## Password Based Circuit Breaker

**A PROJECT REPORT**

***Submitted by***

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***in partial fulfilment for award of the degree of***

### BACHELOR OF TECHNOLOGY

***in***

**COMPUTER SCIENCE ENGINEERING**

**CHENNAI INSTITUTE OF TECHNOLOGY CHENNAI 600 069**

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**APRIL 2023**

**BONAFIDE CERTIFICATE**

Certified that this project **“Password Based Circuit Breaker”** is the bonafide work of

**“Claron Antony Raj.A”** who carried out the project work under my supervision.

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**ACKNOWLEDGEMENT**

We thank our beloved **Chairman Shri. P. SRIRAM** and all the trust members of Chennai Institute of Technology at this high time for providing us with a plethora of facilities to complete my project successfully.

We take the privilege to express my thanks to our Principal **Dr A. RAMESH, M.E., Ph.D.,** who has been a bastion of moral strength and a source of incessant encouragement to us.

We express our sincere thanks to **Dr. S.Pavithra, M.E., Ph.D.,** Head of the Department, Ms.K.P.Aswathi , M.E., (Ph.D.)**,** Project Supervisor. We take immense pleasure to have them also as ourmentor providing valuable suggestions, excellent guidance, and constant support allthrough the course of our project.

We also thank the teaching and non-teaching staff members of the Information Technology Department and all our fellow students who stood with us to complete our project successfully. Finally, we extend our deep gratitude to our beloved family members for their moral coordination, encouragement, and financial support to carry out this project

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### ABSTRACT

A password-based circuit breaker built with an Arduino Uno is a rudimentary yet effective security mechanism. It employs a keypad for password input and a relay to control electrical circuits. Users must enter the correct password to activate the relay and allow current to flow through the circuit. If an incorrect password is entered, the relay remains open, effectively acting as a circuit breaker. While this approach is a basic example of access control, it underscores the principles of security using a simple and cost-effective microcontroller. In practical applications, stronger encryption and authentication methods should be used to protect against unauthorized access.

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**Chapter 1**

# Introduction

IoT refers to the interconnected network of physical devices, vehicles, appliances, and other objects embedded with sensors, software, and network connectivity, enabling them to collect and exchange data.

Waste management is a critical aspect of modern urban living, and with the ever-increasing urbanization, there is a growing need for innovative and efficient solutions to address this challenge. Traditional waste bins require physical contact to open their lids, which can lead to hygiene concerns, especially in public spaces.

The "Smart Dustbin" project presented in this report is a creative application of contemporary technology, combining an Arduino Uno microcontroller, a servo motor, and an ultrasonic sensor to create an intelligent waste disposal system.

In this report I will explain and discuss about the components that are used for the Smart dustbin. In this project we use Arduino uno and dc motor. This project is done to try to simplify the garbage management system.

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**Chapter 2 Literature Review**

Password Based Circuit Breaker :

A comprehensive literature review on password-based circuit breakers offers valuable insights into the world of electrical security systems. These innovative systems employ user-defined passwords to effectively control the flow of electrical current, enhancing security and access control in a wide range of applications. Key themes and findings in existing literature include the critical need for heightened security measures in electrical circuits, particularly in environments where unauthorized access can lead to dire consequences. Password-based circuit breakers provide a cost-effective and versatile solution to address these concerns.

Practical implementations typically revolve around microcontroller platforms such as Arduino, which provide a foundation for secure access control. The integration of human-computer interaction is often facilitated through user-friendly interfaces like keypads, making these systems accessible to a broad range of users. In this regard, literature underscores the significance of user password security. Ensuring the strength and integrity of user-defined passwords is paramount to thwart potential hacking attempts. Researchers propose advanced password protection techniques, including encryption and hashing, to safeguard these systems against security breaches..

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Reliability and robustness are also prominent themes in the literature. Circuit breakers must not only prevent unauthorized access but also maintain a high level of reliability to avoid system failures. Researchers have explored methods to enhance the robustness of these systems, with particular attention to the mechanisms governing both access control and system integrity.

The discussion on security threats and vulnerabilities is integral to the literature, as researchers have delved into potential risks. Some of the threats considered include brute-force attacks, where an attacker systematically tries various passwords until the correct one is found. In response, literature suggests countermeasures, such as lockout mechanisms that temporarily disable access after a certain number of failed attempts. Rate limiting, another recommended approach, slows down the number of attempts an attacker can make within a given time frame.

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**Chapter 3**

# Hardware Components.

### To make a password based circuit breaker i the components we need is:

* Arduino Uno
* Relays
* 11V Transformer
* Jumper Wires
* LED panel
* 9v Battery

### Arduino Uno:

Arduino Uno is a versatile and widely used microcontroller board designed for a myriad of electronics projects and prototyping applications. At its core, it features the Atmel ATmega328P microcontroller, boasting 14 digital input/output pins, 6 of which can produce pulse-width modulation (PWM) signals, and 6 analog input pins for reading varying voltage levels. With a clock speed of 16 MHz and ample memory (32 KB flash, 2 KB SRAM, and 1 KB EEPROM)

Fig. 3.1 Arduino uno

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### Relays :

Relays are integral components in a password-based circuit breaker system, adding a critical layer of control and security to the setup. In this context, a relay is employed to physically interrupt or establish the electrical connection to the circuit, acting as the ultimate switch for controlling the power flow. When a user successfully enters the correct password, the relay is activated, allowing the circuit to be closed, and power to flow to the connected device or system. Conversely, if an incorrect password is entered, the relay remains in its open state, serving as the "circuit breaker" by preventing electrical current from reaching the load. This use of relays not only offers the essential control function but also provides an additional level of security and isolation in password-protected access systems, ensuring that access is only granted to authorized users..

Fig: 3.2. Relay

* 1. **11v Transformer :**

An 11V transformer can be an essential component in a password-based circuit breaker system, primarily for powering the circuit's control and logic components.

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This transformer steps down the higher voltage from the power source to a lower and safer voltage suitable for use in sensitive electronic circuits. The reduced voltage is typically rectified and filtered to provide a stable and low-voltage DC supply for the microcontroller, keypad, and other control elements of the password-based circuit breaker

Fig: 3.3. 11V transformer

## Male To Male Jumper Wirers:

## Male-to-male jumper wires are essential components in electronics and prototyping projects. These wires consist of connectors at both ends, typically in the form of male pins or pins with exposed metal tips.

Fig: 3.4 Male to Male Jumper Wires

They are used to establish electrical connections between various components on a breadboard, PCB, or other electronic platforms. One end of the wire can be

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easily plugged into header pins, sockets, or other female connectors, while the other end can similarly connect to male pins or components like sensors, microcontrollers, or other electronic modules.

## LCD panel:

. An LCD panel, short for Liquid Crystal Display panel, represents a ubiquitous and versatile display technology widely used in numerous electronic devices. These flat and lightweight panels are characterized by their ability to create images or text through the manipulation of liquid crystals. LCD panels are known for their energy efficiency, making them the display of choice for devices like computer monitors, televisions, and smartphones. They produce bright and high-contrast visuals, adapting well to varying lighting conditions. LCD panels come in a variety of sizes, from small screens in handheld devices to large screens for televisions and digital signage. There are different types of LCD panels, such as twisted nematic (TN), in-plane switching (IPS), and organic light-emitting diode (OLED) displays, each with unique advantages. While these panels have transformed the visual landscape in our daily lives, they continue to evolve, with improvements in color accuracy, contrast ratios, and overall display quality, ensuring their continued dominance in the world of electronic displays.

Fig: 3.5 LCD panel

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## 4.1. Arduino IDE setup:

**Chapter 4**

# Software Setup

1. Download Arduino IDE:
   * Visit the official Arduino website at https://[www.arduino.cc/en/software.](http://www.arduino.cc/en/software)
   * Click on the "Download the Arduino IDE" button for Windows.
   * Download the installer to your computer.
2. Run the Installer:
   * Locate the downloaded installer file (e.g., "arduino-x.x.x-windows.exe").
   * Double-click the installer to run it.
   * If prompted for administrative permissions, grant them.
3. Installation Wizard:
   * Follow the on-screen instructions in the installation wizard.
   * You can leave most settings at their default values.
4. Driver Installation (if needed):
   * During the installation, you may be prompted to install drivers for Arduino boards. Follow the prompts to complete this step.
5. Complete Installation:
   * Once the installation is complete, click the "Close" button.

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* 1. **Block Digram:**

**Chapter 5**

# Methodology

### Fig:5.1 Block Daigram

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* 1. **Configuration with components using code:**

#include <Keypad.h>

const byte ROWS = 4; //four rows

const byte COLS = 4; //four columns

char keys[ROWS][COLS] = {

{'1','2','3','A'},

{'4','5','6','B'},

{'7','8','9','C'},

{'\*','0','#','D'}

};

byte rowPins[ROWS] = {9, 8, 7, 6}; //connect to the row pinouts of the keypad

byte colPins[COLS] = {5, 4, 3, 2}; //connect to the column pinouts of the keypad

Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS );

const char\* correctPassword = "1234"; // Change this to your desired password

const int relayPin = 10; // Connect this pin to the relay module

bool circuitClosed = false;

void setup() {

pinMode(relayPin, OUTPUT);

digitalWrite(relayPin, HIGH); // Ensure the circuit breaker is open initially

Serial.begin(9600);

}

void loop() {

char key = keypad.getKey();

if (key) {

if (key == '#') {

if (circuitClosed) {

digitalWrite(relayPin, HIGH); // Open the circuit

circuitClosed = false;

Serial.println("Circuit Opened");

} 14

} else {

static char passwordBuffer[5]; // Assuming a 4-digit password

static int bufferIndex = 0;

passwordBuffer[bufferIndex++] = key;

if (bufferIndex == 4) {

passwordBuffer[4] = '\0'; // Null-terminate the password buffer

if (strcmp(passwordBuffer, correctPassword) == 0) {

digitalWrite(relayPin, LOW); // Close the circuit

circuitClosed = true;

Serial.println("Circuit Closed");

}

bufferIndex = 0; // Reset the buffer

}

}

}

}

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**Chapter 6**

# Conclusion and Future Work

**Conclusion:**

The primary focus of our password-based circuit breaker is to provide a secure and controlled means of accessing and managing electrical circuits, with an emphasis on preventing unauthorized or accidental usage. It is commonly used in a variety of applications, including industrial machinery, home security systems, and other situations where controlled access and safety are paramount.

### Future Scope:

### The future scope of password-based circuit breakers includes advanced authentication methods like biometrics and multi-factor authentication, integration with IoT systems, enhanced cybersecurity measures, cloud connectivity for remote monitoring, and a focus on energy efficiency. These systems will become increasingly customizable, user-friendly, and adaptable to various applications, ensuring secure and convenient electrical circuit management.

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### .Future Work:

Future work for password-based circuit breakers includes integrating emerging technologies like biometrics and AI-driven security, enabling remote control via IoT, and enhancing cybersecurity to thwart evolving threats. Customization and user-friendliness will be key, along with compliance with industry standards. Such advancements will empower safer and smarter circuit management..