

DIGITAL DOOR LOCK SECURITY SYSTEM USING ARDUINO UNO

Dr. Aziz Makandar*¹, Miss. Rekha Biradar*², Miss Shobha Talawar*³

*¹Professor, Department Of Computer Science, KSAWU, Vijayapura, Karnataka, India.

*²Research Scholar, Department Of Computer Science, KSAWU, Vijayapura, Karnataka, India.

*³Student, Department Of Computer Science, KSAWU, Vijayapura, Karnataka, India.

ABSTRACT

As technology advances and expands on a daily basis, safety becomes increasingly essential in all disciplines. Everyone desires a private place where no one can enter without their permission, thus we need to secure our room, office, locker, etc. that preserve our valuable accessories, documents, data, and jewelry, and for that purpose, the proposed work has developed a "Password based door lock system by using Arduino.". This device is a digital door lock with a password or pin code. Which prevents the user from opening the door unless they input the correct password or pin code.

Keywords: Arduino Uno, Keypad Lock, Security, Servomotor.

I. INTRODUCTION

The term "door lock" refers to a device that prohibits a door from being opened and that can only be opened with a key, fingerprint, retina scanner, smartcard, or other similar device. Door locks have played a vital role in human life for a long time. As the rate of theft rises, security has become a top priority in recent years. Door locks are intended to keep us and our belongings safe and secure from thieves.

People used to lock home doors with physical keys, and they required the key to unlock doors. If they lost the key, it was unlikely to repair, and it was expensive. Now, those door lock systems may be replaced with new locking technologies. The Arduino Uno, Servo motor, 4*4 keypad module, and jumper wires comprise the password-based door lock system. In this project, we will use the keypad to enter a password and then use the servo motor to open the door lock. The Arduino is the program's brain, controlling the entire system. The password or pin code is entered using the 4*4 keypad module. The servo motor pushes (locks) or pulls (unlocks) the door's latch.

II. LITERATURE SURVEY

Passwords aren't a novel concept when it comes to locking doors. However, as technology advances, these systems have become more sophisticated.

Akshaya Krishnadas Bhat et al. [1] This article illustrates how a password-protected door lock can be used in a variety of settings, including the home, office, and desk. The system will check the user's entered password for validity before unlocking it for the authorized user. This method could be a less expensive alternative to expensive door lock systems that use retina scans, iris scans, or fingerprints, among several other technologies.

Prof.A.Y. Prabhakar et al. [2] - This article shows how an ARDUINO UNO-based password-based door lock system is created, where the door is unlocked and the user who input the right code is authorized to enter the zone. And the common individual can bid on such a locking system for a low price in order to ensure the protection of their valuables.

Dr. Manish kumar et al. [3] This study states how we may use an Android-based smart door lock system to address the issues of unwanted access, trespassing, and instruction. Also included in this concept is a bluetooth module that serves as a communication channel between the Arduino Uno and a mobile phone. This application is simple to set up and maintain.

Shruti Jalpur et al. [4]- This paper depicts a secure and protected door lock system, with network security supplied by the use of cryptographic algorithms such as SHA-128 and SHA-512. The technology also allows the authorized user to access the information remotely. The user input is encrypted and hashed using the algorithms AES-128 and SHA-512. If the sensor detects unauthorized access, it will send a notification to the smart phone application placed on the authorized user's smartphone.

Aleksander IBRO et al. [5]- This article depicts a door lock system that allows users to unlock the door using face recognition and data stored on the cloud via a camera installed on the door. This work will be quite costly, and it will necessitate the installation and employment of qualified experts.

Shuhad Natashab Bint Mohd Zainot [6]- "The door entry system utilizing Arduino is created to overcome cannot be replaced," according to this research. It also saves time and provides a high level of security.

III. METHODOLOGY

ARDUINO-UNO: The Arduino Uno is a low-cost, flexible, and simple-to-use programmable open-source microcontroller board that may be used in a wide range of electronic applications. This board can operate relays, LEDs, Servos, and motors as an output and can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards [9].



Figure 1: Arduino UNO

4*4 Keypad Module

The polymer material used in these Keypad Modules is thin and flexible. The 16 keys in the 4*4 Keypad module are grouped in a matrix of rows and columns. An electrical wire connects all of these switches together. In most cases, there is no link between rows and columns. When we push the key, a row and a column fall into touch. [10]

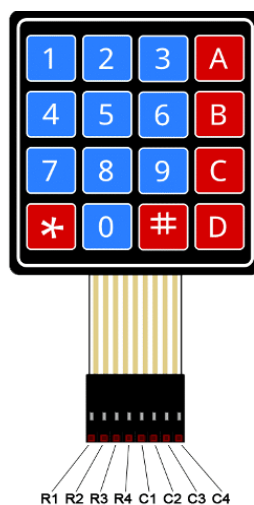


Figure 2: 4*4 keypad

SERVO MOTOR

A servo motor is a simple electric motor which is controlled by servomechanism. When a DC motor is used as a controlled device in conjunction with a servo mechanism, it is referred to as a DC Servo Motor. AC Servo-Motor refers to a controlled motor that is powered by AC [11].

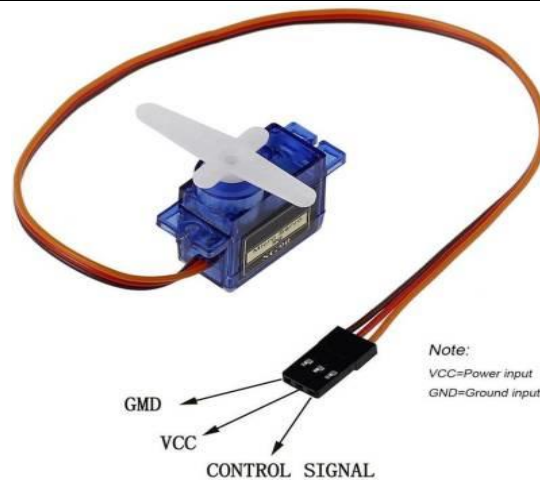


Figure 3: Servo Motor

Jumper Wires

Simple terms, jumper wires are wires with connection pins on both ends. A jumper wire is sometimes referred to as a jumper, a jumper cable, a DuPont, or a cable. Without soldering, jumper wires are used to connect electronic components or a test circuit. Jumper wires come in a variety of colours, and the fact that they all work the same colors doesn't mean anything.

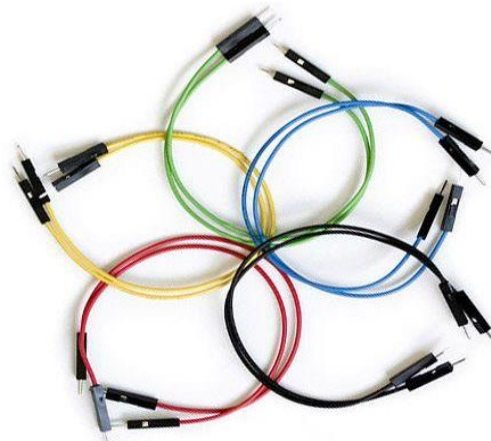


Figure 4: Jumper Wires

Jumper wires typically come in three different versions

- Male-to-male jumper wire
- Male-to-female jumper wire
- Female-to-female jumper wire

The end points of male jumper wires have a pin that is used to connect to other components, whereas female jumper wires do not. Female jumper wires do not have pins on their ends and are used to plug into items. The most common type of jumper wire used to connect components is male-to-male jumper wires. [8]

IV. CIRCUIT DIAGRAM

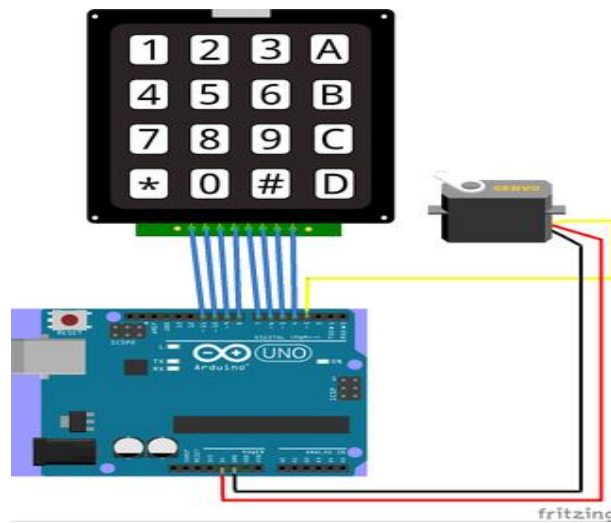


Figure 5: Circuit Diagram

Figure 5 shows the circuit diagram of proposed method [12]

V. FLOW CHART

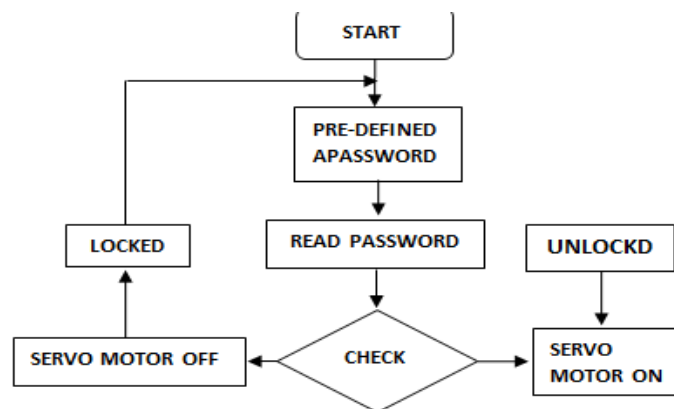


Figure 6: flow of the proposed system

The flow chart above depicts the entire step by step procedure. Here, users must first enter the predefined password, which will be read by the keypad, and if the password is correct, the servo motor will turn on and turn the door lock; if the password is incorrect, the servo motor will not turn on, and we must retype the password which have been predefined in the programme. Passwords can be updated as needed by the user.

VI. RESULTS



Figure 7: inside view of the connection

Figure 7 shows the model setup inside the house. Here the proposed system can setup on the doors where there is security is needed.

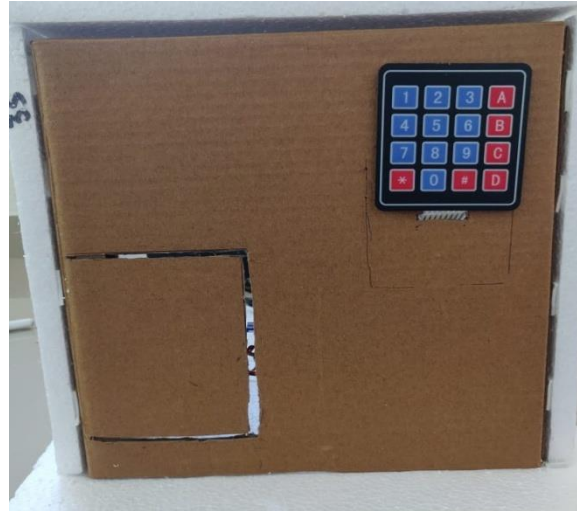


Figure 8: locked status of the door



Figure 9: Unlocked status of the door

This is a low-cost application with simple to programme code. And the password can be updated as needed by the user. In comparison to traditional door locks, the technology requires less power to operate. Furthermore, users are no longer required to carry physical keys.

VII. FUTURE SCOPE

As long as the password is not shared with anyone, this application can provide perfect security. Users can introduce constraints to the password entry process to make it safer. Also add a fingerprint scanner and a display model to show messages such as whether the door is locked or not. Instead of using a keypad module, can employ smart cards to open doors with the same model. In the future, the proposed system can employ a power supply adaptor instead of a battery for power transfer.

VIII. CONCLUSION

Since there are many other security systems available, such as fingerprint, retina scanner, RFID card, pattern, and so on. However, the "Password based door lock system using Arduino" is very inexpensive. It is cost effective because we are using affordable component costs. Also, with the help of the library, it is extremely simple to develop code, and anyone may use this model for security purposes. Because the existing door lock system has an issue with expensive and irreplaceable components, one may use an Arduino-based door lock

system to solve this problem because it is simple to install and remove. Therefore, the "Password-based door lock system using Arduino" is a time-saving programmable module that will assist us in providing excellent security.

IX. REFERENCES

- [1] Akshaya Krishnadas Bhat, Siddesh Praveen kini-"Password Enabled door locking system using Arduino and IOT" from International Journal of Engineering Research and Techonology ,2018. ISSN 2278-0181
- [2] Prof.A.Y.Prabhakar, Prof Dr.Shruti K , Nayan Shrivastava, Prakahar Shrivastava, Gharvit wadhwa,"Password based door lock System" from International Research journal of Engineering and Teconology,2019 .e-ISSN 2395-0056 p-ISSN 2395-0072
- [3] Dr. Manish Kumar, Dr. Hanumantappa, Dr. T V Suresh Kumar, Mr.Amit Kumar Ojha. "Android based smart door locking system with multi user and multiple function from International Journal of Advanced Research in Computer and Communication Engineering, 2 October 2016. ISSN(online) 2278-1021 ISSN(print) 2319-5940
- [4] Shruti Jalapur, Afsha Maniyar, "Door Lock System using Cryptographic algorithm based on IOT" from Computer Science and Engineering, Secab Instituite of Engineering and Technology Karnatak ,India 07 july 2020. e-ISSN: 2395-0056 p-ISSN:2395-0072
- [5] Aleksander IBRO , Auhusto WONG, Mario ZYLA, "Smart Door Lock" WORCESTER POLYTECHNIC INSTITUTE April 28,2019 <http://www.wpi.edu/Academics/projects>
- [6] SHUHAD NATASHA BINT MOHD ZAINOR "DOOR ACCESS SYSTEM – ARDUINO BASED" Department of Electrical and Electronic Engineering University Teknologi PETRONAS September 2012
- [7] HALLIRU, UMAR MUHAMMAD, "DESIGN AND CONSTRUCTION OF SMARTDOOR SECURITY SYSTEM USING ARDUINO AND BLUETOOTH APPLICATION from Department of Electrical and Electronics Engineering, Abubakar Tafawa Balewa University 2020
- [8] www.blog.sparkfuneducation.com
- [9] www.rs-online.com/designspark/
- [10] www.sunrom.com/
- [11] www.circuitdigest.com/