pick and drop points are updated to a server. Parents can see the status of their children through an android application. This system can overcomes the limitations of memory, cost of system, performance, power consumption, reliability, compactness and good look. This system will increase the performance and reliability of school bus security system. With such system parents can know route of the bus, location of the bus, pick and drop point of their children status, without any trouble. Hence need of such system in modern busy life is very essential. The disadvantage of this system,

1) It doesn't access without internet and it needs an android application then only the parents can be able to see their children's location.
2) This system must need one manual access to monitoring the children to put the fingerprint and also ensure the children whether they are inside in the bus or not.

Every bus is equipped with GSM and GPS modules interfacing with the micro-controller embedded board for the purpose of identification of bus position [2]. And also, every bus contains an LCD display and voice processor unit for displaying and announcing the upcoming stations details. Each and every bus stop is having GSM and GPS receivers to receive the information about the bus position and an LCD display to display the number of seats available in the bus. The main disadvantage of this system is,

1) The available seats and upcoming stations are visible only inner side of the bus passenger.
2) This system also requires internet connection and also it is cost effective.

The system designed in [6] depends upon GSM system and RFID for its operation. In this system, 8 channel Radio transmitter and receiver with short range of meters are used to get information about the presence of vehicle near the bus stop, which is further communicated through GSM module. Several components are used in this tracking system. For identification, every vehicle has been provided with 8 bit RF transmitter. Different 8 bit words are transmitted by the buses of different routes. The buses of same route may have same transmitting code if there are large numbers of public vehicles to be tracked in large cities. We have used the microcontroller unit which integrates RFID receiver and GSM unit placed at every bus stop. Every bus stop has 8 bit RF receiver along with GSM modem installed to send and receive data. Whenever any bus comes within the range of about 100 feet of the bus stop, the receiver receives the 8 bit word sent by the transmitter in a bus, which is kept continuously on. Thus information routing is done using the microcontroller unit which integrates RFID receiver and GSM unit placed at every bus. The microcontroller units used at different bus stops are programmed such that they contain GSM number of the modems placed at further bus stops. The communication between microcontroller and modem is done using USART (Universal Synchronous Asynchronous Receiver and Transmitter). The interfacing of RF receiver data with GSM modem is done using microcontroller unit. The eight bits signal received at receiver are then sent to microcontroller which decodes it and depending on the bits received sends the AT commands to the GSM modem required for forwarding vehicle location information to central server and next stops.

IV. PROPOSED METHODOLOGY

The proposed methodology depends upon GSM system and RF transceiver for its operation. In our system, we have used the text-based data via the short message service enabled by the standard cellular phone communication network of GSM which provides a low-cost, effective solution in an urban area with an extensive coverage of mobile phone. GSM is used as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. In addition to that some other important applications, such as fire and vibration sensors and the control switches are implemented. By using this, user can easily identify the current status of bus automatically and that status also sends to the some respective medium. So that the system is very time efficient and each and every person can able to access in all mobile phones. The Figure.1 shows the transmitter section in bus stop and Figure.2 describes the processor block in the bus.

A. Block Diagram

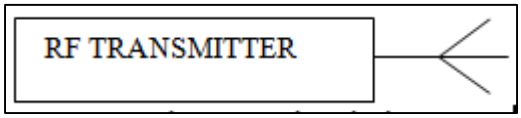

Fig. 1: Transmitter Section in Bus Stop

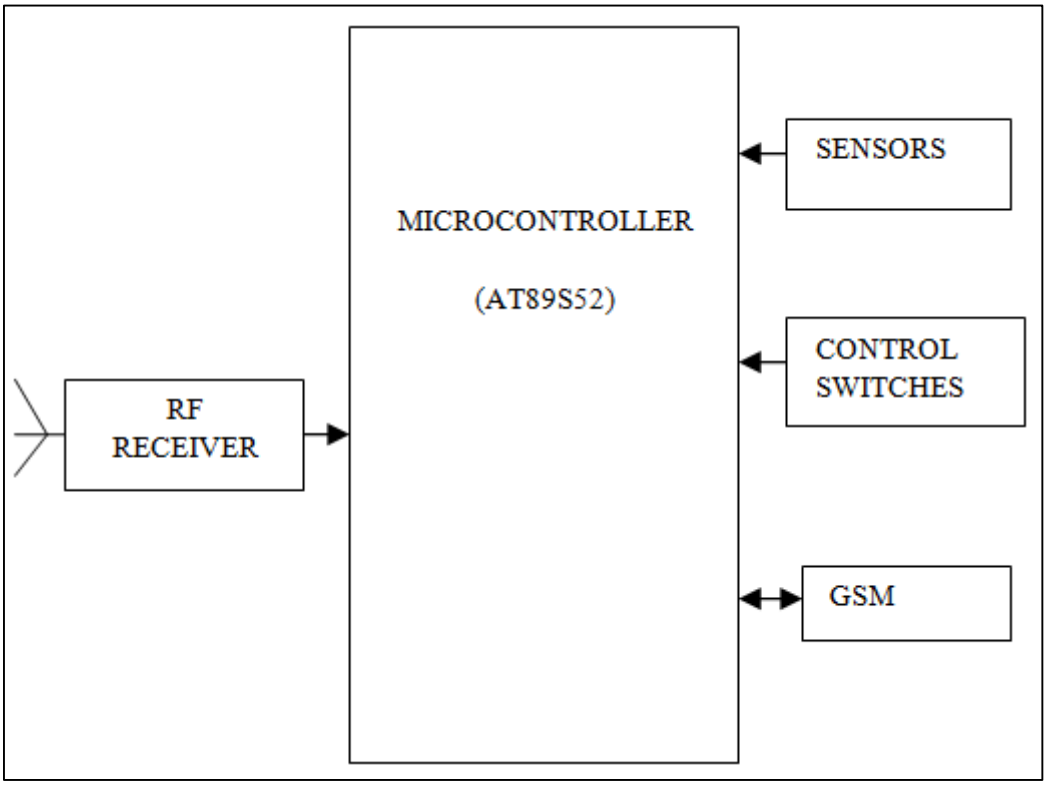

Fig. 2: Processor block in the bus

B. RF Module

It comprises of an RF Transmitter and an RF Receiver. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434MHz. The RF transmitter always remains ON so that it can be identified by RF receivers located at every bus, whenever it is in proximity of few feet. That current location updated into the RF receiver that information is sent to user through GSM [5]. The RF transmitter receives serial data and transmits it wirelessly through its RF antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. RF can travel through large distances making it suitable for long range applications. Figure.3 shows the RF receiver interfaced with GSM.

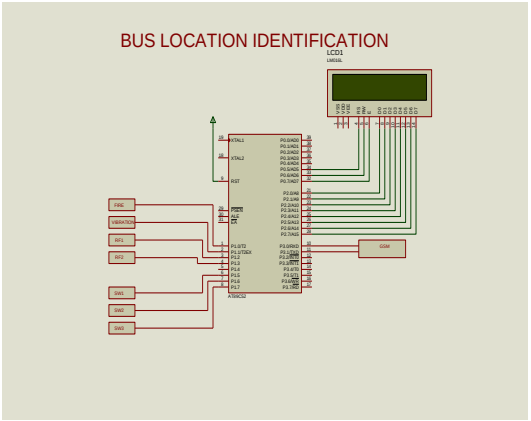

Fig. 3: RF receiver interfaced with GSM

C. *Working of Proposed Project*

The project module consists of GSM technology, 8051 family microcontroller (AT89S52), 433MHz ASK RF transmitter and receivers. The system is to reduce the waiting time for bus by providing the bus location through the GSM without using internet. Here, very bus stop is equipped with RF transmitter interfacing with microcontroller for the purpose of transmitting the information (bus stop name). And every bus is equipped with the RF receiver and GSM interfacing with the microcontroller. When the bus reach the bus stop the RF receiver receives the information. The interfacing of RF receiver data with GSM modem is done using microcontroller unit. The eight bits signal received at receiver are then sent to the microcontroller which decodes it and depending on the bits received sends the AT commands to the GSM modem required for forwarding vehicle location information to user. If the user needs the bus location means they send the request message at the same time they receives their reply message. To test the functionality of the system we placed the RF transmitter at some distances. While the vehicle was moving vehicle's current location was reported to the user when they need. The SMS received by the modems located at different bus is sent to the microcontroller unit. The microcontroller unit analyzes the received message through GSM modem and decodes the information being sent in the form of message. Finally, information about the bus arrival is sent to the user.

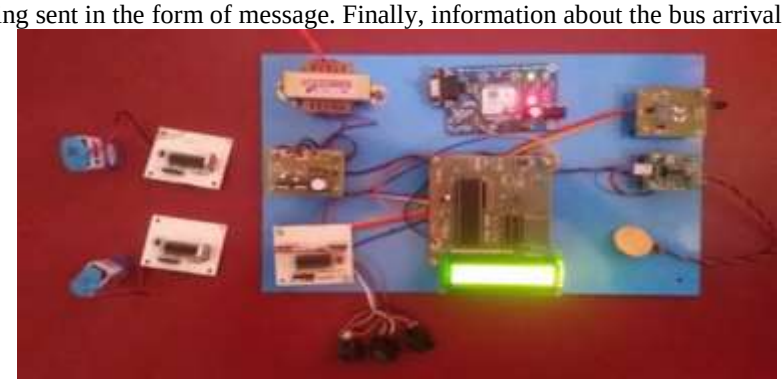

Fig. 4: Hardware module results

Additionally, we developed some other applications by using this GSM and adding some components such as sensors (fire and vibration) and control switches that intimates the information automatically during the emergency periods. In real time, the vibration sensor has a threshold level of 25mA and the fire sensor has a limit of 40o-45oC. When this limit is exceeds the sensors will be turn on. The three control switches are placed in the driver side for the purpose of intimating the bus condition while the bus is in traffic, breakdown and the bus in off state.

V. CONCLUSION

The Rapid growth of technology has made our life easier. This advancement in technology has also increased the traffic hazards. Hence, the ratio of road accidents and sudden fire accident frequently increases. This causes immense loss of life due to poor emergency facilities. The system proves to be very successful and can be easily implemented in real time. This paper provides a solution for accident detection for human life safety also. Tracking system is becoming increasingly important in large cities and it is more secured than other systems. It is completely integrated, so that once it is implemented in all vehicles, then it is possible to trace anytime from anywhere. It has real-time capability, emerges in order to strengthen the relations among people, vehicle and road by putting modern information technologies together and able to forms a real time accurate, effective comprehensive transportation system.

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