

Biometric Based Ignition System Using Arduino

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ABSTRACT: Biometric systems serves as robust security mechanisms in various domains. Vehicle security is an important issue these days due to the rising number of vehicle thefts. Another issue with vehicles is handling its keys. Here we propose a solution to this problem by using a fingerprint authenticated vehicle starter system. This ignition system is designed using Arduino UNO. The biometric system provides a secure and hassle free way to start/stop the vehicle engine and the system only allows authorized users to start the vehicle. Users must enrol into the system by uploading their fingerprints. It allows multiple users to register as authorized personnel. During the monitoring mode, the system scans for the user's biometrics and the engine gets ignited through authentication.

KEYWORDS: Biometric, fingerprint, Arduino UNO.

I. INTRODUCTION

With the introduction of Biometrics in the 18th century, security advancement in technology has gone up to various levels. Biometrics is formed from the Greek words 'Bio' and 'Metrics' where 'Bio' means 'life' and 'Metrics' means 'to measure'. The major methods used in Biometrics are: Palm, Fingerprint, Iris, Voice, Face etc. Biometrics are used in Schools, Banks, Colleges, and Universities etc. One of the growing industries is the automotive industry. The first companies to introduce finger print recognition in cars was Mercedes, which was then followed by Volkswagen. But now a days almost all the vehicle makers are implementing Biometric based security. Fingerprint sensors are quite cheap in comparison to other Biometric sensors. And they are relatively easier to maintain also. The reason for going into biometrics is that its chances of being duplicated are very less. The sole purpose of this project is to provide biometric safety system to civilian.

II. WORKING PRINCIPLE

The starter circuit of the vehicle is controlled using the Arduino UNO. A fingerprint sensor is coupled with the Arduino UNO for biometric authentication. The MOSFET is the switch which is controlled by the Arduino UNO. The current operation is displayed in the 16x2 LCD display. The starter circuit is initially open. When the user places his finger on the fingerprint sensor, his fingerprint is authenticated. After successful authentication, the Arduino UNO sends a trigger to the MOSFET which closes the starter circuit to start the engine. After successful drive the engine and the Arduino UNO are simultaneously turned off which resets the program in the microcontroller.

III. ALGORITHM

Step1: Declare the global variables and pin numbers for LCD display, MOSFET and fingerprint sensor.

Step2: An infinite while loop is used to run the program till the Arduino UNO is reset.

Step3: A fingerprint_Match() function is called to initiate the fingerprint sensor to verify the user.

Step4: Once the fingerprint is verified positive, the value 1 is returned else -1 is returned.

Step5: An if loop is used to power the MOSFET pin if the returned value is 1, else the program jumps to step3.

IV. ARCHITECTURE

BLOCK DIAGRAM

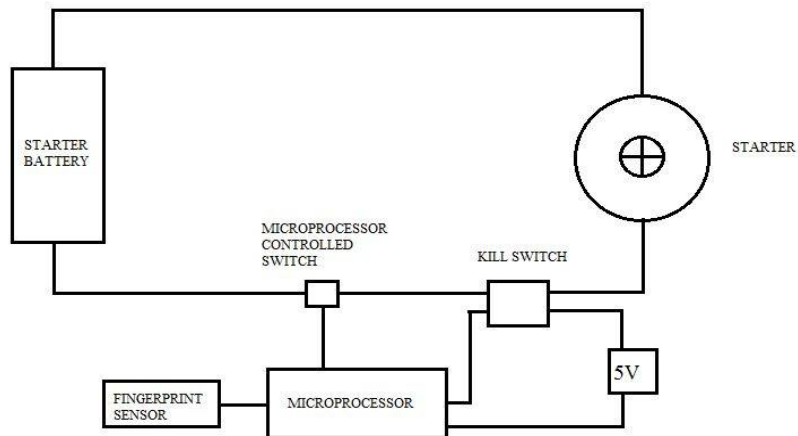


Fig 1: System Architecture

CIRCUIT DIAGRAM

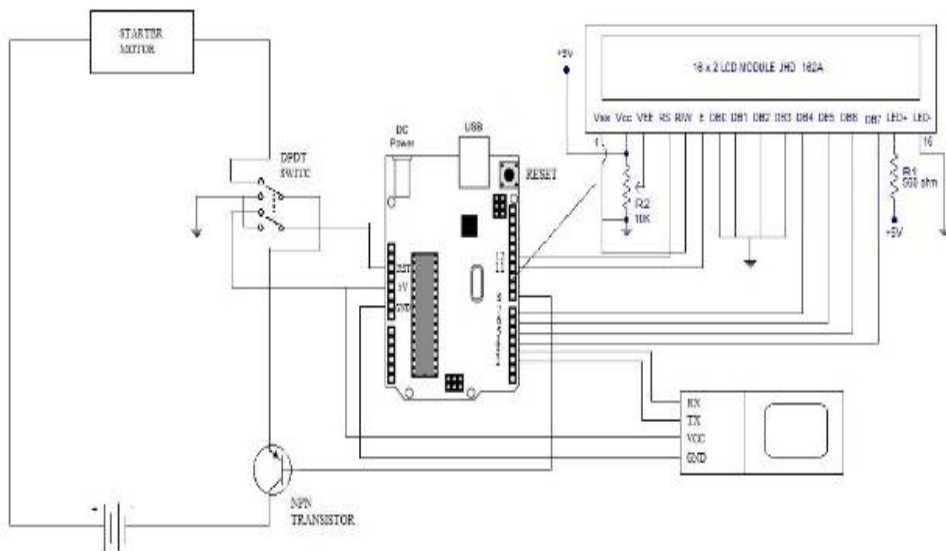


Fig 2: Circuit Diagram

V. COMPONENT SPECIFICATION

ARDUINO

Table 1: Arduino Description

Microcontroller	ATmega328p
Operating Voltage	5v
Digital IO pins	14
Analog input pins	6
Flash memory	32KB
SRAM	2KB
EEPROM	1K
Clock speed	16MHz

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.

FINGERPRINT MODULE

A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The captured image is called a live scan. The live scan is authenticated with the pre-stored users fingerprint. The sensor used in the project is R305, which is optical and the scanning speed is 0.3 seconds. The Storage capacity for this sensor is 250 live scans.

LCD DISPLAY

The 16x2 display is used to provide the current process as output.

MOSFET

The MOSFET is used as a switch to control the starter circuit of the vehicle. The MOSFET used is IRFP150N.

ADVANTAGES

With the biometric based ignition system, the vehicle is safe with the authenticated user. Unauthorised users are restricted from accessing the vehicle. The system is user friendly and can be used by anyone who lack the knowledge in electronics.

V. RESULT AND DISCUSSION

Thebiometric ignition system is developed in such a way to provide high security and safety to the vehicle. The ignition circuit can only be controlled by providing an authorised users fingerprint. The system verifies and unlocks the ignition circuitin 0.3 seconds which makes the system robust.

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