

GPS AND GSM BASED VEHICLE TRACKING AND FUEL STOPPING SYSTEM

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ABSTRACT

Many of the projects based on vehicle tracking have been developed so far. All of these projects tracks the position of the vehicle and provide the information about the location of the vehicle, to the owner of the vehicle. These projects are quite well in their operation but they do not provide a complete cut-off of the fuel supply. This project is different from the other tracking systems designed previously. It tracks the position of the vehicle and provides a best way of fuel supply stopping by using the servomotor with fuel knob. Although many systems are already developed for this but they cause the damage of the engine because of thrust or sudden stoppage of the vehicle. This system uses a GPS receiver, GSM modem ATMEGA328P microcontroller that is connected to a servomotor. The fuel supply of the vehicle is stopped using a servomotor that is connected to fuel knob and it will not rotates without the permission of the owner of the vehicle.

KEYWORDS: Tracking, Global positioning system (GPS), Global system for mobile communication (GSM), Servomotor, Microcontroller.

I. INTRODUCTION

The safety of private and all the public vehicles is a very important and major concern nowadays so having GPS vehicle tracking system provide safety while travelling. This GPS AND GSM based vehicle tracking system can be fixed in consumers vehicles as theft prevention and locating device. Police can follow the signal given by the Vehicle tracking system to locate the stolen vehicle. Generally this system must be installed for the two wheelers but for country like India where the majority of the people using two wheelers, this is the cheapest source for the anti-theft tracking system. A vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place [1].The Vehicle tracking and locating system is also popular in consumer vehicles as theft prevention and locating device. Police can simply follows the information given by the tracking system and locate the stolen vehicle [2]. The system uses the geographical position of the area and time information from the Global Positioning Satellites. The system has a module that is fixed in the vehicle which is to be tracked and a "Base Station" or user equipment that monitors data from the vehicles. An SMS containing the GPS coordinates to the user, using which he tracks the vehicle on Google Earth [3].Although many systems also developed for this but they cause the damage of the engine due to wear and tear to the pistons but this system doesn't harm the vehicle in anyway. Since the fuel supply of the engine can be easily stopped by using the servomotor, so it doesn't affect vehicle pistons and engine.

II. PROPOSED METHOD

The GPS/GSM Based System is one of the most important systems, which integrate both GSM and GPS technologies. It is necessary due to the many of applications of both GSM and GPS systems and

the wide usage of them by millions of people throughout the world [4]. In this project ATMEGA328P microcontroller is interfacing with various hardware peripherals. This system will continuously monitor a moving vehicle and tells the status of the Vehicle on demand through a SMS. For doing so a Multiplexer IC 4052 is used along with ATMEGA328P microcontroller.

2.1. Block Diagram

The block diagram of the GPS and GSM based vehicle tracking and fuel stopping system is shown in figure 1.

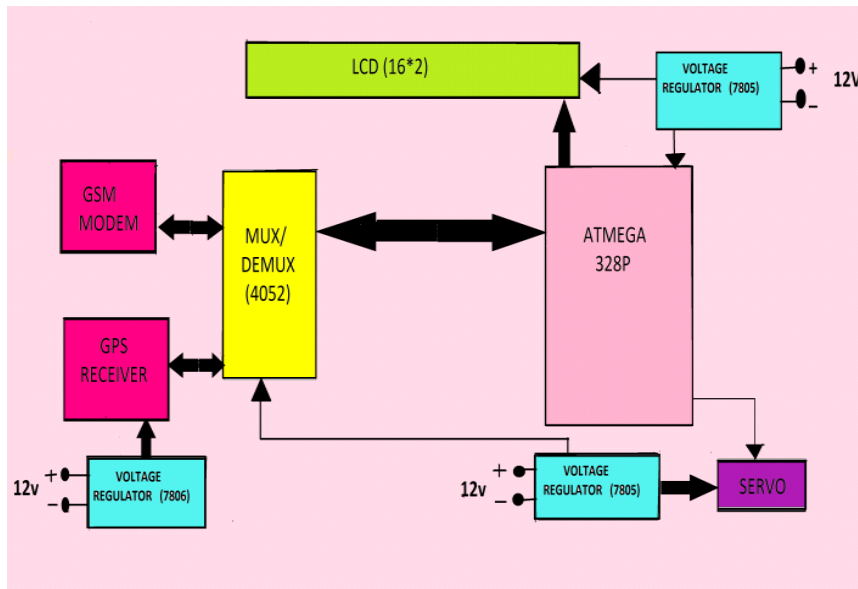


Figure 1. Block Diagram of tracking and locating system

It consist of a GPS receiver, GSM module, ATMEGA328P microcontroller, IC4052 (multiplexer/demultiplexer), RS232 driver and LCD. The GSM board has a valid sim card with sufficient balance so that it can send back the location of the vehicle.

III. WORKING

The working of the system is explained as follows. In this circuit we have used a microcontroller ATMEGA328P and a MUX IC 4052. LCD 16*2 is used to display the operation. Servo motor is used to drive the fuel knob to it's on and off position. The GSM modem and GPS receiver are connected through the transmitter and receiver pin to the 1&12, 5&14 pins of MUX that is the input pins of MUX, now the output pin of the MUX 3 and 13 are connected to pin 2 and 3 of the microcontroller respectively. Pin number 16 and 8 of the MUX are Vcc and ground pin respectively. Pin number 15 and 16 of the LCD are Vcc and ground respectively. All the Vcc or the positive supply are connected to the voltage regular IC 7805 which takes 12V as input and provide 5V to controller, MUX and LCD. When we got to know that our vehicle that is already installed with locating and tracking system, to know that our vehicle that has been stolen, we send a message code (that indicates that the fuel supply is off) to the GSM and system shows fuel supply is off as shown in the figure2.



Figure 2. Fuel supply is off

Then GSM receives the code and transmit that code to controller. Now the controller read the code if the code matches with the programmed code then the values of the select lines are 10 so the line is switched to the GPS as shown in figure 3, and the longitude and latitude information are extracted from the GPS to the controller.

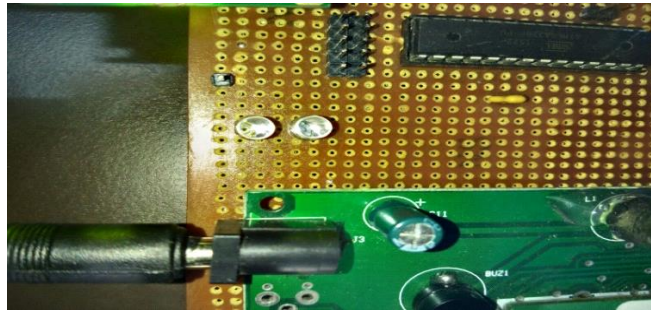


Figure 3. LED showing that the select line is switched to the GPS

Now the value of the select lines of MUX is 00 so it switches the line to GSM. Now the controller that is programmed assembles the code which is received by GSM and the GSM modem send the message to user which includes the information about the position and time that is tracked of the vehicle. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or using direct TCP/IP connection with Tracking server through GPRS [5].



Figure 4. LCD shows the longitude and latitude position locked by the GPS receiver.

The LCD shows the operation of each step. The figure 4 is showing that LCD display is providing the information about the system booting.

After getting the information about the position of the vehicle, again a message code (that indicates that the fuel supply should be off) is send to the GSM, GSM receives the code and transmit that code to the controller. Now again controller reads the code, if the code matches then the controller sends the pulse width modulation (PWM) signal of pre-defined value to the servomotor which in turn rotates the servo and thus stops the fuel supply to the engine with the help of fuel knob that is connected to servomotor the line is switched to the GPS and longitude and latitude information are extracted from the GPS to the controller. Upon receiving the location of the vehicle, the owner can either stop or start the ignition of the engine [6].

3.1 Circuit Diagram

The circuit diagram of the vehicle tracking and fuel stopping system is shown in figure 5. Circuitry of this system is built around the ATMEGA 328P microcontroller. The other important components are the GPS receiver, GSM modem, RS232 driver, IC 4052(MUX/DEMUX) and LCD. The circuit requires +12V power supply to operate.

The GSM modem is a specialized type of modem which accepts a SIM card operates on a subscriber's mobile number over a network, just like a cellular phone [7]. Modem sim300 is a triband GSM/GPRS engine that works on EGSM900MHz, DCS1800MHz and PCS1900MHz frequencies.

GSM Modem is RS232-logic level compatible, i.e., it takes -3v to -15v as logic high and +3v to +15 as logic low[7]. A GPS tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle, person, or other asset to which it is attached and to record the position of the asset at regular intervals [8]. A GPS receiver must be locked on to the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement [9]. DC servo motors have been used generally at the computers, numeric control machines, industrial equipments, weapon industry, and speed control of alternators, control mechanism of full automatic regulators as the first starter, starting systems quickly and correctly [10]. ATmega328p is a high performance, low power AVR 8-bit Microcontroller. It has 23 programmable pins and operating voltage is low (1.8-5.5v)[11]. A voltage regulator is designed to automatically maintain a constant voltage level regardless of changes in load current [12].

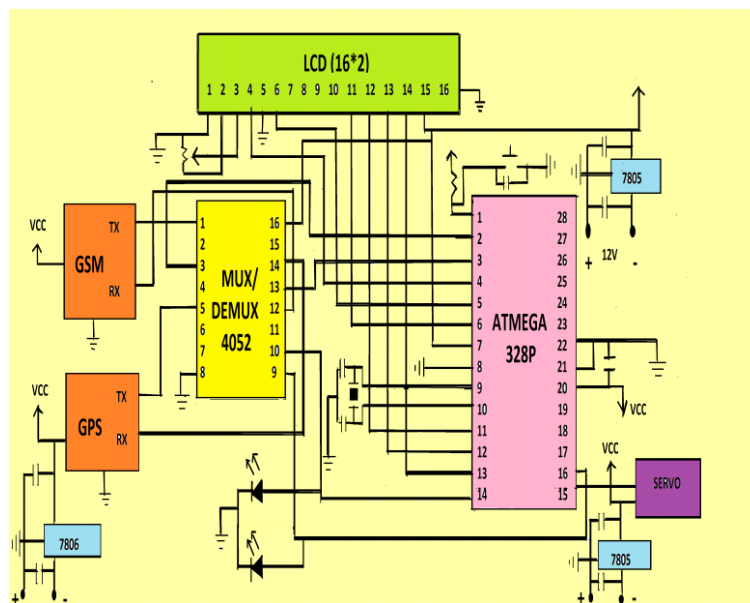


Figure 5. Circuit Diagram of Vehicle tracking and locating system

3.2 Circuit Simulation-

The circuit simulation of the circuit using the proteus software is shown in figure 6. Through this we can check whether this project is working against all the conditions or not.

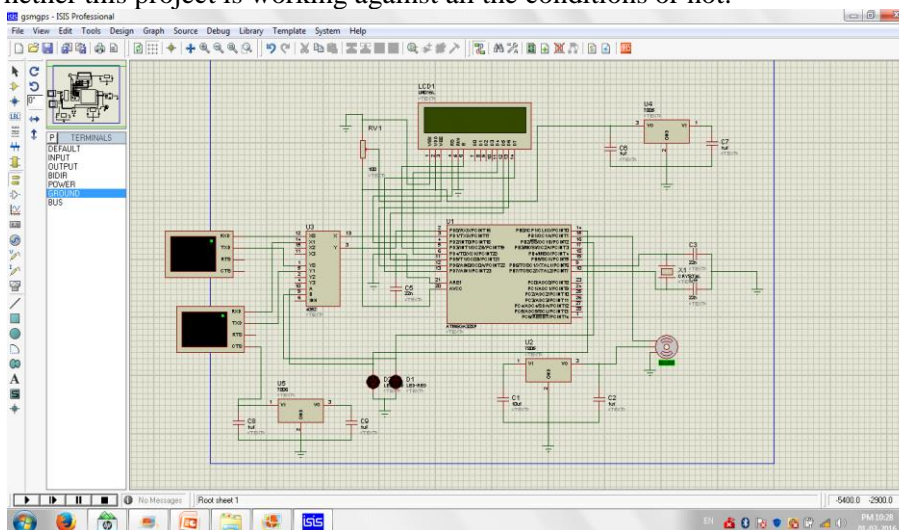


Figure 6. Circuit simulation on proteus.

IV. RESULTS

The select lines S_0S_1 are connected to GPS and GSM in the following manner-

When $S_0S_1 = 00$, GSM is connected

When $S_0S_1 = 10$, GPS is connected.

The following table shows the operation of the system-

Table 1. Different stages and its corresponding outputs.

Stages	Servo Motor	Fuel Knob	Fuel Supply	Line(S_0S_1) Switching
Stage 1 (System ON)	ON(0°)	ON	ON	GSM
Stage 2 (Message sent to off the knob)	Rotates (90°)	OFF	OFF	GSM to GPS
Stage 3 (Position sent by the GSM to the owner)	Rotates (90°)	OFF	OFF	GPS to GSM
Stage 4 (Message sent to ON)	Rotates (0°)	ON	ON	GSM to GPS
Stage 5 (Position Received)	Rotates (0°)	ON	ON	GPS to GSM

V. CONCLUSION

In this project we have used the efficient and effective method for vehicle tracking and fuel stopping using GSM and GPS technology. The key feature of this project is, it stops the fuel supply by rotating the fuel knob to its off position through servomotor so that it doesn't harm the engine of the device. There are many more systems like this available in the market but they are not as efficient as this system.

It can easily track the position of the vehicle and also stops the supply of fuel without damaging the engine of the vehicle.

VI. Future scope

It is very important for us to secure our vehicles for doing so we can use this system in our vehicles. As we can see vehicle theft is increasing day by day this system helps us to secure our vehicle as well as show the location of the vehicle. It can be used by the parents to look after their children. It can also be used in the ambulance to estimate the time to reach to the hospital. This project can be further modified by using the application in which we can know the name of the place instead of checking into the user equipments.

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