VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANA SANGAMA, BELAGAVI - 590018

MINI PROJECT REPORT (18ECMP68)

ON

"Password Based Circuit Breaker and Distribution Panel"

Submitted in partial fulfilment for the requirements for the sixth semester of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION

Submitted by:

RAJSHREE SINGH (1MV20EC094)

REETHU K L (1MV20EC095)

SHIVAM KUMAR (1MV20EC107)

SUBRAMANIAM G (1MV20EC115)

Under the guidance of

Dr. SHEETAL BAGALI

Assistant Professor, Department of ECE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SIR M. VISVESVARAYA INSTITUTE OF TECHNOLOGY

Bengaluru – 562157

2022-2023

TABLE OF CONTENTS

TABLE OF CONTENTS **i**

CERTIFICATE **iii**

DECLARATION **iv**

ACKNOWLEDGEMENT **v**

ABSTRACT **vi**

1. **INTRODUCTION** **1**
2. **PROBLEM STATEMENT** **2**
3. **LITERATURE SURVEY** **3**
4. **OBJECTIVES** **5**
5. **METHODOLOGY**

5.1 CIRCUIT DIAGRAM **6**

5.2 WORKING **7**

6. **HARDWARE DETAILS**

6.1 RASPBERRY PI PICO **8**

6.2 KEYPAD **10**

6.3 FOUR CHANNEL RELAY MODULE

6.3.1 SPECIFICATIONS **11**

6.3.2 PIN DIAGRAM **12**

6.4 OLED DISPLAY **13**

7. **SOFTWARE DETAILS**

7.1 ARDUINO IDE **14**

7.2 FLOWCHART **14**

7.3 ALGORITHM **15**

8. **RESULT** **16**
9. **MERITS AND DEMERITS** **18**
10. **CONCLUSION AND FUTURE SCOPE** **20**

REFERENCES **21**

APPENDIX **22**

LIST OF FIGURES

Fig 5.1 Circuit Diagram of Password Based Circuit Breaker **6**

Fig 6.1 Raspberry Pi Pico **8**

Fig 6.2 Raspberry Pi Pico Pinout **9**

Fig 6.3 4x4 Matrix Keypad **10**

Fig 6.4 Four Channel Relay Board **11**

Fig 6.5 Four Channel Relay Pin Configuration **12**

Fig 6.6 OLED Display **13**

Fig. 7.1 Flow Chart **14**

Fig 8.1 Overview of the Model **17**

Fig 8.2 Circuit is on after entering Password **17**

Fig 8.3 Circuit is Off After Entering Password **17**

SIR M. VISVESVARAYA INSTITUTE OF TECHNOLOGY

Bengaluru – 562157

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

It is certified that the mini project work (18ECMP68) entitled "**PASSWORD BASED CIRCUIT BREAKER AND DISTRIBUTION PANEL**" is a carried out by **RAJSHREE SINGH (1MV20EC094), REETHU K L (1MV20EC095), SHIVAM KUMAR(1MV20EC107), SUBRAMANIAM G(1MV20EC115)**, bonafide students of **Sir M Visvesvaraya Institute of Technology** in partial fulfilment for the award of the Degree of Bachelor of Engineering in Electronics and Communication Engineering of the **Visvesvaraya Technological University, Belagavi** during the year **2022- 2023**. It is certified that all corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of Mini Project work prescribed for the said Degree.

DR. SHEETAL BAGALI	**Dr. V. G. SUPRIYA**	**Prof. RAKESH S. G.**
Assistant Professor	Professor and HOD	Principal
Dept. of ECE	Dept. of ECE	Sir MVIT

External Examination Viva

Name of the Examiner **Signature with Date**

1)

2)

DECLARATION

We hereby declare that the entire Mini-Project work embodied in this dissertation has been carried out by us and no part has been submitted for any degree or diploma of any institution previously.

Place: Bengaluru

Date:

Name of the Students and Signature:

RAJSHREE SINGH
(1MV20EC094)

REETHU K L
(1MV20EC095)

SHIVAM KUMAR
(1MV20EC107)

SUBRAMANIAM G
(1MV20EC115)

ACKNOWLEDGEMENT

It gives us immense pleasure to express our sincere gratitude to the management of **Sir M Visvesvaraya Institute of Technology,** Bengaluru for providing the opportunity and the resources to accomplish our mini-project work in their premises.

We would like to convey our regards to **Prof. RAKESH S. G.,** Principal, Sir MVIT for providing us with the infrastructure and facilities needed to develop our project.

Heartfelt and sincere thanks to **Dr. V. G. SUPRIYA,** HOD, Dept. of ECE, for her suggestions, constant support and encouragement.

On the path of learning, the presence of an experienced guide is indispensable and we would like to thank our guide **Dr. SHEETAL BAGALI**, Assistant Professor, Dept. of ECE, for her invaluable help and guidance.

We would also like to thank the staff of Department of Electronics and Communication Engineering and lab-in-charges for their co-operation and suggestions.

Finally, we would like to thank all our friends for their help and suggestions without which completing this project would not have been possible.

RAJSHREE SINGH **(1MV20EC094)**
REETHU K L **(1MV20EC095)**
SHIVAM KUMAR **(1MV20EC107)**
SUBRAMANIAM G **(1MV20EC115)**

ABSTRACT

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see fatal electrical accidents to the line man are increasing during the electric line repair due to the lack of communication and coordination between the maintenance staff and the electric substation staff. In order to avoid such accidents, the breaker can be so designed such that only authorized person can operate it with a password. This ensures security of the worker because no one can turn on the line without his permission. The system is fully controlled by the Raspberry Pi Pico microcontroller. The password is stored in an RAM, interfaced to the microcontroller and the password can be changed any time unlike a fixed one burnt permanently on to the microcontroller. A keypad is used to enter the password and a relay to open or close circuit breaker, which is indicated by a lamp. Any wrong attempt to open the breaker (by entering the wrong password) an alert will be actuated.

CHAPTER 1

INTRODUCTION

Password-based distribution panels and circuit breakers are advanced electrical control systems that provide an additional layer of security and control over the distribution of electricity within a building or facility. These systems are designed to ensure the safety of personnel and equipment by allowing only authorized individuals to access and manipulate the electrical distribution system.

A password-based distribution panel typically consists of a centralized control unit and multiple circuit breakers or switches connected to different electrical circuits. The control unit is equipped with a secure password entry mechanism, such as a keypad or a biometric scanner, which allows authorized users to input their unique password or biometric data to gain access to the system.

Once access is granted, users can use the control unit to manage the distribution of electricity. They can selectively enable or disable power to specific circuits or areas, monitor the electrical load, and receive alerts or notifications in case of any abnormalities or faults. The password-based system ensures that only authorized personnel have the ability to control the power distribution and safeguards against accidental or unauthorized modifications that could lead to electrical hazards or disruptions.

Circuit breakers, on the other hand, are electrical switches that automatically interrupt the flow of electricity in a circuit if an overload or short circuit occurs. They act as crucial safety devices, protecting the electrical system from damage and preventing hazards such as electrical fires or equipment failures.

Password-based circuit breakers incorporate an additional layer of security by requiring a password or authentication process to access and operate the breaker. This added security measure ensures that only authorized personnel can manipulate the circuit breaker, reducing the risk of intentional or accidental disruptions to the electrical system.

CHAPTER 2

PROBLEM STATEMENT

Security is the prime concern in our day to day life while performing any activity. In the current scenario, accidental death of lineman is often read and evidenced. In this direction, a safety measure to safeguard the operator is found very necessary looking into the present.

Critical electrical accidents to line men are on the rise during electric line repair due to lack of communication and co-ordination between the maintenance staff and electric substation Staff.

During maintenance of distribution lines there is a chance communication gap between the electric line and sub-station operator or staff.

This communication gap may risk life of electric line man. The control to turn ON/OFF the line lies with the line man only. During maintenance the entire line is turned off this cause inconvenience to the consumers

CHAPTER 3

LITERATURE SURVEY

[1] J. Vinoth Kumar, M. SatyaRohit, M. Pavan and M. Raghu, Password Based Circuit Breaker, International Journal of Research Publication and Reviews, Page 3887-3889, Vol (2) Issue (3) (2021)

The entire project is based on Embedded Systems. In this project Microcontroller are used which controls all the operations in regarding the password system. For this process we require the components like microcontroller, control circuitry, power supply and key pad. This key pads are used for entering password for operating different load which are connected to the controller. A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see fatal electrical accidents to the line man are increasing during the electric line repair due to the lack of communication and coordination between the maintenance staff and the electric substation staff. In order to avoid such accidents, the breaker can be so designed such that only authorized person can operate it with a password. Here, there is also a provision of changing the password. The system is fully controlled by the microcontroller of . The password is stored in an MC, interfaced to the microcontroller and the password can be changed any time unlike a fixed one burnt permanently on to the microcontroller. A keypad is used to enter the password and a relay to open or close circuit breaker.

[2] Pramod M. Murari, Mahabal V. Kinnerkar, Prashant S. Koppa, Vishal S. Kamble and Rashmitha R. Mendan, Electric Line Man Safety with Password Based Circuit Breaker and Intimation of HT Wire Sag using GSM, IJSDR | Volume 2, Issue 7, July 2017

This system is fully controlled by a microcontroller A matrix keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the password store in the ROM of the microcontroller. If the password entered is correct, then only the line can be turned on/off. The activation/deactivation of the circuit breaker is indicated by a lamp that turns on or off. Ultra sonic sensors are the devices that use electrical –Mechanical energy transformation to measure to distance from the sensor to the target object. These sensors are

categorized into two types according to their working phenomenon piezoelectric sensors and electro static sensors. Here we are using the piezoelectric principle. PIR sensors are small, inexpensive, low power, easy to use and don't wear out. These sensors allow to sense motion, almost always used to detect whether a human has moved in or out of the sensors range

[3] Vedant Sunil Kulkarni, Gitesh Suresh Karale and Trupti Kherde, "Password based circuit breaker using microcontroller", International Research Journal of Modernization in Engineering Technology and Science, Volume:03/Issue:06/June-2021

When operated manually we see dangerous electrical accidents to the lineman are raising during the electrical line repair because of the dearth of communication and coordination between the maintenance/upkeep staff and also the electric substation staff. So as to avoid such accidents, the breaker will be so designed such only an authorized person can operate it with a password. A 4*4 keypad matrix is used to enter the password and a relay to open or close the circuit, which is indicated by a lamp. Any wrong try and to open the breaker (by entering the inaccurate password) an alert is going to be actuated, indicated by another LED. Its basic working is to find a fault and interrupt into the current flow. Unlike a fuse, which operates once so then must get replaced, a circuit is often reset (either manually or automatically) to resume normal operation.

[4] Mallikarjun G. Hudedmani* , Nitin Ummannanavar, Mani Dheeraj Mudaliar, Chandana Sooji and Mala Bogar, Password Based Distribution Panel and Circuit Breaker Operation for the Safety of Lineman during Maintenance Work, Advanced Journal Of Graduate Research,ISSN: 2456-7108 Volume 1, Issue 1, pp. 35-39, January 2017

The model is constructed around microcontroller and GSM module interfaced with that at transformer control panel. The matrix keypad, LED indicators and stepper motor driven by microcontroller for the door operation are arranged around the controller. The control center is assumed as a mobile to receive and send password to the lineman's mobile and GSM receiver of the control panel. The work mainly focuses on the distribution transformer control panel and circuit breaker. The opening of doors of the control panel is presently simple and much more doors normally open in the present scenario. This is very dangerous and results accidental disasters.

CHAPTER 4

OBJECTIVES

The primary objectives of the password-based circuit breaker system for lineman safety are:

1. Unauthorized Access Prevention: The system aims to prevent unauthorized personnel from operating circuit breakers

2. Lineman Safety Enhancement: The system intends to improve lineman safety by minimizing the risk of accidental or unauthorized switching of circuit breakers.

3. System Integrity Preservation: The password-based circuit breaker system aims to maintain the integrity of the electrical system by preventing malicious or unauthorized changes

Overall, a password-based circuit breaker system for lineman safety aims to enhance security, protect personnel, maintain system integrity, and improve operational efficiency in managing electrical circuits.

CHAPTER 5

DESIGN METHODOLOGY

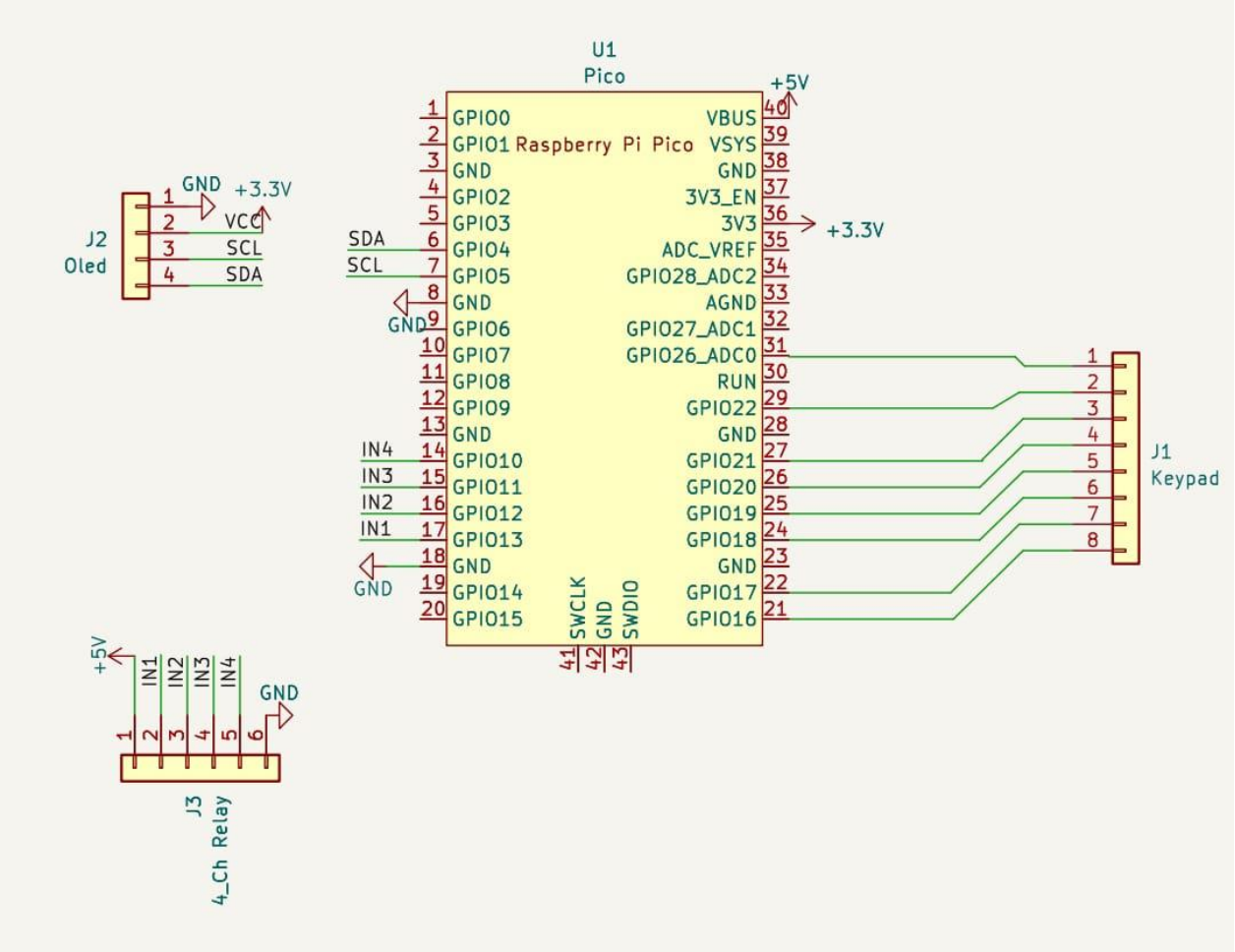

Fig. 5.1 Circuit diagram for password based circuit breaker

This project does not allow to control of the circuit to be located in the working field ensuring to minimize the fatal accidents occurring with the linemen in the working field. The system's control will be provided only the line men working on that area in his substation. To make any repairs. the line men have to enter password using his android phone and switch OFF the circuit. This will help him work safely, do the required changes and after returning back to his substation he had to re-enter the password to switch ON. Since the control of the switches is in the hand of the line men itself, there is no chance of accidents occurring. This system provides the storage of password using EEPROM and also allows changing the password for security reason if and when required.

5.2 WORKING:

- Power OFF: Initially, the power supply to the protected device or circuit should be OFF.
- Password Input: Enter the password through the chosen input method connected to the Raspberry Pi.
- Password Validation: The program running on the Raspberry Pi compares the entered password with the correct password.
- Power ON: If the entered password is correct, the program activates the GPIO pin connected to the relay module, allowing power to flow to the protected device or circuit.
- Power OFF: If the entered password is incorrect, the program either does nothing or triggers an alarm, and the power supply remains OFF.

CHAPTER 6

HARDWARE REQUIREMENTS

6.1 RASPBERRY PI PICO

In a password-based circuit breaker project using a Raspberry Pi, the Raspberry Pi serves as the central component responsible for controlling the entire system. Here's an elaboration on its role and functionality within the project:

1. Control and Processing: The Raspberry Pi acts as the control unit for the circuit breaker system. It provides the necessary computational power to execute the logic and algorithms required for password verification, user interaction, and relay control.
2. GPIO Pins: The Raspberry Pi features General Purpose Input/Output (GPIO) pins that can be used to interface with external components. These pins allow the Raspberry Pi to read inputs from the keypad, control the relay module, and communicate with other peripherals like the display.
3. Keypad Interface: The Raspberry Pi's GPIO pins are used to connect the keypad to the Raspberry Pi. Each key on the keypad is associated with a specific GPIO pin. The Raspberry Pi reads the state of these pins to determine which key has been pressed by the user. The keypad input is then processed to verify the entered password.
4. Relay Control: The Raspberry Pi's GPIO pins are also used to control the relay module. By toggling the appropriate GPIO pin, the Raspberry Pi can activate or deactivate the relay, thus controlling the flow of electricity to the circuit being protected.

5. User Interface: The Raspberry Pi can be connected to a display, such as an LCD or OLED screen, to provide a user interface. The display can show prompts for entering the password, display status messages and provide feedback to the user.

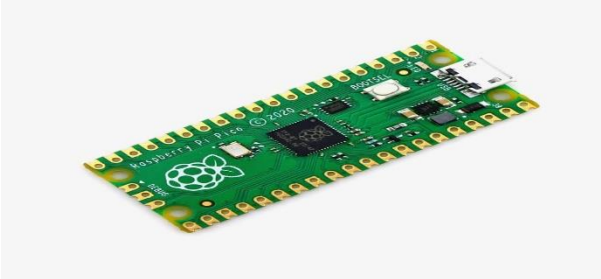

Fig 6.1 Raspberry Pi Pico Diagram

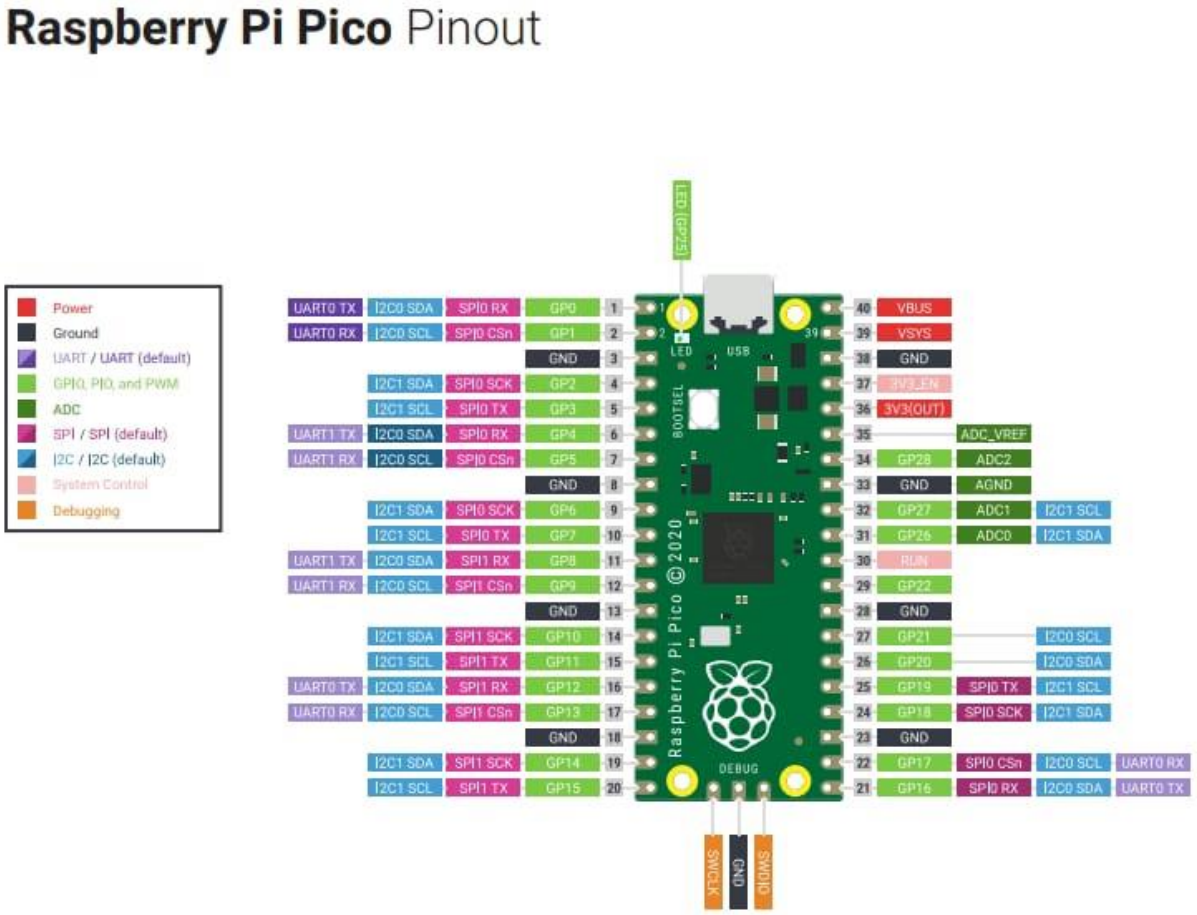

Fig. 6.2 Raspberry Pi Pico pin Diagram

6.2 KEYPAD

A keypad is a set of buttons arranged in a block or “pad” which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers, then it can also be called a numeric keypad.

In order to detect which key is pressed from the matrix, the row lines are to be made low one by one and read the columns. Assume that if Row1 is made low, then read the columns.

If any of the keys in row1 is pressed then correspondingly the column 1will give low that is if the second key is pressed in Row1, then column2 will give low.

Fig 6.3 4x4 matrix keypad

6.3 FOUR CHANNEL RELAY BOARD

The **four-channel relay module** contains four 5V relays and the associated switching and isolating components, which makes interfacing with a microcontroller or sensor easy with minimum components and connections. The contacts on each relay are specified for 250VAC and 30VDC and 10A in each case, as marked on the body of the relays.

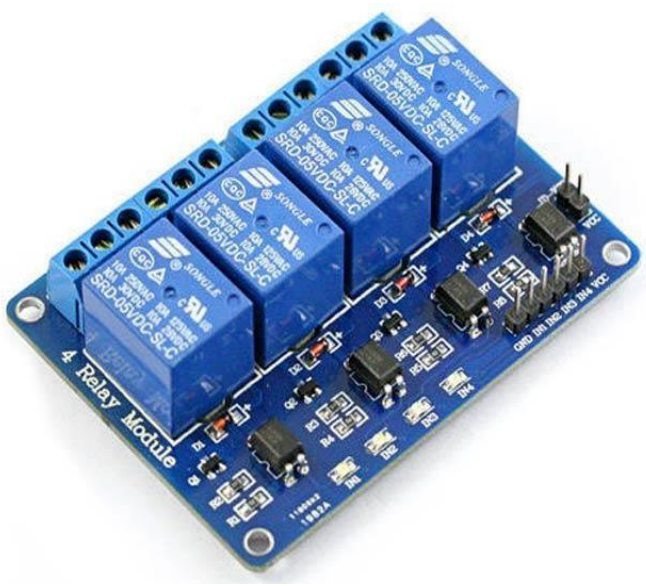

Fig 6.4 Four Channel Relay Board

6.3.1 Specifications

- Supply voltage – 3.75V to 6V
- Trigger current – 5mA
- Current when the relay is active - ~70mA (single), ~300mA (all four)
- Relay maximum contact voltage – 250VAC, 30VDC
- Relay maximum current – 10A

6.3.2 Pin Diagram

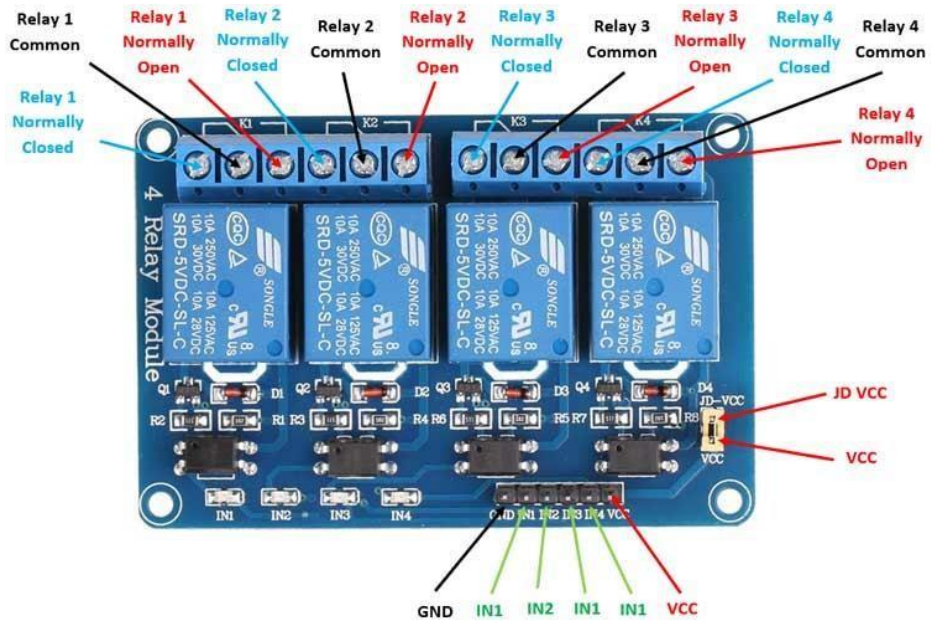

Fig 6.5 Four Channel Relay Pin Configuration

Pin Number	Pin Name	Description
1	GND	Ground reference for the module
2	IN1	Input to activate relay 1
3	IN2	Input to activate relay 2
4	IN3	Input to activate relay 3
5	IN4	Input to activate relay 4
6	V_{CC}	Power supply for the relay module
7	V_{CC}	Power supply selection jumper
8	JD-V_{CC}	Alternate power pin for the relay module

6.4 OLED DISPLAY

This display, just like all other OLED displays, is low power (consumes just 25mA when all the pixels are on) and offers brightness levels greater than what is available with LCDs. It has a resolution of 96×64 pixels and can display over 65000 different colors

Fig 6.6 OLED DISPLAY

CHAPTER 7
SOFTWARE DESCRIPTION

7.1 ARDUINO IDE

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment. The program or code written in the Arduino IDE is often called as sketching. We need to connect the Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '. ino'.

7.2 FLOW CHART

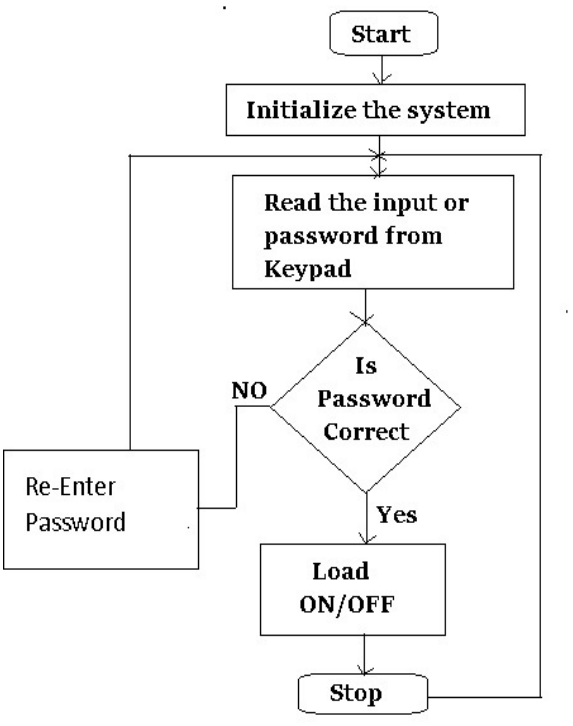

Fig 7.1 Flow Chart

7.3 ALGORITHM

1) Step 1:.Start.
2) Step 2: Initialize the system
3) Step 3: Read the input or password from keypad.
4) Step 4: If password is correct then Breaker is ON/OFF.
5) Step 5: If the password is wrong then go to step no.3..
6) Step 6: Stop.

RESULT

8.1OUTCOMES

1. The system which prevents unauthorized personnel from operating circuit breakers is designed

2. Lineman safety is ensured by minimizing the risk of accidental or unauthorized switching of circuit breakers.

3. The password-based circuit breaker system maintains the integrity of the electrical system by preventing malicious or unauthorized changes

8.2 OUTPUT OF THE PROJECT

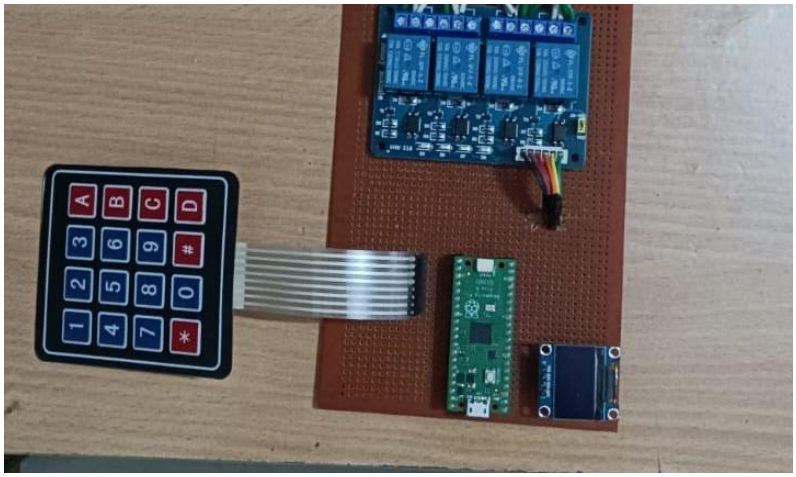

Fig 8.1 Overview of the Model

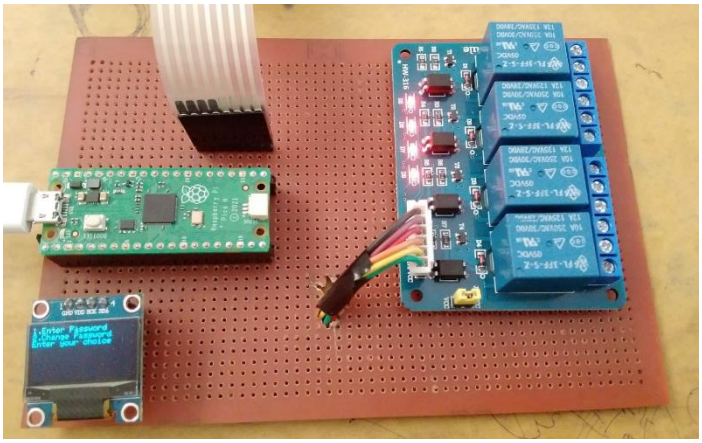

Fig 8.2 Circuit is on after entering Password

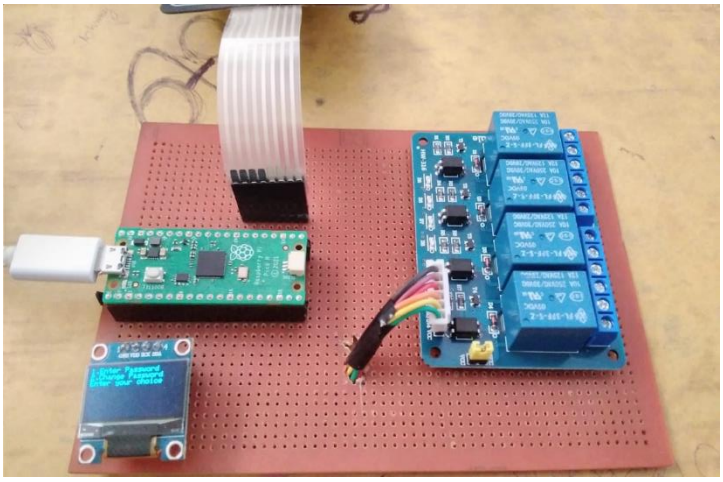

Fig 8.3 Circuit is Off After Entering Password

CHAPTER 9
MERITS AND DEMERITS

9.1 MERITS

1. Access control: Password-based circuit breakers provide a means of access control, ensuring that only authorized personnel can operate the equipment. By requiring a password, the circuit breaker limits access to trained linemen, reducing the chances of accidental or unauthorized operation.

2. Cost-effective: Password-based systems are generally more cost-effective compared to complex biometric or smart card-based access control systems. They are relatively simple to implement and require minimal additional hardware or infrastructure.

3. Ease of implementation and use: Password-based systems are easy to set up and use. Linemen can quickly learn and remember their passwords, facilitating efficient and seamless access to the circuit breaker when needed. It does not require additional training or specialized equipment.

4. Flexibility: Passwords can be easily changed or updated, allowing for periodic password rotations to enhance security. This flexibility enables organizations to adapt to evolving security needs and maintain control over who can access the circuit breaker.

5. Integration with existing systems: Password-based circuit breakers can often integrate with existing security infrastructure, such as user management systems or centralized authentication servers. This integration simplifies administration and provides a consistent approach to access control across different systems.

6. Audit trail and accountability: Password-based systems can be designed to maintain an audit trail of user actions. This allows for accountability and tracking of any changes or operations performed on the circuit breaker. In case of any unauthorized or malicious activity, the audit trail can help identify the responsible party.

While password-based circuit breakers have their advantages, it's important to carefully manage and address the associated disadvantages and risks to ensure the highest level of lineman safety. This may involve implementing additional security measures, conducting regular password updates, and providing training on password best practices.

9.2 DEMERITS

While password-based circuit breakers may offer certain benefits, there are several disadvantages and potential risks associated with relying solely on passwords for lineman safety. Here are some of the drawbacks:

1. Vulnerability to unauthorized access: Passwords can be easily compromised or shared, leading to unauthorized personnel gaining access to the circuit breaker. If an unauthorized individual gains control over the circuit breaker, they can potentially disrupt power supply or manipulate the system, putting lineman safety at risk.

2. Weak password practices: Password-based systems are often susceptible to weak password practices. Users may choose easily guessable passwords, reuse passwords across multiple systems, or fail to change default passwords. These practices increase the risk of unauthorized access and compromise the security of the circuit breaker.

3. Human error and forgetfulness: Linemen may forget passwords or accidentally enter incorrect passwords, leading to delays or difficulties in accessing the circuit breaker during critical situations. Such errors can hinder timely response and compromise lineman safety.

4. Password sharing and accountability: In some cases, linemen may share passwords with their colleagues for convenience, which undermines individual accountability and makes it challenging to trace actions back to specific individuals. This can make it difficult to identify the responsible party in case of any unauthorized or malicious actions.

5. Lack of multi-factor authentication (MFA): Passwords alone do not provide strong authentication. Implementing additional layers of security, such as MFA, can significantly enhance system security. Without MFA, the reliance on passwords alone increases the risk of unauthorized access and compromises lineman safety.

It's important to consider these disadvantages and implement additional security measures, such as robust authentication protocols, regular password updates, and training programs to mitigate the risks associated with password-based circuit breakers.

CHAPTER 10
CONCLUSION AND FUTURE SCOPE

10.1 CONCLUSION

Overall, password-based distribution panels and circuit breakers enhance the safety and security of electrical systems by providing controlled access and operation. These advanced systems help prevent unauthorized access, reduce the potential for accidents, and allow for efficient management and monitoring of electrical distribution within a building or facility.

By incorporating password-based distribution panels and circuit breakers into electrical systems, organizations can enhance safety, control, and security. These systems provide authorized users with the ability to manage power distribution efficiently while reducing the potential for accidents

10.2 FUTURE SCOPE

1.Development in Electrical power transmission system requires the use of circuit breakers with increasing breaking capacity.

2. Mobile Application: Develop a mobile application that communicates with the Raspberry Pi Pico circuit breaker system. This would provide users with a convenient interface to authenticate and control the circuit breaker using their smartphones or tablets.

3. Multi-factor Authentication: Enhance the security of the system by implementing multi-factor authentication. Instead of relying solely on a password, additional authentication factors like biometrics or hardware tokens (RFID, smart cards) can be incorporated to ensure a higher level of access control.

4. Remote Access: Enable remote access and control of the circuit breaker system. This can be achieved by integrating the Raspberry Pi Pico with networking capabilities, such as Wi-Fi or Ethernet.

5. Voice Control: Incorporate voice recognition capabilities using technologies like Amazon Alexa or Google Assistant. This would allow users to control the circuit breaker system by issuing voice commands, further enhancing accessibility and ease of use.

REFERENCES

[1] J. Vinoth Kumar, M. SatyaRohit, M. Pavan and M. Raghu, Password Based Circuit Breaker, International Journal of Research Publication and Reviews, Page 3887-3889, Vol (2) Issue (3) (2021)

[2] Pramod M. Murari, Mahabal V. Kinnerkar, Prashant S. Koppa, Vishal S. Kamble and Rashmitha R. Mendan, Electric Line Man Safety with Password Based Circuit Breaker and Intimation of HT Wire Sag using GSM, IJSDR | Volume 2, Issue 7, July 2017

[3] Vedant Sunil Kulkarni, Giteshsureshkarale and Trupti Kherde, "Password based circuit breaker using microcontroller", International Research Journal of Modernization in Engineering Technology and Science, Volume:03/Issue:06/June-2021

[4] Mallikarjun G. Hudedmani*, Nitin Ummannanavar, Mani Dheeraj Mudaliar, ChandanaSooji and Mala Bogar, Password Based Distribution Panel and Circuit Breaker Operation for the Safety of Lineman during Maintenance Work, Advanced Journal of Graduate Research, ISSN: 2456-7108 Volume 1, Issue 1, pp. 35-39, January 2017

APPENDIX

CODE

```
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
#include <stdint.h>
#define SCREEN_WIDTH 128 // OLED display width, in pixels
#define SCREEN_HEIGHT 64 // OLED display height, in pixels
#define IN1 13
#define IN2 12
#define IN3 11
#define IN4 10
String defaultPassword = "12345678";
String tempPassword;
bool flag=1;
char readKeypad();
// Declaration for an SSD1306 display connected to I2C (SDA, SCL pins)
// The pins for I2C are defined by the Wire-library.
// On an arduino UNO: A4(SDA), A5(SCL)
// On an arduino MEGA 2560: 20(SDA), 21(SCL)
// On an arduino LEONARDO: 2(SDA), 3(SCL), ...
#define OLED_RESET -1 // Reset pin # (or -1 if sharing Arduino reset pin)
#define SCREEN_ADDRESS 0x3C ///< See datasheet for Address; 0x3D for 128x64, 0x3C for
128x32
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, OLED_RESET);
// Define the keypad matrix
const byte ROWS = 4; // Number of rows
const byte COLS = 4; // Number of columns
char keys[ROWS][COLS] = {
  {'1', '2', '3', 'A'},
  {'4', '5', '6', 'B'},
  {'7', '8', '9', 'C'},
  {'*', '0', '#', 'D'}
};
byte rowPins[ROWS] = {26, 22, 21, 20}; // Connect to the row pinouts of the keypad
byte colPins[COLS] = {19, 18, 17, 16 }; // Connect to the column pinouts of the
keypad
void setup() {
  // put your setup code here, to run once:
  Serial.begin(115200);
  pinMode(IN1,OUTPUT);
```

```
  pinMode(IN2,OUTPUT);
  pinMode(IN3,OUTPUT);
  pinMode(IN4,OUTPUT);
  digitalWrite(IN1,HIGH);
  digitalWrite(IN2,HIGH);
  digitalWrite(IN3,HIGH);
  digitalWrite(IN4,HIGH);
  // SSD1306_SWITCHCAPVCC = generate display voltage from 3.3V internally
  if(!display.begin(SSD1306_SWITCHCAPVCC, SCREEN_ADDRESS)) {
  Serial.println(F("SSD1306 allocation failed"));
  for(;;); // Don't proceed, loop forever
  }

  // Show initial display buffer contents on the screen --
  // the library initializes this with an Adafruit splash screen.
  // display.display();
  // delay(2000); // Pause for 2 seconds
  // Clear the buffer
  display.clearDisplay();
  display.setTextSize(1); // Normal 1:1 pixel scale
  display.setTextColor(SSD1306_WHITE); // Draw white text
  display.cp437(true); // Use full 256 char 'Code Page 437' font
  }
char key;
char temp;
void loop() {
  // put your main code here, to run repeatedly:
  Serial.println(defaultPassword);
  display.setCursor(0, 0); // Start at top-left corner
  display.println("1.Enter Password");
  display.println("2.Change Password");
  display.println("Enter your choice");
  display.display();
  key = '\0';
  while (key == '\0') {
  key = readKeypad(); // Read the keypad
  if(key!='\0'){
  display.println(key);
  display.display();
```

```
79    break;
80    }
81    }
82    if(key == '1'){
83    display.clearDisplay();
84    display.setCursor(0, 0);
85    display.println("1.Enter Password");
86    display.display();
87    for(;;){
88    temp = '\0';
89    while (temp == '\0') {
90    temp = readKeypad(); // Read the keypad
91    }
92    if(temp != '*'){
93    display.print(temp);
94    display.display();
95    tempPassword.concat(String(temp));
96
97    } else{
98    break;
99    }}
100   Serial.println(tempPassword);
101   if(defaultPassword.equals(tempPassword)){
102   if(flag==1){
103   digitalWrite(IN1,LOW);
104   digitalWrite(IN2,LOW);
105   digitalWrite(IN3,LOW);
106   digitalWrite(IN4,LOW);
107   flag = 0;
108   }else {
109   digitalWrite(IN1,HIGH);
110   digitalWrite(IN2,HIGH);
111   digitalWrite(IN3,HIGH);
112   digitalWrite(IN4,HIGH);
113   flag = 1;
114   }
115   }else{
116   display.clearDisplay();
117   display.setCursor(0, 0);
```

```
118     display.println("Wrong Password");
119     display.println("Try after sometime");
120     display.display();
121     }
122     tempPassword = "";
123     } else if(key == '2'){
124     display.clearDisplay();
125     display.setCursor(0, 0);
126     display.println("2.Change Password");
127     display.display();
128     for(;;){
129     char temp = '\0';
130     while (temp == '\0') {
131     temp = readKeypad(); // Read the keypad
132     }
133     if(temp != '*'){
134     display.print(temp);
135     display.display();
136     tempPassword.concat(String(temp));
137     } else{
138     Serial.println(tempPassword);
139     defaultPassword=tempPassword;
140     display.clearDisplay();
141     display.setCursor(0, 0);
142     display.println("Password Set Success");
143     display.display();
144     delay(1000);
145     display.clearDisplay();
146     break;
147     }}
148
149   }
150   delay(5000);
151   display.clearDisplay();
152   }
153   char readKeypad() {
154     // Set all column pins as outputs and set them low
155     for (int row = 0; row < ROWS; row++) {
156     pinMode(rowPins[row], OUTPUT);
```

```
157   digitalWrite(rowPins[row], HIGH);
158   }
159   // Set all row pins as inputs and enable internal pull-up resistors
160   for (int col = 0; col < COLS; col++) {
161   pinMode(colPins[col], INPUT_PULLUP);
162   }
163   // Scan the keypad matrix
164   char key = '\0';
165   for (int i = 0; i < ROWS; i++) {
166   digitalWrite(rowPins[i], 0);
167
168   for (int j = 0; j < COLS; j++) {
169   if (digitalRead(colPins[j]) == 0) {
170   delay(10); // Debounce delay of 10ms
171   while (digitalRead(colPins[j]) == 0); // Wait for key release
172   digitalWrite(rowPins[i], 1);
173   return keys[i][j];
174   }
175   }delay(10);
176
177   digitalWrite(rowPins[i], 1);
178   }
179
180   return '\0'; // No key pressed
181  }
182   break;
183   }}
184
185  }
186  delay(5000);
187  display.clearDisplay();
188  }
189  char readKeypad() {
190   // Set all column pins as outputs and set them low
191   for (int row = 0; row < ROWS; row++) {
192   pinMode(rowPins[row], OUTPUT);
193   digitalWrite(rowPins[row], HIGH);
194   }
195   // Set all row pins as inputs and enable internal pull-up resistors
```

```
195  // Set all row pins as inputs and enable internal pull-up resistors
196  for (int col = 0; col < COLS; col++) {
197  pinMode(colPins[col], INPUT_PULLUP);
198  }
199  // Scan the keypad matrix
200  char key = '\0';
201  for (int i = 0; i < ROWS; i++) {
202  digitalWrite(rowPins[i], 0);
203
204  for (int j = 0; j < COLS; j++) {
205  if (digitalRead(colPins[j]) == 0) {
206  delay(10); // Debounce delay of 10ms
207  while (digitalRead(colP
```