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ELECTRIC VEHICLE START FINGERPRINT IGNITION SYSTEM

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ABSTRACT

From earlier times, security was and also till now is an issue of concern in our cars, vehicles and also in office, shops, etc. Everyone has a fear of unauthorized person entering to their home or office without their knowledge. The car ignition can be fitted with locks which are capable of breaking with the use of an alternate key. Alternatives to this system can be found like the password or pattern system in the locks which again has the possibility of getting exposed and opening the lock. So, a solution to such problems can be by combining car door lock with biometrics and IOT. Biometric verification is any means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures. Here we will use fingerprint for biometric verification as it is one such thing which is unique to every individual and the use of fingerprint as the key to ignition locks can overcome the security problem of unauthorized people trespassing to our homes, shops, offices, etc. to a great extent as delicacy in such key is not possible. Also, this system will not lead to problems like losing keys because we do not require carrying keys if this system is used instead of traditional locks. So, using Arduino and IOT we will try to implement the system with features which will increase the security level.

This concept which is of Fingerprint car ignition lock is related to the security issues in the day today life, the physical key can be made as duplicate in very cheap cost and the key can be lost somewhere or the key can be stolen, to overcome these issues we can use biometric security gadgets and try to improvise the security much more because it can never be stolen it cannot be lost and the chance of duplication are very low to break the security. From the old times the security is the big issue for the company's houses and other places and every person is worried about the security now a days. The traditional ignition locks can be bypassed by the duplicate keys, but the best solution for this situation is biometric locks which include Fingerprints, Iris and Handprint scanners. So in this project we are going to try to get upper level of security.

KEYWORDS: Biometric Authentication, Fingerprint Scanner, Unauthorized Prevention Control, Vehicle Security System, Keyless Ignition System, Anti-Theft System, Fingerprint Vehicle Starter, Engine Start Ignition

INTRODUCTION

The use of biometric-based systems has grown at an exponential rate in the twenty-first century. This is due to tremendous progress in this field, which has allowed them to lower their prices. Biometrics is quickly becoming a cutting-edge method

for security systems. Biometrics are used to provide secure access to major operating systems such as ATMs, cellular phones, automobiles, laptop computers, offices, and other items that require authorized access. Biometrics have made significant changes in security systems, making them

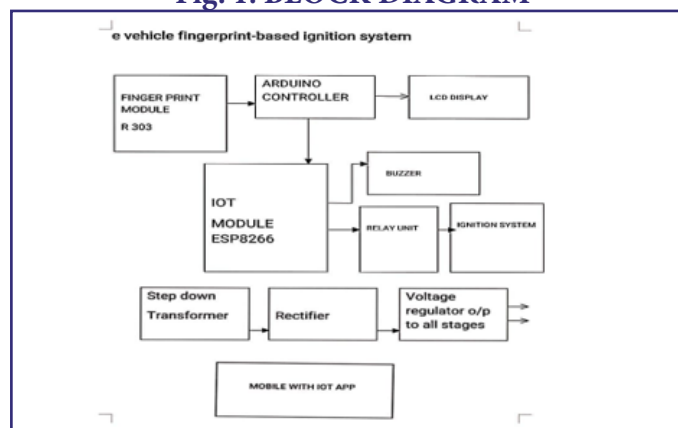
more secure, efficient, and cost-effective than before. The fingerprint biometric security system is widely used. Because each person's finger is unique, this method is more secure. Vehicle security is becoming increasingly important these days. More vehicles are stolen and cannot be recovered. A security system, such as a fingerprint system, can help to reduce theft, particularly in automobiles. Fingerprint sensor and Arduino are combined. The vehicle's starting system has been modified. The basic connection is from the ignition switch to the voltage regulator, then to the Arduino to turn it on and off, and when input is given to the fingerprint sensor, it scans the finger. Matching fingerprints will activate the relay that controls the starter relay. This will start the engine. The fingerprint sensor will then turn off. If no finger was scanned or the image did not match, it will display finger not found. Please try again. The fingerprint sensor will not start the vehicle engine. It will only activate or deactivate the starter relay, preventing or. Here we are using NODE MCU IOT module which is connected to the cloud once after the biometrics verified the authenticated user has to send the control signal from the mobile to enable the signal for the ignition.

OBJECTIVES

1. Testing and implementation of Arduino circuit.
2. Designing power supply circuits to test different circuit.
3. Implementation of IOT circuit and its programming
4. Installation and testing IOT app in mobile
5. Assembling testing of the final result

METHODOLOGY

Fig. 1: BLOCK DIAGRAM



Testing and implementation of Arduino circuit:

Designing power supply circuits to test different circuits
Implementation of IOT circuit and its programming
Installation and testing IOT app in mobile
Assembling testing of the final result
Documentation preparation

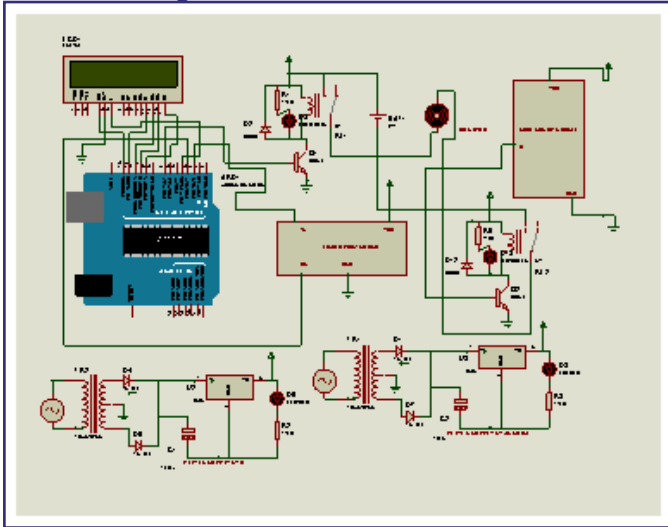
Firstly, 230V AC supply is being given to the 0-12V transformer which is the step-up transformer. As we know, a transformer in which the output (secondary) voltage is greater than its input (primary) voltage is called a step-up transformer. The step-up transformer decreases the output current for keeping the input and output power of the system equal. Then the LCD display, displays car ignition system. 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. The 16 x 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data. We have used three 4 buttons: UP/DOWN, ENROLL, D/T, OK. By the use of these 4 buttons, we can store and delete the fingerprints. So, for that Press UP/DOWN button, then press OK to set the location of the fingerprint for e.g., 1,2,3, ... Once we have set the location press D/T button, then it will display Please wait and after that it will show place the finger on the fingerprint sensor that is R305 sensor.

Fingerprint Sensor Module or Fingerprint Scanner is a module that captures finger's image and then converts it into the equivalent template and saves them into its memory on selected ID (location) by Arduino. Here all the process is commanded by Arduino like taking an image of a fingerprint; convert it into templates, and storing location, etc. And then it will display image taken and then remove the finger and place the finger again. After that, the LCD will display STORED! So, again it will display press UP/DOWN button and then place the finger. After placing the finger, it is showing Gate opened that means, the car is ignited. And the ignition is done by the servomotor. For the ignition, we have used the servomotor. As we know, Servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. Another method is the RFID. In this the RFID tag is put close to RFID reader and the RFID sensor will sense the RFID tag. There are two cards

one is valid and another is invalid. If RFID reader finds a valid RFID tag, then the car will get ignited.

CIRCUIT DIAGRAM

Fig. 2: CIRCUIT DIAGRAM

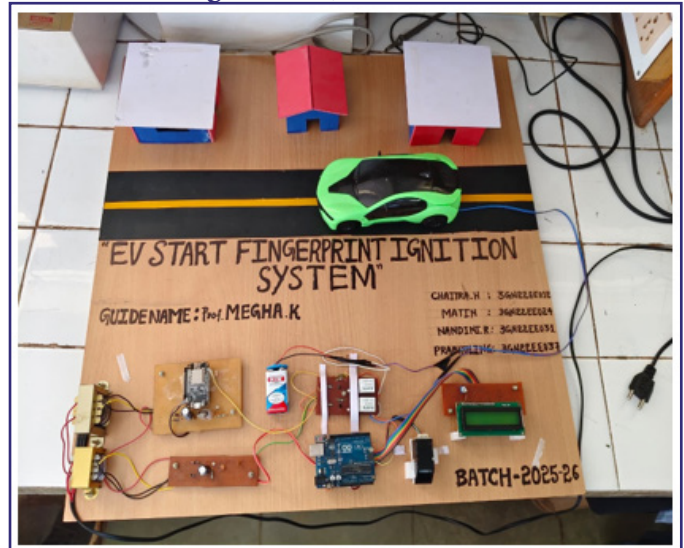


The fingerprint and IOT based ignition and unlocking system is designed with Arduino Uno controller and node MCU IOT module the Arduino UNO controller is connected to the fingerprint scanner module R 303 which is designed with the scanning of a fingerprint data and which is connected to the pin number 2 and pin number 3 of Arduino as a TX and RX to detect the fingerprint status using a 16 *2 LCD which is connected to the number 13 12 11 10 9 and 8 of Arduino controller. Fingerprint scanner module R 303 is used to store the different fingerprint data using a program and the Stored fingerprint data is match during the recognition operation and compare the fingerprint data and provide a suitable output from the Arduino controller.

After comparison of fingerprint using the fingerprint scanner the Arduino provides a output the second part of the recognition is done with the authorized person mobile and through IOT cloud app the person has to send authorized signal from the mobile which is the received at IOT module and this also provides a control signal at its output. As soon as the signals are generated from Arduino and NODE MCU module the electromagnetic relay circuit which is connected with BC 548 NPN transistor get electromagnetic relay coil get activated and turn on the ignition motor to start the engine.

The power supply system for the circuits is a designed with step down Transformer 909 500 mA or 909 750 mA according to the requirement and the secondary of the transformer need to be convert from AC to DC so we are using a full wave rectifier with the centre tap using 2 PN junction diode and a filter capacitor of 1000 microfarad 25 V is used to remove the ripples and make it pure DC and if the circuit or microcontroller required a 5 volt power supply that is possible to generate from 9v DC to 5 volt using 7805 regulator and the regulator output now is a 5 volt which is going to connect for microcontroller or NODE MCU units.

Fig. 3: PROJECT SETUP



FUTURE SCOPE

The future scope of fingerprint ignition systems in electric vehicles (EVs) is highly promising, focusing on enhanced security, seamless user experience, and integration with broader smart and autonomous vehicle technologies. The market for automotive biometrics is projected to grow significantly, driven by demand for advanced, personalized security solutions.

CONCLUSION

A fingerprint ignition system for electric vehicles offers a sophisticated combination of biometric security and user convenience, transforming the traditional vehicle starting process. By replacing physical keys with advanced biometric authentication, these systems significantly reduce the risk of vehicle theft methods like key duplication. This technology also enhances the user experience with swift and

secure access. Furthermore, these systems can integrate with other vehicle functions, potentially offering features like personalized driver settings and enhanced security features, demonstrating that biometric ignition is a valuable advancement for smart transportation.

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