



CODE GUARD DOOR LOCKING SYSTEM USING ARDUINO UNO

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Abstract: The Code Guard Door Locking System is a secure access control solution designed to enhance residential and commercial security. Leveraging a combination of advanced encryption algorithms and user-specific codes, this system provides a robust barrier against unauthorized entry. Users can easily program unique access codes, and the system's intelligent monitoring capabilities log all access attempts. With a focus on user-friendly design and cutting-edge security measures, Code Guard ensures peace of mind through its efficient and reliable door locking mechanism. The project not only enhances security through code-based access but also allows for easy code customization, making it adaptable to various security requirements. Additionally, the open-source nature of Arduino Uno facilitates further enhancements and modifications to meet specific user needs. Overall, this Code Guard Door Locking System offers a reliable and customizable solution for bolstering door security.

Index Terms – Arduino Uno

I.INTRODUCTION

The Code Guard Door Locking System using Arduino presents a contemporary approach to augmenting traditional door security. In a world where security is paramount, this project integrates Arduino microcontroller technology with a keypad, display, and servo motor to create an advanced access control system. By requiring users to input a specific code for door entry, the system enhances security measures, offering a customizable and efficient solution. The Code Guard Door Locking System operates by leveraging the capabilities of Arduino, a versatile and widely-used microcontroller platform. A keypad serves as the user interface, allowing individuals to input a predetermined code. This code is then processed by the Arduino, which compares it with the stored authentication data.

Upon successful verification, the system activates a servo motor responsible for unlocking the door.

The integration of a

visual feedback mechanism, such as an LCD display, enhances user interaction by providing real-time status updates. Beyond its fundamental components, the Code Guard Door Locking System incorporates additional features for heightened security and user convenience. The system can be expanded to include biometric authentication, integrating fingerprint or facial recognition modules alongside the existing keypad. Moreover, it supports remote access control through IoT (Internet of Things) connectivity. This enables users to monitor and control the door lock remotely using a smartphone or a web interface, enhancing the system's accessibility and management. To address potential security concerns, the Arduino code can be fortified with encryption techniques, adding an extra layer of protection against unauthorized access or tampering. This emphasis on security measures makes the system robust and suitable for a range of applications, from residential to commercial settings. The modularity of the Arduino platform also allows for easy integration with existing security systems, providing a seamless solution for those looking to upgrade their current setups. Overall, the

Code Guard Door Locking System showcases the adaptability and versatility of Arduino technology in creating a comprehensive and sophisticated security solution.

1.1 Objective

The primary objective of implementing the Code Guard Door Locking System using Arduino is to enhance door security through a technologically advanced and customizable access control mechanism. Code-Based Access Control: Create a system that requires users to input a predefined code via a keypad for door entry, replacing or complementing traditional key-based systems. User-Friendly Interface: Design an intuitive user interface with a keypad and optional LCD display for smooth interaction, ensuring ease of use for individuals with varying technical expertise. Adaptability: Enable users to easily customize access codes, providing a flexible solution that can be tailored to different security requirements and preferences.

1.2 Literature Survey

Many papers we've referred for this project. Paper title " Password Based Door Lock system "(1). In this paper Design and Implementation of Door lock system. In this paper a secure and protected door lock system. " Digital Door Lock System Using Arduino "(2). The system will check the user's entered password for validity before unlocking it for the authorized user. This form could be a less costly choice to priceless door lock systems that use retina checks, iris checks, or fingerprints, among several other technologies. " Android- based smart door locking system "(3). Android- based smart door lock system to address the effects of unwanted access, trespassing, and instruction. similarly contained in this concept is a blue tooth module that serves as a message channel between the Arduino Uno and a mobile phone. This operation is simple to set up and maintain. " IOT based Smart Door Lock System "(4). The holder can also unlock the door from a mobile phone after checking the pic. The proposed Door Security System application uses Wi- Fi Door Lock with ESP32 CAM and Internet of Things(IoT) technology to watch the status of the door, manage the door, and increase security in a home.

1.3 RESEARCH METHODOLOGY

Our project is to design a Arduino based Door locking system. We use Arduino microcontroller other than the other microcontroller because Arduino is ease to Use, Extensive Community Support, Abundance of Libraries, Versatility, Affordability, Rapid Prototyping, Open Source Nature. The device connected to Arduino are key pad, servo motor, LCD, Buzzer.

3.1 Block Diagram

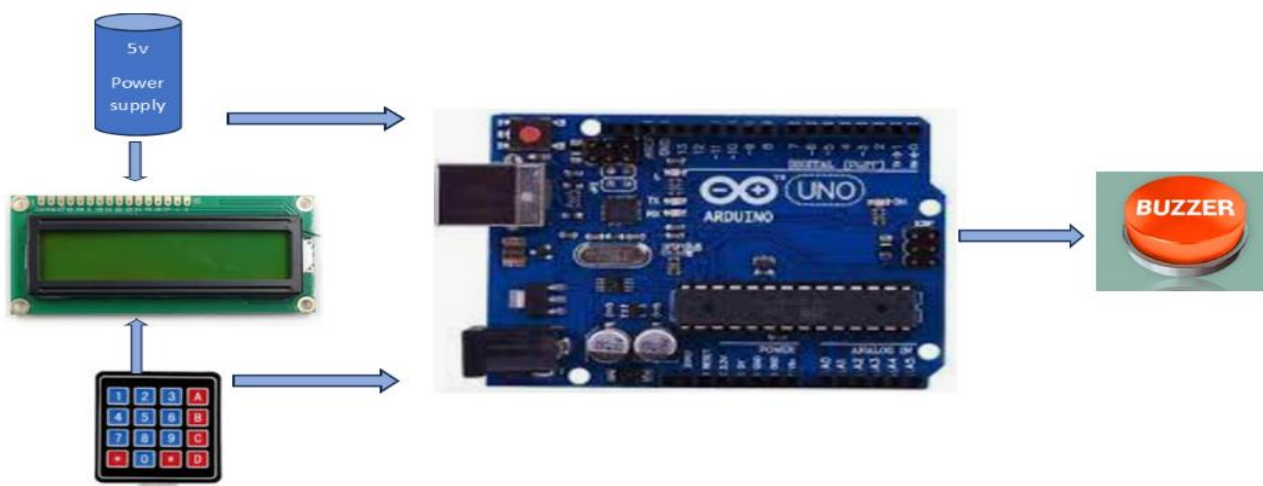


Figure 1

The block diagram for a Code Guard door locking system using Arduino shows how different components work together to create a secure access control system. Here's a breakdown of each component:

Keypad: This is the input device where the user enters the password. It typically consists of a set of buttons or keys labelled with numbers or characters.

Arduino: The Arduino is the microcontroller that acts as the brain of the system. It receives the input from the keypad and processes it to determine if the entered password is correct.

Stored Password: The password is stored in the Arduino's memory or in an external storage device, such as an EEPROM. The stored password is compared with the entered password to validate access.

Lock Mechanism: If the entered password matches the stored password, the Arduino sends a signal to the lock mechanism to unlock the door. The lock mechanism can be a servo motor, an electromagnetic lock, or any other suitable mechanism. **LCD Display:** The LCD display provides visual feedback to the user. It can show messages like "Access Granted" or "Access Denied" to indicate the result of the authentication process.

Buzzer: The buzzer provides audible feedback to the user. It can produce sounds or beeps to indicate successful or unsuccessful access attempts.

3.2 Components Description

Arduino UNO: The Arduino Uno-board is a 8 bit-microcontroller. It has I/O pins including both digital and analog pins.

SG-90 Servo Motor: It is small and light weight server motor with large output power. A servo motor can turn 90 degree in either direction.

4*4 Matrix Keypad Membrane: It is used as an input in a project. It has total 16 keys.

Arduino Software (IDE): It is an open-source Software (IDE) which makes it easy for us to write code and upload it to the Arduino boards. It runs on Windows, Linux etc.

Buzzer: In our project, we tend to used buzzer to point the right entry of password and additionally it indicate once we successfully changed the present old password.

I2C Module: The Inter-Integrated Circuit protocol is a protocol intended to allow multiple "Peripheral" digital integrated circuits("chips")to communicate with one or more "controller" chips.

16×2 LCD Display: The display has 16 columns and 2 rows. The term LCD stands for liquid crystal display.

3.3 FLOW CHART

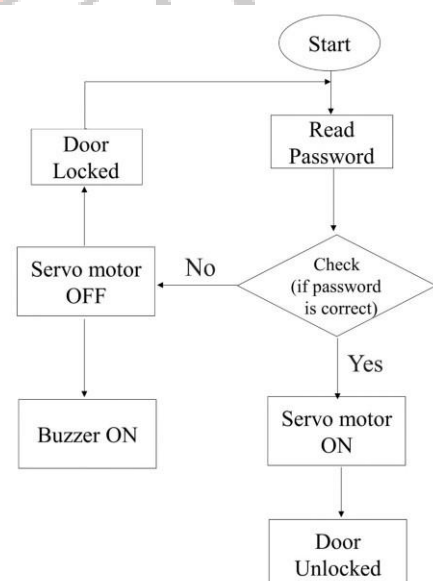


Figure 2

IV. RESULTS AND DISCUSSION

4.1 Results



Figure 3 Welcoming Message when the system is started

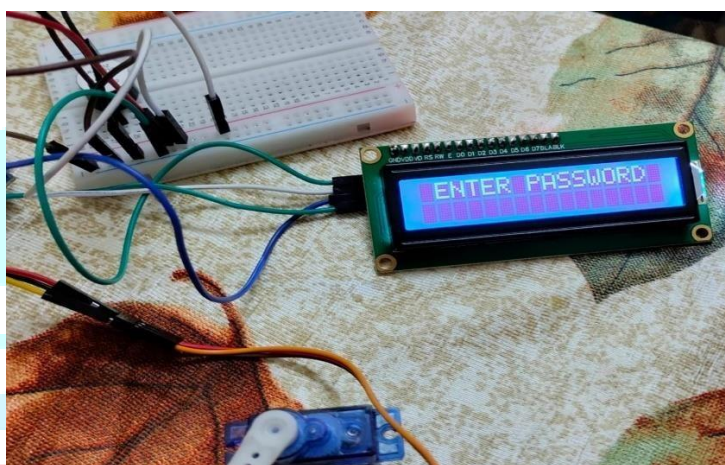


Figure 4 Instructed to enter the password



Figure 5 When the password Matches it displays the message “CORRECT PASSWORD OPEN THE DOOR” and Servo motor is rotated.

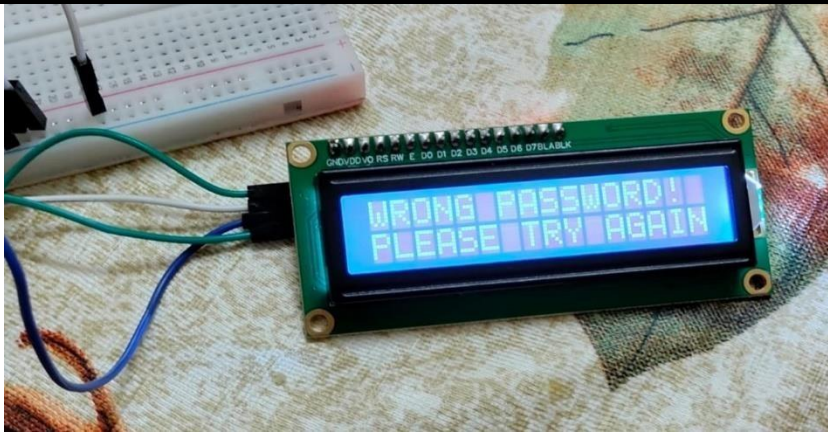


Figure 6 Shows the message “WRONG PASSWORD! PLEASE TRY AGAIN” when wrong password is entered.



Figure 7 Shows the message “ENTER PASSWORD” when presses * for changing password.



Figure 8 Shows the message “Password changed” when new password is entered.

Code guard Door Lock system using Arduino typically involves using a keypad to enter a password. The Arduino board is programmed to compare the entered password with a predefined password. If the passwords match, the Arduino triggers a mechanism, such as a servo motor, to unlock the door. Otherwise, the door remains locked.

4.2 Conclusion

Code Guard door locking system using Arduino is a secure and customizable way to control access to a door. By incorporating a keypad, Arduino, servo motor, and feedback element buzzer, the system can corroborate watchwords, unleash the door, and give feedback to the stoner. It's a popular and practical design that can be expanded upon with fresh features for enhanced security. This design provides enough security as long as the word isn't participated. We've successfully tested our design. This secret key based entry locking system can end up being a less costly then the expensive entry locking system which utilizes retina check, iris scan and fingerprint scan. The issues of the model were as per our anticipation. Hence, everyone can go to protect for similar locking system at smallest price to keep his precious effects safe.

4.3 FUTURE SCOPE

The Code Guard door locking system using Arduino has a promising foundation, and there are several avenues for future work and improvements. Some potential areas for expansion and enhancement include Biometric Integration, Mobile App Integration where we Consider developing a mobile app that connects to the Arduino-based system. This would allow users to control and monitor the door lock remotely, receive notifications, and manage access permissions, Integration with Smart Home Systems where we Explore integrating the door locking system with existing smart home platforms like Amazon Alexa or Google Home. This would allow users to control the door lock using voice commands and integrate it with other smart devices in their home.

4.4 APPLICATION

The Code Guard door locking system using Arduino can find applications in various contexts where secure access control is essential. Some potential applications include:

- Home Security
- Residential Security
- Office Access Control
- Smart Hotels and Guesthouses
- Educational Institutions
- Server Room Security
- Storage Unit Access
- Industrial Facilities
- Healthcare Facilities
- Gated Communities
- Retail Stores
- Vehicle Security
- Restricted Areas
- Schools and Institutions
- Bank Vaults and Financial Institutions

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