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Fabrication of a Passcode Based Circuit Breaker Using the Global Mobile Communication System

Ankush Tandon
Dept. of electrical engg.
Swami keshvanand institute of technology, management & gramothan
Jaipur, India

Anshuman
Dept. of electrical engg.
Swami keshvanand institute of technology, management & gramothan
Jaipur, India

Arun prajapati
Dept. of electrical engg.
Swami keshvanand institute of technology, management & gramothan
Jaipur, India

Archana Jha
Dept. of electrical engg.
Swami keshvanand institute of technology, management & gramothan
Jaipur, India

Anurag Singhal
Dept. of electrical engg.
Swami keshvanand institute of technology, management & gramothan
Jaipur, India

Abstract— *In this project, a password-based circuit breaker system that utilizes GSM technology to provide remote access and control of the circuit breaker is proposed. The system includes a microcontroller, GSM module, and a keypad for entering the password. The microcontroller is programmed to validate the password entered by the user and control the operation of the circuit breaker accordingly. The GSM module allows for remote access and control of the circuit breaker via a mobile device, as well as remote monitoring and troubleshooting of the system. Our proposed system offers added security and convenience by allowing only authorized personnel to operate the circuit breaker and can be useful in industrial or commercial settings where equipment is located in remote or hard-to-reach locations. The system also allows for remote resetting of password, in case of lost password. Additionally, it can also provide a layer of security to the system, by providing the notification of unauthorized access, or any other suspicious activities. The system was tested and the results showed its effectiveness and efficiency.*

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I. INTRODUCTION

In the modern era, electrical power systems are an integral part of daily life and secure and efficient management of these systems is crucial. In this context, the password-based circuit breaker with GSM technology provides a secure and efficient solution for controlling and monitoring electrical power systems. The system consists of a circuit breaker, a microcontroller, and a GSM module [1]. The microcontroller is responsible for controlling the operation of the circuit breaker, while the GSM module provides the remote control and monitoring capabilities through a password-protected interface. The password-based circuit breaker with GSM technology offers several benefits over traditional circuit breaker systems. Firstly. it allows users to remotely control the circuit breaker status, which reduces the need for manual intervention and saves time and effort. Secondly, the system provides real-time monitoring of the power supply status, enabling users to quickly

identify and address any problem. Thirdly. The use of a password for activation and deactivation adds an extra layer of security, preventing unauthorized access to the electrical power system [2-3].

In conclusion, the password-based circuit breaker with GSM technology provides a secure and efficient solution for controlling and monitoring electrical power system. With its combination of remote control, real-time monitoring, and password-based security, the system represents a significant advancement in the field of electrical power management.

A literature review of password-based circuit breaker with GSM technology shows that there has been growing interest in this field in recent year. Many researches and engineers have explored the use of GSM technology for remote control and monitoring of electrical power systems. Studies have shown that the password-based circuit breaker system provides a secure and efficient solution for controlling and monitoring electrical power systems. The use of password for a activation and deactivation adds an extra layer of security. While the GSM technology provides real-time monitoring and remote control capabilities [4].

Several researchers have investigated the various components of the password-based circuit breaker system, including the microcontroller, GSM module, and circuit breaker. They have explored the design and implementation of these components, as well as the communication protocols used for remote control and monitoring.

There are several advantages of using a password-based circuit breaker in electrical systems:

- **Security**: the password-based system adds an extra layer of security to the circuit breaker, ensuring the only authorized personal can operate it. This can prevent accidental or intentional damage to sensitive equipment or systems.

Remote access and control: by incorporating GSM technology into the circuit breaker, users can remotely control the circuit breaker using a mobile device, such as a smartphone or tablet. This allows for greater flexibility and convenience [5-6].

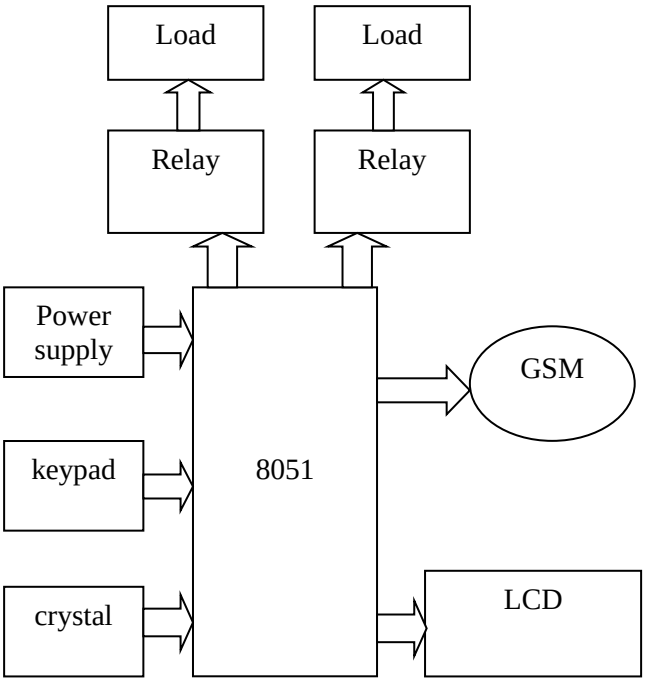
A contribution in the field of password-based circuit breaker with GSM can involve various aspects as design and implementation, performance evaluation, and the development of new technologies and applications. some potential contributions in this area are

- **Design and implementation**: contributing to the design and implementation of a new password- based with GSM module that addresses limitations of existing systems and improves performance.
- **Performance evaluation**: conducting detailed performance evaluation of existing password – based circuit breaker with GSM system and developing new method to access their efficiency and effectiveness [7]
- **Cost optimization:** developing cost optimized solutions for password-based circuit breaker with GSM, making it more accessible and Affordable for wider adoption
- **Security and privacy:** Improving the security and privacy features of password-based circuit breaker with GSM to protect against unauthorized access and data branches [8-9].

In this research paper we have integrated password–based circuit breaker with GSM to enhance its functionality and performance.

The remainder of this paper is organized as follows. Section 2 Explain the block diagram of the system and different components. Section 3 describes the different methodologies. Detailed working of the system is described in section 4. Section 5 present some concluding remarks about the work performed.

II. BLOCK DIAGRAM

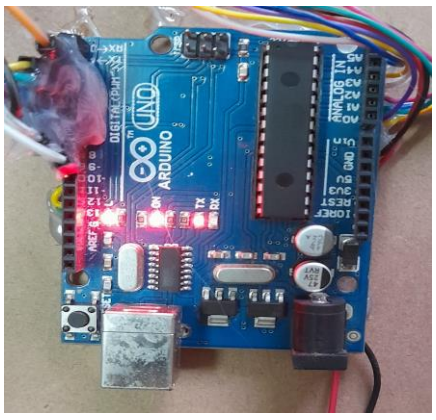


Block Diagram of Password based circuit breaker with GSM module

A password-based circuit breaker is a system that uses a password for controlling the function of an electrical circuit breaker. The components used are:

- **Power supply**: The circuit breaker is powered by a power supply unit that provides the necessary voltage and current to the various components in the system
- **Arduino**: The Arduino boards are small, single-board computers that can be programmed using a simple, easy-to-learn language. They have a variety of inputs and outputs, including digital and analog pins, USB ports, and communication protocols like I2C, SPI, and UART, which allows them to interact with a wide range of sensors, actuators, and other devices.

The Arduino Integrated Development Environment (IDE) is a cross-platform software that enables users to write, upload, and debug code on their Arduino boards. It supports a large number of programming languages, including C, C++, and python, and includes a library of pre-written code sketches, which can be modified and used in projects.



i. Arduino (Atmega328) board

- **Microcontroller**: The microcontroller is the brain of the circuit of the circuit breaker and controls the functioning of all the other components in the system. It is responsible for receiving and processing the password entered by the user and determining whether the circuit breaker should be turned on or off.

ii. Microcontroller

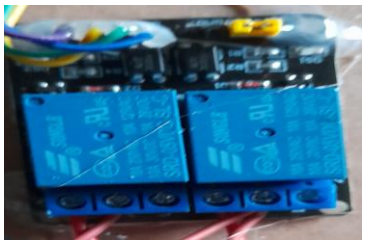
- **Keypad**: The keypad is used to enter the password and send it to the microcontroller. The password can be a combination of numbers or a personal identification number (PIN).

iii. Keypad

- **GSM Module**: The GSM module is used to send and receive messages from the circuit breaker. It allows the user to control the circuit breaker remotely using SMS Messages.

iv. GSM Module

- **Relay driver**: The relay driver is used to control the functioning of the relay which is responsible for switching the circuit breaker on or off. The relay is controlled by the microcontroller based on the password entered by the user.



v. Relay Driver

- **Load**: The load represents the electrical equipment or devices that are connected to the circuit breaker. The flow of electrical current through the load is controlled by the circuit breaker.

vi. Load (Bulb)

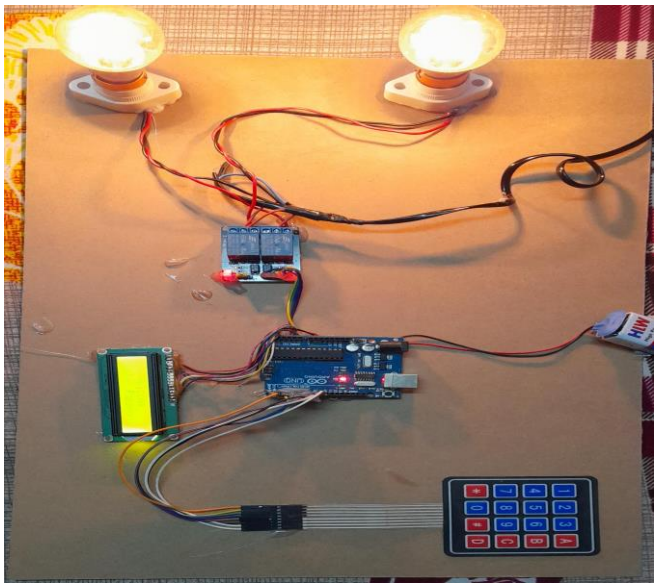
III. METHODOLOGY

A password-based circuit breaker using GSM technology would likely involve several steps, including:

- **Designing the circuit breaker system**: This would involve determining the appropriate components and writing for the circuit breaker, as well as the design of the control system, which would include the microcontroller and the GSM module.
- **Programming the microcontroller:** The microcontroller would need to control the circuit breaker and to communicate with the GSM module. This would involve writing code to handle the various functions of the system, such as controlling the circuit breaker and sending and receiving SMS messages.
- **Integrating the GSM module:** The GSM module would need to be integrated into the circuit breaker system, and configured to communicate with the microcontroller. This would involve setting up the appropriate communication protocol and testing the system to ensure that it is functioning correctly [10-12].
- **Implementing the password feature:** The password feature would need to be implemented in the system, which would likely involve adding and input device (such as a keypad) to allow users to enter a password and programming the microcontroller to check the entered password against a predefined value before allowing the circuit breaker to be operated.
- **Testing and debugging:** The entire system would need to be thoroughly tested and debugged to ensure that it is functioning correctly and to identify and fix any issues that may arise.
- **Deployment and maintenance:** Once the system is complete and has been tested it would be deployed in the field and regular maintenance would be done to ensure that it continuous to function correctly overtime [13-14].
- **Security improvement:** The security of the system can be improved by adding features such as encryption regular password updates and two- factors authentication.

IV. WORKING

A "Password based circuit breaker with GSM" is a circuit breaker that can be controlled and reset using a password, and is also connected to a GSM (Global System for Mobile Communication) network. This allows for remote control and monitoring of the circuit breaker using a mobile device, such as a smartphone, through SMS (Short Message Service) messages or a mobile app. The result of such a system would be increased convenience and safety, as well as the ability to remotely to control and monitor the status of the circuit breaker. This can be useful in various application, such as residential, commercial, and industrial settings, where remote control and monitoring can be reduce downtime and improve efficiency. However, the implementation of such a system may also require a significant investment in terms of cost and time, as well as careful consideration of security and privacy concerns, such as the protection of passwords and the secure transmission of data over the GSM network.



V. CONCLUSION

The password-based circuit breaker system with GSM module provides several advantages over traditional circuit breaker systems. With the integration of GSM technology, the system allows for remote control and monitoring providing improvement convenience and safety. The password- based security system adds an extra layer of protection, ensuring that only authorized can control the circuit breaker. Additionally, the system has the potential to improve energy management and reduce costs, making it an attractive solution for various application. Overall, the password-based circuit breaker system with GSM module represents a significance step forward in the development of smart electrical systems. It has the potential to improve safety, convenience, and energy efficiency, and to provide a secure and cost-effective solution for controlling and monitoring electrical circuits. Further research and development in this area is likely to even more advanced and sophisticated system in the future.

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