International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 02 | Feb 2020 www.irjet.net p-ISSN: 2395-0072

Vehicle Commencement Process using Fingerprint with Speed Locking System to Avoid Overspeed

Nooka Mohanavamshi[1], Andugulapati Rohith[2], Pathi Anish Jaisimha[3]

[1]UG student, Dept. of Mechatronics Engineering, Mahatma Gandhi Institute of Technology, Telangana, India
[2]UG student, Dept. of Mechatronics Engineering, Mahatma Gandhi Institute of Technology, Telangana, India
[3]UG student, Dept. of Mechatronics Engineering, Mahatma Gandhi Institute of Technology, Telangana, India

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Abstract - *This project work focuses on the use of fingerprints for the commencement of vehicle ignition, as opposed to the conventional method of using keys. In this system speed of vehicle can be changed with respect to enrolled fingerprint and locks speed for security which helps to avoid accidents occurring due to over speed. The system could be based on different modules: Fingerprint analysis software module that accepts fingerprint images, hardware interface module and ignition system module. The fingerprint recognition software enables the fingerprint of valid users of the vehicle to be enrolled in a database. The user can start the vehicle when a user fingerprint image is matched against the fingerprints in the database while users with no match in the database are prevented from starting the vehicle. Control for the commencement system of the vehicle is achieved by sending appropriate signals to the parallel port of the computer and subsequently to the interface control circuit.*

Key words: Vehicle ignition, hardware interface module, Ignition system module.

1. INTRODUCTION

This paper introduces a speed variation technology with respect to fingerprints. The fingerprint sensor is a type of technology that identifies and authenticates the fingerprints of an individual to grant or deny access to a computer system with the help of a micro controller. A micro controller is a device that acts as a compact integrated circuit designed to govern a specific operation in an embedded system. Here, a Motor driver is used which acts as an interface between the motors and the control circuits and it is charged using 12V Battery to supply electric power to motors and fingerprint sensor and a voltage regulator is used to regulate voltage levels in the circuit. All these components are arranged on the chassis of a vehicle is to support different parts (like motors, battery) and these components are connected using Jumper wires. This device can be used for security purposes and prevents theft. Also it is of great significance to avoid accidents that occur due to over speeding of the vehicle and can be equipped to the existing vehicles.

2. HARDWARE COMPONENTS

ATmega162/V: The ATmega162 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega162 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimise power consumption versus processing speed. The ATmega162 provides the following features: 16K bytes of In-System Programmable Flash with read/write capabilities, 512 bytes EEPROM, 1K bytes SRAM, an external memory interface, 35 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary-scan, On-chip Debugging support and programming, four flexible Timer/Counters with compare modes, internal and external interrupts, two serial programmable USARTs, a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and five software selectable power saving modes.

Fig 1: ATmega162/V

Fingerprint Sensor: Fingerprint Identification Fingerprints are one of many forms of biometrics, used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern.

Fig 2: Finger Print Sensor

These include patterns, which are aggregate characteristics of ridges, and minutia points, which are unique features found within the patterns. It is also necessary to know the structure and properties of human skin in order to successfully employ some of the imaging technologies. Minutiae and patterns are very important in the analysis of fingerprints since no two fingers have been shown to be identical. The three basic patterns of fingerprint ridges are the arch, loop, and whorl.

Fig 3: Three Fingerprint types

- **Loop**: The ridges enter from one side of a finger, form a curve, and then exit on that same side.
- **Whorl**: Ridges form circularly around a central point on the finger. In the whorl pattern, ridges form circularly around a finger.
- **Arch**: The ridges enter from one side of the finger, rise in the centre forming an arc, and then exit the other side of the finger.

A fingerprint recognition system can be used for both verification and identification. In verification, the system compares an input fingerprint to the enrolled fingerprint of a specific user to determine if they are from the same finger (1:1 match). In identification, the system compares an input fingerprint with the prints of all enrolled users in the database to determine if the person is already known under a duplicate or false identity (1:N match). Detecting multiple enrolments, in which the same person obtains multiple credentials such as a passport under different names, requires the negative identification functionality of fingerprints.

Voltage Regulator: A voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components.

Fig 4: Voltage Regulator

Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

Motor Driver: The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN.When an enable input is high, the associated drivers are enabled and their outputs are active and in phase with their inputs.

Fig 5: Motor driver

When the enable input is low, those drivers are disabled and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications. On the L293, external high-speed output clamp diodes should be used for inductive transient suppression. A VCC1 terminal, separate from VCC2, is provided for the logic inputs to minimize device power dissipation. The L293and L293D are characterized for operation from 0°C to 70°C.

DC Motor: The DC motor you will find in modem industrial applications operates very similarly to the simple DC motor described earlier in this chapter. Figure 12-9 shows an electrical diagram of a simple DC motor. Notice that the DC voltage is applied directly to the field winding and the brushes. The armature and the field are both shown as a coil of wire. In later diagrams, a field resistor will be added in series with the field to control the motor speed. When voltage is applied to the motor, current begins to flow

through the field coil from the negative terminal to the positive terminal.

Fig 5 : D C Motor

This sets up a strong magnetic field in the field winding. Current also begins to flow through the brushes into a commutator segment and then through an armature coil. The current continues to flow through the coil back to the brush that is attached to other end of the coil and returns to the DC power source. The current flowing in the armature coil sets up a strong magnetic field in the armature.

3. SOFTWARE PERIPHERALS

3.1 Keil Software: Keil MicroVision is a free software which solves many of the pain points for an embedded program developer. This software is an integrated development environment (IDE), which integrated a text editor to write programs, a compiler and it will convert your source code to hex files too.

3.2 Flash Programming: µVision3 integrates Flash Programming Utilities in the project environment. All configurations are saved in context with your current project.

Flash Programming may be started from the Flash Menu or before starting the µVision3 Debugger when you enable Project — Options — Utilities — Update Target before Debugging.

For more information refer to the following topics:

Configure Flash Menu: Configures the Flash Menu for using an external command-line based utility or the Keil ULINK USB-JTAG Adapter.

ULink Configuration: Explains the configuration settings for the Keil ULINK USB-JTAG Adapter.

Pre-Download Scripts: Allows to you program multiple applications or configure the BUS system which is required for ULINK when you program off-chip Flash devices.

Flash Algorithms: Explains you how to create own Flash Program Algorithms for the Keil ULINK USB-JTAG Adapter.

HEX File Flash Download: Explains how to program existing HEX files.

4. INTEGRATION OF COMPONENTS

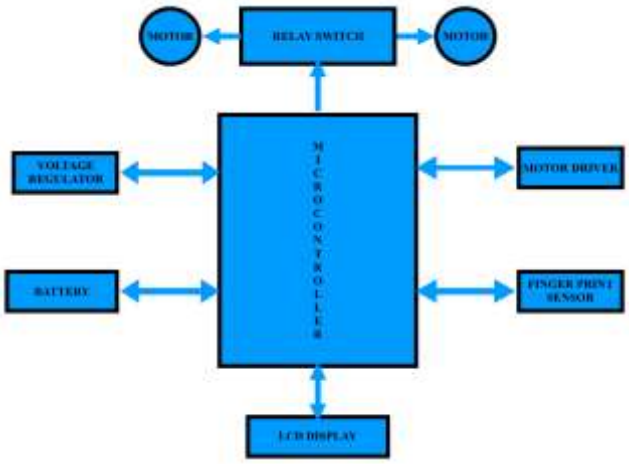

Fig 6: Block Diagram

All the Hardware components are connected to the Micro controller with the help of wires. The major components of the system are: Micro Controller (ATmega162/v), Finger print sensor, Motor driver, DC Motor, battery, LED. The DC Motors are connected to the pins of the micro controller with the help of voltage regulators.

The Fingerprint sensor is connected to analog pins in the same manner. This is the input to the microcontroller. Now two DC Motors are connected to the pins of the micro controller. Here all the finger prints are stored in micro controller. A battery is connected through the switch so as to control the power supply to the components and use when ever required.

Steps to be followed:

1. User have to give DC power (Battery) supply to run the system and then need to switch on the power supply to the system.

2. Two switches are placed to ENROL and IDENTIFY the finger prints.

3. To Enrol the new fingerprints, user need to press ENROL button. Then the micro controller asks to keep the finger on the fingerprint sensor.

4. The user should place one finger and release the button so that the fingerprint will be stored into micro controller with Some ID number like ID-0.

5. Same procedure can be done for four different fingerprints. For four different speeds user need to add four fingerprints.

6. Once the Enrolling is completed the system is ready for identifying the fingerprints.

7. Now, the user should place any finger which was enrolled and press the Identification Button.

8. If the placed finger is authorised then vehicle starts moving with some speed.

9. To change the speed of the vehicle user need to place different fingerprints and press the identification button.

10. When user place the authorised fingerprint the micro controller will on a relay switch to give power supply to the DC motors.

11. If the placed fingerprint is unauthorised then the micro controller will display on LCD and No relay will be on. The vehicle will start with respective speed of fingerprint which is given by user.

5. ADVANTAGES AND CHALLENGES

ADVANTAGES:

- Improved security
- Improved customer experience
- Cannot be forgotten or lost
- Reduced operational costs

CHALLANGES:

- Environment and usage can effect the measurements
- Systems are not 100% accurate
- Require integration and/or hardware

6. CONCLUSION

The project mainly focuses on the ignition of vehicle using sensors, which would provide ease to users in different circumstances, such as in case they forget the keys inside the vehicle or at the other current place .The use of fingerprint sensors provides the authentication to valid and registered users only. The proposed works deals with the project in 2 modules that consists of an LCD crystal display which shows and display the value and the other one it comprises of fingerprint sensor which takes input from the user side .The speed of the vehicle varies according to the users (fingerprints), as the micro controller stores the data in relation speed and user's fingerprint.

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