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Vehicle Theft Detection and Tracking Based on GSM and GPS

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Abstract— *Currently most of the public having their own vehicle, theft is happening on parking and sometimes driving insecurity places. The safe of vehicles is extremely essential for public vehicles. Vehicle tracking and locking system is installed in the vehicle, to track the place and locking engine motor. The place of the vehicle is identified using Global Positioning system (GPS) and Global system mobile communication (GSM). These systems constantly watch a moving vehicle and report the status on demand. When the theft is identified, the responsible person sends SMS to the microcontroller, then microcontroller issue the control signals to stop the engine motor. Authorized person needs to send the password to controller to restart the vehicle and open the door. This is more secured, reliable and low cost.*

Index Words *— Vehicle Tracking, Locking, Microcontroller, GPS, GSM*

1.INTRODUCTION

In the last few decades, India has progressed at such an enormous rate that many companies have strongly established themselves here. These companies bring a huge amount of workforce with them. Arranging transportation to such a huge mass is a difficult task involving many problems. Generally, this transport is arranged through the local transport vendors on a yearly contract basis. Recently happened problems are such as burglary, rape cases etc. The development of satellite communication technology is easy to identify the vehicle location. Vehicle tracking systems have brought this technology in day-to-day life of the common person. Today GPS used in cars,ambulances, fleets and police vehicles are common sights on the roads of developed countries. All the existing technology support tracking the vehicle place and status.

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. This system is designed for users in land construction and transport business, provides real-time information such as location, speed and expected arrival time of the user in moving vehicles. This system may also useful for communication process among the two points.

Currently GPS vehicle tracking ensures their safety as travelling. This vehicle tracking system found in clients vehicles as a theft prevention and rescue device. Vehicle owner or police follow the signal emitted by the tracking system to locate a robbed vehicle in parallel the stolen vehicle engine speed going to decreased and pushed to off. After switch of the engine, motor cannot restart without permission of password. This system installed for the four wheelers. Vehicle tracking is usually used in navy operators for navy management functions, routing, send off, on board information and security. The applications include monitoring driving performance of a parent with a teen driver. Vehicle tracking systems accepted in consumer vehicles as a theft prevention and retrieval device. If the theft is identified, the system sends the SMS to the vehicle owner. After that vehicle owner sends the SMS to the controller, issue the necessary signals to stop the motor.

II. Survey of the Related Work

The proposed GPS/ GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are working successfully. These results are compatible with GPS technologies.

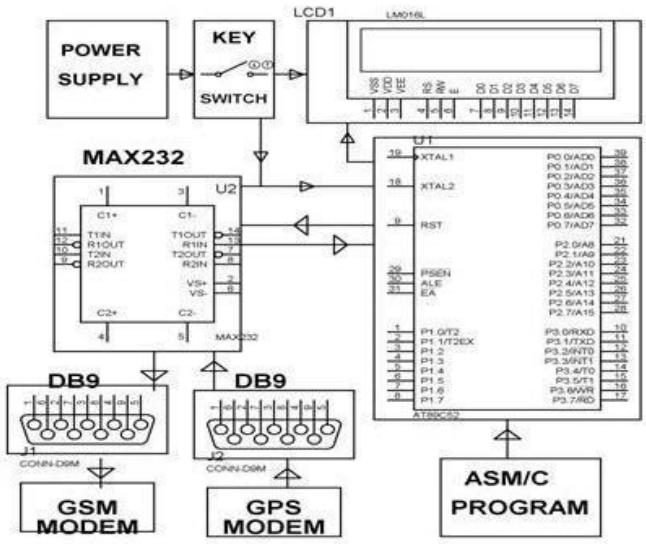
A vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to t rack the vehicle's place. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology. This system built is based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving vehicle and report the status of the vehicle on demand.

III. Proposed Method

In this proposed work, a novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into sleeping mode while the vehicle handled by the owner or authorized person otherwise goes to active mode, the mode of operation changed by in person or remotely. If any interruption occurred in any side of the door, microcontroller is interrupted and SMS is sent to the microcontroller. The controller issues the message about the place of the vehicle to the car owner or authorized person. When send SMS to the controller, issues the control signals to the engine motor. Engine motor speeds are gradually decreases and come to the off place . After that all the doors locked. To open the door or restart the engine, authorized person needs to enter the passwords. In this method, tracking of vehicle place easy and doors locked automatically, thereby thief cannot get away from the car.

IV. Block Diagram

The Block diagram of Vehicle tracking and locking system based on GSM and GPS technology is shown .



V. Software Specifications

- Kiel µVision IDE
- MC Programming Language: Embedded C

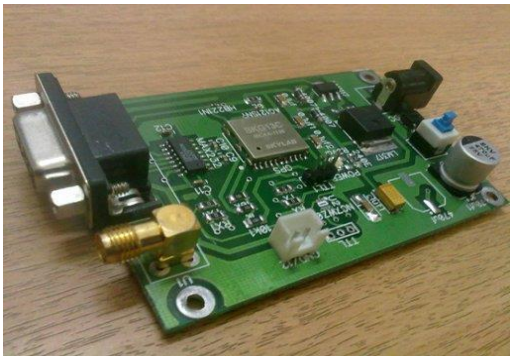
VI. GPS Technology

The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. The system provides essential information to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver. GPS works in any weather circumstances at anywhere in the world. Normally no subscription fees or system charges to utilize GPS.

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. 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. GPS receiver is used for this research work to detect the vehicle location and provide information to responsible person through GSM technology.

VII. GSM Modem SIM900

SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.



With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

Features of GSM:

- Single supply voltage
- Typical power consumption
- Tri-band
- MT,MO,CB, text and PDU mode,
- SMS storage: SIM card
- Supported SIM card: 1.8V, 3
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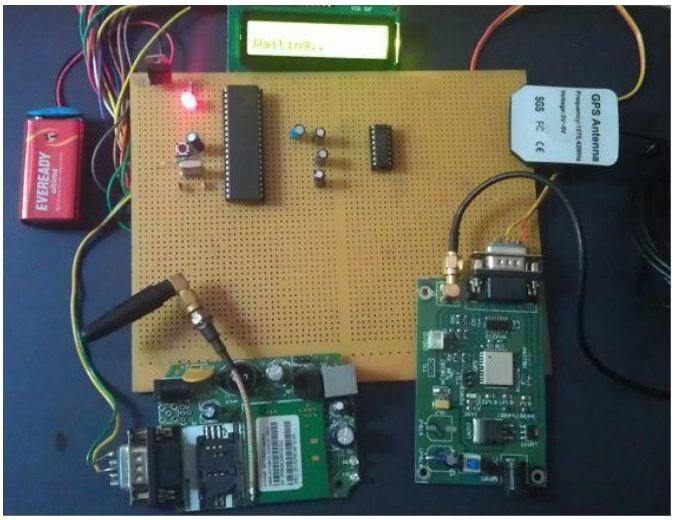
VIII. HARDWARE DESIGN



In this we are using a 40 pin ATmega16 microcontroller. It has four input–output ports.ATmega16 microcontroller is the heart of the project that is used for interfacing. Two pins are VCC pins and other two pins are at ground. Pin 9 is reset pin. A crystal oscillator of 12 MHz is connected to the microcontroller. RS-232 protocol is used as serial communication between the microcontroller, GPS and GSM modem. A serial driver MAX232, 16 pin IC is used for converting RS-232 voltage levels into TTL voltage levels. There are four electrolytic capacitors which are used with MAX232. A 9V battery is used to power the circuit. A 7805

regulator is use dare powered by 5V. LED indicates the presence of power supply.

IX.SOFTWARE PROGRAM

The software programming is done in 'C 'language. Data(co-ordinates) received by GPS from the satellites is defined in the software. Decoding the NMEA (National Marine Electronics Association) protocol is the main purpose of developing this software. The mobile number of the user should be included in the software programming in order to receive the location values fromthe SIM card which we are using in GSM modem. The NMEA protocol consists of set of messages. These messages are ASCII character set. GPS receives data and present it in the form of ASCII comma – delimited message strings. '$' sign is used at the starting of each message. The locations (latitude and longitude) have the format of ddmm.mmmm. i.e. degrees minutes and decimal minutes. The software protocol consists of the GGA (global positioning system fixed International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.3, No.3, June 2013 37 data) and GLL (geographic position latitude/longitude). But in this system we are using CGA only.

The flow chart of the system is given as:

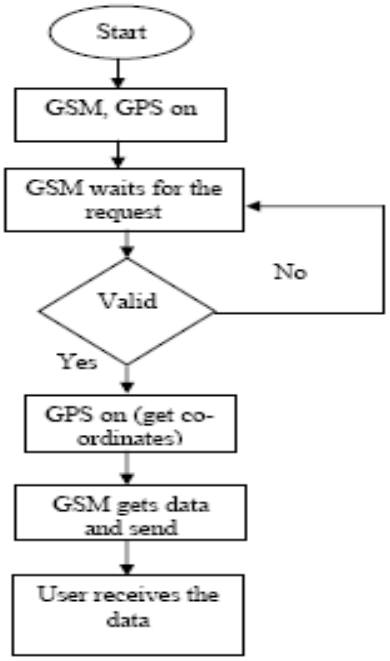


Figure 4.Program flow chart of the tracking system

X. Debugging and testing process

A microcontroller-based system is a complex activity that involves hardware and software interfacing with the external world. Doing well design of a microcontroller-based system requires skills to use the variety of debugging and testing tools available. The debugging and testing of microcontroller-based systems divided into two groups: software-only tools and software-hardware tools. Software-only tools come as monitors and simulators, which are independent of the hardware under development. Software-hardware tools are usually hardware dependent, more expensive and range from in-circuit emulators and in-circuit simulators to in-circuit debuggers. In general, the higher the level of integration with the target hardware, the greater the benefit of a tool, resulting in a shorter development time, but the greater the cost as well. The factors to consider when choosing a debugging tool are cost, ease of use and the features offered during the debugging process.

A software simulator is a computer program running on an independent hardware and it simulates the CPU, the instruction set and the I/O of the target microcontroller. Simulators offer the lowest-cost development tools for microcontroller-based systems and most companies offer their simulator programs free of charge.

The user program operated in a simulated environment where the user can insert breakpoints within the code to stop the code and then analyze the internal registers and memory, display and change the values of program variables and so on. Incorrect logic or errors in computations can analyze by stepping through the code in simulation. Simulators run at speeds 100 to 1000 times slower than the actual micro controller hardware and, thus, long time delays should avoid when simulating a program. Micro controller-based systems usually have interfaces to various external devices such as motors, I/O ports, timers, A/D converters, displays, push buttons, sensors and signal generators, which are usually difficult to simulate. Some advanced simulators, such as the Proteus from Lab center Electronics allow the simulation of various peripheral devices such as motors, LCDs, 7-segment displays and keyboards, and users can create new peripheral devices. Inputs to the simulator can come from files that may store complex digital I/O signals and waveforms. Outputs can be as form of digital data or waveforms, usually stored in a file, or displayed on a screen. Some simulators accept only the assembly language of the target microcontroller. Most of the microcontroller software has written a high-level language such as C, Pascal or Basic, and it has become necessary to simulate a program has written in a high-level language.
The software program has written in c or assembly language and compiled using Keil software. After compiler operation, the hex code generated and stored in the computer. The hex code of the program should be loaded into the AT89C52 by using Top win Universal programmer.

XI. Hardware Assembling and Testing:

First step, we need to make single side PCB layout for the given circuit diagram. After made the PCB the following process is required to complete the project.

1. Assemble all the components on the PCB based on circuit diagram. TX and RX pins of the GSM modem to pins 13 and 14 of MAX 232 and insert a valid SIM in the GSM modem.
2. Connect the GPS module according to circuit diagram.
3. These projects implemented and tested successfully by us. This system is very useful and secure for car owners.

XII . Conclusion

In this paper, we have proposed a novel method of vehicle tracking and locking systems used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors locked. To open the doors or to restart the engine authorized person needs to enter the passwords. In this method, easily track the vehicle place and doors locked.

XIII. Acknowledgement

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XIV. References

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