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BITS (Bus integrated tracking system)

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ABSTRACT

A vehicle tracking system combines the use of automatic vehicle location in individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. In this Bus Integrated Tracking System, a Global Positioning System/Indian Regional Navigation Satellite System (GPS/IRNSS) receiver is mounted on the bus, which dynamically gets latitude and longitude details and process to find the exact location, once the location is finalized it is sent to the cloud. The client may use the mapping software to display the position of the vehicle on the Map. It is a very easy way to find out the exact location of the vehicle where it is travel in the world. The main purpose of this project is to help the parents/guardians know about their children and also have a track of them, helping the parents/guardians to do their work without any kind of worries about their children. BITS help the teaching and non-teaching faculty the estimated arrival time of the bus to their respective locations and also track the present location of the bus. Also interfacing emergency system to the bus, i.e crash and flame sensors, where alert messages are sent in case of emergency.

Keywords: GPS, IRNSS, BITS.

1. INTRODUCTION

The vehicle tracking system main aim is to give Security to all vehicles/Bus. The accident alert system main aim is to rescue people in accidents. And also used for tracking school/college buses location and give the count of students present in the bus. This also helps in tracking the location of the bus which improves security systems for vehicles. This system enables the owner to observe and track his vehicle and find out vehicle movement and its past activities of the vehicle. This technology, popularly called vehicle Tracking Systems which created many wonders for the security of the vehicle. This hardware is fitted on to the vehicle in such a manner that it is not visible to anyone who is inside or outside of the vehicle, thus it is used as a converting unit which continuously sends the location data to the monitoring unit. The main purpose of this project is to help the parents/guardians know the location about their children, helping the parents/guardians to do their work without any kind of worries about their children. BITS help the teaching and non-teaching faculty the estimated arrival time of the bus to their respective locations and also track the present location of the bus.

When the vehicle is stolen, the location data from tracking system can be used to find the location and can be informed to police for further action.

1.1 Hardware and Software Tools

Raspberry Pi

It is a small sized single board computer. There are various models available in Raspberry such as Model A, Model B, Model A+, Model B+, Model 2 b, Model 3. It has 1GB RAM model with 4 USB ports, an Ethernet connection, Speed is 900Mhz, the requirement of power supply for this device is 3V, a slot for SD card, it also consists of 40 pins and HDMI port for projection.



Figure1: Raspberry-Pi

PYTHON

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 (i.e, it determines types implicitly), and it relies on indentation as a control structure.

Raspbian OS - Noobs: Among all operating system such as RISC OS, Chromium OS, Angstrom Linux, Pidora, Gentoo, Raspbian is the best one for Raspberry. It is feasible for working and also free operating system available on the website. Raspbian also has types like wheezy, Jessie, noobs. We prefer noobs because it improves the performance and flexibility, particularly as regards the control of the system processes,

GPS

GPS stands for Global Positioning System by which anyone can always obtain the position information anywhere in the world.

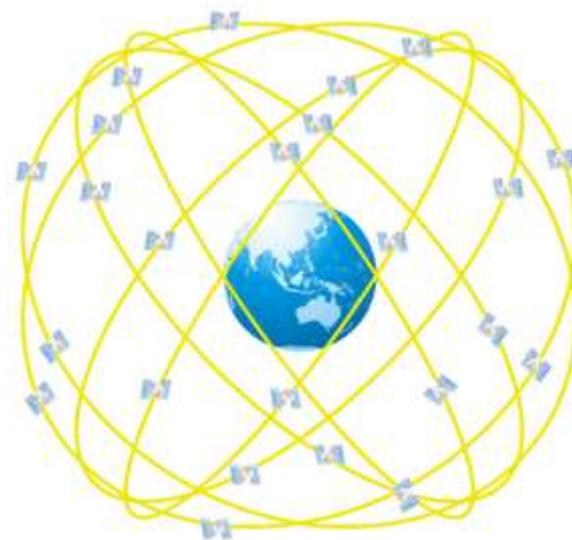


Figure 2: Orbit of GPS satellites

USB to TTL

This is a USB2.0 to Transistor-Transistor Logic Universal Asynchronous Receiver-Transmitter (TTL UART) Converter module which is based on CP2102 Bridge by SiLabs. This module can be used with Laptop's which don't have a standard serial port. This module creates a virtual COM port using USB on your computer which can support various standard Baud Rates for serial communication. You just need to install the driver using a setup file which automatically installs correct driver files for Windows XP/Vista/ 7. After driver installation, plug the module into any USB port of your PC. Finally, a new COM port is made available to the PC. The feature which makes it more convenient is the TTL level data i/o. So you don't need to make an RS232 to TTL converter using chips like MAX232.



Figure 3: USB to TTL

PUBNUB

PUBNUB datastream allows you to establish and maintain persistent socket connections to any device (mobile, browser, desktop, and server), and push data to global audiences in less than a 1/4 second. PubNub utilizes the Publish/Subscribe model for realtime data streaming and device signaling, supporting all the capabilities of WebSockets, SignalR, Socket.IO, WebRTC Data Channel and other streaming protocols.

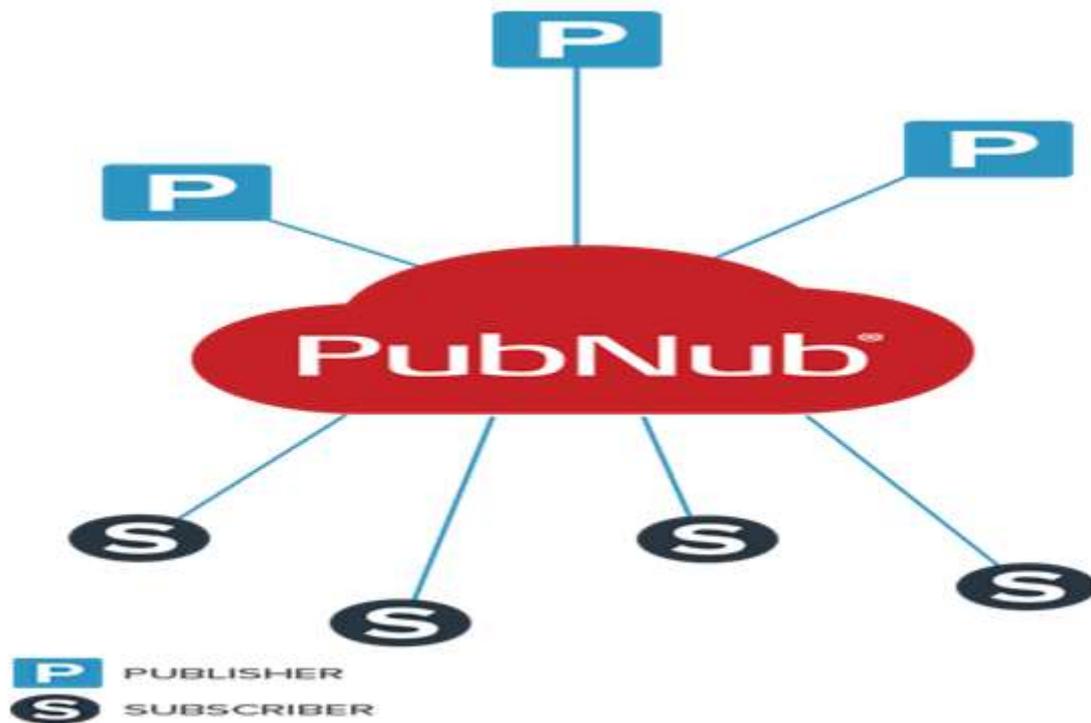


Figure 4: PUBNUB Infrastructure

ANDROID STUDIO

Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps.

Geo-Fencing

Geofencing is a location-based service in which an app or other software uses GPS, RFID, Wi-Fi or cellular data to trigger a pre-programmed action when a mobile device or Radio Frequency Identification (RFID) tag enters or exits a virtual boundary set up around a geographical location, known as a geofence.

Flame Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system.

Collision Sensor

Collision sensors are installed in the vehicles, where during an accident an alert message is sent to the institute. The alert message is sent when the collision sensor is triggered.

1.2 Proposed System

The proposed system provides relevant information regarding the longitude and latitude values of the bus. Also, the real-time tracking of the bus can be done. In our system, GPS is attached to the bus. Firstly GPS receives the satellite signals and then position the latitude and longitude values determined by it. After receiving the tracking data it can be transmitted to any wireless communication system. Pubnub/GPS is used for transmitting the data, a remote user can access this information of the bus based on users source and destination. And also during a fire or crash of the vehicle, an alert message is sent to the institute and the guardian.

The following methodology is used to develop the system:

- Developing and interfacing Raspberry Pi with GPS receiver and PUBNUB.
- Programming Raspberry Pi with help of Python language.
- Study of GPS receiver.
- Creating an App for showing the estimated time of arrival and departure of the bus.
- Interfacing emergency system to the bus, i.e flame, and crash sensor.

Where the Application is developed for the users, where they can see the location and see the estimated time of arrival of the bus to their respected stops.

In case of an accident, an alert message is sent to the institution in the form of an alert message. Using the APP developed they can track the bus down. The crash sensor and the flame sensor is connected to the GPIO pins of the Raspberry-Pi, where the alert message is sent when the sensors are triggered.

The GPS receiver is also connected and configured using Raspberry-Pi, where the latitude and longitude of the bus are obtained, which is later sent to the cloud memory (that is PUBNUB) and sent to the APP which is at the user side.

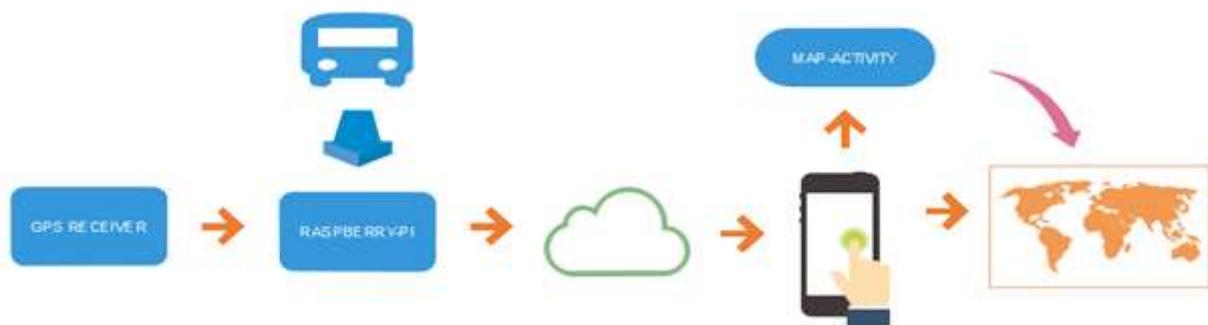


Figure 5: Proposed Architecture

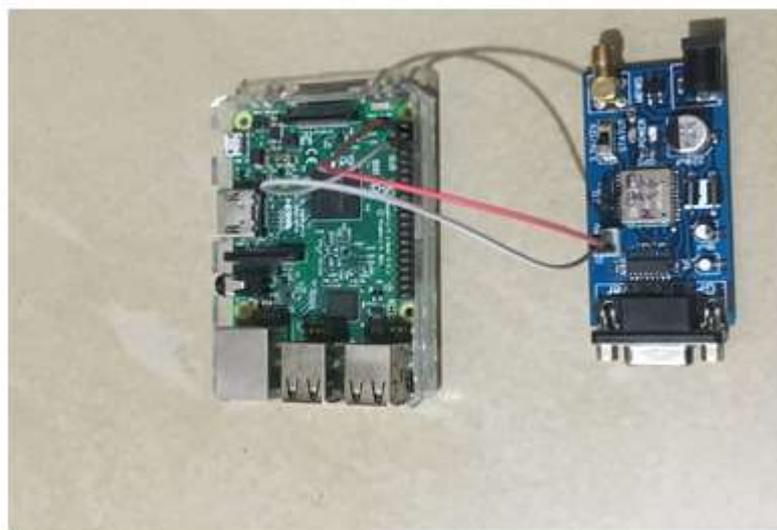


Figure 6: GPS configured with Raspberry-Pi

2. CONCLUSION

From the above system, we can obtain the longitude and latitude of the bus and also the estimated time of arrival of the bus, where it can be observed by the teaching as well as the non-teaching faculty using the APP. The emergency system installed in the bus plays the key role by sending an alert message immediately to the institution.

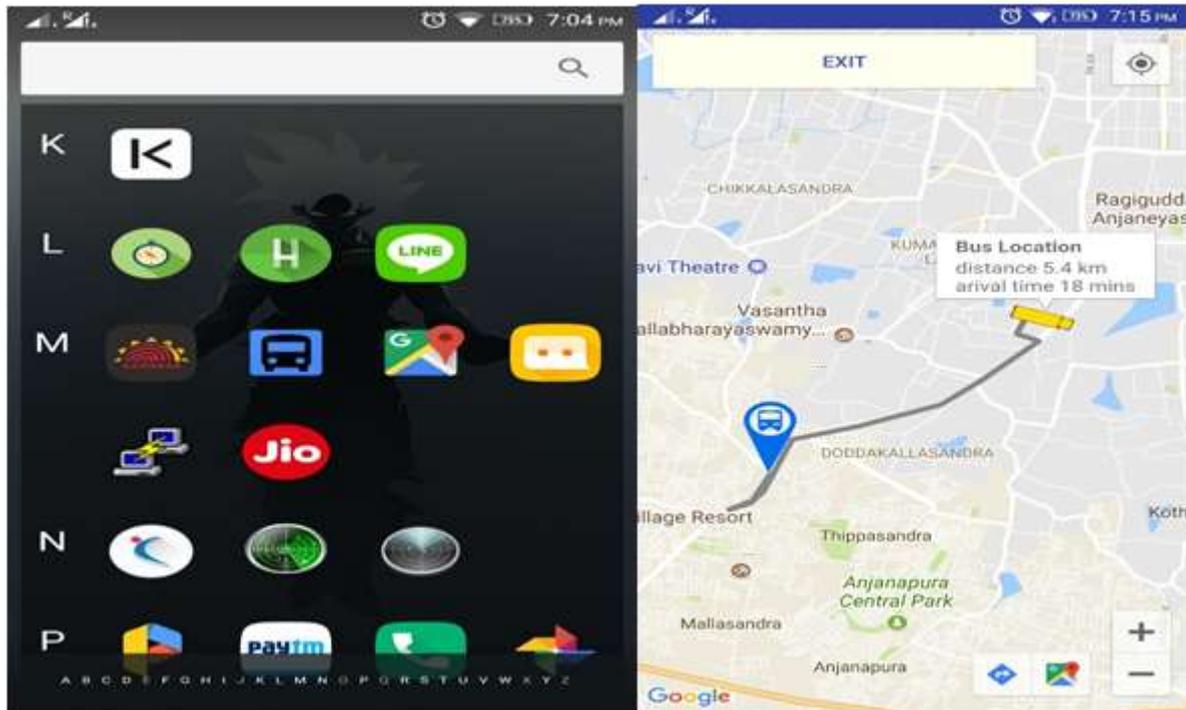


Figure 7: APP developed to see the latitude and longitude and estimated arrival of the bus

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