Vehicle Theft Detection and Locking System using GSM and GPS

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Abstract: *A vehicle tracking system is very useful for tracking the movement of a vehicle from any location at any time. An efficient vehicle tracking system is designed and implemented for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of popular technology that combines a smartphone with an Arduino UNO. This easy to make and inexpensive compared to others. The designed in vehicle device works using Global Positioning System (GPS) and Global System for Mobile Communication(GSM) technology that is one of the most common ways for vehicle tracking. The device is embedded inside a vehicle those positions is to be determined and tracked in real time. 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 location. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology, which would be the cheapest source of vehicle tracking and it would work as anti-theft system. It is an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). An Arduino UNO is used to control the GPS receiver and GSM module. The vehicle tracking system uses the GPS module to get geographic coordinates at regular time interval. The GSM module is used to transmit and update the vehicle location to a database. This paper gives minute by minute update about vehicle location by sending SMS through GSM modem. This SMS contain latitude and longitude of the location of vehicle. Arduino UNO gets the coordinates from GPS modem and then it sends this information to user in text SMS. GSM modem is used to send this information via SMS sent to the owner of the vehicle. Location is displayed on LCD. And then Google map displays location and name of the place on cell phone. Thus, user able to continuously monitor a moving vehicle on demand using smartphone and determine the estimated distance and time for the vehicle to arrive at a given destination.*

Keywords: vehicle tracking system

I. INTRODUCTION

This paper presents a mechanism to make vehicle thefts almost impossible. GSM and GPS technologies are used for that purpose. The proposed system provides two levels of security, password protection for the vehicle and remote ignition cut-off mechanism. This system also provides provision for vehicle tracking using GPS. GSM technology is used for intimating the owner. An alert message is sent to the owner if the wrong password is entered. Message is also sent when the ignition system of the vehicle is started. The owner can respond with an SMS to stop the engine. A buzzer is also activated to alert the nearby people or the security personnel if the right password is not entered after maximum number of trials. Message is sent to owner even when vehicle is started using correct password.

Modern vehicle tracking systems commonly use GPS or GLONASS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via the Internet or specialized software. Urban public transit authorities are an increasingly common user of vehicle tracking systems, particularly in large cities.[1]The safety of private and public vehicles is a major concern nowadays so having GPS vehicle tracking system ensure their safety while travelling. This vehicle tracking system can be found in consumers vehicles as a theft prevention and retrieval device. Police can follow the signal emitted by the tracking system to locate a stolen vehicle. Generally this system is meant to be installed for the four wheelers but for country like India where majority of the people using two wheelers, here is the cheapest source of an anti-theft tracking system.

Vehicle tracking systems are commonly used by fleet operators for fleet management functions such as routing, dispatch, on-board information and security. [2], Global System for Mobile Communication (GSM) and Global Positioning System (GPS)based vehicle location and tracking system provided effective, real time vehicle location, mapping and reporting this information value and add by improving this level of service provided. The GPS based vehicle tracking system is designed to find out the exact location of any vehicle and intimate the position to the concerned authority about through an SMS.

Problem Statement:

In today's world almost every common man owns a vehicle. Vehicle theft is a common issue which everyone faces in insecure parking places. This is a major problem which seemingly little being done about it. Several underlying problems have led to increase in vehicle theft, ranging from sheer human absent mindedness, to the lack of vehicle parking structures. The safety of the public vehicle is extremely essential. Current security systems have certain vulnerabilities.

Objectives:

To locate vehicle 's location and transfer information to monitoring station.

To integrate Global Positioning System (GPS) based tracking system forpositioning information.

To choose Global System for Mobile Communication (GSM)for informationtransmission and acquisition of Vehicle 's location information (latitude, longitude). To develop software to display all transmitted information to the end user Literature Survey

GSM & GPS Based Tracking System: This system is helpful for public transport vehicles such as buses and taxis, it provides Tele monitoring and management system for the transportation of the taxisand buses within the city. Software using C and include libraries and define software serial library (SSL) for allowing serial communication.

Cost Minimization of GPS -GSM Based Vehicle Tracking System: A key parameter that affects the feasibility of tracking system is overall cost of the SMS messages, C, over the observation time period. Total cost is given by C=N.C sms. For this suitable dTH can be selected to minimize the track cost. Software used is VB. NET and along with this android application "apk" app program isdeveloped using Eclipse Integrated Development Environment (IDE). Threshold distance is 4km

Vehicle Tracking System Using GPS GSM and Biometric: Provides features like cost effectiveness, robust, secure model. This aims at controlling theft but prevents it with help of biometric that permits only authorized people to access the vehicle. In addition to this provides vehicleto stop the engine by engine locking system wherein owner can send a message saying "Engine OFF "to GSM connected vehicle.

GPS -GSM based Inland Vessel Tracking System for Automatic Emergency and Position Notifications: it helps in reducing or nullifying accidents in water ways and the entire safety solution to inland vessels. For this Arduino platform is used.

VTS Using GPS GSM Along With Smartphone Application: An in vehicle device, a server and a smartphone application are used for VTS. Web interface written in" PHP" is implemented to directly connect to a database. And smart phone application is created to display a vehicle location on Google Maps. This system was able to experimentally demonstrate its effective performance to track a vehicle's location anytime and anywhere.

Automatic Vehicle Accident Detection and Messaging System using GPS and GSM : It provides solution to poor emergency facilities provided to victims in road accidents in most feasible ways. It is highly beneficial to automotive industry. This will help the medical teams to reach the accident spot in time and save the valuable human lives. Here arduino platform is used for overall interfacing

II. METHODOLOGY

The proposed system is used for positioning and navigating the vehicle with an accuracyof 10 m. The Exact location is indicated in the form of latitude and longitude along withthe exact Navigated track on Google map. The system tracks the location of particular vehicle and sends to users mobile in form of data and also to microcontroller. The arrived data, in the form of latitude and longitude is used tolocate the Vehicle on the Google maps and also we can see the output on

the LCD. This vehicle tracking system takes input from GPS and send it through the GSM module to desired mobile/laptop using mobile communication.

Vehicle Tracking System is one ofthe biggest technological advancements to track the activities of the vehicle. The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send to send the coordinates and the location data to the monitoring centre. At monitoring centre various software's are used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles Here AT89S52 microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which willcontiounsly moniter a moving vehicle and report status of the vehicle on demand. For doing so an AT89S52 is interfaced serially to a GSM and GPS recivers.

GPS is **(global positioning System)** space-based radio navigation system that broadcasts highly accurate navigation pulses to uses on or near the earth.

--It uses latitude and longitude data for finding position of vehicle

Feature

24 satellite of different orbits

Revolve around Earth twice a day

For a 2D location, 3GPS satellite are used

For 3D location, more than. 3satellites are used

Here, GPS reciver each every time receives the co-ordinates of location from satelliteand sends that to controller.GSM is global system for mobile communication is develop by European Telecommunication standards Institute(ETSI) to describe the protocols for 24 digital cellular network used by mobiledevice.GPS modem will continuously give the data and gives many parameters as output, but only NMEA datacoming out is read and displayed

III. SYSTEM DESIGN

Block Diagram
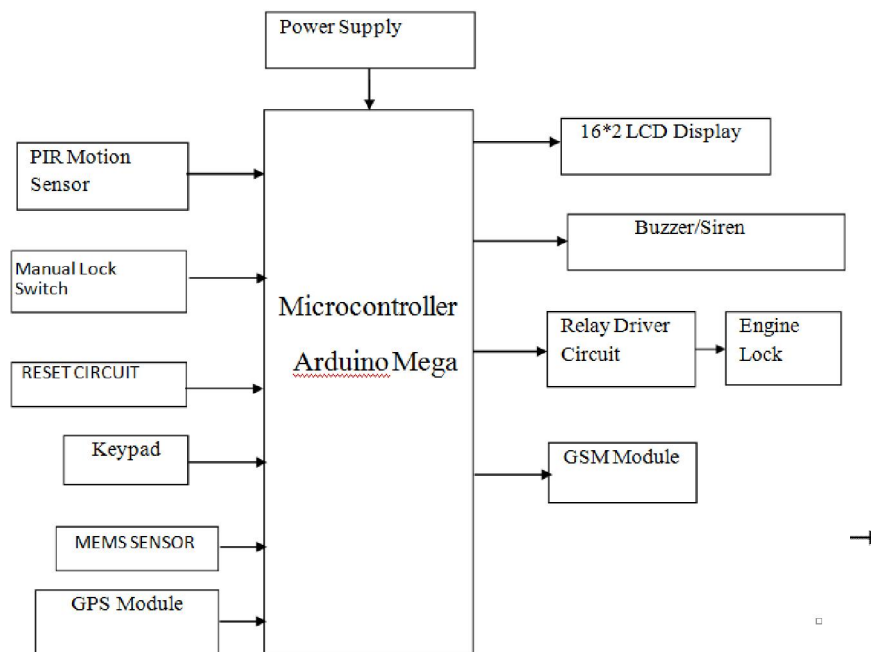
Block Diagram Description:

Proposed System consists of Remote ignition cut-off and Vehicle tracking modules. Both of them make use of GSM sub module. Vehicle tracking module further makes use of GPS sub module and Remote ignition cut-off module uses password authentication sub module. User enters the correct password to start the vehicle. If incorrect password is entered three times, an auto-generated message is sent to owner and a buzzer activates alerting the nearby Personnel. GSM modem is used to send OTP to owner. The owner is also notified if his vehicle is started. The owner can respond with an SMS.The ignition of the vehicle will be disabled whenever $OFF message is sent. GPS technology is used to track the vehicle. Location co-ordinates of the vehicle are sent to owner whenever $LOC message is

Specification of components

SIM800A Quad Band GSM/GPRS Serial Modem

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with thecomputer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you needto find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem.Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. When you send AT commands for example: "AT\r" you should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

SIM800 is a complete Quad-band GSM/GPRS solution in a LGA type which can be embedded in the customer applications. SIM800H support Quad-band 850/900/1800/1900MHz, it can transmit Voice,SMS and data information with low power consumption. With tiny size of 15.8*17.8*2.4 mm, it can fit into slim and compact demands of customer design. Featuring and Embedded AT, it allows total cost savings and fast time-to-market for customer applications

Features of SIM800A

- Bands: GSM 850MHz, EGSM 900MHz, DCS 1800MHz, PCS 1900MHz
- GPRS class 2/10
- Control via AT commands (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT commandset)Supply voltage 3.4-4.4V
- Coding schemes: CS-1, CS-2, CS-3, CS-4 Tx power: Class 4 (2W), Class 1 (1W)Small package: 23 * 23 * 3mm
- Low power: down to 1mA in sleep modeTCP/IP AT firmware
- Operating temperature: -40C to +85C
- Audio channels which include a microphone input and a receiver output.One SIM card interface.

Modem Features:

- High Quality Product (Not hobby grade)

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- Quad-Band GSM/GPRS 850/ 900/ 1800/ 1900 MHz
- RS232 interface @ RMC Connector for direct communication with computer or MCU kit
- Configurable baud rate
- SMA connector with GSM Antenna.
- SIM Card holder.
- Built in Network Status LED
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- Audio interface Connector
- Normal operation temperature: -20 °C to +55 °C
- Input Voltage: 5V-12V DC

Interfacing with controller:

GSM module is used in many communication devices which are based on GSM (Global System for Mobile Communications) technology. It is used to interact with GSM network using a computer.

GSM module only understands AT commands, and can respond accordingly. The most basic command is "AT", if GSM respond OK then it is working good otherwise it respond with "ERROR". There are various AT commands like ATA for answer a call, ATD to dial a call, AT+CMGR to read the message, AT+CMGS to send the sms etc. AT commands should be followed by Carriage return

i.e. \r (0D in hex), like "AT+CMGS\r". We can use GSM module using these commands.

AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at". That's why modem commands are called AT commands.

Many of the commands that are used to control wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state), are also supported by GSM/GPRS modems and mobile phones. Besides this common AT command set, GSM/GPRS modems and mobile phones support an AT command set that is specific to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (Send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages).

Note that the starting "AT" is the prefix that informs the modem about the start of a command line. It is not part of the AT command name. For example, D is the actual AT command name in ATD and

+CMGS is the actual AT command name in AT+CMGS. However, some books and web sites use

Here are some of the tasks that can be done using AT commands with a GSM/GPRS modem or mobile phone:

Get basic information about the mobile phone or GSM/GPRS modem. For example, name of manufacturer (AT+CGMI), model number (AT+CGMM), IMEI number (International Mobile Equipment Identity) (AT+CGSN) and software version (AT+CGMR).

Get basic information about the subscriber. For example, MSISDN (AT+CNUM) and IMSI number (International Mobile Subscriber Identity) (AT+CIMI).

Get the current status of the mobile phone or GSM/GPRS modem. For example, mobile phone activity status (AT+CPAS), mobile network registration status (AT+CREG), radio signal strength (AT+CSQ), battery charge level and battery charging status (AT+CBC).

Establish a data connection or voice connection to a remote modem (ATD, ATA, etc).

Send and receive fax (ATD, ATA, AT+F*).

Send (AT+CMGS, AT+CMSS), read (AT+CMGR, AT+CMGL), write (AT+CMGW) or delete (AT+CMGD) SMS messages and obtain notifications of newly received SMS messages (AT+CNMI).

Read (AT+CPBR), write (AT+CPBW) or search (AT+CPBF) phonebook entries.

GPS MODULE

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The SKG13BL is a complete GPS engine module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial datamessage with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

It is based on the high performance features of the MediaTek MT3337 single-chip architecture, Its

–165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems.

Figure3.4.3.1SKG13BL Top View

Features

- Ultra high sensitivity: -165dBm
- Extremely fast TTFF at low signal level
- Built-in 12 multi-tone active interference canceller
- Low power consumption: Typical 22mA@3.3V
- ±11ns high accuracy time pulse (1PPS)
- NMEA Output：GGA,GSA,GSV,RMC
- Advanced Features: AlwaysLocate; AIC
- QZSS,SBAS(WAAS,EGNOS,MSAS,GAGAN)
- UART interface: 4800/9600/38400/115200 bps
- Small form factor: 15x13x2.2mm
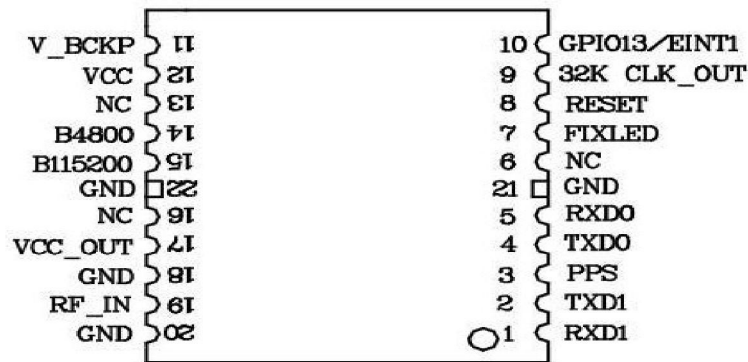- RoHS compliant (Lead-free)

Figure 3.4.3.2 SKG13BL Pin Package

The Global Positioning System(GPS) is a satellite based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information. Using GPS technology one can determine location, velocity and time, 24 hours a day,in any weather conditions anywhere in the world for free. GPS was formally known as the NAVSTAR (Navigation Satellite Timing and Ranging). The basis of the GPS technology is a set of 24 satellites that are continuously orbiting the earth. These satellites are equipped with atomic clocks and sent out radio signals as to the exact time and location. These radio signals from the satellites are picked up by the GPS receiver. Once

the GPS receiver locks on to four or more of these satellites, it can triangulate its location from the known positions of the satellites. It is a higher performance, low power satellite based model. It is a cost effective and portable system which accurately detects the location. The GPS receiver used here is Sky Traq Venus 6 GPS module ST22 which is having TTL logics and also RS232 as option. The GPS receiver is shown in Fig.5. This GPS is used to track the position of the train after the emergency brake is applied in order to avoid the accidents,Global Positioning System tracking is a method of working out a cell phone, or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person. So, for example, a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck, and by parents to check on the location of their child, or even to monitor high-valued assets in transit. A GPS tracking system can work in various ways. From a commercial perspective, GPS devices are generally used to record the position of vehicles as they make their journeys. Some systems will store the data within the GPS tracking system itself (known as passive tracking) and some send the information to a centralized database or system via a modem within the GPS system unit on a regular basis (known as active tracking) or 2-Way GPS.

Interfaces Configuration
Power Supply
Regulated power for the SKG13BL is required. The input voltage Vcc should be 3.0V to 4.2V range, current is no less than 100mA. Suitable decoupling must be provided by external decoupling circuitry (10uF and 1uF). It can reduce the Noise from power supply and increase power stability.

Main power supply Vcc current varies according to the processor load and satellite acquisition. Maximum Vcc peak current is about 30 mA during acquisition.

RESET
The SKG13BL modules include a RESET pin. Driving RESET low activates a hardware reset of the system. RESET is only an input and will not reset external circuitry. At power down the reset is forced when the Vcc drops below 2.7V.

Antenna
The SKG13BL GPS receiver is designed for supporting the active antenna or passive antenna connected with pin RF_IN. The gain of active antenna should be no more than 25dB (18~20dB Typical). The maximum noise figure should be no more than 1.5dB and output impedance is at 50 Ohm.

Vcc_out
Antenna power output pin. When user wants to use external active antenna. The pin supply power for active antenna.

UART Ports
There are several function in SKG13BL related to UATR communication, such as UART data transmission/receive and NMEA sentences input/output. In general, UART0 is as NMEA output and PMTK command input, UAR1 as RTCM input. The bit rates are selectable from 4800,9600,38400,115200 bps

The default EINT1 function is Standby mode control but the function is not supported; leave signal floating (not connected).

RF_IN
The transmission line must to be control impedance from RF_IN pin to the antenna or antennaconnector of your choice. (Impedance 50Ω)

32K CLK_OUT
The 32K Out can output 32.768KHz clock which can be used to support some peripherals that need an real time clock source, don't need an external crystal and cost saving. The pin also could be programmed to be input pin which can receive the signal from an external accelerator sensor or vibration sensor to be the wake -up signal of SKG13BL when the module is in low power mode

PPS
A pulse per second (1 PPS) is an electrical signal that very precisely indicates the start of second. Dependingon the source, properly operating PPS signals have an accuracy ranging 10ns. The PPS signals are used for precise timekeeping and time measurement.

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RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram
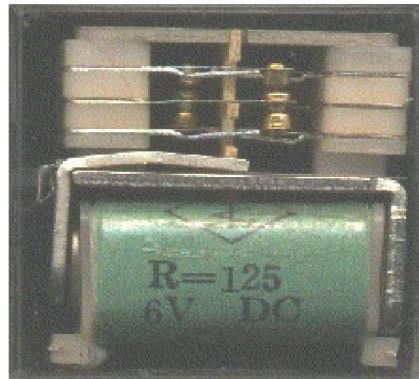

Fig 4.8 Relay showing coil and switch contacts

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see the page on switches.

Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

The supplier's catalogue should show you the relay's connections. The coil will be obvious and it may be connected either way round. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection diode across the relay coil.

The figure shows a relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts.
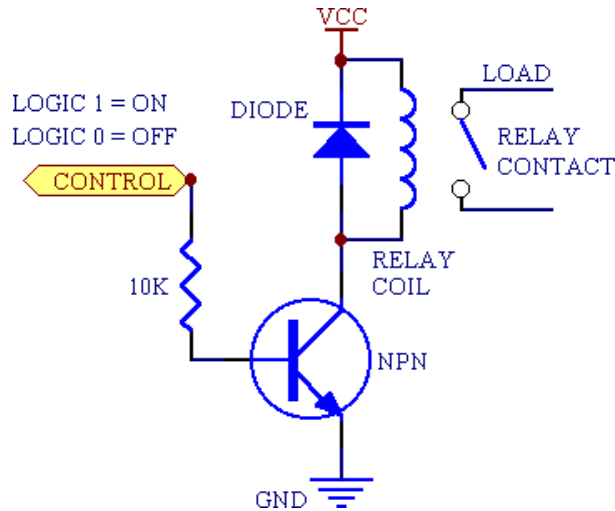
There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

The relay's switch connections are usually labelled COM, NC and NO:

COM = Common, always connect to this; it is the moving part of the switch.

NC = Normally Closed, COM is connected to this when the relay coil is off.

NO = Normally Open, COM is connected to this when the relay coil is on

Applications of relays

Relays are used to and for:

- Control a high-voltage circuit with a low-voltage signal, as in some types ofmodems or audio amplifiers.
- Control a high-current circuit with a low-current signal, as in the starter solenoid ofan automobile.
- Detect and isolate faults on transmission and distribution lines by opening and closing circuit breakers.
- Time delay functions. Relays can be modified to delay opening or delay closing a set of contacts. A very short (a fraction of a second) delay would use a copper disk between the armature and moving blade assembly. Current flowing in the disk maintains magnetic field for a short time, lengthening release time. For a slightly longer (up to a minute) delay, a dashpot is used. A dashpot is a piston filled with fluid that is allowed to escape slowly. The time period can be varied by increasing or decreasing the flow rate. For longer time periods, a mechanical clockwork timer is installed.

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ARDUINO UNO BOARD

Arduino UNO board uses ATmega328 Micro-controller. It contains 14 digital input output pins, reset button, an USB and power jack. Uno means one in Italian language whichmeans Arduino 1.0 series. The Uno series is the latest version of USB Arduino boards. This Arduino board can be powered with both the USB connection as well as external power source. It selects the power source automatically. The technical specifications of the Arduino board are as follows:

Table1. Specification for Arduino Uno Board

S. No	Specification	
1	Microcontroller	ATMega328
2	Operating voltage	5 V
3	Digital I/O pins	14
4	Analog input pins	6
5	Flash Memory	32 KB
6	EEPROM	1 KB

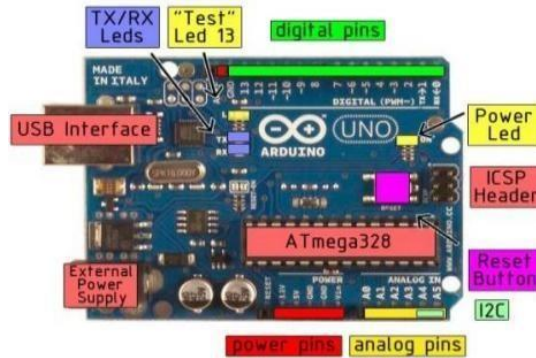| 7	SRAM	2KB
8	Clock Speed	16 MHZ

Fig.2 Arduino Uno board

SOLENOID VALVE

Solenoid valve is an electromechanical device. The valve is operated by electric current passed through the solenoid. Through this valve the outflow of the fluid can be allowed or restricted. Solenoid valve uses less power, accurate in working, gives longer life and compact design. The technical specifications of solenoid valve are as follows.

S. No	Specification	
1	Operating Voltage	12 V DC
2	Fluid used	Petrol
3	Orifice size	2.5 mm
4	Type	2 Way
5	C_v Value	0.48

Table.2 Technical data for solenoid valve

Fig.3 Solenoid valve

SIM 808 MODULE

SIM 808 module contains GSM, GPRS and for satellite navigation it also incorporates GPS technology. With this technology we can trace our assets with a single system. This system is very convienient and cost effective because of its simplicity by incorporating the GPS, GPRS and GSM module in a single chip. It is Quad-band module working in frequency range of GSM 850 MHz, EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. It provides horizontal position accuracy up to 2.5 m. It works in two modes that is functional mode and sleep mode. In sleep mode the current flowwillbe minimum in the module. The technical data of the system are as follows

S. No	Specification	
1	Operating voltage	3.4 to 4.5 V
2	Modes	2 modes

3	Tracking sensitivity	165 dBM
4	Update Rate	5 Hz
5	GPS receiver channels	22 tracking
6	Operating temperature	40 to 80 ˙C

Table.3 Technical data for the SIM 808 Module

Piezoelectric Buzzer
MICRO BUZZER 5V DC / 20mA PCB TYPE

Features
Sealed: yes
Operating power: 3-6V DC / 25mA extremely compact, ultrathin construction no electrical noise
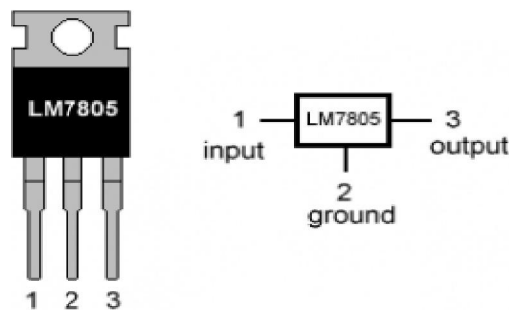low current consumption yet high sound pressure level

Specifications
tone type: single
operating voltage: 3-6V DC rated voltage: 5V DC current consumption: 25mA osc. frequency: 3.2kHz sound level: 87dB connector type: pcb
body color: gray weight: 0.056oz

LM7805

LM7805 PINOUT DIAGRAM

Features
• Output Current up to 1A
• Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
• Thermal Overload Protection
• Short Circuit Protection
• Output Transistor Safe Operating Area Protection

Description

The MC78XX/LM78XX/MC78XXA series of three terminal positive regulators are available in theTO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

MOTOR

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

PIR MOTION SENSOR

PIR sensors are more complicated than many of the other sensors explained in these tutorials (like photocells, FSRs and tilt switches) because there are multiple variables that affect the sensors input and output. To begin explaining how a basic sensor works, we'll use this rather nice diagram

The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. The blocking time potentiometer is also provided on-board to set the blocking time during which the sensor does not respond to any change in motion. The minimum blocking time that can be set is 2.5 seconds and maximum of 10 seconds.
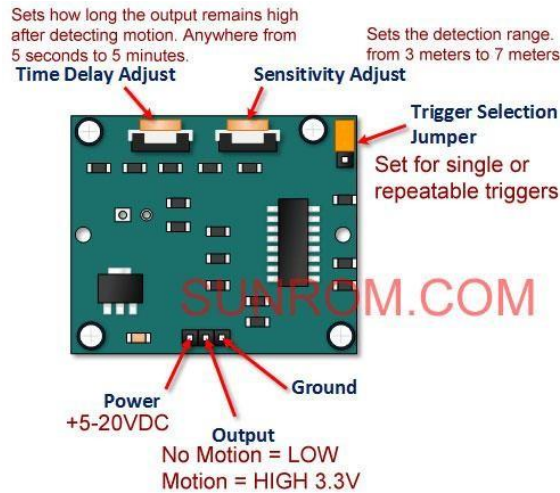
16*2 LCD DISPLAY:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen,setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.
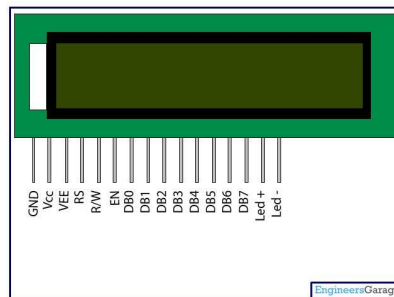
POWER SUPPLY
REQUIRED REGULATED POWER SUPPLY 5V/1A: -

Almost all electronic circuits require a DC source for power   supply unit may be defined as a piece of equipment, which converts the alternating waveforms from the power lines (A C supply) into an essentially direct voltage A rectifier with filter gives out unregulated supply An unregulated power – supply consists of a transformer, arectifier, and filter circuit .There are three reasons why such a simple system is not goodenough for same.

The first is its poor regulation i.e. the output voltage is for from constant as the loadvaries.

The second is that the D.C output voltage varies with the A.C input directly in many locations the line voltage for nominal value 230 v may vary as wide a range as 150 v to 270 v and yet it is necessary that the D.C voltage remains essentially constant.

The third is that the D.C voltage varies with temperature particular if semiconductor devices are used
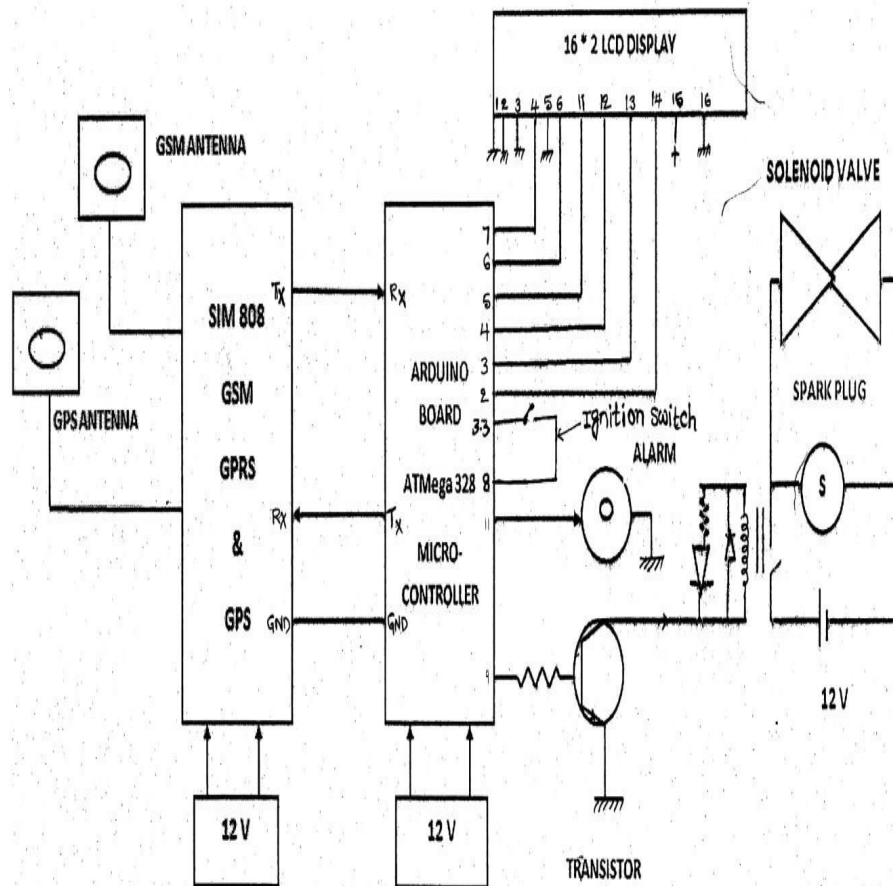
ATMega328 Microcontroller

Arduino board is an open-source microcontroller board which is based on Atmega 2560 microcontroller. The growth environment of this board executes the processing or wiring language. These boards have recharged the automation industry with their simple to utilize platform wherever everybody with small otherwise no technical backdrop can start by discovering some necessary skills to program as well as run the Arduino board. These boards are used to extend separate interactive objects otherwise we can connect to software on your PC like MaxMSP, Processing, and Flash. This article discusses an introduction to Arduino mega 2560 board, pin diagram and its specifications.

What is an Arduino Mega 2560?

The microcontroller board like "Arduino Mega" depends on the ATmega2560 microcontroller. It includes digital input/output pins-54, where 16 pins are analog inputs, 14 are used like PWM outputs hardware serial ports (UARTs) – 4, a crystal oscillator-16 MHz, an ICSP header, a power jack, a USB connection, as well as an RST button. This board mainly includes everything which is essential for supporting the microcontroller. So, the power supply of this board can be done by connecting it to a PC using a USB cable, or battery or an AC-DC adapter. This board can be protected from the unexpected electrical discharge by placing a base plate

IV. CIRCUIT DIAGRAM

The circuit diagram of the vehicle tracking and locking embedded system using GPS and GSM technology. The compact circuitry is built around Atmel ATMega328 Microcontroller.

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8- bit RISC processor core.

The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I/O lines, 32 general-purpose working registers, 3 flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8 channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and 5 software-selectable power-saving modes. The device operates between 1.8 and 5.5 volts. The device achieves throughput approaching 1 MIPS/MHz.

PCB Layout For Tracking System
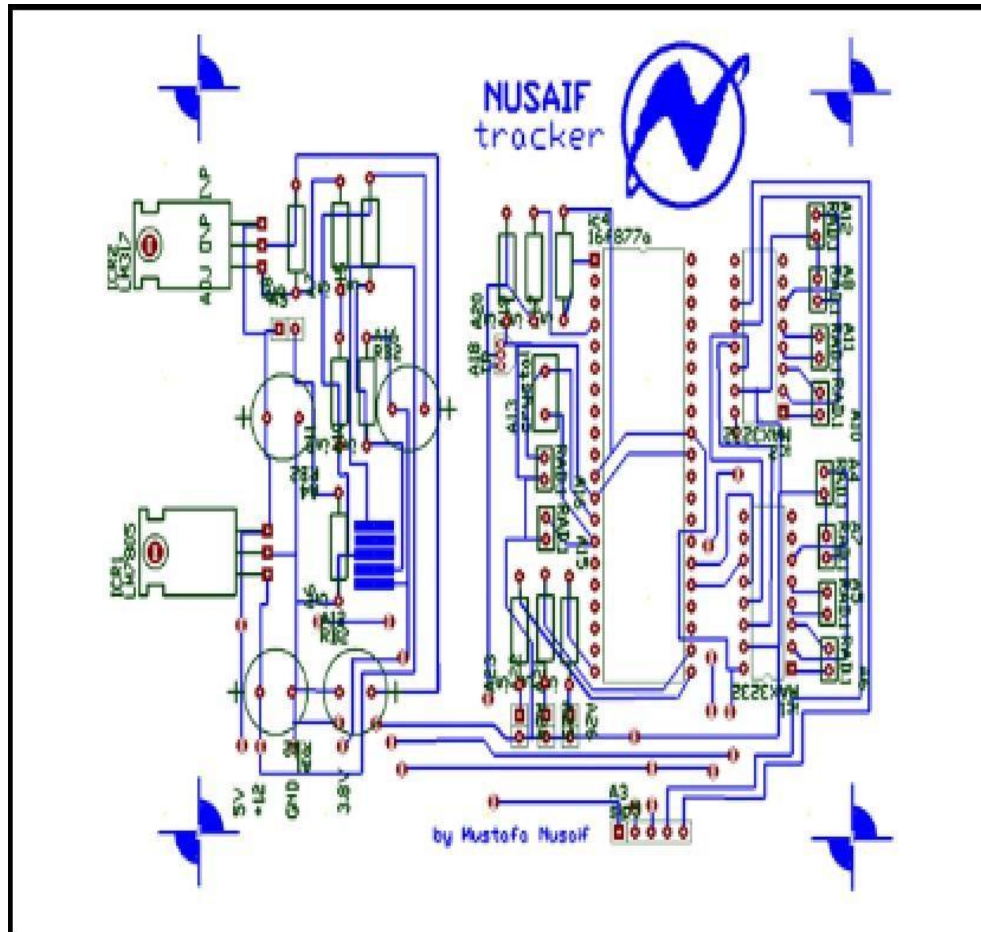
The layout for the printed circuit board has been designed using PCB tools. Two PCB layouts were designed in order to minimize the size of the tracking device andto be able to print them using a single face PCB, where the double side PCB was not available. The two PCB layouts are connected using a ribbon cable. Figure 2 present

FLOWCHART
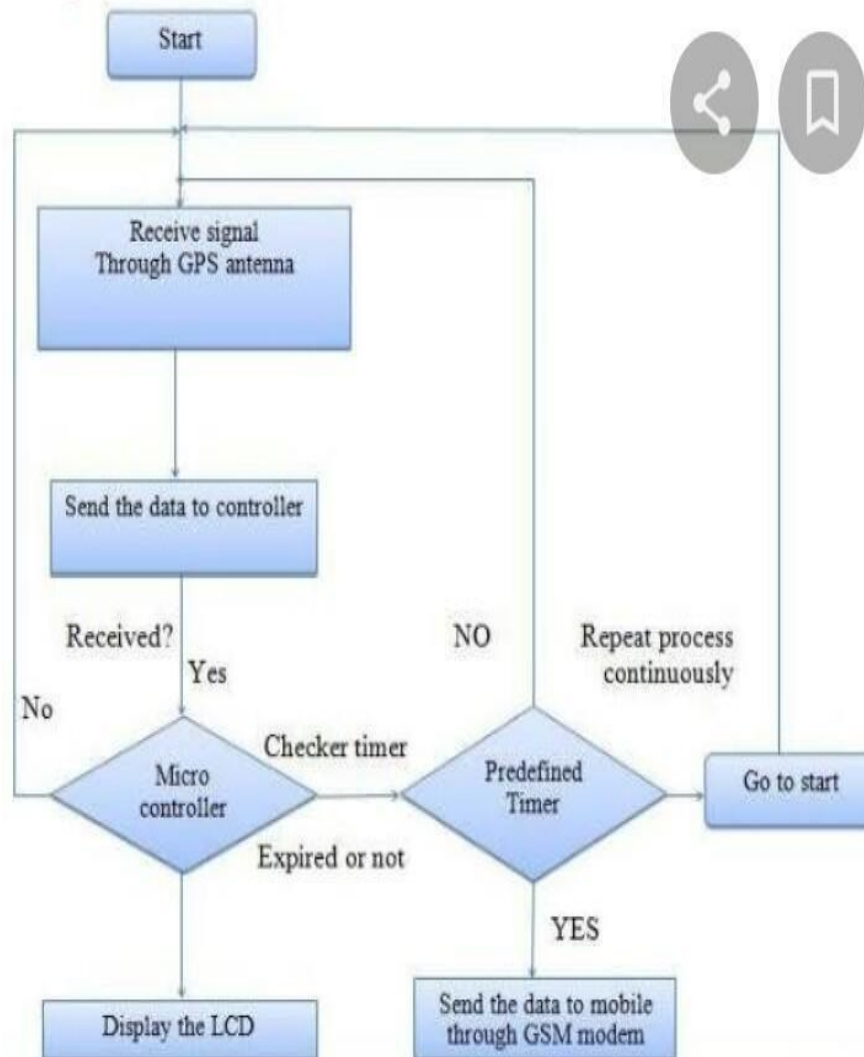
V. ADVANTAGES & APPLICATION

Advantages:
- Easy to use for rural areas.
- Automated areas
- Low power consumption
- Flexible and reliable
- The project can implement for security of supply
- This application is easy to install and easy to operate

Disadvantages:
- GPS Location can be inaccurate sometimes
- Environmental condition
- Human intervention
- If there is noise in edge detected image, then it is hard to track the vehicle.

Application:

1. Anti theft system
2. Systematic transportation management
3. Field service management
4. Used for food delivery
5. Track animals in jungles
6. Positioning Tracking

VI. PROJECT PLAN

Week No.	Action plan
1	Searching of Project information
2	Collection of components requiredfor project
3	Designing of PCB , printing ofcopper for interior layer
4	Etching, drilling, layer alignment ofPCB
5	Mounting components on PCB asper circuit diagram
6	Soldering components on PCB
7	Software Development for theproject
8	Testing circuit is proper or not
9	Troubleshooting for any problems
10	Checking project is properlyworking or not if not then correct
11	Presentation of report
12	Presentation of PPT
13	Checking project from projectguide
14	Checking report & PPT fromproject guide
15	Confirmation from project guide,co-ordinator , HOD
16	Submission of Project model,Project report, PPT

VII. CONCLUSION & FUTURE SCOPE

Conclusion

Tracking framework or system is getting to be progressively vital in expansive urban areas and it is more secured than different frameworks. It has continuous ability, rises with a specific end goal to fortify the relations among individuals, vehicle and street by assembling present day data advances or technologies and ready to structures a real time accurate, compelling exhaustive transportation framework. Updating this setup is simple which makes it open to future a prerequisite which likewise makes it more efficient. The proposed work is cost- effective, reliable and has the function of preventing theft and providing accurate tracking system. A smart anti-theft system is one of the essential systems that homogenize both GPS and GSM systems. It is fundamental because of the huge numbers of uses of both GSM and GPS frameworks and the wide use of them by a great many individuals all through the world. This framework intended for clients in area development and transport business, provides real- time information such as location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format. This framework might likewise valuable for correspondence process among the two focuses

Future Scope:

Vehicle Positioning System is thus designed by using Arduino Mega controller along with GPS, GSM and password modules.

When the latitude and longitude values obtained and fed into Google Earth software, the location of the vehicle could be found out. Authentication is also provided so that only the authorized users can access the vehicle. The use of One Time Password makes it almost impossible for the thief to hack the password. A wide future scope guarantees that an

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