



PASSWORD BASED CIRCUIT BREAKER USING GSM MODULE

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ABSTRACT:

This invention aims to protect lineman from unexpected electrical shocks while they are performing their duties. Since lineman frequently come into contact with live wires, there is already a very high risk of serious accidents. Still, a lot of those accidents could have been avoided with improved coordination between lineman and stations. The project's objective was to provide a solution that would ensure the security of the staff members. Here, a lineman will immediately send an SMS to the station staff informing them of an electrical line problem. Once the issue is resolved, the crew will flip the road and turn it on, reducing the likelihood of accidents and saving the facility altogether. It is a little controller that controls the full planned system. Overall system control is exercised by the ATMEGA328 microprocessor. Using an input device, enter the password to open or close. The circuit breakers are indicated by a lamp. Systems can be accessed remotely using the worldwide system for mobile communications (GSM) network.

Key words: LCD, microcontroller, GSM module, regulator, and relay

INTRODUCTION :

Embedded systems are necessary for the project. A tiny controller is used in this project to manage every aspect of the positive identification system. We often need parts for this strategy, such as a keyboard for power and small management controllers for electronic equipment. This keyboard is used to enter a positive identification for a different load that is attached to the controller and is operating.[1]. This project gives a solution to the explore issue of ensuring lineman safety. This makes it extremely useful for the lineman even though its upkeep could be extremely minimal. Many products are available on the market today, but they are quite expensive and lengthy at the same time. Our tool cuts down on the amount of time the lineman needs to spend fixing.[2]. There is no doubt that the components our model requires are available on the market. The most important aspect of our project is to reduce the lineman's time. The GSM module, which is required to send associate SMS, is the most important component of our project.[7] But many of such mishaps can be prevented if linemen and stations work together well enough. The project's goal was to offer a system that guarantees employee security station employeesThe microcontroller is the only device that powers the intended system. The Atmega328 microprocessor is in complete control of the system. The bulbs indicate the location of the circuit breakers, which can be opened or closed by entering the password on a keypad. Remote system control is made possible via the worldwide system for mobile (GSM) circuit[4].

Our project's primary goal is to cut down on the lineman's time. The GSM module, which is necessary to send SMS messages, is the primary component of our project. The current method of operating circuit breakers has numerous significant drawbacks, such as the following: when maintenance or repairs are performed, the entire line is shut off, causing significant inconvenience to customers; occasionally, miscommunication between line and substation personnel can lead to fatal accidents[2]. Therefore, we suggest a new operating system that eliminates the need for the circuit breaker to be manually operated in order to replace this antiquated method and improve lineman safety. This is how our device will function: On the LCD panel, the passcode that the lineman input will be shown. The password that was obtained via the GSM module will be compared to this passcode.[4]. During the maintenance of the line in the distribution sector, present practice is to cut off the supply and carry the fuse along with the lineman but due to miscommunication between the lineman and other staff fatal accidents can take place. So to avoid this a keypad and GSM based module is installed on pole mounted substation.[11] The mobile with which are going to send the request is saved on the microcontroller so only the registered mobile can send the request. In case of signal unavailability keypad can be used to enter the password.[13].

LITERATURE REVIEW:

This review of the literature sets the stage for our research endeavor by summarizing significant studies and current developments in the field of GSM-based lineman safety. A review of the literature on your project to create a password- based circuit breaker utilizing a GSM module must include relevant research as well as historical records, insights, and context for the project.-

A study [1] by V. Anand Kumar and colleagues In the article, the lineman's security is illustrated through the use of an Arduino microcontroller and GSM-based technology, which allows circuit breakers to be turned on and off as well either open or closed for upkeep or fixing.[24]The method closes the gap in the existing procedure for LC opening and closure requests for the line. Working linemen can access the substation's secure authentic password, which guarantees that the circuit breakers and panel doors will be operational when the formal workday commences. Similarly, with a valid password and line charging, the substation operators have to ask that the lines be closed once the work is finished.The procedure ensures the work's safety and double-checks its completion. Every time an illegal user logs in to the system with a weak password, a security alert is delivered to both the substation and the LED screen.

An investigation by R. Srivathsan et al.[4] This study explains the meaning of a smart circuit breaker through the use of the GSM module project "GSM and Arduino based smart circuit breaker." To access the circuit breaker, a user must first enter a uniquely generated one-time password (OTP), which is sent to the associated mobile number. If the OTP is entered correctly using the matrix keypad, the circuit breaker is activated.[9] The individual must input only another OTP that he will receive if the original one is entered incorrectly in any way. The password-based circuit breaker offers advantages, such as keeping people safe while repairs are being made, but it also has a One minor drawback is that the only thing an individual can do if they forget their password is to reset the circuit breaker. The OTP-based circuit breaker was designed to address this complaint.

Hasan U. Zaman et al.'s study[3] This study addressed the designed system that uses password-based circuit breaker operation to give a comprehensive solution for automated control of household appliances and technician safety[17]. The environment is significantly safer thanks to the gas safety system that uses buzzers. Because it has a secure admin mode, the system is user-friendly. The entire system is controlled by a microcontroller, which makes it affordable and simple to construct. Quick response times are the product of effective microcontroller coding. All things considered, the system's design ought to assist individuals in leading more convenient, safe, and comfy lives in the present day. People with disabilities and the elderly should benefit most from this arrangement.

Athira P. Nair et al.'s study [12] This paper concerns the safety of electric lineman using OTP-based circuit breakers. A password is all that is needed to operate a circuit breaker in the electric line man safety system. The main tasks in this system are OTP creation and OTP verification. This project's primary draw is OTP generation. It offers a fresh perspective on lineman security and totally eradicates incidents where linemen sustain electric shocks while repairing electric lines. It is also possible to implement this technique in numerous other public spaces.

An investigation conducted by Santosh Ashok Kamble and colleagues.[5] The properties of IoT-based circuit breakers are outlined in this study. By completing this project, we can state that it is intended to be used for remote electrical device operation. By sending an SMS, we may operate the gadgets from anywhere in the world.[23] The maintenance worker's time and life are saved by this system. A maintenance worker will send an SMS to cut off the pole's power supply. He will complete the maintenance task risk-free and with ease. Once the maintenance is finished, he will send an SMS to turn on the pole's power supply. Thus, a circuit break action can be carried out using GSM SMS transmission. We can control the switching at any time and from any location, making our system Internet of Things based. The goal of this project is to safeguard linemen during operations so they are not suddenly shocked by electricity.

A study by N Mathavan, et al. [2] Proposed a Electrical Linemen Safety using Android Based Circuit Breaker in Which proposed safety system is successfully designed . It provides a new approach to the security of the lineman and completely eliminates the fatal electrical accidents to the lineman due to electric shock during the power line repair. This system can also implement in many other public areas.It can work on a single given QR code. No other person can reclose the breaker until the stored QR code is scanned. The concept of two times verification of password provides the more secured system. It gives no scope of password stealing. It is also economical and it can be easily installed

A Study by Abhijeet, et al. [6] Proposed About Electric Linemen Protection Using Keypad And GSM Based Circuit Breaker Which Discuss About This project can be used to ensure the safety of the maintenance staff e.g. line man. The line can be only turned off/on by the line man. This system provides an arrangement such that a password is required to operate the circuit breaker (ON/OFF). Line man can turn off the supply and comfortably repair it, and then turn on the line by entering the correct password. Since it has the provision of entering the password through registered mobile only authorized person can enter the password. In case of remote areas where signal is unavailable password can be entered through keypad.

A Study by N. Shrivastava et al. [9] Proposed about password based door lock system In this deals about system offers an effective and convenient way to secure access to a space. By requiring users to input a correct password, it adds an extra layer of security compared to traditional locks. However, it's essential to implement robust security measures to prevent unauthorized access, such as using strong passwords, encryption techniques, and regular system updates to patch vulnerabilities. Additionally, user education on password hygiene and system usage is crucial to ensure the system's effectiveness. Overall, when properly designed and implemented, a password-based door lock system can enhance security and convenience for users.

A Study by Antony et al. [8] Proposed about password based circuit breaker using GSM modem offers remote control, security, and monitoring benefits. However, it's essential to carefully consider the associated challenges, such as reliability, cost, complexity, and security risks, to ensure the effectiveness and suitability of the solution for Integrating GSM communication and password authentication adds complexity to the circuit breaker design and may require additional programming and testing.

A Study by M. G. Hudedmani et al. [11] Proposed about password based distribution panel and circuit breaker operation for the safety of linemen during maintenance work in which ARDUINO microcontroller and GSM based work demonstrate the security of the lineman as switching ON/OFF of circuit breaker and opening or closing of control panel door is done for the purpose of repair or maintenance. The method overcomes the deficiency of existing system of LC opening and closing request for the line. The secured authentic password from the substation to the working lineman ensures the operation of the panel doors and circuit breaker for the beginning of work. Similarly, a request to close the lines after the work by authentic password and charging up of the line by the substation operators is done. The method double cross checks the completion and ensures the safety. Any unauthorized access into the system by wrong password for specific number of trials send a message to the LCD display and a message to substation for the security purpose.

A Study by Ganpati Singh et al [13] Proposed about automated load distribution with password protected circuit breaker in which Implementing automated load distribution with a password-based circuit breaker offers several advantages, including improved system reliability, enhanced security, and efficient allocation of resources. By integrating password protection, the system ensures authorized access only, minimizing the risk of

unauthorized tampering or disruption. Additionally, the ability to automatically redistribute loads optimizes resource utilization and prevents overload situations, thereby promoting stability and longevity of the electrical infrastructure. Overall, this solution presents a comprehensive approach to managing electrical loads effectively while prioritizing security and reliability.

A Study by Ajeet J. Parmar, et. al [16] Proposed about Arduino based protection system for wirement in which Developing an Arduino-based protection system for wiremen offers a practical and cost-effective solution to enhance safety in electrical work environments. By leveraging Arduino's flexibility and programmability, the system can detect various hazards such as overcurrent, short circuits, and ground faults, thereby reducing the risk of accidents and electrical fires. Additionally, integrating features such as real-time monitoring and alarm notifications ensures prompt response to potential threats, minimizing downtime and mitigating damage. Overall, this solution provides an effective means to safeguard wiremen and surrounding infrastructure, promoting a safer and more secure working environment in the electrical industry.

A Study by Michael faxa, et.al [22] Proposed about application of disconnecting circuit breaker in which regarding the application of disconnecting circuit breakers typically involves summarizing their effectiveness in various scenarios. This could include their ability to quickly interrupt electrical circuits in case of emergencies, their role in providing protection to electrical equipment and personnel, and their contribution to minimizing downtime and damage during fault conditions. Additionally, the conclusion may highlight the importance of proper installation, maintenance, and adherence to safety standards when utilizing disconnecting circuit breakers in industrial, commercial, and residential settings.

A Study by M. Kezunovic, et. al [19] Proposed About Improving circuit breaker maintenance management tasks by applying mobile agent software technology in which Implementing mobile agent software technology for improving circuit breaker maintenance management tasks offers several benefits, including enhanced efficiency, flexibility, and automation. Through the deployment of mobile agents, maintenance tasks can be performed remotely, reducing the need for manual intervention and minimizing downtime. Additionally, mobile agents can gather real-time data and perform analyses on-site, enabling proactive maintenance and timely decision-making. Overall, the adoption of mobile agent software technology in circuit breaker maintenance management presents a promising solution for optimizing operations and maximizing asset reliability in electrical systems.

BLOCK DIAGRAM

An Arduino R3, relay, keypad, LCD display, and breadboard are used to create a password-based circuit breaker that functions by requiring the entry of a password before permitting electrical current to flow through. An Arduino microcontroller would be in charge of the circuit breaker [12], and a keypad would be used to enter the password. To assist the user in inputting the right password, the system would show messages on an LCD display. The relay would activate and permit current to flow through the circuit when the proper password is entered. The relay would not be activated by the system and no current would flow through the circuit if the wrong password was supplied. The purpose of the circuit breaker [15] would be beneficial for preventing unwanted entry and safeguarding appliances or electrical equipment

PROPOSED SYSTEM

We are offering GSM MODULE [4] as a new technology in our project. This allows us use text messages to manage the power supply. A multi-layered architecture is required for a password-based circuit breaker system with a GSM module in order to guarantee security and dependability. The system's fundamental component is an atmega328 microcontroller unit (MCU) [16], which is in charge of processing user inputs furthermore managing the circuit breaker. Through a keypad, users communicate with the system by entering a pre-determined password.

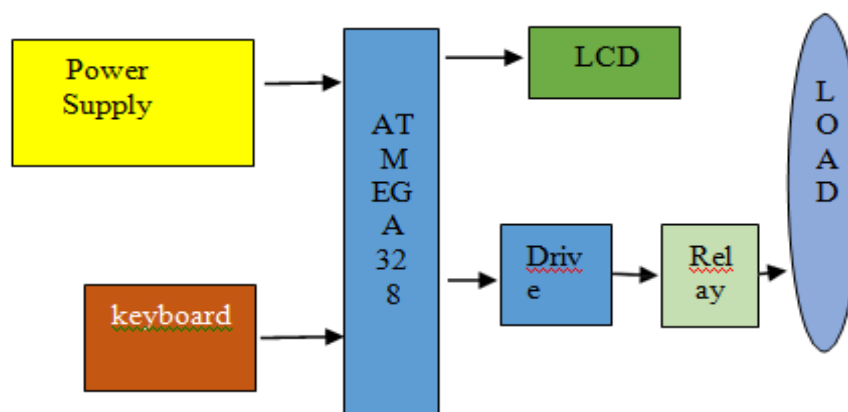


Fig . I

The goal of this project is to safeguard linemen during operations so they are not suddenly shocked by electricity. Since linemen must impact living wires rather frequently, the likelihood of significant mishaps is already extremely high. However, many of those mishaps could be prevented if linemen and stations coordinated properly. The project's goal was to offer a solution that would guarantee the safety of the service personnel. proposed safety system is successfully designed. It provides a new approach to the security of the lineman and completely eliminates the fatal electrical accidents to the lineman due to electric shock during the power line repair. This system can also implement in many other public.

Requires a successful authentication before allowing access and verifies the password against a database that is saved. When a password is entered incorrectly or there are several unsuccessful tries, the system triggers a security protocol that could lock out future attempts to log in for a predetermined amount of time or send an SMS alert to the administrator using the embedded GSM module. This guarantees defense against any tampering and unauthorized access. Additionally, the GSM module acts as a crucial communication link, enabling the system to notify specified receivers in real time, like the administrator or maintenance staff [13], in the event of unexpected activity, circuit excursions, or security breaches. To help with a timely response and resolution, these notifications may provide comprehensive information regarding the incident's location and nature. The system also has fail-safe measures to ensure that it will continue to function even when there is no GSM network coverage or when there is a power outage. This could entail using supplementary backup modules to enable phone or email communication in addition to local storage of important configurations and data [19]. Security, dependability, and remote accessibility are given top priority in the design of a password-based circuit breaker system with a GSM module, which makes it appropriate for a range of uses, such as infrastructure monitoring, industrial automation, and home security [11].

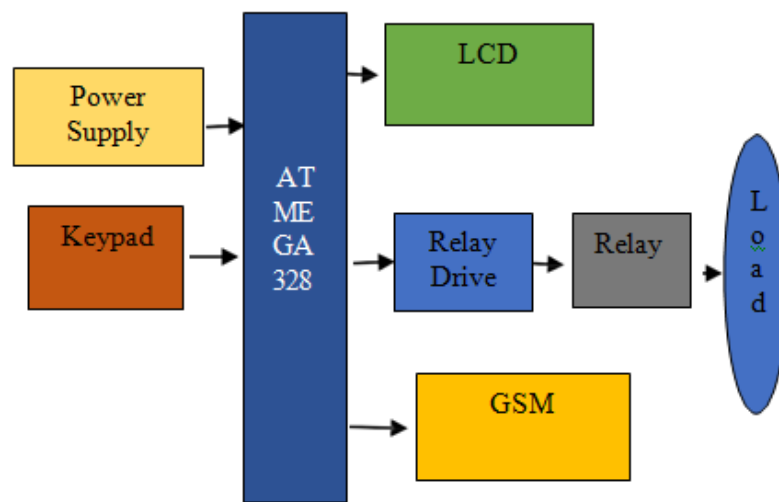


Fig. II

In accordance with the circuit schematic, connections are made. It is important to ensure that there are no shared connections between the AC and DC suppliers while providing the connectors. The controller will get regulated 5V DC from the 5V power supply circuit. The AC and DC supplies are now both turned on. The output pins of the relay receive 230V, thus they shouldn't be touched. When in keypad mode, the LCD says "ENTER PASSWORD." Use the keypad to enter the password. Now, the circuit breaker state changes if the password is right. When utilizing GSM mode [4], the password is input via the smartphone, which is already registered on the microcontroller, allowing the request to only be sent by that specific smartphone. Thus, safety is guaranteed. The Relay modifies its state if the password and the one that is stored match. The password used for the keypad and GSM mode is the same for shutting and opening the circuit.

Conclusion

The goal of this project is to guarantee the safety of the lineman or maintenance personnel. The lineman's only authority is to turn the lines on and off. He can remotely manage the electronic circuit breaker via SMS from any location with the use of a GSM module. By means of an Arduino Uno, he also received an alert message regarding the ON/OFF relay in a registered mobile number. After lineman fixes the faulty line, lineman can use the right password to turn ON. It provides a sound security concept. The suggested method can therefore be used to keep a single, uncrackable password. This increases the safety of linemen by preventing electrical accidents.

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