

GPS BASED VEHICLE TRACKING SYSTEM USING WI-FI MODULE

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Abstract: In this fast life, everyone is in hurry to reach their destinations. People who rely on the public transport their major concern is to know the real time location of the bus for which they are waiting for and the time it will take to reach their bus stop. This information helps people in making better travelling decisions. Now a day's people are not aware of exact timing and location of the vehicles for easy transportation. So we planned to implement to a smart bus tracking system for easy transportation facility using IoT. By knowing the location of the vehicle, lot of the time will be saved.

Index Terms – GPS, Node MCU, Adafruit 128*64 OLED, Fire Base, MIT App Inventor.

I. INTRODUCTION

Vehicle tracking system is technology used to determine the location of a vehicle using GPS and such this technology has become very prominent. In order to implement a vehicle tracking system which can display the location on Google map, the GPS, Wi-Fi modules controlled by Node MCU must be placed inside the vehicle. The vehicle position will be updated every 10 second as the vehicle is moving. This system enables the owners who have expensive cars to observe and track the vehicle and find out vehicle movement and its past activities of vehicle. This technology popularly called real time GPS vehicle Tracking Systems which created many wonders in the security of the vehicle. The system can be fitted into the vehicle where it cannot be seen by anyone. When the vehicle is lost or stolen, the location information can be viewed in the android application in the terms of longitude and latitude and can also be viewed on the Google map. This information is available to authorized users of the system via website over the internet.

II. RELATED WORK

The system consists of modern hardware and software of the GPS network with help of Internet which enable to track the vehicle. Any vehicle tracking system consists of mainly three parts mobile, vehicle unit and data base. Vehicle unit is the hardware component attached to the vehicle having a GPS and Wi-Fi modem. With the GPS module the location information is received and sends it to the database. From there location information can be viewed on the android application which is installed in the mobile. This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand.

The Global Positioning System (GPS) is the only fully functional Global Navigation Satellite System (GNSS). The GPS uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals that enable GPS receivers to determine their location, speed, direction, and time. A GPS receiver receives the signals from at least three satellites to calculate distance and uses a triangulation technique to compute its two dimension (latitude and longitude) position or at least four satellites to compute its three dimension (latitude, longitude and altitude) position. Therefore GPS is a key technology for giving device its position. GPS was developed by the United States Department of Defense. Its official name is NAVSTAR-GPS. It is originally used in military services but later allowed the system available free for civilian use as a common good. Since then, GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, and scientific.

Espressif Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement. ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (SDK). Espressif Systems' Smart Connectivity Platform (ESCP) demonstrates sophisticated system-level features include fast sleep/wake context switching for energy-efficient VoIP, adaptive radio biasing for low-power operation, advance signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation.

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014. As of October 2018, the Firebase platform has 18 products which are used by 1.5 million apps. Firebase provides a real-time database and backend as a service. The service provides application developers an API that allows

application data to be synchronized across clients and stored on Firebase's cloud. The company provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C, Swift and Node.js applications. Developers using the real time database can secure their data by using the company's server-side-enforced security rules. Cloud Fire store which is Firebase's next generation of the Real-time Database was released for beta use.

App Inventor lets you develop applications for Android phones using a web browser and either a connected phone or an on-screen phone emulator. The MIT App Inventor servers store your work and help you keep track of your projects.

One can build many different types of apps with App Inventor. Often people begin by building games like Mole Mash or games that let you draw funny pictures on your friend's faces. You can even make use of the phone's sensors to move a ball through a maze based on tilting the phone.

III. PROPOSED METHOD

The GPS module receives the location information from the satellites it is processed by the NodeMCU (Advanced development kit within built micro controller) and sends that information to the firebase real time database (cloud). Further the information can be viewed in the android application which is developed using MIT app inventor. The location information is updated for every 10 seconds

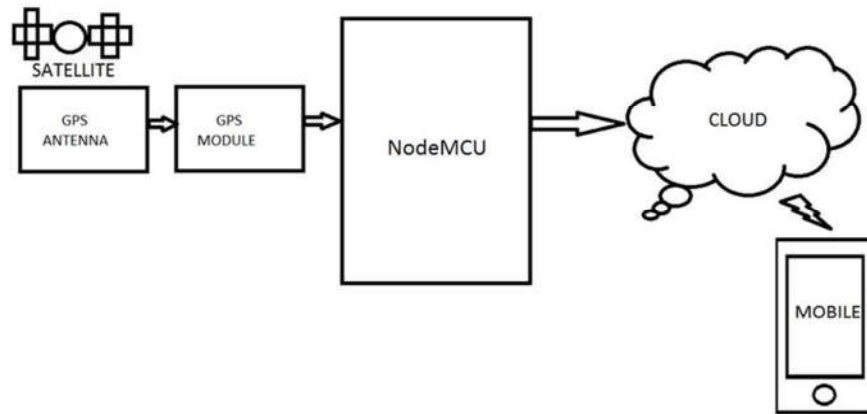


fig (a): block diagram of GPS based vehicle tracking system

The block diagram consists of the six blocks satellite, GPS antenna, GPS module, NodeMCU, Mobile, and Cloud. The location information (latitude and longitude) is received by the GPS module through the GPS antenna. For better reception there should be a proper impedance matching between GPS antenna and GPS module which is typically 50Ω. Further the information is transmitted to cloud (Fire base) through NodeMCU.

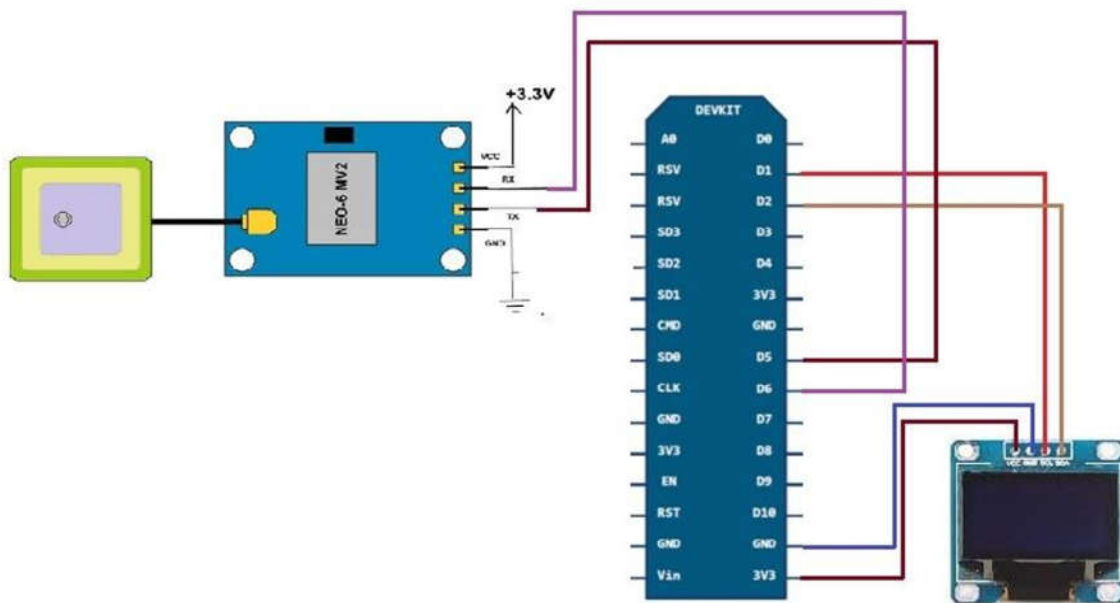


fig (b): circuit diagram of GPS based vehicle tracking system

A NodeMCU is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so NodeMCU is interfaced serially to a GPS Receiver. The Global Positioning System (GPS) is a satellite based navigation system consists of a network of 24 satellites located into orbit. GPS works in any weather circumstances at anywhere in the world. A GPS receiver must be locked onto the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement. With four or more satellites in sight, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the vehicle position has been determined, the GPS unit can determine other information like, speed, distance to destination, time and other. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output such as the vehicle is moving or parked which then the data will be sent to the mobile at the other end from where the position of the vehicle is demanded.

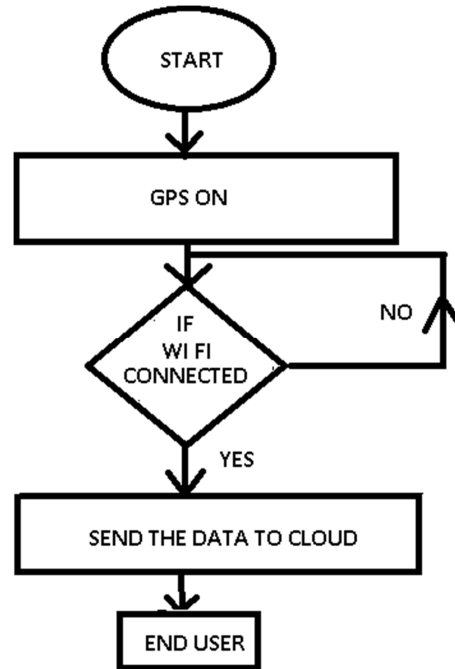


Fig (c): Flow chart of GPS based vehicle tracking system

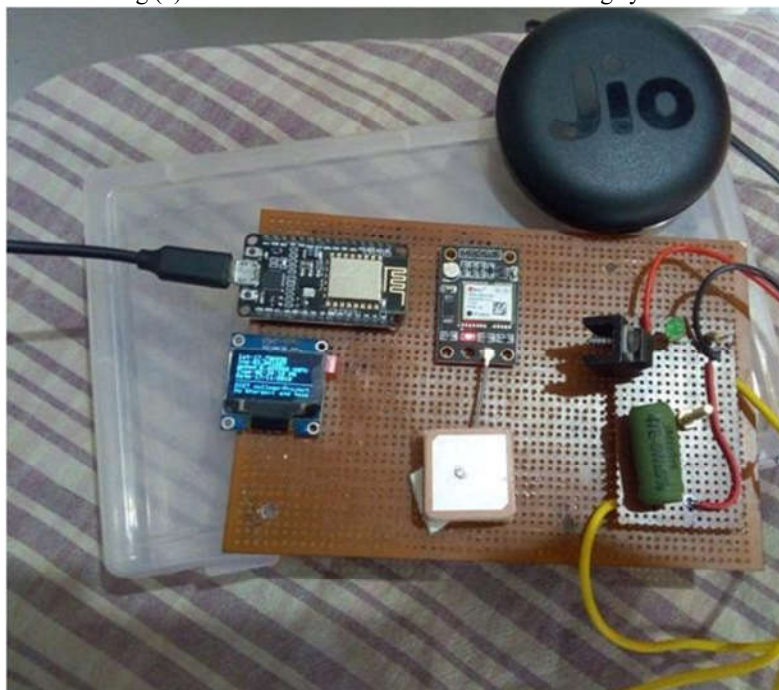


fig (d): hardware implementation of the GPS based vehicle tracking system

IV. RESULTS AND DISCUSSION

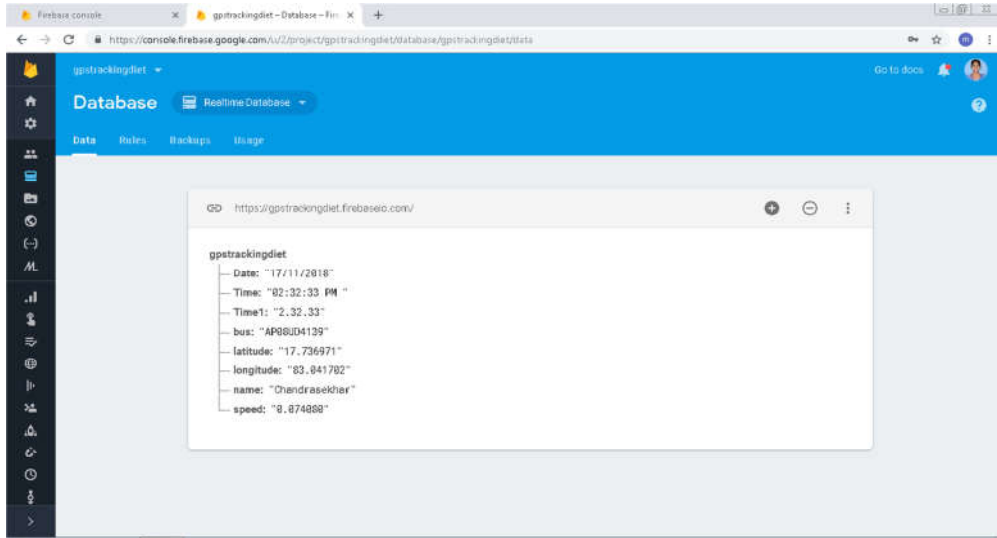


fig (e): location information stored in real time database



Diver name: Chandrasekhar

Bus Number: AP08UD4139

latitude & longitude: 17.68289 , 83.02579

Click here to know the adress of your college bus

Speed of College bus: 0.0926 in KMPH

Last update time: 11.08.57

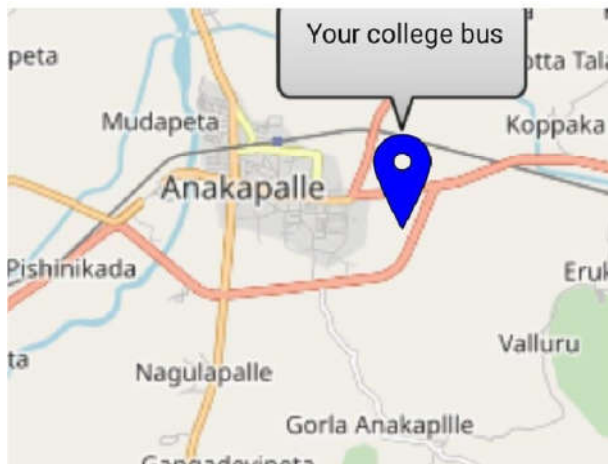


fig (f): android application

The proposed system is more user friendly than existing system. And it also gives greater performance. The proposed system is successfully designed, implemented and tested and the following conclusions are made. Our system reduces the waiting time of

remote users for the bus. The system that tracks the bus at any location at any time. All the current information is stored to the server and it is retrieved to remote users via Android mobile application. The system is more user friendly for user to get information visually shown on Google map. User can freely get this Mobile application for real time tracking of the bus which provide interactive interface environment. So by using this application remote user can just wait or they may reschedule their journey according to the availability of the bus. So this paper presents a system which provides high practical value in the modern fast era. The system has high practical value and cost efficient.

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