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Vehicle Security Control

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Abstract: ***Due to increase in vehicle theft cases being reported all over the world, vehicle security system has been a topic of great interest over the years. There is an increase in the production of vehicle every year, but at the same time, theft attempts on the vehicles are also increasing. It has been shown in the statistics that, nearly 1500 vehicles have been stolen between the years 2008 and 2012.Most of the advanced vehicle security systems best suit the four wheelers. The security system available in the market, for the two wheeler security, is of no use as the burglars are well equipped. This paper "Vehicle Security Control" focuses on the ignition of fuel in vehicle based on fingerprint. In this project, a reliable design for vehicle security has been proposed with features enhancing the control of fuel for ignition. The fingerprint is detected and matched with the stored database. If the detected fingerprint matches with the registered fingerprint, then the solenoid valve gets opened and there is a fuel flow for ignition. This approach would be fruitful to the users who want to possess valid and authenticated entry.***
Keywords: Fingerprint sensor, Solenoid valve

I. INTRODUCTION

A perfect security system is required for any vehicle as the theft rate is increasing every year. There are many security systems available in market with variety of functions, modes, etc, but they are costlier. At the same time, those system are not suitable now-a-days, because thieves are well equipped. In this project, the latest technology called biometric is used for vehicle's advanced security. Biometrics is the technical term which refers to metrics related to human characteristics. The reason for going into biometrics is that its chances of being duplicated are very less. The realistic authentication for access control is the Biometric authentication. The biometric identifiers refer to the physiological characteristics and behavioral characteristics. Fingerprint, face recognition, DNA, palm print, hand geometry, iris recognition, retina and odour/scent are called the physiological characteristics of the biometric identifier. The pattern of behavior of a person like rhythm, gait and voice are called the behavioral characteristics. Fingerprint sensor is more advantageous than the other biometric sensors. This is because the fingerprint sensor provides high accuracy, high reliability, high stability and high acceptance. Also, fingerprint sensors can be used both for identification and authentication. And so in this project fingerprint sensor has been chosen for providing security. In this project, fingerprint can be used to make sure the authorized access of the vehicle. The primary security system uses a combination of enrolled Fingerprint and the vehicle key to enable the fuel ignition. It means that even if someone gets hold of user's key the vehicle is still safeguarded from theft and misuse. This system also has the feature of sending message to the owner of the vehicle when unauthorized access has been detected. In forensic applications automation of the fingerprint recognition process turned out to be a great success. Fingerprints have remarkable permanency and individuality over the time. The fingerprints offer more secure and reliable person identification. The fingerprint sensor takes in the fingerprint of the user which in turn sends the signal to the microcontroller. The microcontroller then matches the fingerprint with the ones that are stored in the database. Once the fingerprint is matched, the microcontroller sends the signal to the solenoid valve which controls the fuel flow for the ignition of fuel in the vehicle. At the same time 'matched fingerprint' message will be displayed in the LCD. Whenever an unauthenticated person tries to scan his fingerprint, there is no fuel flow for ignition, and hence the vehicle is secured from starting. At the same time, 'did not match' message will be displayed in the LCD. This paper focuses on the fuel flow in vehicle using fingerprint sensor for generating the results along with some proficiency and accuracy by reducing its cost factor. It could be easily bought by customers at affordable price.

II.EXISTING SYSTEM

The efficient security systems that are available in the market are very expensive, so that the normal buyers could not afford to it easily. The security systems that are affordable have lots of limitations. The basic security system that is available in the market at affordable price is provided with just an alarm circuit. It makes loud noise in such a way disturbing people around it whenever someone touches the bike. Even if the owner touches it unfortunately, without turning on the key, then also the system installed will produce loud noise. This security system is simple in construction but at the same time it is not user friendly. Numerous researches are being carried out to improve the security system to the vehicle that is user friendly. One such system has incorporated radio frequency identification method for vehicle security. This system includes three units like transmitting unit, receiving unit and the

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interfacing unit. The receiver unit is always embedded in the vehicle and the transmitter unit is present in the hands of the owner. So that the owner can control the vehicle through this transmitter unit. This establishes a perfect communication between the vehicle and the owner. But this has the limitation of operating range. This system is suitable only upto the operating range of 200m.
next level of security system was introduced with password. Once the user forgets the password, then it is difficult for the owner to start the vehicle. Then came the GSM based security system. Since the microcontroller can be interfaced efficiently between input and output devices, some security systems used microcontroller interfacing. In such GSM based security systems, mobile phone has been used as a medium of communication between the user and the system. In such systems the mobile phones were used as the input device. This type of security system has been used only for tracking the vehicle by making phone calls from the registered SIM through the input device, that is mobile phone. This system does not deactivate the engine operation and it also doesn't inform the user regarding the theft. It has been used only for tracking the vehicle. This GSM based security system is bit costlier when compared to other type of security systems. There is another type of anti-theft alarm system, where the number of sensors used are more and because of this the system became complicated and costly.

III. PROPOSED SYSTEM

The proposed system is designed in such a way that it is easily affordable for the buyers. Though this system is affordable, it has very little limitations when it is compared with the other systems.

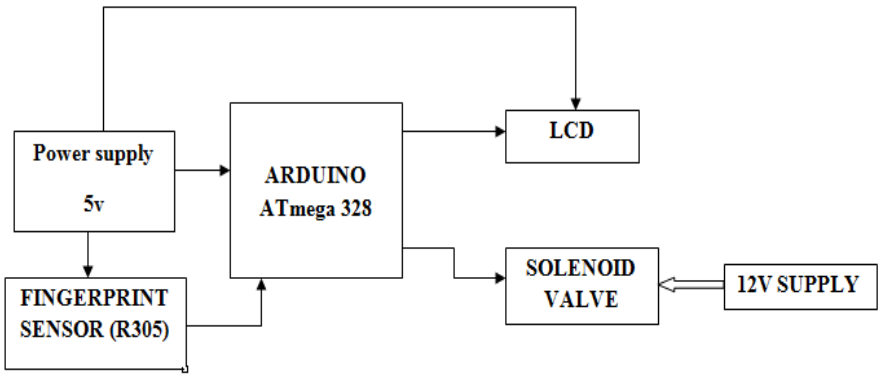


Fig.1: Proposed block diagram

The supply to the components that are used in this system is DC. Hence battery which supplies the DC voltage is used. The battery used in this system can supply the voltage of 12 v. But, some of the components used in the system requires only 5v. Hence voltage regulator is used to regulate the supply voltage. In order to have the ripple free supply voltage from the regulator, the capacitor is used. The ripples have to be removed as it may damage the rest of the components used. The ripple free supply is regulated using the regulator IC. Then this voltage is given to the components like microcontroller and the fingerprint sensor. The fingerprint sensor has the EEPROM chip which is used to store the fingerprints for authorized access. The fingerprint sensor senses the fingerprint of the user and then it is matched with the database of fingerprint stored in its memory.
When the fingerprint matches with the database then the microcontroller sends the signal to the solenoid valve. When the solenoid valve receives the signal from the microcontroller, it starts operating. If the fingerprint sensed by the fingerprint sensor doesn't match with the database then signal will not be sent to the solenoid valve. So the solenoid valve doesn't operate. It means that there is no fuel flow for the ignition system. Hence the vehicle can be secured from the unauthorized person's access at the time of ignition itself.

IV. SYSTEM ARCHITECTURE

A. Fingerprint Sensor (R305)

A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The image that has been captured by the fingerprint sensor is called a live scan. The biometric template is created by digitally processing the live scan. This biometric template is used for storing and matching. This fingerprint sensor module with TTL UART can be interfaced for direct connections to microcontroller's UART and to PC's through MAX232 or USB-Serial adapter. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The fingerprint module can be directly

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interfaced with microcontroller. A level converter (like MAX232) is required for interfacing with PC serial port. This module has the best image processing capability and can capture images upto the resolution of 500dots per inch(dpi)

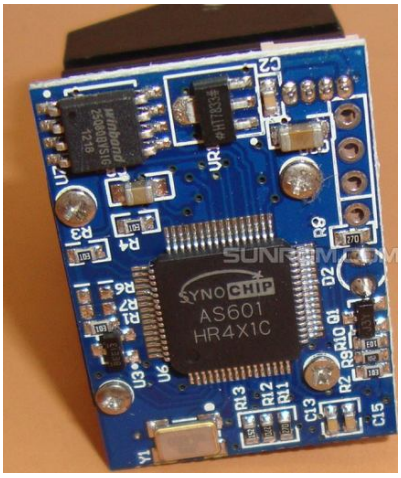


Fig.2 Fingerprint module (R305)



Fig.3 Fingerprint sensor

B. Solenoid valve

Solenoid valve is an electromechanically operated valve. The electric current flows through the solenoid and controls the valve. There are different types of solenoid valve depending on the number of ports. In two port valve the flow can be switched on or off, whereas in a three-port valve, the flow is switched between the two outlet ports. The valve can be placed together on a manifold if it is a multiple solenoid valve.

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Fig.4 Solenoid Valve

They can operate at a voltage of about 12V. The mode of operation of such a type of valve is normally closed. The working media can be air, water, oil, etc. It has different response time with open timing of 0.15s and close timing of 0.3s. It can operate at the temperature of about -10^{0}C to 80^{0}C.

C. Arduinouno

The microcontroller board based on the ATmega328 is the Arduino Uno. It has 16 digital input and output pins, out of which 6 are provided for PWM output. It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It can support the microcontroller in all the way.

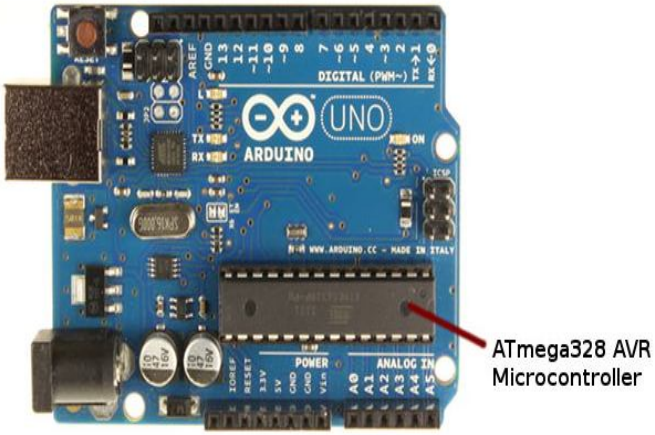


Fig.5 Arduino UNO

Arduino has boot loader which is pre-programmed so that it simplifies the uploading of program on the flash memory. The operating voltage of such an Arduino is 5V. The recommended voltage is around 7V to 12V. The DC current for one I/O pin is 40mA. It has the flash memory of 32KB.

D. Liquid crystal display

Liquid Crystal Displays (LCD) have materials, which combine the properties of both liquids and crystals. The LCD has electrodes. When the required voltage is applied to the electrodes, the liquid crystal molecules would align themselves in the particular direction in such a way displaying the desired character. 16x2 alpha-numeric lcd is used in this security system to display the message of fingerprint match or fingerprint doesn't match.

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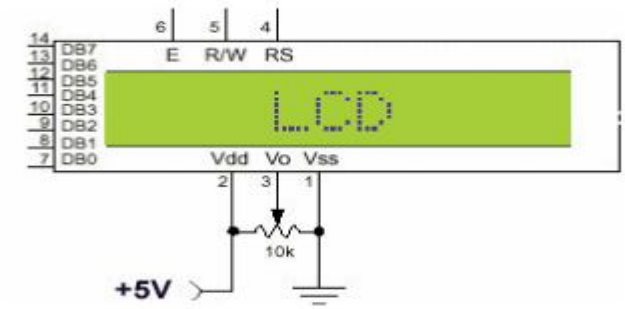


Fig.6 LIQUID CRYSTAL DISPLAY

E. Power supply

The power supply to the components used in the designed system is provided by the battery of 12v. The power supply circuit also has a voltage regulator, because most of the components used in the system require only 5v supply. And so, the voltage regulator regulates the voltage from the 12v battery.

v. RESULT AND ANALYSIS

The developed system is capable of providing security to the vehicle. This designed security system can be used in all the two wheelers that require protection against theft.Fig.7 shows the hardware of the proposed system.



Fig.7 Proposed system

Whenever the fingerprint matches with the stored database then the 'Found match' message will be displayed in the LCD.



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Fig.8 Authorized fingerprint

Whenever the fingerprint doesn't match with the fingerprint stored in the database then 'did not match' will be displayed in the LCD.



Fig.9 Unauthorized fingerprint

VI. CONCLUSION

This vehicle security system was designed to focus on ignition of vehicle by the means of fingerprint. The reason for developing this model is to increase the security level and the robustness of the vehicles from day-to-day threats. The main reason for using this, it is low in cost and the fingerprint biometric which is used, it cannot be matched of any two people. So it results in the accuracy for verifying the owner of the vehicle who can only access their own vehicle. With significant improved in range and reliable data accuracy in real time, this project promises a bright future with a high commercial value.

VII. FUTURE SCOPE

This paper has many of the future scopes for developing very high security systems. The proposed system can be extended by including GSM, GPS, accelerometer sensor and pressure sensor. GSM module will help in sending SMS to the owner regarding the unauthorized access of the vehicle, which acts as safety measure for the vehicle theft. GPS provides additional safety, that is, it helps in tracking the location of the vehicle when it is being stolen. The accelerometer sensors are helpful in knowing about the fuel theft whereas the pressure sensors can be used for indicating the air pressure in the tubeless tyre of vehicles. We can use this type of security system in four wheelers also.

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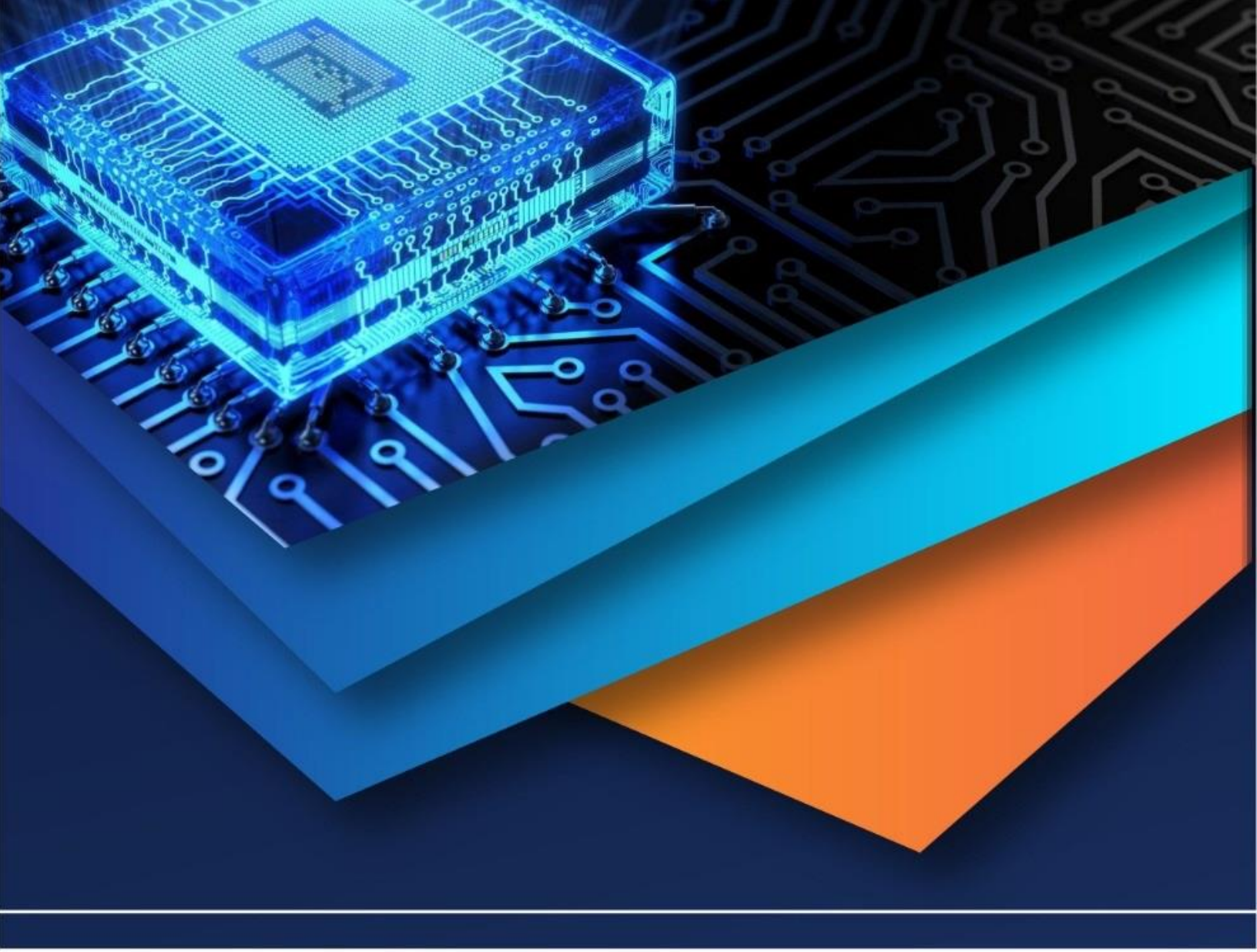
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