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GSM AND GPS BASED SCHOOL BUS TRACKING AND ACCIDENT DETECTION SYSTEM

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Abstract

Global Positioning Systems (GPS) are widely used to track and monitor vehicles. The system is used to instantly track vehicles using GPRS (General Packet Radio Service) technology. The system can track the location of the vehicle at an affordable price.Vehicle tracking technology allows travelers to locate a vehicle throughout the journey. The system provide a GPSGPRS based vehicle tracking system. The current location of the vehicle is received by the GPS device integrated into the target vehicle and the shared location can be sent via GPRS provided by the GSM network. The GPS receiver is used to provide the latitude and longitude of the current location. The system concept can be created using a microcontroller. This is the basis of the system. The GPS receiver is connected to the same chip via serial port and can be used to realize the current location. The GPS receiver receives the current position of the location and uses a GPRS modem to send the vehicle data to the tracking server. GPRS provides TCP/IP connection to the monitoring server. The monitoring server retrieves traffic location information from the internet and stores this information in a database. Authorized users of the system can access this information via the internet map.

Keywords: GPS and GPRS expansion board, Arduino uno board, GPS antenna, GPRS antenna

1. Introduction

The purpose of this project is arduino uno To design and develop a vehicle tracking system using GPRS that can be easily controlled via. In today's rapidly evolving and insecure world, knowing your own security has become a simple need. The number of vehicles on roads and highways also increased. The proposed system is GPbased realtime vehicle tracking used in security applications and any organization that manages large vehicles and needs accurate information about the location of the vehicle.The system used for this application uses navigation tools such as GPS, GPRS and database technology. The system will be installed in cars and use GPS and GPRS modules to allow vehicle owners to track the location of the vehicle. Global positioning systems determine the exact location of the vehicle. The GPS antenna located in the GPS receiver module receives data from GPS satellites in NMEA (National Marine Electronics Association) format and sends this data to the server using the GPRS module. GPRS provides TCP/IP connection to the monitoring server. The monitoring server retrieves traffic location information from the internet and stores this information in a database. Authorized users of the system can access this information via the internet map.GPS is a satellitebased navigation system with 24 satellites in orbit. These satellites send coded messages to GPS receivers, which are used to determine the car's position on Earth by measuring its distance to the satellite.The GPRS network is a "normal" private data network. It uses existing GSM networks to send and receive TCP/IP based data for GPRS devices/modules. It supports file transfers like email and web browsers. GPRS allows network operators to use an IPbased core architecture for data applications. GPRS can send data at a maximum speed of 115.2 kbps. Best for real-time management.

2. Designmethod:

The main purpose of this project is to design a vehicle location tracking system for tracking purposes. The signal received from the satellite is sent to the hardware for further processing and finally the signal is sent to the computer for display on Google Maps. This project is divided into two parts: tracking and imaging. Tracking is responsible for obtaining the user's location; The control an

d display part shows the location on Google Map.The hardware used in this project are GPS and GPRS expansion modules and Ar duino UNO microcontrollers. All these hardware devices are programmed using AT commands, Arduino programming and php sc ripts. software.One of the ones used to write the code is the Arduino IDE. In addition, the user interface was created using php scri pts.

A. Hardware Representation:

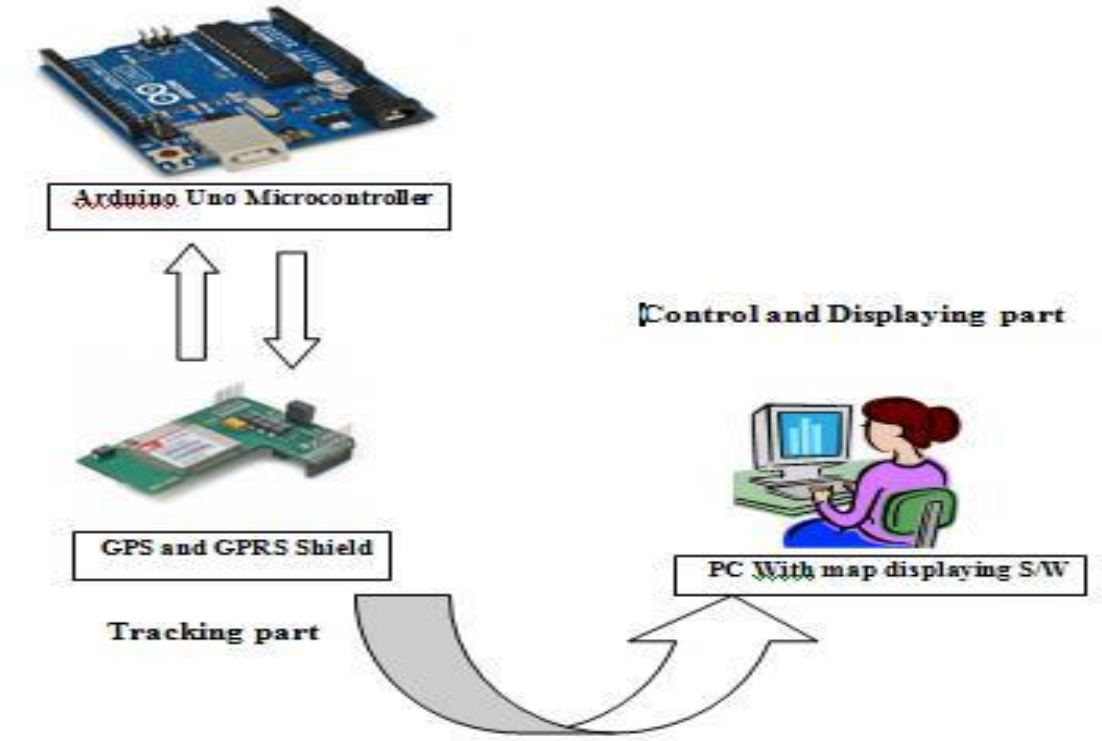

Figure 1: Hardware representation of vehicle tracking system using GPRS

B. GPS Receiver Module

Any part of the entire world can be determined using a control area. Geographic coordinates are a system tha t determines the latitude and longitude of a location on the earth's surface. Some devices can read the geogra phic location of a place using signals received from multiple satellites orbiting the earth. The satellite system that helps locate the location is called the Global Positioning System (GPS). A device that can read the locati on of a place with the help of at least four GPS satellites is called a GPS receiver or simply GPS module. The GPS module continues to generate information about the Earth's location at its current position relative t o the Earth's equator (latitude and longitude). In this project, information about the control area is extracted fr om the GPS output with the help of Arduino. The Arduino can be used as a standalone board with its own co mponents or components provided on or off the board.

C. GPS and GPRS shieldassembly

First, combine the GPRS + GPS expansion card with the antenna and SIM card and set your APN, login name and pass word. Also set the URL to your computer's IP address (external IP, not LAN IP address) or the name of the server. Wit h vehicle integration, the GPRS+ GPS expansion card connects to the network, the GPS module receives location data, and the 3G module sends HTTP requests. It starts sending HTTP requests with location information (latitude and long itude) every few seconds. It sends GPS information to the php.ini file over the internet. Type the letter on your comput er. We then get the location of the device on Google Maps

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Figure 2: Bottom view of GPS and GPRS module

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Table 1: LED status

Status	*SIM908 behavior*
Off	SIM908 is not running
64ms On/ 800ms Off	SIM908 not registered the network
64ms On/ 3000ms Off	SIM908 registered to the network
SIM908 registered to the network	PPP GPRS communication is established

The LED on the expansion card indicates the status of the GPRS + GPS module. Table 1. Show the meaning of LED flashes.

D.Controlanddisplayingmanaging and viewingphp script is used to provide user interface to end users. To use php scripts the php server must be enabled. You can complete the script on your PC.

E. Mapping

Map data is only available in a web browser. This form accepts latitude and longitude and uses this information to display the location on Google Maps. The query line is created using the surrounding latitude and longitude lines and is passed to the web browser at the location indicated by the latitude and longitude. We need the URL to display the map with icons. The IP address or server domain is the same.

F. AT commands usedfor the systemThis AT command is used to retrieve gps data via theserial window of the arduino IDE.

Table 2: Get GPS data operation

AT command	*Response*	*Description*
AT+CGPSPWR	OK	Powers the GPS
AT+CGPSRST	OK	Sets the reset mode

AT+CGPSSTATUS		Gets the status: Unknown, Not Fix, 2D Fix and 3D Fix
AT+CGPSINF	NMEA string	Gets NMEA strings

3.Hardware Required:

A. GPS and GPRS Quadband module(SIM908)SIM908 module is a complete Quad-Band GSM/GPRS module which combines GPS technology for satellite navigation.

General features

•Quad-Band 850/900/1800/1900MHz •GPRS multi-slot class 10

•GPRS mobile station class B

•Low power consumption

•Dimensions: 30*30*3.2mm

•Weight:5.2g

Specification for GPS

•Receiver type

- 42-channel

- GPS L1 C/A code,

- High-performance STE engine

•Sensitivity

- Tracking: -160 dBm

- Cold starts : -143 dBm

•Time-To-First-Fix

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- Cold starts: 30s (typ.)

- Hot starts: 1s (typ.)

•Power consumption (GSM engine in idle mode)

- Acquisition 77mA

- Tracking 76mA

B. GPRS+GPS shield:

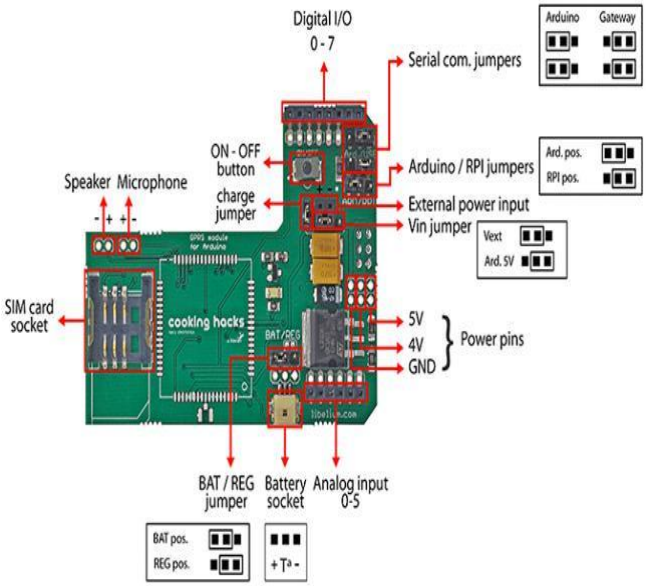
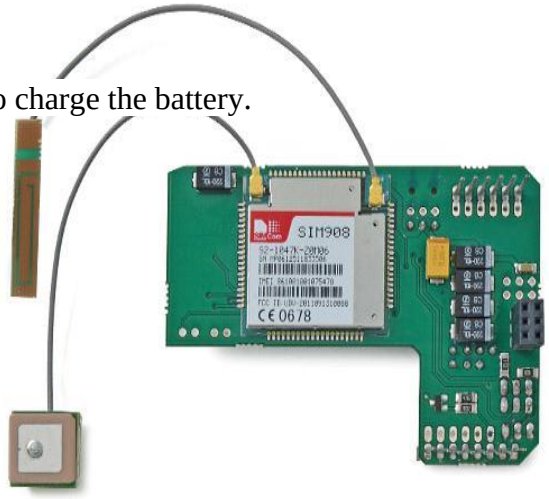


Figure 3: Top view of GPS and GPRS module

This shield uses a battery to power itself but does not use the Arduino board. To charge the battery using the expansion board, all you have to do is turn on the Arduino. The expansion card uses 5v (ICSP connec

C. Antennas Connection With Module:

tor) to charge the battery.



- Power handling: 25W
- Connector: RPSMA Male
- Size: 114mm x 9mm
- Operating temperature: -40°Cto +85°C

Figure 4: External antenna connection with shield

External GPS Antenna specifications: It includes a SMA-Female to UFL pigtail.

- Frecuency: GPS 1575.42 MHz
- Impedance: 50 Ohms
- Polarization: RHCP
- Gain: 26dB at 3V, 28dB at 5V
- VSWR: <1.2:1
- Supply Voltage2.7V - 5.5V
- Current: 15mA - 25mA
- Power (max.): 125mW
- Connector: SMA Male
- Size: 41mm x 34mm x 13.7mm
- Operating temperature -40°Cto +85°C

External GPRS antenna specification

The new quadband antenna offers a gain of 2.14 dBi. It includes a RPSMA to uFL pigtail.

- Frequency: 4G/LTE (791-862/1710-2690 MHz), 3G (UMTS 2.1 GHz), GSM Quadband (850-900-1800-1900 MHz) WIFI / BLUETOOTH (2.4 GHz)
- Impedance: 50 Ohms
- Polarization: horizontal
- Gain: 2.14dBi
- VSWR: <2:1

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D. Arduino uno Board:

Uno is a microcontroller board based on ATmega328P. It has 14 input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, USB connection, power jack, ICSP header, and a r eset button. It includes everything you need to support your microcontroller; Just connect it to your computer with a USB cable or power it with an AC-DC adapter or battery starter.

4. Results

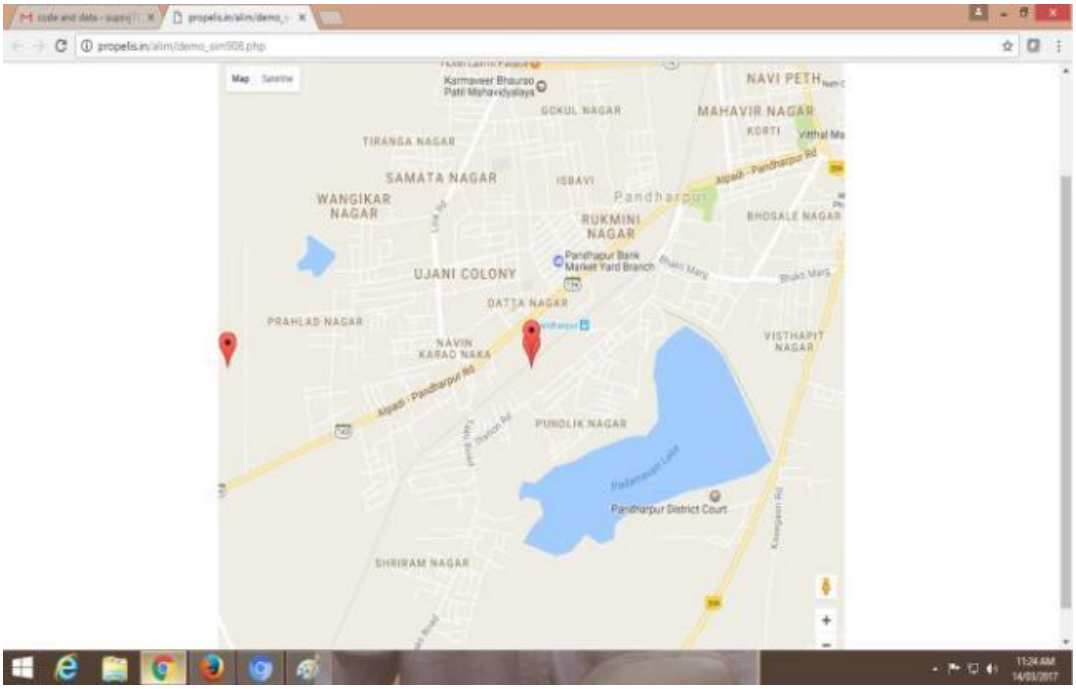

Figure 6: SKN Korti to Pandharpur bus location positions

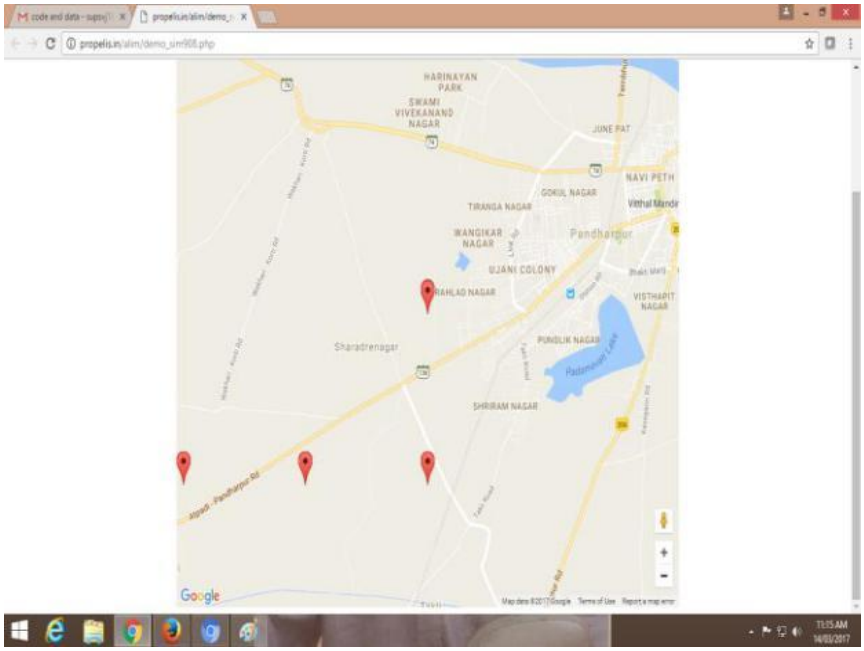

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Figure 7: SKN Korti to Pandharpur bus location positions

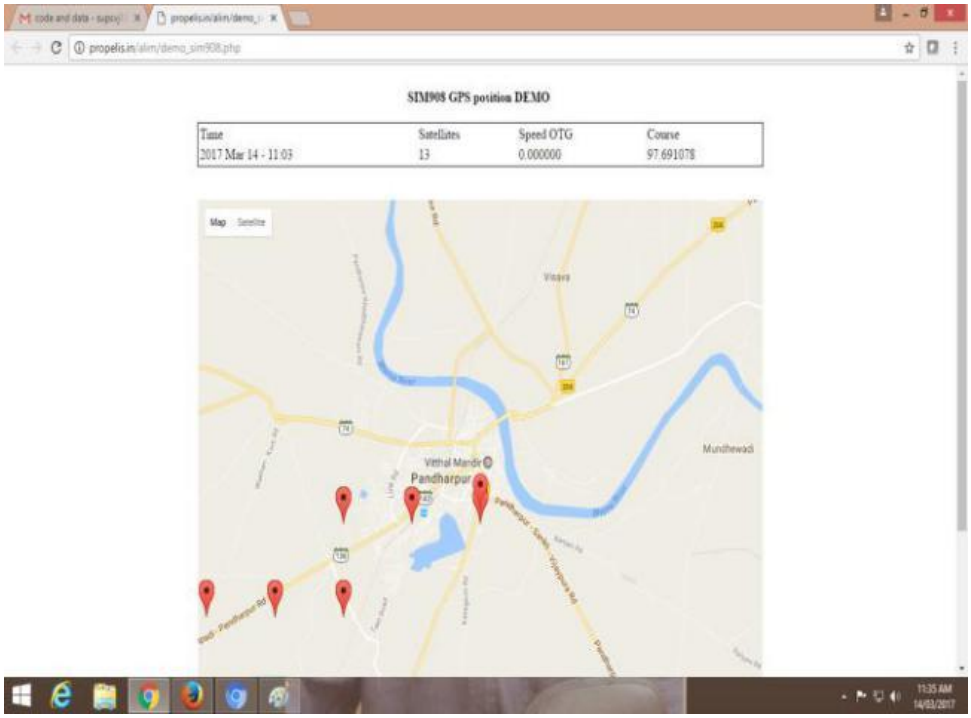

Figure 8: SKN Korti to Pandharpur bus location positions

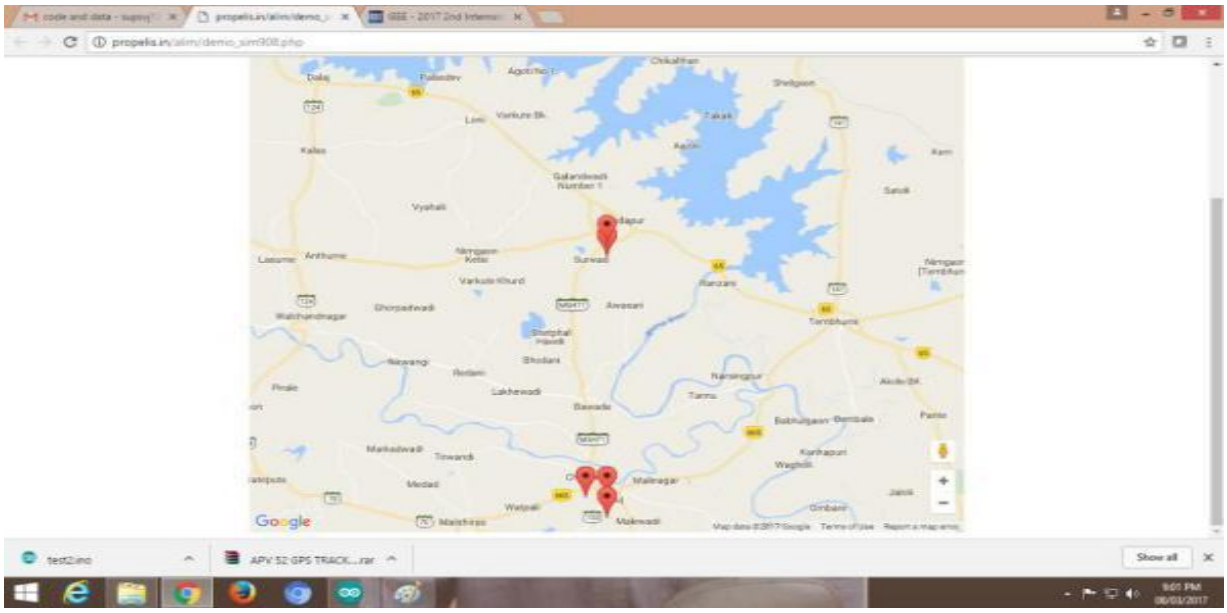

Figure 9: Indapur to Akluj bus location positions

The above image shows different bus stops used for testing:

1) SKN korti Pandharpur bus terminus

2) Indapur to Akluj bus terminus<

5. Conclusion:

This project Its aim is to develop a vehicle tracking system that will track the location of the b us. The system provides the latitude and longitude of the bus location.According to the mana gement standard for tracking and location determination using GPS and GPRS, it shows that performance is very difficult even within the limits of GPS sensitivity.

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