Keypad Based Door Lock System

Statement about the Problem

We picked the keypad door lock to make things safer and more convenient. Regular keys can be a hassle – you might lose them, or someone could copy them without permission. The keypad system solves these problems by letting you use a special code instead of a physical key. This means no more worries about losing keys, and you can easily change the code when needed. It's a handy and flexible solution. Even though it's a step up in security, we need to be careful about things like code vulnerabilities. So, we'll make sure to keep everything updated to ensure the system works well. In the end, the keypad door lock is a modern and smart way to control who gets in.

Why is the particular topic chosen?

We chose the keypad door lock system because we want to make things safer and more convenient when it comes to controlling who can access a space. The old-style locks with physical keys have their problems – keys can get lost, someone might make copies without permission, and it's just a hassle to carry them around.

So, we went with the keypad system, which is like a digital key. Instead of a physical key, you enter a special code to unlock the door. This solves the issues with traditional locks because you don't need physical keys anymore. Plus, it's handy because you can easily change the code whenever you need to. It's a practical and adaptable solution.

Objective and scope of the project

The goal of this project is to research and analyse a suitable collection of components for developing a smart door lock using Arduino that provides excellent security and quick access. The following are the specific project goals:

• Familiarity with a smart door locking system based on a microcontroller.

• Using Arduino to create a simple and smart door locking system.

The scope of a password-based door lock system includes implementing a secure access control mechanism using Arduino, a keypad, and other components. This system allows authorized users to unlock the door by entering a correct password, providing a cost-efficient and reliable solution for controlled access

Methodology

A. Introduction

In this project, we used an Arduino and a keypad to create a password-based security system. Thefts and frauds are becoming more common by the day, therefore security is becoming a serious worry. As a result, a smart lock with a digital code can simply secure our home, business, locker, and other valuables. It only unlocks a door when the correct password is supplied. Due to a password-based door lock mechanism, only authorized personnel are permitted access to the restricted areas. The Arduino is in charge of the project's overall operation. A 4×4 keypad can be used to input the necessary password**.**

B. Working Principle

There are two cases for this experiment. The purpose of this experiment is to implement a door-locking mechanism that opens or closes the lock on the door automatically with password.

Case 1: The lock will open and close

When a password is entered via keypad, the system checks the password and finds out if it is right or wrong. If the password matches with the stored password in the microcontroller chip, the microcontroller sends the signal to the LCD display for showing “The door is open” as well as the microcontroller sends the signal to Servo Motor. Then the motor is rotated by 0° to 180° and opens the lock, allowing the door to be unlocked. Later, by pressing ‘#’ button, the Servo motor is rotated again by 180° to 0° closing the door.

Case 2: The lock will not open

If the wrong password is entered, the system shows “Password doesn’t match – Please try again” and Servo Motor is not rotated. A bit of time the system automatically starts again from the beginning**.**

Hardware & Software to be used

● **Hardware:**

1. Arduino UNO
2. 4×4 Matrix Keypad
3. SG90 Micro Servo Motor
4. 16×2 LCD Display
5. Potentiometer

● **Software:**

1. Arduino IDE
2. WOKWI Web Application

What contribution would the project make?

Improved Security:

The keypad door lock system enhances security by using unique codes instead of traditional keys, reducing the risk of unauthorized access.

Convenience for Users:

Users find it convenient as they can enter a code instead of carrying physical keys, making access simpler and reducing the chance of key-related problems.

Flexible Access Control:

The system is flexible, allowing easy changes to access codes. This adaptability is useful for updating access permissions as needed.

Easier Key Management:

The system eliminates challenges related to managing physical keys, such as duplication or loss, leading to a more streamlined and efficient process.

Technological Advancement:

The project adopts modern technology for access control, demonstrating a commitment to staying current with security practices and technological standards.

REFERENCES

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