



BIOMETRIC AUTHENTICATION USING FINGERPRINT AND KEYPAD FOR DOOR LOCK SECURITY SYSTEM

Sharaf Ahmed Al-Azam 1*, Hamed Sarea 2**, Muhammad
Suhaimi Bin Sulong 3***

^{1, 2, 3}Faculty of Electrical and Electronic Engineering, University Tun
Hussein Onn Malaysia- Johor – Malaysia

E-mail: Sharaf.mw@gmail.com*, Hamed@gmail.com**,
msuhaimi@uthm.edu.com***

Abstract

Biometric lock is a lock that uses fingerprint to grant genuine user an access to a building, offices, and laboratory. The purpose of this project is to solve the major problems faced by the conventional lock or electronic combination lock, by adding electronic technology as well as biological technology together, user is the key to the lock. Users do not have to memorize combination as it is in the electronic combination lock, or carry the key along all the time. However with this device users simply need to place their finger on the fingerprint module and the device itself will determine whether to give or deny the access. This study also has other method which is password by using keypad. This study divided into three parts, which are hardware design, software design, and prototype design. The hardware design includes the electronics circuits used to enrol, identify, and delete fingerprint to the fingerprint module, LCD that gives command to the user. Software design includes the development of the source code that enables the Arduino UNO to control and interface with all hardware. The operation of the hardware, software and prototype design parts have been tested and verified individually and in combination. It simply performs three functions which are addition, verification, and deletion.

Keywords: Finger print module, Arduino UNO, Keypad, Security System

INTRODUCTION

Door lock is a very important device especially in the current era that has a very high crime rate. Locking your door is not enough to secure your safety. According to a study conducted by California crime technological research foundation, it was found that most burglars enter the door. The intruders were asked for the reason of using the door, different answers were obtained but all agreed that conventional lock is easy to get around, either by kicking or picking the lock. [1] Good door lock is one step of making your home or office more secure, so it is a small price to pay to ensure your family and your properties safety. When choosing a lock one very important factor is security, when using a normal lock, which operates using a key that is not very secure, first because the key can be easily duplicated, secondly this key has a keyway which also makes it susceptible to picking. So lock that operates with a key is not that secure. With the advancements of engineering now it is possible to control anything using the electric circuit. So it possible to have the lock that operates electronically.

In this modern competitive world, safety is the primary issue. Humans have found various ways to provide

security, but with the advent of technology, there are more and more opportunities to steal other people's personal information have also increased. In view of this danger, personal identification technology that can identify authorized and unauthorized users is now attracting people's interest. Nowadays, we mainly see various personal identification technologies such as password authentication, RFID authentication system. But these techniques are not reliable, because password cracking is easy and ID cards may be lost. Therefore, it is very important to develop a reliable, safe and secure system [2]. The proposed system will be developed using fingerprint and Arduino UNO. Biometrics considers an automatic method of distinguishing one people may verify their identity based on their behavior or psychological characteristics. Biometric technology is used for authentication in many places [3]. The biometric technology that has been chosen for our study is fingerprint biometric technology, because fingerprint biometric technology can be effectively accessed and highly reliable when related to other biometric technologies. Fingerprint all users are saved first and verified during access enrolled. If the fingerprint is similar to the registered fingerprint, then access accepted.

RELATED WORK

Many methods such as password authentication, voice recognition, RFID reader authentication, face recognition have been used in door locks. Some of these methods are discussed below.

RFID reader authentication

In this method, an individual user has a specific code containing an RFID tag. The advantage of this system is that the data on the chip is very safe, because the data on the RFID card can only be read by a specific device. But the disadvantage of this system is that even unique cards can easily be copied or stolen.

Voice Recognition

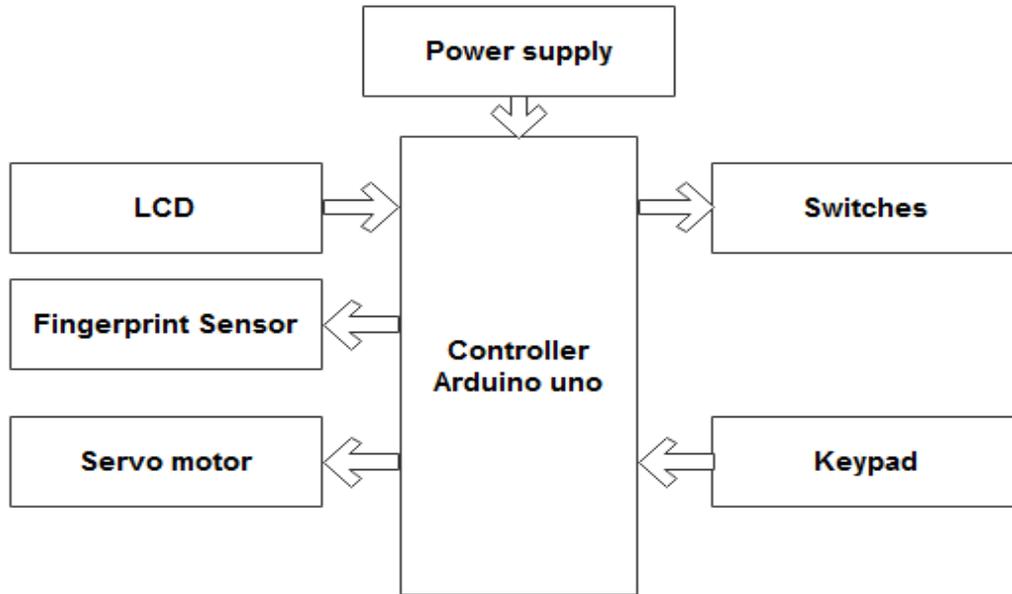
This method uses the sound characteristics of speech because it varies from person to person. Because the voice features are sensitive to many factors such as background noise, they are unreliable. Identify user problems from bad words [4].

Password authentication system

In this case, the system stores the password, and only authorized users know the password. But even unauthorized users can access by cracking the password. It's even difficult for everyone authorized users are prompted for a password for a long time.

PROPOSED SYSTEM

Methods based solely on fingerprints or passwords. To overcome this problem in our current model, we use both fingerprint and Keypad systems to provide more security. Initially, the fingerprint of the authorized user is registered and stored in the fingerprint sensor memory. This system is a door lock security system (DLSS) that only users with valid fingerprints or correct passwords can gain access to the door. The implementation of this project had been testing using a small wood box with a servo motor that will control the door. Also, two switches can control the door one is for close the door and the other one for opening the door. The technology that should use for this project is fingerprint device, controller Arduino Uno, keypad, LCD, and servo motor. So Users should enroll their fingerprint and the fingerprint module will verify the fingerprint, and based on the verification user is granted or denied access. Furthermore, this device deletes fingerprints after addition. Or enter the password to gain access to the door. Figure 1 shows the overall hardware layer of the proposed approach. It comprises the controller Arduino Uno, keypad, fingerprint sensor, with memory to store fingerprint templates, computer for data analysis, servo motor, and LCD for display. The block diagram of our proposed system is shown as follows:



- 1.
- 2.
- 3.

SYSTEM STRUCTURE



SYSTEM HARDWARE

Hardware components include Fingerprint Sensor, LCD, Servo motor Arduino Uno, Keypad, Switches, Power supply.

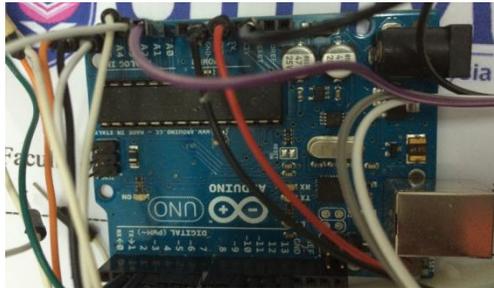
FINGERPRINT SENSOR

Fingerprint processing includes two parts. Fingerprint enrolment and fingerprint matching. When enrolling, user needs to enter the finger. The system will process the finger images, generate a template of the finger based on processing results and store the template when matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library.[5] The Module, for system will Search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.



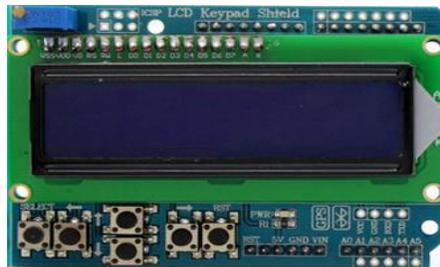
ARDUINO UNO MICROCONTROLLER

For this project all Arduino pins had been used to make a connection between all components that used in door lock security system



LCD KEYPAD SHIELD

This is a very popular LCD Keypad shield for Arduino and other variants. It includes a 2x16 LCD display and 6 momentary push buttons. Pins 4, 5, 6, 7, 8, 9 and 10 are used to interface with the LCD. Just one Analog Pin 0 is used to read the five pushbuttons. The LCD shield supports contrast adjustment and backlit on/off functions. It also exposes five analog pins with DF Robot colour code for easy analog sensor plugging and display.



This design is great since easily lets you keep connecting sensors to the rest of the pins, and use it for monitoring or menu selection with the push buttons even for gaming. Often project applications require testing or debugging. Displaying information right away help on most occasions when a computer is not at reach. If you are planning to build something not attached to a computer and you need to check what is going on when you place it on position, this addition will prove very valuable to make sure the program is running well. The used LCD pins are not exposed on top side of the board leaving only the unused ones.

The six buttons that are shown above everyone have his own job for controlling this project

KEYPAD SYSTEM

The use of keypad system in this project is another method to have a secure password that can access the door directly with the help of two switches that should control the servo motor for open and also close the door. This keypad used four columns and four rows that users should press six numbers to access the door.



SERVO MOTOR

Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse and a repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement. The motor's neutral position is defined as the position where the servo has the same amount of potential rotation in the both the clockwise or counter-clockwise direction.



The PWM sent to the motor determines position of the shaft, and based on the duration of the pulse sent via the control wire the rotor will turn to the desired position. In this project the servo motor returns around 90 degree for opening the door and there is a switch will control the servo motor when it closes.

IMPLEMENTATION AND RESULTS

The main results of the current study, it is to be present the analysis of this study in details and clear explanation. The results are presented in accordance to the Software and Hardware. The software results include results for finger print matching to evaluate the performance of image quality by placing the finger of the user to captured and saved through EEPROM memory and also using keypad for users to use password number. The display showed in LCD should presented based on the difference testing of three process which are enrolment, deleting and changing password which analysed the image matching by measuring the confidence level for how sure it's the match to be analysed for furthermore investigation. The developed program was successfully save into The EEPROM uses a USB programmer.

Step1: Connect on the power supply and control from LCD then enroll your fingerprint to be saved in EEBROM.



Step2: Place your finger and remove the finger and place it again for one time then select your ID.



Step3: Type the numerical ID that you want to store.



Step4: Image captured and stored.



Step5: Door Access.



CONCLUSION

In conclusion, "FINGERPRINT SCANNER" is used to provide security and authentication for an organization using fingerprints as forgery of that is not possible. The project report began with the introduction to the basic functioning of controller Arduino Uno based Identification, Authentication, and Setup of the Security system. This project is mainly focused on the implementation of matching image logarithms to increase the security system. Based on the research and all of the information that have been gathered, it is showed that fingerprint identification is the most appropriate way to secure your system.

Analysis and results obtained from this project are based on the objectives and scopes that have been made. Based on the results obtained, the project is successfully done due to the fulfillment of the requirement of the objectives with the limitation by the scopes of the project.

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