

Password Based Circuit Breaker

Himanshu Pandita, Rishikesh Jawale, Palak Bawanker

*(Electronics &Telecommunication, D. Y. Patil College of Engineering , Pune
Email: himanshupandita2017@gmail.com)

** (Electronics &Telecommunication, D. Y. Patil College of Engineering , Pune
Email: rishikeshjawale@gmail.com)

***(Electronics &Telecommunication, D. Y. Patil College of Engineering , Pune
Email: bawankerpalak5@gmail.com)

Abstract:

To maintain the accuracy, dependability, and secrecy of the electrical infrastructure, power distribution system security is of utmost importance. Traditional circuit breakers don't have strong access control methods, which makes them susceptible to intrusion and potentially harmful activity. Using a password-based circuit breaker system, we suggest a novel strategy in this research to improve the security of circuit breakers. To enable secure and effective access control to the circuit breakers, the proposed system makes use of authentication methods and cryptographic techniques. Our solution uses a two-step authentication procedure that entails a cryptographic handshake after a password-based verification. Strong encryption techniques are used to store and transmit the password securely in order to thwart password-based attacks. The cryptographic handshake also guards against unauthorised parties taking over the system by ensuring the authenticity and integrity of communication between the authorised user and the circuit breaker. To evaluate the performance and effectiveness of our password-based circuit breaker system, we conducted extensive simulations and real-world experiments. The results demonstrate that the proposed system effectively mitigates the risk of unauthorized access, ensuring only authorized personnel can operate the circuit breakers. The system also exhibits low latency and high scalability, making it suitable for deployment in large-scale power distribution networks.

Keywords: Circuit breaker, Cryptographic techniques, Encryption

I. INTRODUCTION

The efficient and consistent supply of electricity to consumers is made possible by power distribution networks. However, the complexity of cyber threats and the possible consequences of unauthorised access and hostile behaviour have made the security of these systems a rising source of concern. Traditional circuit breakers, crucial parts of power distribution networks, frequently do not have strong access control measures, making them susceptible to breaches and potential interruptions.

In this research, we suggest a novel strategy for improving circuit breakers' security by using a password-based access control system. Our

research's main goal is to create a trustworthy and effective system for access control to circuit breakers, guaranteeing that only authorised employees can control these vital equipment. Our password-based circuit breaker system aims to reduce the risks associated with unauthorised access and safeguard the integrity of power distribution systems by using cryptographic methods and authentication processes.

In many different fields, using passwords as a form of authentication is a well-established practise. We add a further layer of security to the conventional physical and administrative restrictions by extending this method to circuit breakers. In order

to gain safe and authorised access, users of our system must first submit a valid password before exchanging a cryptographic handshake with the circuit breaker.

By developing a strong password-based access control system for circuit breakers, we hope to improve security in power distribution systems through our research. By putting this technology into place, we can reduce the dangers that come with conventional circuit breakers and guarantee the dependability and integrity of the

means that two lines can display 16 characters per line. The display uses a 5x8 pixel matrix to show one character. Two registers, such as the data and command registers, are connected to an LCD. These modules are favoured because they are simple to programme. When assisting the lineman visually, this is inevitable.

I. MATERIALS AND METHODS
HARDWARE USED:

1. ATMEGA (MICROCONTROLLER):

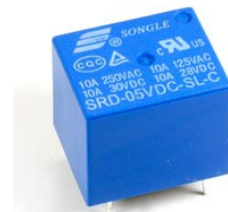
The AVR (Advanced Virtual RISC) architecture-based ATmega microcontrollers are popular in many embedded systems and applications. There are available ATmegas that can read inputs like light on a sensor, a finger on a sensor button, or a tweet and transform them into outputs like turning on a motor or an LED or posting content obtained online. By giving a set of instructions to the board's microprocessor, you may control how your board behaves. Integrated Development Environment (IDE) software and a physical programmable circuit board, usually referred to as a microcontroller, make up the ATmega



2. **LCD DISPLAY:** Liquid Crystal is where the term "LCD" comes from. In reality, it is a combination of the solid and liquid forms of matter. They maintain their separate states in relation to one another and possess the qualities of both solids and liquids. An electronic display module is used in this system to enable user engagement. In this instance, a 16x2 LCD is employed. This



3. **RELAY:** In reaction to electrical signals received from outside sources, relays which are electrically powered switches open and close circuits. The word "relay" may conjure up images of relay races in which teams exchange batons back and forth to finish the race. The "relays" built inside electrical items operate similarly; they take in an electrical signal and send it to another device to turn it on or off.



4. **KEYPAD:** The keypad's main function is to make it possible for users to securely enter their passwords. The keypad normally consists of a grid of buttons, each of which stands for a character that can be either numeric or alphanumeric. By depressing the correct buttons of the keypad, users can

enter their passwords.



and is utilised by users who are typically not aware that the system is computer-based.

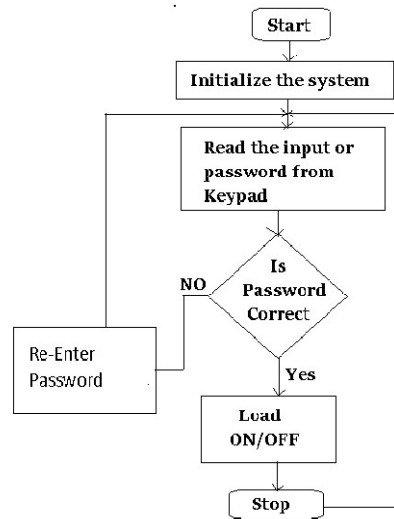
III. METHODOLOGY:

5. GSM MODULE: The circuit breaker system can be remotely monitored thanks to the GSM module. Authorised users or monitoring systems can receive status updates, alarms, or warnings via SMS or other communication channels. This makes it possible for users to monitor the circuit breaker system's status even when they are not present physically.



If there is a failure in the line, the lineman sends the password, causing the line to be turned off. Following his job, an SMS is sent to notify that the electricity line is off. Because there are so many electrical lines, the password for a specific line may be compacted. Because the system has a GSM modem, the network issue will have an impact on its correct operation.

6. DC TO DC CONVERTER: The voltage level needed by various circuit breaker system components can be regulated and stabilised using the DC to DC converter. The circuit breaker's control circuits, microcontrollers, sensors, and other electronic components are powered by converting an input voltage, usually from a DC power source, to the appropriate output voltage level.



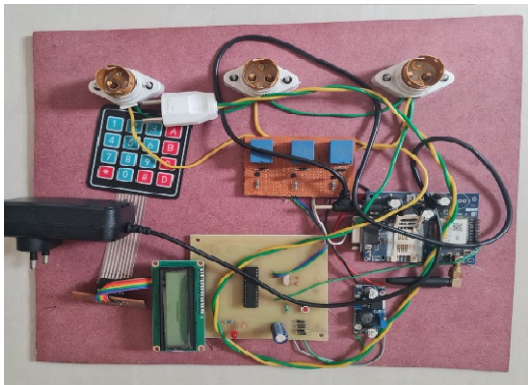
Flow chart

II. SOFTWARE REQUIREMENT

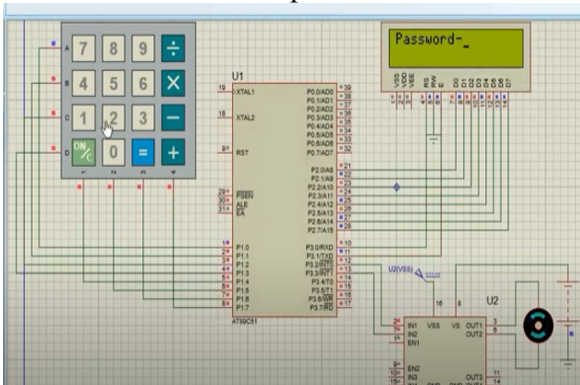
Embedded C Language: A computer-based application known as an embedded system is one that has at least one programmable computer (usually in the form of a microcontroller, microprocessor, or digital signal processor chip)

IV. RESULT

The proposed system offers a means of guaranteeing the security of maintenance workers, such as linemen. The only person who has the authority to turn the line on and off is the lineman. The circuit breaker (ON/OFF) control on this system requires a password in order to operate. The lineman can safely shut off the supply and make repairs before going back to the substation to restart the line. It enables people to change their passwords, so they can. He can finish his work with any password that you provide more security.



Setup



Simulation Result

V. CONCLUSION

Using a password-based circuit breaker offers considerable security and control advantages. It enables user authentication, guarding against unauthorised access and changes to documents. By making sure that only people with the proper authorization may make modifications and oversee the publication process, the circuit breaker improves the overall integrity of the publishing system. It offers transparency and accountability because it can keep track of user activity.

VI. ACKNOWLEDGMENT

We express our sincere gratitude towards the faculty members who makes this project phase I successful. We would like to express our thanks to our guide Mr. Sagar Bhavsar for his wholehearted

cooperation and valuable suggestions, and technical guidance throughout the project work. Special thanks to our H.O.D. Dr. Rutuja Deshmukh for her kind official support and encouragement. We are also deeply thankful to our project coordinator Mrs. Shailaja Yadav for their valuable guidance. Finally, we would like to thank all staff members and faculty members of the E & TC Department who helped us directly or indirectly to complete this work successfully.

VII. REFERENCES

- [1] Ajay Mohan: "Mobile agent software application in implementing maintenance of circuit breaker and repairs". EEE, R.M.K. College of Engineering and Technology, Thiruvallur District, Chennai, India, Volume1, issued in January 2019
- [2] Athira P Nair: "electric line man safety system with OTP based circuit breaker" BTC College of Engineering, Kerala, Volume: 04, issue: April, 2019
- [3] Deepak Sharma & Major Sing Goraga: "International Journal Of Current Engineering And Scientific Research (IJCESR)" Volume2,issue-May 2015
- [4] Veena, "Electric line man safety system with OTP based circuit breaker", SR Engineering College, Volume:2, May 2015
- [5] Dr.Neelam Rup, Prakash, "International Journal of Engineering Trends and Technology", (IJETT) ,Volume 13, page:261,Issue:3 – Jul 2014.
- [6] Mohammad Tasdighi: "Inductive FCL's impact on circuit breaker's interruption condition during short-line faults" North American Power Symposium (NAPS), Issue: 22-24 Sept2013.
- [7] G. Geethamahalakshmi, EEE, R.M.K. College of Engineering and Technology, Thiruvallur District, Chennai, India :Volume3, - issued in September 2009
- [8] "Application of Disconnecting Circuit Breakers," Michael Faxe, p.11. 9th of July, 2012.
- [10] VINCENTB DEL TORO: "ElectricalEngineering Fundamentals," January 1, 1986.