International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 05 | May - 2022 Impact Factor: 7.185 ISSN: 2582-3930

VEHICLE THEFT DETECTION AND SECURE SYSTEM USING ARDUINO

Tirupathi Rao Vankala[1],Lokesh Borra[2],Supra Deepika Runkna[3],Jhansi Pinninti[4] Anil Prasad D[5]
[12345]Department of ECE & ANITS

Abstract: Today vehicles form an important asset to us, without which our life would be incomplete. But, when it comes to the security of our vehicles, we are very helpless. It is of a great concern, especially in metropolitan cities, where these incidents occur each and every day. So, in this paper, we have focussed on the security of vehicles. The Aim of this work is to authenticate and inform the details of the vehicle to the owner through SMS when it is to be used by any other person. If the owner is aware of that person he can give access through a return reply- motor on otherwise he can deny by replying –motor off. This is possible using GSM and fingerprint sensor. In case if the vehicle is theft by any chance, we can detect the vehicle using RFID reader where RFID reader is placed in the device. On the other hand the owner can also trace the location of the vehicle where he gets the information in terms of latitude and longitude using GPS. All these operations are controlled using ATMEGA328 micro controller.

Keywords: Arduino, GSM, GPS, RFID, Fingerprint Sensor, Node mcu.

1.INTRODUCTION:

Vehicle theft is a common problem due to which people have lost their vehicles, faced many difficulties to find them and sometimes failed even after a lot of struggle.To overcome this problem, we introduce "VEHICLE THEFT DETECTION AND SECURE SYSTEM USING ARDUINO" with which we can find the vehicles which were either theft without any strenuous efforts. Using fingerprint sensor, RFID reader, GSM GPS module it is made easy to identify and track the vehicle. On the other hand the owner can also trace the location of the vehicle where he gets the information in terms of latitude and longitude using GPS. All these operations are controlled using ATMEGA328 micro controller

2.Components:

2.1Arduino UNO:

Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. The unit comes with 32KB flash memory that is used to store the number of instructions while the SRAM is 2KB and EEPROM is 1KB. This board includes digital I/O pins-14, a power jack, analog i/ps-6, ceramic resonator-A16 MHz, a USB connection, an RST button, and an ICSP header. All these can support the **microcontroller** for further operation by connecting this board to the computer. The operating voltage of the unit is 5V which projects the microcontroller on the board and its associated circuitry operates at 5V while the input voltage ranges between 6V to 20V and the recommended input voltage ranges from 7V to 12V.

2.2.Arduino ide :

Arduino is an open-source electronics platform based on easy-to-use hardware and software. This platform allows you to create different types of single-board microcomputers to which the community of creators can give different types of use. Arduino offers the Arduino IDE (Integrated Development Environment) platform, which is a programming environment with which anyone can create applications for Arduino boards, so that they can be given all kinds of utilities.

2.3. Fingerprint sensor:

Optical fingerprint scanners are the oldest method of capturing and comparing fingerprints. As the name suggests, this technique relies on capturing an optical image essentially a photograph. It then uses algorithms to detect unique patterns on the surface, such as ridges or marks, by analyzing the lightest and darkest areas of the image. Just like smartphone cameras, these sensors have a finite resolution. The higher the resolution, the finer details the sensor can discern about your finger, increasing the level of security. However, these sensors capture much higher contrast images than a regular camera. Optical scanners typically have a very high number of diodes per inch to capture these details up close. Of course, it's very dark when your finger is placed over the scanner. The scanners, therefore, incorporate arrays of LEDs or even your phone's display as a flash to light up the picture come scan time.

2.4.Motor Driver:

L298N module is a high voltage, high current dual full-bridge motor driver module for controlling DC motor and stepper motor. It can control both the speed and rotation direction of two DC motors. This module consists of an L298 dual-channel H-Bridge motor driver IC. This module uses two techniques for the control speed and rotation direction of the DC motors. These are PWM – For controlling the speed and H-Bridge – For controlling rotation direction. These modules can control two DC motor or one stepper motor at the same time. PWM, or pulse width modulation is a technique which allows us to adjust the average value of the voltage that's going to the electronic device by turning on and off the power at a fast rate. The average voltage depends on the duty cycle, or the amount of time the signal is ON versus the amount of time the signal is OFF in a single period of time. On the other hand, for controlling the rotation direction, we just need to inverse the direction of the current flow through the motor, and the most common method of doing that is by using an H-Bridge. An H-Bridge circuit contains four switching elements, transistors or MOSFETs, with the motor at the center forming an H-like configuration. By activating two particular switches at the same time we can change the direction of the current flow, thus change the rotation direction of the motor.

2.5. LCD:

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

2.6. GSM:

Digital cellular technology like GSM (Global System for Mobile Communication) is used to transmit mobile data as well as voice services. GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is a widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operate at the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bandsGSM technology was developed as a digital system using the time division multiple access (TDMA) technique for communication purposes. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has the ability to carry 64 kbps to 120 Mbps of data rates. This technology was developed by using digital technology. At present, GSM technology supports above 1 billion mobile subscribers around the world in the above 210 countries. This technology provides voice and data services from fundamental to complex.

2.7. GSM:

Satellite Navigation is based on a global network of satellites that transmit radio signals from medium earth orbit. Users of Satellite Navigation are most familiar with the 31 Global Positioning System (GPS) satellites developed and operated by the United States. Three other constellations also provide similar services. Collectively, these constellations and their augmentations are called Global Navigation Satellite Systems (GNSS). The other constellations are GLONASS developed and operated by the Russian Federation, Galileo developed and operated by the European Union, and BeiDou, developed and operated by China. All providers have offered free use of their respective systems to the international community. All providers have developed International Civil Aviation Organization (ICAO) Standards and Recommended Practices to support use of these constellations for aviation

2.8.RFID:

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time. RFID tag consists of an integrated circuit and an antenna. The tag is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the application. For example, employee ID badges containing RFID tags are typically made from durable plastic, and the tag is embedded between the layers of plastic. RFID tags come in a variety of shapes and sizes and are either passive or active. Passive tags are the most widely used, as they are smaller and less expensive to implement. Passive tags must be "powered up" by the RFID reader before they can transmit data. Unlike passive tags, active RFID tags have an onboard power supply (e.g., a battery), thereby enabling them to transmit data at all times. For a more detailed discussion, refer to this article: Passive RFID Tags vs. Active RFID Tags. Smart labels differ from RFID tags in that they incorporate both RFID and barcode technologies. They're made of an adhesive label

embedded with an RFID tag inlay, and they may also feature a barcode and/or other printed information. Smart labels can be encoded and printed on-demand using desktop label printers, whereas programming RFID tags are more time consuming and requires more advanced equipment.

2.9.NODE MCU:

The **Node MCU ESP8266 development board** comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. Node MCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

3.METHODOLOGY:

In this work we built a secure system for vehicle theft using Arduino. We first connect our motors to the motor driver. Actually single motor driver can operate only two motors but here we connect the two right side motors internally and same with the left side also. So that we can use 4 motors with the help of single motor driver. With the help of Arduino microcontroller and motor driver we connect a vehicle(robot) which will move towards front and back. Now we take a fingerprint sensor connect it with Arduino and enrol your(owner) finger in the fingerprint sensor with the help of inbuilt libraries in Arduino ide.

Now make changes in the vehicle code that it only starts if valid finger is placed on the fingerprint sensor. If any unmatched finger is placed then it don't start the motor rather it sends a message to the owner using gsm, that some unauthorized persons wants to start your vehicle. If the owner wants to give the permission then he can reply with a message saying YES or NO. If he says yes then the vehicle starts otherwise it won't.

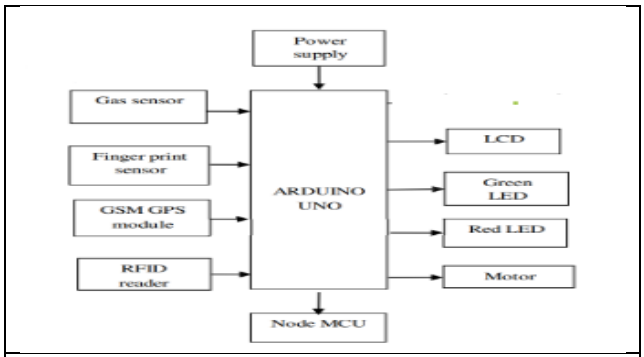

Fig: Block diagram of developed system

Let us take another situation that you gave permission to someone but you want to track the vehicle, we can still do it by using gps by using the location indicator in gsm code. But we only get the latitude and longitude of the location. We can still track the exact location by using rfid tag and reader which are placed in car and tollgate.

4.Hardware Implementation:

During implementation, the Hardware components like GSM, motor, GPS, and RFID are connected to Arduino Uno board and Node MCU using jumper wires. LCD is connected to NodeMCU. Once the connections are made perfectly, Arduino takes input from the Fingerprint sensor and then if Authentication of the person is matched the vehicle starts moving. If the Authentication of a person is mismatched, it sends an SMS as "access denied" to the owner through GSM module. If the owner is aware of a person, he can give access through an SMS reply. In case if the vehicle is theft, owner can track the location of the vehicle using GPS. We can also track the vehicle using RFID technology where the reader is installed at toll gates and tags are placed on vehicles. The registered tag can be detected when the vehicle is passed through the toll gate. The status of vehicle is displayed on the LCD.

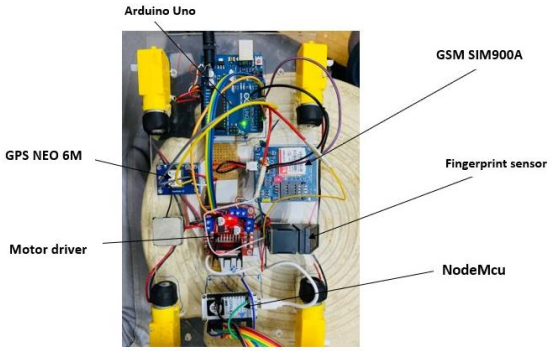

Fig Hardware implementation of proposed system

5.Conclusion:

In this work we built a hardware model by using Arduino as a main component as it is an open-source electronics platform based on easy-to-use hardware and software. It is verified the functionality of developed model that provides authentication and security by using fingerprint sensor to start a vehicle. It can also send a message to the owner if any unauthorized person tries to start the vehicle. Vehicle location can also be tracked by using GPS and RFID.

ACKNOWLEDGEMENT:

We would like to thank Dr.V.Rajya laxmi (HOD, Department of ECE), D.Anil Prasad (Project Guide) and management of ANITS for their support and encouragement towards completion of project work.

REFERENCES:

1.Mohammad Jahangir Alam, Dhiman Sarma," A Smart Security Solution to Prevent any Mischief with the Vehicles", 2021 IEEE Region 10 Symposium (TENSYMP). DOI: 10.1109/TENSYMP52854.2021.9550811, 23-25 Aug 2021

2.Shadman Sakib, Mohammad Sayem Bin Abdullah, "GPS-GSM based inland vessel tracking system for automatic emergency detection and position notification", 2016 10th International Conference on Intelligent Systems and Control (ISCO). DOI: 10.1109/ISCO.2016.7727018, 7-8 Jan. 2016.

3. Md. Akteruzzaman Arif; Md. Asif Mahmud, "Anti-theft protection of vehicle by GSM & GPS with fingerprint verification", 2017 International Conference on Electrical", Computer and Communication Engineering (ECCE). DOI: 10.1109/ECACE.2017.7913034, 16-18 Feb. 2017.

4. SeokJu Lee, Girma Tewolde," Design and implementation of a vehicle tracking system using GPS/GSM/GPRS technology and smartphone application", 2014 IEEE World Forum on Internet of Things (WF-IoT). DOI: 10.1109/WF-IoT.2014.6803187,6-8 March 2014.

5.Vidhyotma; Jaiteg Singh," Bluetooth Enabled Anti-Theft System Using Android Based Handheld Device", 2018 6th Edition of International Conference on Wireless Networks & Embedded Systems (WECON). DOI: 10.1109/WECON.2018.8782082, 16-17 Nov. 2018