Abstract
In this dynamic life where everyone is in a hurry to reach their destinations, waiting for bus is hectic and even many of us are unaware of the bus timing. To overcome this difficulty, an easy system is proposed in this paper to aid tracking real time bus location. The proposed method takes advantage of GPS in the mobile of the driver to provide current location of the bus to the user app via server. The system consists of two sides, server side and client side. The server device’s main responsibility is to provide the exact location of the bus to the server. If client’s device is an android based smartphone, they can install our application to track bus location using internet service and also book seats. The server’s device will be placed on the vehicle of interest with android application installed on it.

1. INTRODUCTION
This paper describes a vehicle tracking system. The vehicle tracking system shows the movement of a vehicle on a map. A normal vehicle tracking system consists of a vehicle component usually a GPS or location tracking system. It collects and sends geographical information to a server at periodic intervals. The server stores the geographical information. As population is burgeoning, there is an increase in the number of vehicles on the road and hence an upsurge in the problems associated with traffic management, especially the Public Transport. There is also an increase in the number of accidents and various other traffic related issues. Intelligent Transportation System (ITS) provides the
solution to most of these problems by integrating existing technologies with the underlying infrastructure. With the advent of mobile technology and the ubiquitous cellular network, real time vehicle tracking for efficient transport management has become viable. The futile long wait for a bus to arrive can be avoided by Intelligent Public Transportation System. The omnipresence of Smart Phones and their ever-increasing power at a very economical price makes them one of the most attractive options for developing IOT applications. Here, an approach based on the combination of technologies like GPS and Android is discussed which can assuage passengers who commute by the means of public transport. The user is furnished with explicit information about the current location of nearest buses approaching the bus-stop on a mobile application. Using readily available Android 1API’s, technologies like 3G network and SMS based services in the existing mobile phones can reduce the cost and size of hardware required, as well as lead to a better output.

2. METHODOLOGY

2.1 Arduino mega
The Arduino Mega 2560 is a board based on ATmega 2560 controller. It has 54 digital input/output pins of which 15 can be used for PWM outputs, 16 analog pins, 4 UART, 16Mhz crystal oscillator, USB connection and power jack and reset button. It contains everything we need to support the microcontroller. Arduino Mega 2560 is compatible with the most Shields designed for Arduino Uno and the former boards Duemilanove.

2.2 Ultrasonic Sensor
Ultrasonic detection is commonly used for range detection and detects hidden cracks in various materials. For this purpose, laws of physics which are indicating the propagation of sound waves through solid materials have been used since ultrasonic sensors using sound instead of light for detection. Ultrasonic sensor necessarily consists of a transducer for conversion of one form of energy to another, a housing enclosing the ultrasonic transducer and an electrical connection. The sensor sends out the sound waves at a specific frequency. It then waits for specific sound waves to reflect off an object and comeback. This sensor keeps track of time between transmitted and reflected waves. This sensor chosen for this project is HC-SR04.

Distance can be calculated by using the formula:

\[ D = \frac{V \times T}{2} \]

Where

D- Distance to be calculated
V- Speed of the sound.
T- Time taken between transmitted and reflected waves.

2.3 LCD Display
A liquid crystal display (LCD) is a type of device which uses the light modulating techniques of liquid crystals. They are semi-solid crystals arranged on substrate. Liquid
crystals do not emit light directly, they are the medium that helps the light to bend or rotate. LCD screen consists of large number of small pixels, each having a combination of red green and blue sub-pixels. LCD uses the properties of persistence of vision of human eye due to which we see the video. LCD module is made up of mesh of liquid crystal and arranged in front of a light source which is at the bottom of the screen. The reflector is used to spread the light evenly through the screen area. A liquid crystal cell consists of thin layer of a liquid crystal sandwiched between 2 glass sheets with transparent electrodes deposited on their inside faces. Where the both glass sheets are transparent, the cell is known as transmitting type cell, when one of the glasses is transparent and other has a reflective coating the cell is called reflective type. The LCD dose not produces any illumination of its own.

2.4 Bluetooth Module

HC-05 module is a Bluetooth Serial Port Protocol Module which is designed for wireless serial connection setup. Bluetooth transits information through low power radio waves. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced data rate) 3mbps modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR core 04 external single chip Bluetooth system with CMOS technology and AFH (Adaptive Frequency Hopping Technique). The Bluetooth is Master/Slave Module, the default setting is SLAVE. The SLAVE module cannot initiate connection to other Bluetooth devices, but can accept connection. MASTER module can initiate connection to other devices. Bluetooth operates at a frequency between 2400MHz to 2483MHz including guard bands. It uses radio technology called Frequency Hopping Spread Spectrum (FHSS). The Bluetooth separates the transmitted data into different packets and transmits each of the packets in one of the 79 designated Bluetooth channels. Each of the channels has bandwidth of 1MHz and uses 2MHz spacing. It usually performs 1600 Hops/second.

2.5 RFID Module

The RFID reader is used to read out a certain code, which is sent from RFID transmitter (also called as a RFID tag) by radio. Each RFIF tag has only one unique code. The RFID kit is useful to realize projects like bill payment, locking mechanism etc. RFID tag may come in different shapes like key chain or a card in credit card format. In this project we use RFID to pay for tickets.

3 DESIGN OF THE SYSTEM

Whenever a passenger enters the bus, they are required to swipe the RFID card in order pay for their journey in the bus. The ultrasonic sensors are mounted above each seat, when a passenger sits on the seat the ultrasonic sensor detects this and updates the information to the server indicating that this seat has been occupied. In the passenger android application side, the passenger will be able to get the information of the bus such as exact
location of the bus, number of seats available to book, cost of the journey. This information is updated by the application provided to the drive.

Figure 1: Block Diagram

Figure 2: Flow Chart of Passenger App
The above flowcharts show the working of the passenger application which is used to book ticket and track the location of the bus. The user has to login using his mobile number which is already registered, else they have to register it before login. They will receive the OTP when logging in which has to be entered and verified. The application will fetch the current location of the user via mobile GPS and will be asked to enter the destination. He has to select the bus by which he wants to travel and check for the available seats and book the ticket, the payment is also done through the app via debit/credit card. All these details will be updated to the server.

![Flow Chart of Driver App](image)

**Figure 3: Flow Chart of Driver App**

The figure 2.6.2 represents working of the driver app which is used for monitoring and updating the information from the bus to the server, this data is provided to the user app. The user has to enter his mobile number to login; he will receive an OTP (one time password) which is generated by the server. The diver’s application receives update from the ultrasonic sensor which indicates the availability of seats and it also checks for the payment done via RFID card and all these information is updated to the server.
RESULT

Figure 4: Login Screen Of Driver And Passenger App

These are the login screen for the application shown in figure 3.1 which then show the information of bus. There are two types of login for bus driver and another for passenger. When the driver logs in with his username and password it will direct them to this page. The driver will have the facility to upload the information to the server, information such as which seats are available to book, live location of the bus, journey details. When the driver logs in with his username and password it will direct them to this page. The driver will have the facility to upload the information to the server, information such as which seats are available to book, live location of the bus, journey details.

Figure 5: Screen after Logging in for Admin User
Once the passenger logs into the app they will get to enter the start and destination of their journey. After they enter the destination app will direct them to next page which shows the route on the map and displays the buses traveling through that route, cost of the trip, time required. If the passengers wish to travel through a particular bus then they have to select the seat which is available and make payment.

![Image](image_url)

**Figure 6: Option To Track The Bus and Book Seats**

5 CONCLUSION

The proposed system is a Bus tracking System Application that has its client side on the Android platform. The accuracy of this system relies on the GPS coordinates generated using the bus drivers phone. This system uses Arduino for a website-based vehicle tracking system that can be used for all type of vehicles. Ease of travel for the travelers could be enhanced by locating the current position of the vehicle, book tickets online using an app and RFID card for non app users for ticket payment. 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 monitor vehicle continuously.
6. REFERENCES


