

## Real Time Tracking System

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**Abstract** –One of the mankind’s most unfulfilled desires on this planet has been the ability to track, trace and control anything by anyone from anywhere. The use of GSM and GPS technologies can be a better solution for many unsolved problems. Firstly, using GPS we can get the current location of the vehicle and some additional features controlling parts of subsystem via GSM using SMS or GPRS which are integrated with Raspberry Pi. It sends data to the cloud. Secondly, it sends fuel status of the vehicle to the college. It also has emergency handling system which will send alert messages to college in case of accidents. This system is efficient and cost effective.

**Key Words:** GSM, GPS, Raspberry Pi, Cloud, Fuel indicator, Emergency alerts

### 1. INTRODUCTION

The safety of public and private vehicles is very important nowadays so having a GPS tracking system in a vehicle can ensure their safety. The automated vehicle tracking system can resolve following problems such as fuel indication, assigned routes attendance of the students and emergency alerts, and once it is implemented in the vehicle according to its necessity then it is easy to track vehicle anytime.

The real time tracking of the bus can be done by using this system and this information is given to a remote user who wants to get the information. This will make the college transport system smooth and passenger friendly.

### 2. PROJECT REVIEW

In our project we are using Raspberry Pi 3B+ model which is the main control unit of the overall system. We have interfaced some modules such as GPS, GSM, RFID reader and also the Fuel indicator. The Raspberry Pi will get the data from respective modules viz GPS, GSM, Fuel indicator and even RFID reader and send it to cloud. The same data will be sent to college server and parents when they request to get the information. The location coordinates will refresh after every 5 seconds. Also, the emergency handling switch is installed to send the alerts when in emergency.

### 3. PROPOSED SYSTEM

Proposed System is the Real Time Tracking System that sends the real time data of the vehicle to the cloud. The data includes location coordinates, fuel indication, attendance of the students and even emergency alerts. It makes sure the safety of the vehicle as well as students.

### 3.1 SYSTEM REQUIREMENTS

#### 3.1.1 Raspberry Pi 3B+



Fig-1:Raspberry Pi

The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games.

#### 3.1.2 RFID Module

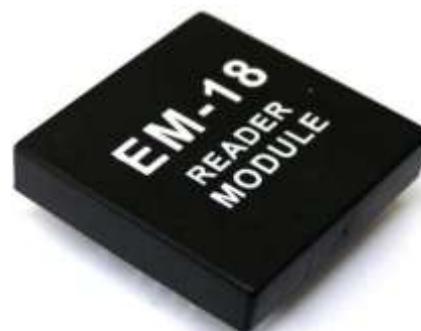


Fig-2:RFID Module

RFID (Radio Frequency Identification) uses electromagnetic fields to read, monitor and transfer data from tags attached to different objects. It is not necessary that the cards are to be in visibility of the reader, it can be embedded in the tracked object. The tags can be actively powered from a power source or can be passively powered from the incoming electromagnetic fields.

### 3.1.3 SIM808



Fig-3:SIM 808 Module

SIM808 module is a GSM and GPS two-in-one function module. It is based on the latest GSM/GPS module SIM808 from SIMCOM, supports GSM/GPRS Quad-Band network and combines GPS technology for satellite navigation.

### 3.1.4 LCD Display Module

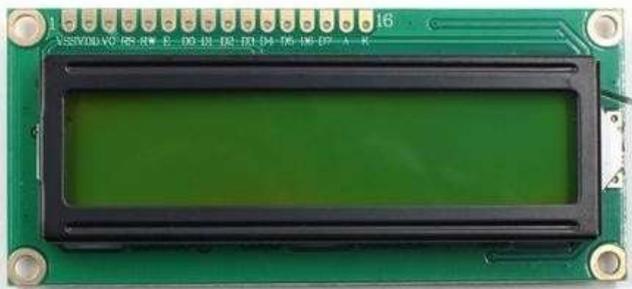


Fig-4:LCD Display Module

LCD display having 16 pins which are connecting to first section and also to another section. At first LCD will display message as 'Place your card'. Once the student place the card on RFID reader it displays 'Processing'. Then if the name is found in the database it displays 'Welcome "Name of the student"' and if the name is not found it displays the message as 'Invalid Card'.

### 3.1.5 Fuel sensor



Fig-5:Fuel sensor

Fuel level sensor passes the information on raising or lowering fuel level or volume in tank to tracking device. Vehicle tracking system with the help of GPS determines the location and time.

The user of a system receives information about changes in fuel level in the form of parameters or Graphs.

### 3.1.6 Emergency Switch



Fig-6:Emergency Switch

An emergency stop push button is a fail-safe control switch that provides both safety for the machinery and for the person using the machinery. The purpose of the emergency push button is to send the alert message to the college server in case of any emergency.

### 3.1.7 Python



Fig-7: Python symbol

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). Python is a powerful modern computer programming language. It bears some similarities to Fortran, one of the earliest programming languages, but it is much more powerful than Fortran. Python allows you to use variables without declaring them and it relies on indentation as a control structure. You are not forced to define classes in Python (unlike Java) but you are free to do so when convenient. Python was developed by Guido van Rossum, and it is free software. By learning Python you will also be learning a major tool used by many web developers. Python has topped the charts in the recent years over other programming languages like C, C++ and Java and is widely used by the programmers.

### 3.1.8 Raspbian OS

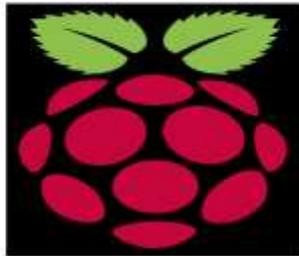


Fig-8: Raspbian OS symbol

Raspbian is the free and foundation’s official supported operating system based on Debian optimized for the raspberry pi hardware. Raspbian provide more than pure OS if compare to the other operating system. It comes with over 35000 packages, precompiled software bundled in a nice format for easy installation on raspberry pi. Software like python IDE, Scratch and more are included in this OS. Raspbian is a community project under active development, with an emphasis on improving the stability and performance of as many Debian packages as possible.

### 3.1.9 VNC Viewer

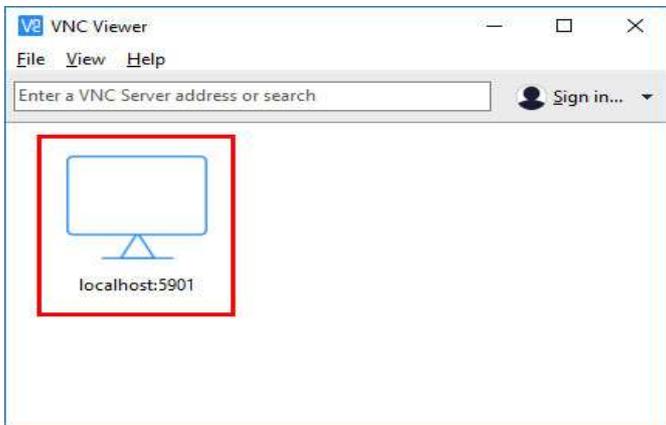


Fig-9: VNC Viewer

Virtual Network Computing (VNC) is a graphical desktop-sharing system that uses the Remote Frame Buffer protocol (RFB) to remotely control another computer. It transmits the keyboard and mouse events from one computer to another, relaying the graphical-screen updates back in the other direction, over a network. Multiple clients may connect to a VNC server at the same time. Popular uses for this technology include remote technical support and accessing files on one's work computer from one's home computer, or vice versa. VNC Connect from Real VNC is included with Raspbian. It consists of both VNC Server, which allows you to control your Raspberry Pi remotely, and VNC Viewer, which allows you to control desktop computers remotely from your Raspberry Pi should you want to.

### 3.1.10 Balena etcher



Fig-10: Balena etcher

BalenaEtcher is a free and open-source utility used for burning image files such as .iso, .img files and zipped folders to create live SD cards and USB flash drives. In this tutorial we are using balenaEtcher to burn our Raspbian operating system on our SD card. Etcher is a free tool for flashing microSD card with the operating system images for Raspberry Pi single board computers. The user interface of Etcher is simple and it is really easy to use. It is a must have tool if you're working with a Raspberry Pi project. I highly recommend it. Etcher is available for Windows, macOS and Linux. So you get the same user experience no matter which operating system you're using.

### 3.2 Block diagram

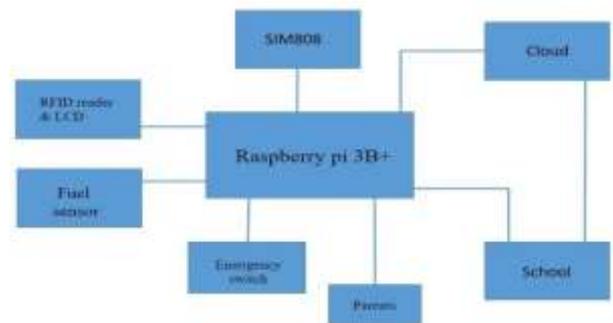


Fig-11: Block diagram of system

From the above figure it can be considered that the Raspberry pi module is the main control unit in the entire system. All other modules and sensors interface with the main unit viz Raspberry Pi. This system is used for tracking real time data of the vehicles. SIM808 module consists of GSM and GPS which is used for sending short message service and location coordinates to the user when they send request to get the data which has a refresh rate of 5 seconds. RFID and LCD modules consist of EM18 RFID reader and LCD display which is used for Attendance System that displays name of the particular student on LCD screen. Next, is Fuel sensor which is used for indicating fuel level of the vehicle sends data to the server. Emergency switch is used for sending emergency alerts whenever necessary. Also, cloud is used for uploading different sensors and student’s data. School’s server system is connected

with the main system and cloud. Also, parents have the access of the main system to know the exact location of their child. We can customize this system by interfacing different sensors and modules and making necessary modifications according to the requirements of the user.

## 4 METHODOLOGY

Firstly, setup Raspberry Pi by formatting memory card and then installing Operating System on memory card. Also, create notepad file for configuring network and SSH file that allows you to set up a per-user configuration file where you can store different SSH options for each remote machine you connect to. Then insert memory card into raspberry pi and reboot it. After that enable configuration of all interfacing modules and again reboot it. Then install all libraries which are required for the project. Write the code and debug it.

Firstly, we have attendance system which consists of RFID reader module and LCD. When student place his/her id card which consists of RFID tag, the particular information corresponding to the tag viz Name of the Student which is stored in database and their current location is sent to their parents. At the same time student's name is displayed on LCD screen. If student's data is not found in the database then it is displayed as invalid card. Attendance system can be installed at doors where students enter into bus. This system is used for monitoring student's presence and to check how many seats are filled in the bus. This every single bit of data is sent to cloud.

SIM808 module is a combination of GSM and GPS system. This module is installed for sending SMS and current location of students present in the bus. When student place his/her card on the attendance system the data is scanned through RFID reader and SMS is sent on registered mobile number of parents of the particular student. Its main advantage is that parents get to know whether their children are entering into bus or not along with their location. GPS module is used for sending coordinates of the location while GSM is used to send short message service to parents.

Fuel sensor is connected to the main system for monitoring fuel level. Emergency switch is used to send alerts in emergency condition and when it is pressed the alert notification is sent on college system. All the data and required information is uploaded on cloud on regular basis.

## 5 RESULT



Fig-12: Final result of system

## 6 CONCLUSION

With the implementation of the project, a complete track can be kept of the buses of the college. Due to this, an ideal system of bus transport is established by us for college purposes. The main features of this project are real time information, attendance system and emergency alert system. Internet-enabled mobile phones can receive real-time transit information and will help to monitor the status more effectively and precisely.

## 7 FUTURE SCOPE

For future enhancement, we can develop a vehicle monitoring system using GPS & GSM module with high speed processor. The system will have latest technology and optimized algorithm with moderate cost. The system may focus on accurate arrival time prediction and real time position of vehicle. The system can be installed in buses, cars and trucks this project is having a wide scope. A web based application which can be further modified using cloud. Use of video camera to this system would take this system to the next level in the field of security. It will help to monitor the crimes that happen nowadays which is witnessed by common people every day. This would prove a major breakthrough in reducing the crime rates. Also, with use of motion sensors the speed of the bus can be calculated presently only SMS feature is available, we can include the Call feature for ease of operation. Microphone can be induced in the GSM module so that during theft activity, voice can be recorded in the bus for evidence purpose.

## 8 REFERENCES

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