Smart Vehicle Tracking System

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Abstract : There are various problems faced in transportation like security issues, breakdown issues. There is requirement of efficient transportation management system. Thus this problem can be solved by using vehicle tracking system. GPS is one in all the technologies that square measure employed in an enormous range of applications these days. One of the applications is tracking your vehicle and keep regular monitoring on them. This pursuit system will inform you the situation and route traveled by vehicle, and that information can be observed from any other remote location. It additionally includes the net application that has you actual location of target. GPS vehicle tracking system can be also used for routing, on-board information and security. Such systems are used to provide customers real time information. Transmitting this data to a server which keeps a record of all the previous readings will help for analysis of entire history. Vehicle location is shown on the map which enables user to keep real time information. Main objective is to style a system which will be simply put in and to produce platform for any improvement.

IndexTerms **– Remote, Security, Tracking, Transportation.**

I. INTRODUCTION

Transportation is very common in this urban life. It is important because it enables trade between persons, which is essential for the development of civilizations. Relocation of passengers and cargo are the most common uses of transport. Better transport permits additional trade and a larger unfold of individuals. It is important that the transportation systems should be safe, efficient and reliable. There are many problems faced during transportation related to security, management, inefficient resources utilization, vehicle breakdown, etc. It has become very important to manage transport efficiently. Therefore there is need of security and monitoring. This problem can be solved electronically by using vehicle tracking system. It is GPS (Global Positioning System) and GSM based system which will help in transport management. GPS based vehicle tracking system provides real time vehicle location on the map. It provides many functions such as routing, tracking, on-board information (example, engine status) and security alert. Customer can access this information on a computer from remote location in real time which is important advantage of this system.

We will get following information:

- Vehicle location
- Travelling history
- Current speed
- Total distance covered in a day
- Ignition status

This system is user friendly, easy installable, accessible and can be used for various other purposes. After installation system will locate target by using web application on Google map. This system permits to trace the target anytime and anyplace.

II. SYSTEM ARCHITECTURE

This system contains two sides, one is transmission side and other is receiver side. Transmission side is fixed into vehicle and receiver is a computer server which consists of software part. Transmitter uses GPS and GSM modules for data acquisition and transmission.

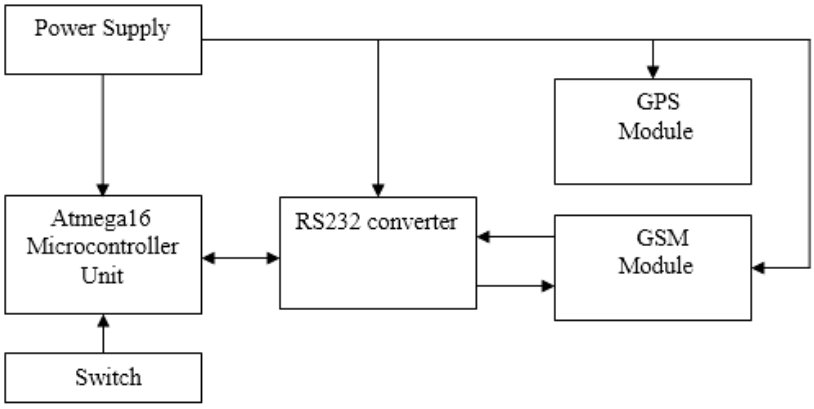

Figure1 System Block Diagram

The blocks connected here are GPS module, GSM module, microcontroller, max 232 converter, power supply and switch as shown in figure1.

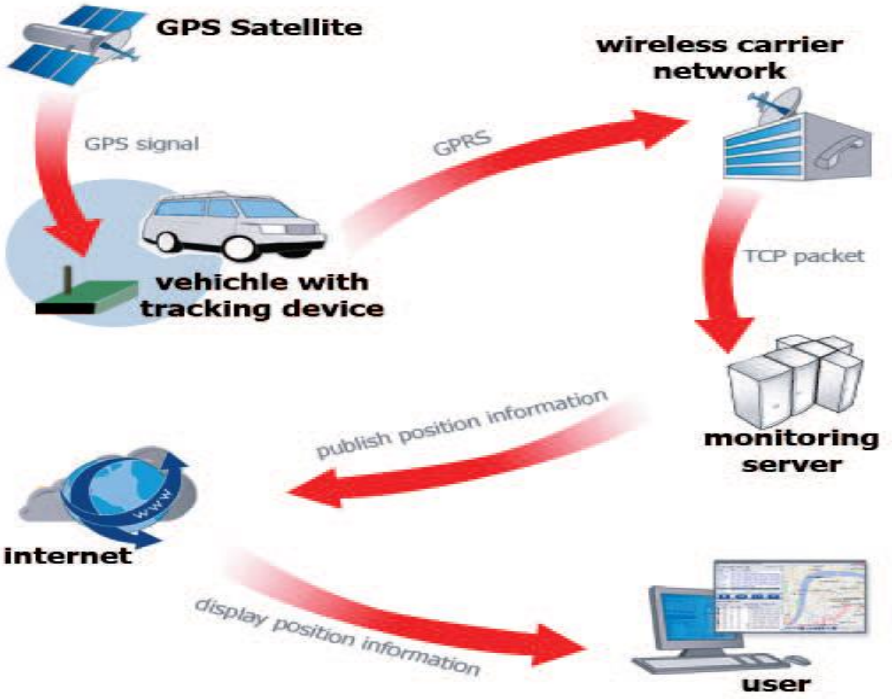

Figure 2 The tracking system architecture

GPS module is shown in figure 3 GPS is a space-based satellite navigation system. It provides location and time data all told atmospheric condition, anyplace on or close to the world. GPS receivers square measure popularly used for navigation, positioning, time dissemination and other research purposes. The GPS consists of satellites that orbit the world. These satellites square measure fixed with associate degree orbital amount that's identical because the Earth's rotation amount. So they maintain precisely the same position with relevance the world below them. All the GPS satellites transmit radio signals, that square measure then captured by a GPS receiver and wont to calculate its geographical position. A minimum of 4 satellites is also needed to reason the four dimensions of X, Y, Z (latitude, longitude and elevation) and time. GPS receiver converts the received signals into position and estimates time and a few alternative helpful data betting on the appliance and necessities.

GPS determines the gap between a GPS satellite and a GPS receiver by activity the quantity of your time taken by a radio radiation (the GPS signal) to travel from the satellite to the receiver. To obtain correct data, the satellites and also the receiver use terribly correct clocks, which are synchronized so that they generate the same code at exactly the same time. Industry standard National Marine Electronics Association (NMEA) protocol is used by GPS. NMEA knowledge are often transmitted via differing kinds of communications interfaces like RS-232, USB, Bluetooth, Wi-Fi, UHF, and lots of others. Here we are using RS-232 for communication with GPS module

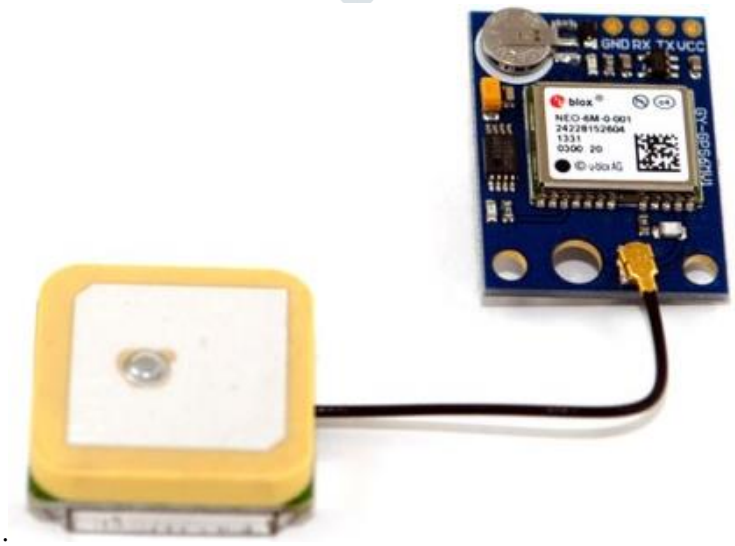

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Figure 3 GPS Module

GSM module is shown in figure 4 GSM abbreviates global system for mobile communication. GSM is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe technologies for second-generation (2G) digital cellular networks. A GSM modem is a specialized type of modem that accepts a SIM card and operates over a subscription to a mobile operator just like a mobile phone. GSM modems are a cost-effective solution for receiving SMS messages because the sender is paying for the message delivery. To perform these tasks, a GSM modem must support an extended AT command set for sending and receiving SMS messages, as defined in the ETSI GSM 07.05 and 3GPP TS 27.005 specifications. In our project the device is used for transmitting data.

Figure 4 GSM Module

Microcontroller Unit is used for data processing. Mainly small controller consists of computer hardware, memory and numerous I/O pins, and also the speed of this small controller is enough to execute the program in real time. Microcontroller will receive data from GPS module using serial communication. Then it will switch the serial connection to GSM module and will send this data to the server using URL. It will also send information about ignition status.

RS-232 could be a commonplace for serial communication transmission of information. The standard defines the electrical characteristics and temporal arrangement of signals, the means of signals, and also the physical size and pinout of connectors. RS-232 converter converts signals from serial port (RS-232) to signals suitable for use in TTL-compatible digital logic circuits which is microcontroller in this project.

This system will take supply from vehicle battery. All modules including microcontroller require 5V supply. Power supply unit is used for converting battery voltage (12V) to 5V.

III. SYSTEM DESIGN & DEVELOPMENT

1. GPS module:
   - Neo6m GPS module is used because of low cost, small size.
   - Start time: 1s
   - Sensitivity: -157dBm
   - Navigation update rate: 1Hz to 5Hz
   - Position accuracy: 2m
   - Velocity accuracy: 0.1m/s

2. GSM module
   - Operation: Quad band
   - Operating Voltage: 3.2 – 4.8V
   - Operating temperature: -20℃ to 55℃
   - Max data rate 85.6 kbps DL
   - Cost of module (Rs.) 950

3. Microcontroller
    - Program Memory (KBytes): 32 KB
    - Data Memory (SRAM) (KBytes): 2 KB
    - Data EEPROM (Bytes): 1 KB
    - Operating Frequency: 20 MHz
    - ADC: 10 bit,8 channels
    - I/O Ports: B,C,D(23 pins)
    - Timers 8/16-bit=2/1
    - I2C module: TWI module
    - SPI module: Yes
    - UART module: USART module
    - Packages: 28-pin PDIP,
    - 32-pin TQFP
    - Cost (Rs); 130

IV. RESULTS

Data transmitted from GSM module will be stored on the server. We can use Google spreadsheet as a server. For this purpose an URL is run on the GSM module using GPRS. Then data included in the URL will be stored on the server. This data is used to show location and other information on Google map using Google map API. We have tried to send data on Google spreadsheet by running URL on the browser.

In case of Google spreadsheet, spreadsheet ID is required for sending data. Data is included in the URL at the end. After running this URL, 'Ok' message is shown on browser window as shown in figure 5.

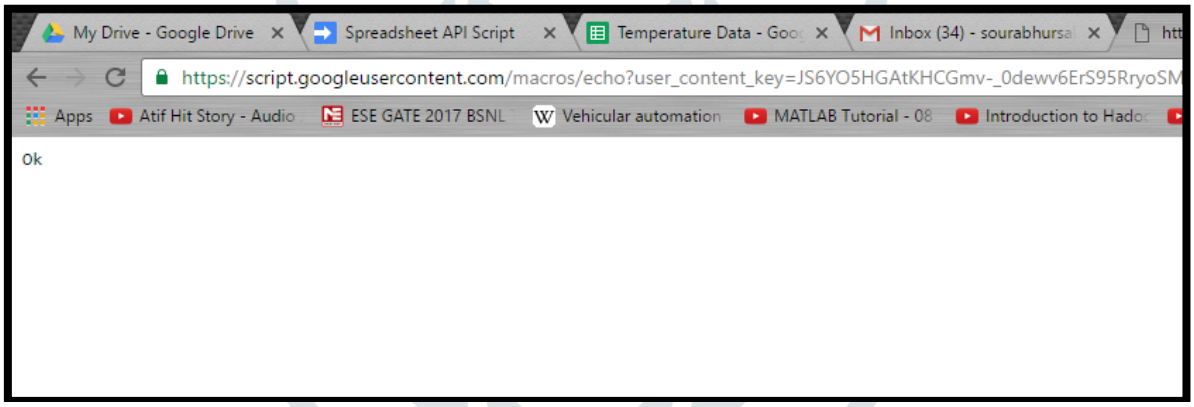
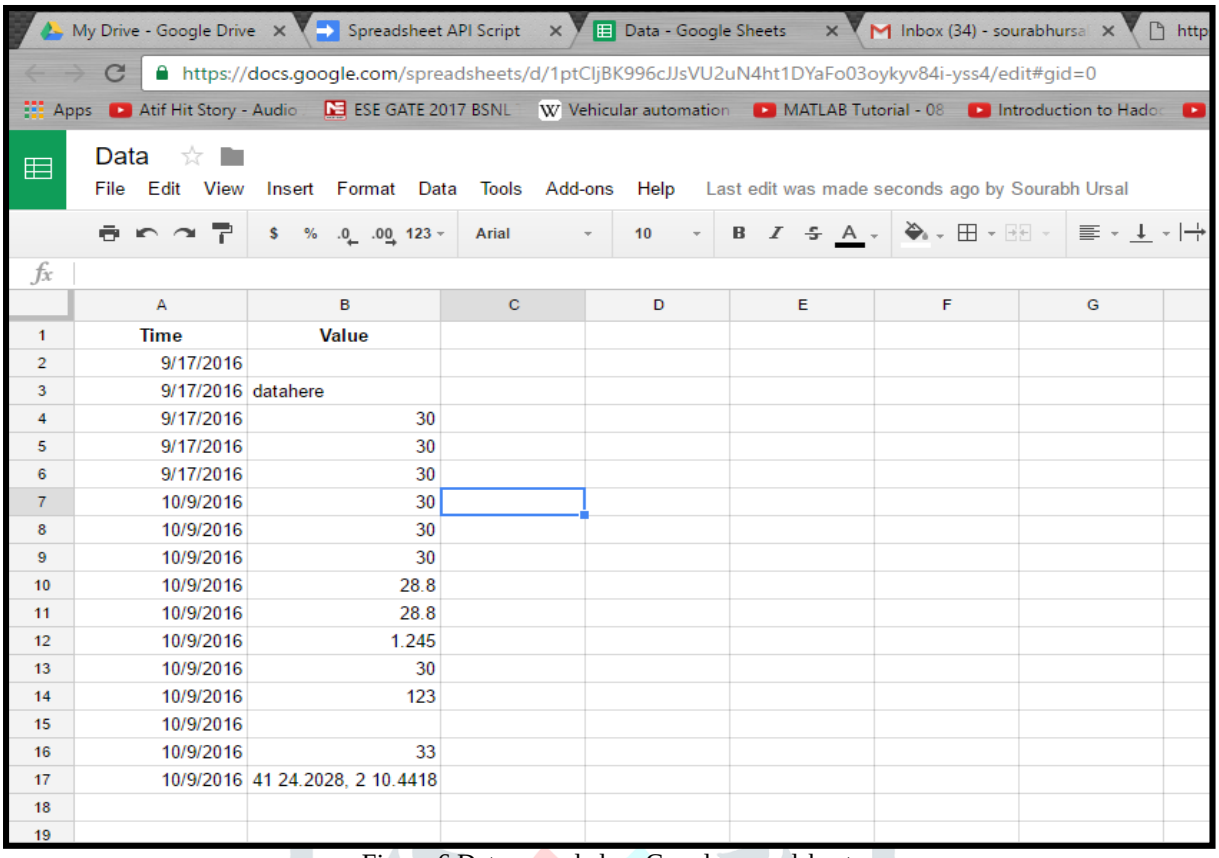


Figure 5 Browser window after running URL

'Ok' message indicates that data is successfully written in spreadsheet. Now we can see this data on the spreadsheet as shown in figure 6.



	A	B	C	D	E	F	G
1	Time	Value					
2	9/17/2016						
3	9/17/2016	datahere					
4	9/17/2016	30					
5	9/17/2016	30					
6	9/17/2016	30					
7	10/9/2016	30					
8	10/9/2016	30					
9	10/9/2016	30					
10	10/9/2016	28.8					
11	10/9/2016	28.8					
12	10/9/2016	1.245					
13	10/9/2016	30					
14	10/9/2016	123					
15	10/9/2016						
16	10/9/2016	33					
17	10/9/2016	41 24.2028, 2 10.4418					
18							
19							

Figure 6 Data recorded on Google spreadsheet

V. CONCLUSION

This system can give out information about vehicle location, travelling history, vehicle speed, theft warning and ignition status which will make transportation more safe, easy to manage and efficient. By implementing this in a vehicle we can test out the actual efficiency of this system. This will need translation of this small scale model to large scale demonstration.

More parameters can be included in this type of system like engine idle time, engine temperature, AC status, battery level, doors status, seatbelt status, occupied and empty seats status, etc.

Fuel monitoring and fuel management control can also be added in this system in combination with ECU. Accessibility to vehicle gadgets and devices through android application and web application can be provided. This system can use automatic rerouting of predefined path depending on fuel level, distance and traffic conditions

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