

VEHICLE THEFT DETECTION AND LOCKING SYSTEM

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Abstract: The main purpose of this project is to stop vehicle from larceny. Today vehicle thefts square measure increasing extremely. This practicality is earned by detection vehicle standing in theft mode and by causing an SMS that is generated mechanically exploitation GSM. This will apprise the owner of the vehicle. Therefore, during this vehicle burglaries are often reduced to a great extent as vehicles these days square measure being taken in large range. Hence, vehicles these days requires high security system which may be earned.

This paper presents a good anti-theft vehicle security system that integrates Global Positioning System (GPS), world System for Mobile Communication (GSM) and Biometrics technologies (i.e., fingerprint) for user identification and authentication. Fingerprint device captures the fingerprint pictures, and matches the distinctiveness of every print scan by the device and compares it to the one keeps in its module or native system database. A vehicle pursuit system that works exploitation GPS and GSM technology, which would be the most cost-effective supply of auto pursuit and it might work as anti-theft system.

1. INTRODUCTION

Recently vehicle chase system is obtaining Brobdingnagian quality due to the rising range of the stolen vehicles. Vehicle felony is going on parking on typically driving in unsecured places. As a results of the rising range of taken or vandalized vehicles, vehicle chase system is currently gaining Brobdingnagian quality particularly in unsecured locations. the safety normal like alarm-based security provided by the makers of vehicles is thought to be being ineffective and unable to stop vehicle felony. thanks to the fearful scenario of car felony, individuals have already began to use felony management systems like immobilizers in their vehicles. however, they're outdated ways which may be hacked simply and additionally these antitheft vehicle systems square measure terribly expensive. Also, the high price of vehicles, commercially on the market anti-theft transport systems, insurance, and deductibles and therefore the potential waiting periods for insurance settlements produce a significant monetary hardship for several victims. A GPS chase unit may be a device that uses the Global Positioning System to work out the precise location of a vehicle, person, or alternative quality to which it's connected and to record the position of the quality at regular intervals. The biometric fingerprint security system is wide used. every person's finger is totally different therefore this can be additional secure. The vehicle security is additional necessary in recently. additional vehicles square measure taken and it cannot be found back. Security system like fingerprint system will scale back this felony, particularly in cars. Fingerprint device and Arduino is combined along. The beginning system of the vehicle is modified. the essential association is from electrical switch that provide voltage is given to the voltage regulator then to the Arduino to show it on and off, once input is given in fingerprint device it scans finger. Fingerprint match which can activate the relay that controls the starter relay. This will crank the engine. Then the fingerprint device can shut down. If no finger scanned or finger image don't match then the beginning system is disabled and no cranking happens. Fingerprint sensor won't crank vehicle engine. It'll solely activate or deactivate starter relay to either prevent or enable cranking of engine.

2. LITERATURE SURVEY

M. Uday Kumar Naidu et al., discussed about when the owner kept the vehicle in parking place. Then any one accessed the vehicle it sends signal to the owner that it is being stolen. If he again sends the SMS to the vehicle to stop then the ignition cutoff, fuel supply become switched off and buzzer will give a loud alarm such that he will leave the vehicle in the same location, with the help of reset SMS it will come to its original mode.

Dhanya N.M et al., discussed about the proposed method uses a prediction algorithm to predict the location if GPS is switched off. The prediction is done with the help of the existing data which is available in the cloud. This way of tracking

is less expensive when compared with other tracking system and once this application is installed the user can check the live status of the vehicle with current updates and hence live tracking and theft can be identified.

Somnath. A et al., discussed about the novel Zigbee based Vehicular Identification and Authentication system. It is provided with a detailed description of the system referring to the prototype one. This prototype uses wireless database access from central data so it is very flexible system.

In 1997 B Webb present wheel and steering lock system, to prevent car from theft, but they are visible from outside the car and prevent the wheel from being turned more than a few degrees[1]. The next system was projected on Security Module for Car Appliances by **Pang-Chieh Wang,et.al**. This system prevents car appliances from stealing and unlawful use on other cars. If illegal moving and use a car appliance with the security module without approval occur that will lead the appliance to useless. But it does not prevent vehicle from theft [12].

In 2008 **Lili Wan, et al.**, implemented new system based on GSM in which owner can obtain the alarm message rapidly and if necessary, also it can monitor the car by phone[14]. The subsequent system was a sensor network created vehicle anti-theft System (SVATS). In this method, first step is to form a sensor network by using the sensors in the vehicles that are parked within the same parking area, then identify and monitor possible vehicle thefts by detecting illegal vehicle movement. An alert will be reported to a base station in the parking area if an illegal movement is detected. As the sensor cannot link with the base station directly in the extreme case, automobile cannot receive any safety when no neighbors can be found even if a sensor has tried its extreme power level[15]. In [16]authors describe an automotive security system to disable a key auto system of automobile through remote control when it is stolen. But it does not help to identify the theft.

An effective automotive safety system is implemented for anti-theft by an embedded system occupied with a Global Positioning System (GPS) and a Global System of mobile (GSM) by **Montaser N. Ramadan et al.**, to monitor and track vehicles that are used via certain party for particular purposes, likewise to stop the automobile if stolen and to track it online for recovery[18]. The subsequent system was projected in 2013 on real time automobile theft identity and control system created on ARM 9. It achieves the real time user verification using face recognition, using the Principle of Component Analysis (PCA) algorithm if the outcome is not accurate then ARM produces the signal to block the car access and the car owner will informed about the illegal access with the help Multimedia Message Services (MMS) via GSM modem. But in this technique the camera captures owner's image only. If the owner's friends or relatives want to start the car it will not start [19]. Newly innovative system proposed on vehicle anti-theft system based on an embedded platform comprises of multiple layers of security. The first layer of security in the system is a fingerprint recognition, created on which the doors are opened. Also, to avoid thieves from breaking the glass and getting inside the vehicle, vibration sensors are used in all the windows with a threshold level to avoid wrong alarms. the vehicle is turned on only with the mechanical keys along with correct key number entry on the combination keypad present, failing to do so for three successive times will result in vehicle getting stopped by cutting the fuel supply and an alert message is lead to the mobile number of the owner. Additional to prevent the capture of the vehicle, tyre pressure sensor is also being used which also alerts the owner via a mobile message[20].

In circumstances of vehicle accident detection new system projected by **Varsha Goud et al.**, on vehicle accident automatic detection and remote alarm device. This system can sense accidents in significantly less time and sends the basic info to first aid center within short time covering geographical coordinates, the time and angle in which a vehicle accident had happened. This attentive message is sent to the rescue team in a short time, which will benefit in saving the valuable lives. Spotting an accident previously occurring it can save human life. To implement this new system was projected in which a car will try to avoid hurdle after avoiding animal or human if there is any. Driver will also be informed with red lights specifying that obstacles are in front. But if the system would not be incapable to avoid accident, then this system will habitually generate a tweet in tweeter. For further safety, this system also comprises buzzer and relay where relay helps to protect the car from battery ignition and buzzer will make noise to notify people surrounded[21]. In 2000 paper recommended on An Introduction to Face Recognition Technology which covers topics such as the generic framework for face recognition, several state-of-the-art face recognition algorithms[4] and factors that may affect the performance of the recognizer. New system has been proposed in 2004 thru Jian Yang, et.al. is two-dimensional principal component analysis (2DPCA) aimed at image representation. As contrasting to PCA, 2DPCA is based on 2D image matrices rather than 1D vector so there is no necessity to change image matrix into a vector prior to feature extraction. Because of this an image covariance matrix is constructed openly by means of the original image matrices and its eigenvectors are resulting for image feature extraction[11]. The succeeding paper projected on image-based face detection and recognition to assess various face detection and recognition methods, which offer complete solution for image-based face recognition and detection with higher accuracy, better response rate as an early step for video surveillance.

3. EXISTING SYSTEM

- In existing system, the implementation of security system is completed supported the automobile mechanical key.
- In case if the key input entered is inaccurate, the vehicle can get immobilized.
- Mostly the safety systems for anti-theft area unit supported RFID tags that area unit accustomed management entry of person within the vehicle.

4. PROPOSED SYSTEM

- The projected system is created from an identity verification unit(i.e., Fingerprint scanner) that is employed for verifactory the users of the vehicle by matching the captured fingerprint with predefined fingerprints within the info.
- GPS receiver receives the situation knowledge like latitude, altitude and meridian of a vehicle.
- This knowledge is often transmitted to the mobile device or the user through GSM network or Wi-Fi.

5. HARDWARE REQUIREMENT

- Arduino Uno
- Node MCU
- Fingerprint sensor
- GPS
- GSM
- Buzzer
- Relay
- Motor

6. BLOCK DIAGRAM

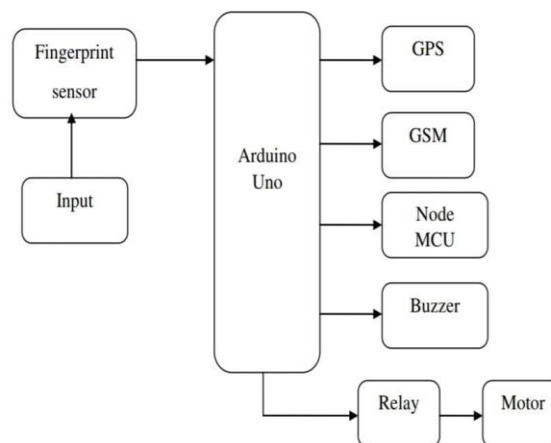


Fig 6.1Block diagram of Vehicle theft detection ad locking system

7. ARDUINO

Microcontroller:

A micro-controller may be a little pc on one computer circuit containing a processor core, memory, and programmable input/ output peripherals .The vital half for USA is that a micro-controller contains the processor (which all computers have) and memory, and a few input/output pins that you just will management. (Often referred to as GPIO - General Purpose Input Output Pins).

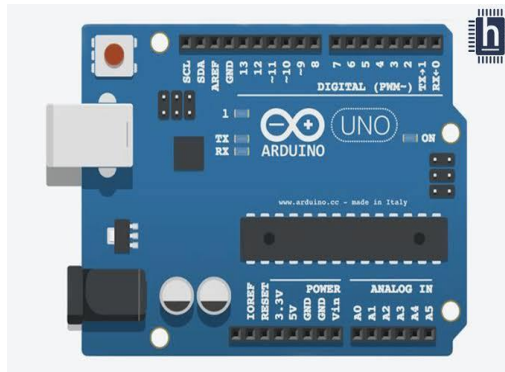


Fig 7.1 Arduino UNO

We will be victimization the Arduino Uno board. This combines a micro-controller at the side of all of the extras to form it straightforward for you to create and right you comes. The Uno could be a microcontroller board supported the ATmega328P. it's fourteen digital input/output pins (of that half dozen are often used as PWM outputs), half dozen analog inputs, a sixteen megacycle per second quartz, a USB affiliation, an influence jack, associate degree ICSP header and a push. It contains everything required to support the microcontroller; merely connect it to a laptop with a USB cable or power it with associate degree AC-to-DC adapter or battery to induce started. you'll be able to tinker along with your UNO without fear an excessive amount of regarding doing one thing wrong, worst-case state of affairs you'll be able to replace the chip for a number of bucks and begin once more. "Uno" means that one in Italian and was chosen to mark the discharge of Arduino package (IDE) one.0. The Uno board and version one.0 of Arduino package (IDE) were the reference versions of Arduino, currently evolved to newer releases. The Uno board is that the initial in a very series of USB Arduino boards, and also the reference model for the Arduino platform; for an intensive list of current, past or noncurrent boards see the Arduino index of boards. this is often a comparatively straightforward thanks to create circuits quickly. Breadboard's area unit created for doing fast experiments. they're not legendary for keeping circuits along for an extended time. after your area unit able to create a project that you simply need to remain around for a jiffy, you ought to think about an alternate technique like wire-wrapping or bonding or perhaps creating a computer circuit board (PCB). the primary factor you ought to notice regarding the board is all of the holes. These area unit jerky into a pair of sets of columns and a group of rows (the rows area unit divided within the middle).

The columns area unit named a, b, c, d, e, f, g, h, i and j (from left to right). The rows area unit numbered one – thirty (from high to bottom). The columns on the sides don't have letters or numbers. The columns on the sides area unit connected from high to bottom within the board to form it straightforward to produce power and ground. (You will think about ground because the negative facet of electric battery and also the power because the positive facet.) For this book our power are +5 volts. within the board, the holes in every row area unit connected up to the break within the middle of the board. For Example: a1,b1,c1,d1,e1 all have a wire within the board to attach them. Then f1, g1, h1, i1, and j1 area unit all connected. however, a1 isn't connected to f1. this could sound confusing currently, however it'll quickly return to form sense as we have a tendency to wire up circuits.

7.1. PROGRAMMING

The Uno will be programmed with the Arduino package (IDE). choose "Arduino/Genuino Uno" from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Uno comes preprogrammed with a bootloader that enables you to transfer new code thereto while not the employment of AN external hardware technologist. It communicates mistreatment the first STK500 protocol (reference, C header files). you'll be able to conjointly bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header mistreatment Arduino ISP or similar; see these directions for details. The ATmega16U2 (or 8U2 within the rev1 and rev2 boards) microcode ASCII text file is out there within the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU bootloader,

which can be activated by:

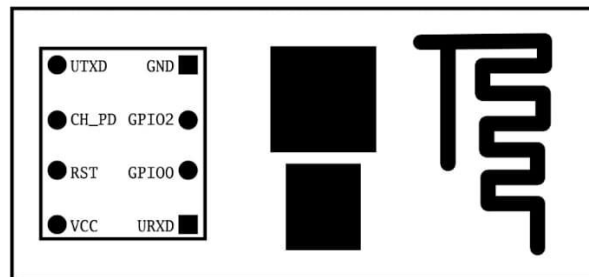
- On Rev1 boards: connecting the solder jumper on the rear of the board (near the map of Italy) then reseing the 8U2.
- On Rev2 or later boards: there's a resistance that propulsion the 8U2/16U2 HWB line to ground, creating it easier to place into DFU mode. you'll be able to then use Atmel's FLIP package (Windows) or the DFU technologist (Mac OS X and Linux) to load a replacement microcode. otherwise, you will use the ISP header with an external programmer(overwriting the DFU bootloader). See this user-contributed tutorial for a lot of data.

8. WI-FI MODULE – ESP8266**PRINCIPLE:**

The ESP8266 Wi-Fi Module could be a self-contained SOC with integrated TCP/IP protocol stack which will offer any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting associate application or offloading all Wi-Fi networking functions from another application processor. every ESP8266 module comes pre-programmed with associate AT command set code, meaning, you'll be able to merely hook this up to your microcontroller. The ESP8266 module is an especially efficient board with a large, and ever growing, community. This module encompasses a powerful enough on-board process and storage capability that permits it to be integrated with the sensors and alternative application specific devices through its GPIOs with tokenish development up-front and tokenish loading throughout runtime. Its high degree of on-chip integration permits for tokenish external electronic equipment, together with the front-end module, is meant to occupy tokenish PCB space. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF permitting it to figure below all operative conditions, and needs no external RF elements.

8.1. PRODUCT FEATURES

- 802.11 b/g/n
- Wi-Fi Direct (P2P), soft-AP
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Integrated PLLs, regulators, DCXO and power management units
- +19.5dBm output power in 802.11b mode
- Power down leakage current of <10uA
- 1MB Flash Memory



ESP8266 WiFi Pinout
Top View (Not to scale)

Fig 8.1.1 ESP8266 Wi-Fi Module

- SDIO 1.1 / 2.0, SPI, UART
- STBC, 1×1 MIMO, 2×1 MIMO
- A-MPDU & A-MSDU aggregation & 0.4ms guard interval
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)

8.2. HARDWARE CONNECTIONS

The hardware connections needed to attach to the ESP8266 module are fairly straight-forward however there are some of vital things to notice associated with power: The ESP8266 needs three.3V power—do not power it with five volts The ESP8266 must communicate via serial at three.3V and doesn't have 5V tolerant inputs, therefore you would like level conversion to speak with a 5V microcontroller. However, if you're venturous and don't have any concern you'll be able to probably depart with ignoring the second demand. however, no one takes any responsibility for what happens if you are doing. :) Here are the connections on the market on the ESP8266 Wi-Fi module: once power is applied to the module you ought to see the red power lightweight activate and therefore the blue serial indicator lightweight flicker shortly.

8.3. TESTING THE MODULE VIA FTDI (OR A USB-TO-SERIAL CABLE)

Before connecting the module to a microcontroller, it is vital to undertake it directly via a serial interface. a simple resolution is to use a 3V3 FTDI cable. Note that the module isn't designed for over three.6V, so a 3.3V power provide

ought to be used - each for power and logic. this batch of the FTDI cables deliver 5V within the provide rail even for the 3V3 version. Apparently, this is often a blunder created by the manufacturer, thus it'd be corrected at some purpose.

1. Connect the RX/TX pins in a very 3v3 FTDI cable to the TX/RX pins within the psychic phenomenon module.
2. Connect a 3v3 power provide to the VCC/GND pins. Note that it's attainable to use AN Arduino 3v3 provide for this.
3. Connect the CH_PID pin to VCC similarly.
4. the remainder of the pins ought to be floating. However, be ready to sometimes ground the RST pin. this might facilitate if the board is stuck on some command.

9. OPERATION

SERIAL CONTROL:

Once you have got opened the Serial monitor, you want to set the primary choice to NL & metallic element and also the information measure. For this newer model, the default information measure is 9600, for the older is 115200.

10. RELAY

A relay is associate electrically operated switch. Current flowing through the coil of the relay creates a force field that attracts a lever and changes the switch contacts. The coil current is on or off therefore relays have 2 switch positions and that they are double throw (changeover) switches. Relays permit one circuit to modify a second circuit which might be fully break away the primary. as an example, an occasional voltage battery circuit will use a relay to modify a 230V AC mains circuit. there's no electrical affiliation within the relay between the 2 circuits, the link is magnetic and mechanical. Relays are terribly easy devices. There are four major elements in each relay. They are

- Electromagnet
- Armature which will be attracted by the magnet
- Spring
- Set of electrical contacts

10.1. WORKING

When a current flows through the coil, the ensuing force field attracts AN coil that's automatically joined to a moving contact. The movement either makes or breaks a reference to a set contact. once the present to the coil is transitioned, the coil is coming back by a force or so 0.5 as robust because the attractive force to its relaxed position.

Usually this is often a spring, however gravity is additionally used usually in industrial motor starters. Most relays square measure factory-made to control quickly. in a very low voltage application, this is often to cut back noise. in a very high voltage or high current application, this is often to cut back arcing.

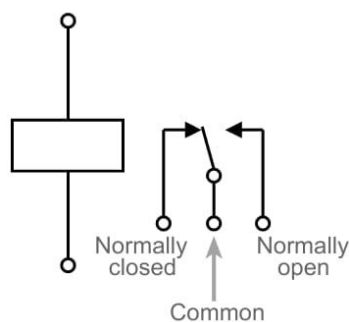


Fig 10.1 Circuit symbol of relay

11. DRIVE CIRCUIT AND PROTECTION DIODES FOR RELAYS

The coil of a relay passes a comparatively massive current, generally 30mA for a 12V relay, however it will be the maximum amount as 100mA for relays designed to work from lower voltages. thence a CB electronic equipment is employed to attain this rating of the relay. Transistors and ICs should be shielded from the transient high voltage made once a relay coil is converted. The diagram shows however a sign diode (e.g., 1N4148) is connected 'backwards' across the relay coil to supply this protection. Current flowing through a relay coil creates a field that collapses suddenly once this is converted. The fast collapse of the field induces a quick high voltage across the relay coil that is extremely doubtless to wreck transistors and ICs. The protection diode permits the induced voltage to drive a quick current through the coil

(and diode) that the field dies away quickly instead of instantly. This prevents the induced voltage turning into high enough to cause injury to transistors and ICs.

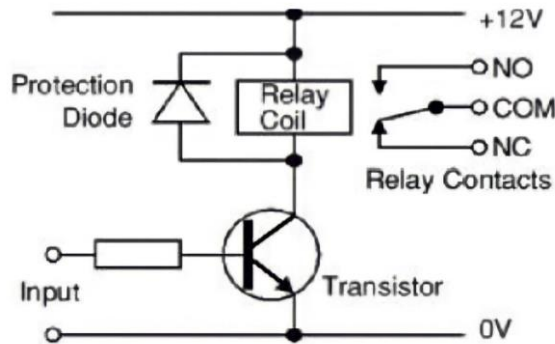


Fig 11 Drive circuit and protection diodes for relays

12. GPS MODULE

The Global Positioning System (GPS) contains 3 segments:

- The house section (all practical satellites)
- The management section (all ground stations concerned within the observance of the system master control station, Monitor stations, and communication system stations)
- The user section (all civil and military GPS users).

GPS Was developed by the U.S. Department of Defense (DOD) and might be used each by civilians and military Personnel. The civil signal SPS (Standard Positioning Service) is used freely by the overall public, while the Military signal PPS (Precise Positioning Service) will solely is employed by approved government agencies. the primary Satellite was placed in orbit on twenty second Feb 1978, and their square measure presently twenty-eight operational satellites orbiting the planet at a height of twenty,180 kilometer on half-dozen completely different orbital planes. Their orbits square measure inclined at 55° to the equator, guaranteeing that a minimum of four satellites square measure in radio communication with any purpose on the world.

throughout the event of the GPS system, specific stress was placed on the subsequent 3 aspects:

- It had to produce users with the potential of deciding position, speed and time, whether or not in motion at rest.
- It had to possess an eternal, global, third-dimensional positioning capability with a high degree of accuracy, regardless of the weather.
- It had to supply potential for civilian use.

12.1. GPS SEGMENTS

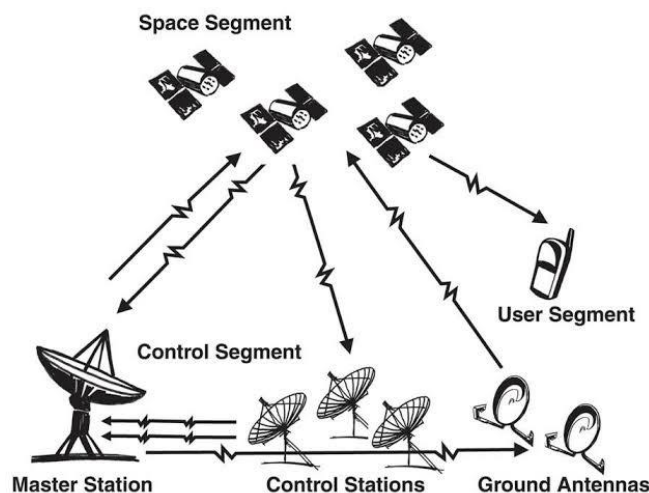


Fig 12.1 GPS Segments

12.2. GENERATING THE SATELLITE SIGNAL

On board the satellites square measure four extremely correct atomic clocks. the subsequent time pulses and frequencies needed for every day operation square measure derived from the resonant frequency of 1 of our atomic clocks:

- The fifty Hertz information pulse.
- The C/A code pulse (Coarse/Acquisition code, PRN-Code, coarse reception code at a frequency of 1023 MHz), that modulates the information exploitation associate degree exclusive-or operation (this spreads the information over a 1MHz Bandwidth).
- The frequency of the civil L1 carrier(1575.42_MHz) the information modulated by the C/A code modulates the L1 carrier successively by exploitation Bi-Phase-Shift-Keying (BPSK). With each amendment within the modulated information there's a 180° amendment within the L1 carrier part.

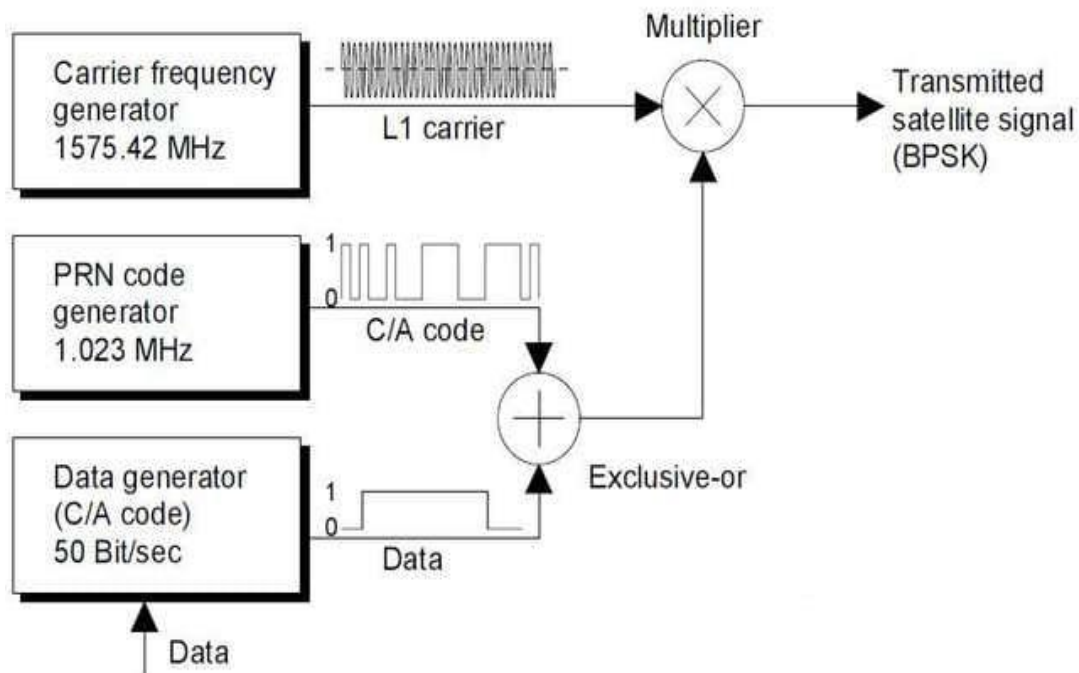


Fig 12.1 Block Diagram of Satellite

13. EMBEDDED C

Now that we've seen a bit regarding Embedded Systems and Programming Languages, we are going to dive in to the fundamentals of Embedded computer program. we are going to begin with 2 of the essential options of the Embedded C Program: Keywords and knowledge sorts.

13.1. Keywords in Embedded C

A Keyword may be a special word with a special desiring to the compiler (a compiler as an example, may be a software system that's won't to convert program written in C to Machine Code). as an example, if we have a tendency to take the Kiel's Cx51 Compiler (a common compiler for 8051 primarily based Microcontrollers) the subsequent square measure a number of the keywords:

- bit
- sbit
- sfr
- small
- large

This square measure few of the various keywords related to the Cx51 compiler together with the quality C Keywords

14. REAL TIME EXPERIMENT

By using this command, we can unlock our vehicle using Fingerprint. If wrong input is given means a SMS will sent to owner of the vehicle as a warning, and a buzzer sound will come in vehicle, so that we can prevent vehicle theft and a GPS also installed to locate the vehicle.

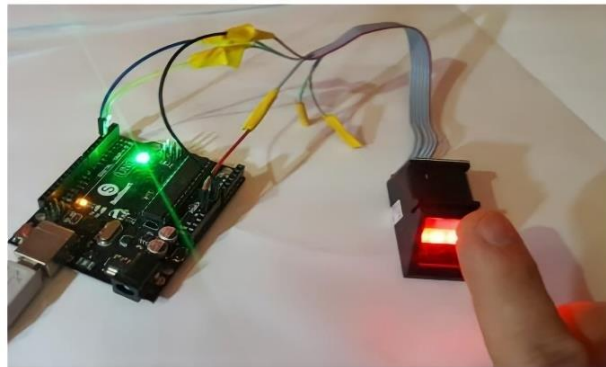
14.1. INPUT

Fig 14.1 Fingerprint unlocking

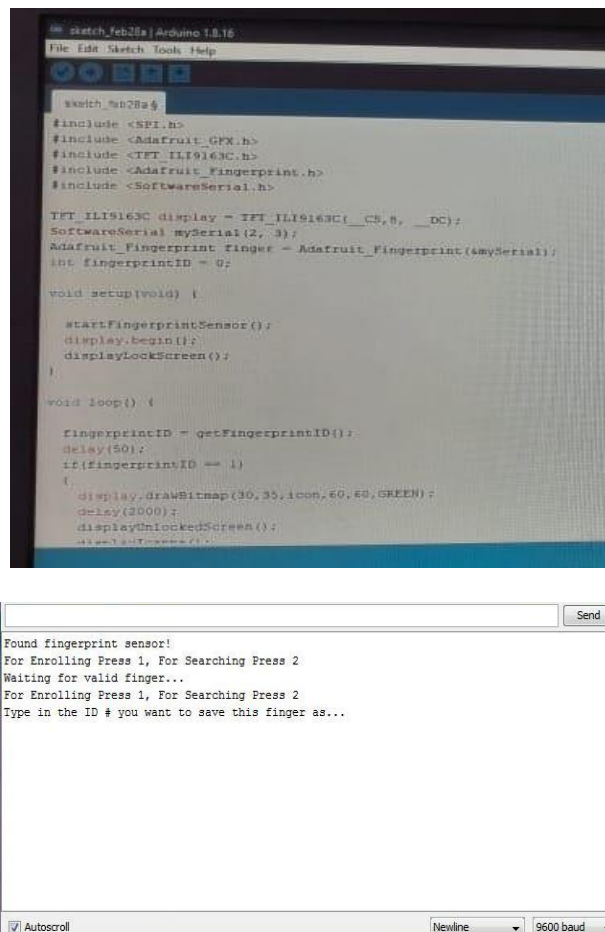
14.2. OUTPUT

Fig 14.2 Output of Fingerprint during scanning



Fig 14.2.1 Fingerprint sensor installed in bike

15. CONCLUSION

The project could be a model for AN anti-theft device for vehicles. The project is aimed toward implementing AN anti-theft device with real time trailing and user management. this can be achieved with the assistance of GPS and GSM technology. The project provides an additional layer of security by as well as biometry within the style of fingerprint recognition to grant access to the vehicle. Hence, fingerprint technology improves the protection of AN automobile creating it attainable for the automobile to be utilized by solely approved users. Therefore, implementing this method on vehicles makes the action of our automobile security system comes in an exceedingly low-cost and simply out their type. Biometric recognition systems gift security and convenience than typical ways of private recognition.

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