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Smart Safety with Password Based GSM Module Controlling Circuit Breaker

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Abstract: ***This paper focus on Smart safety with password based GSM module controlling circuit breaker. In our daily life, Safety is the major concern for all activities. Accidental death of a lineman is often read and proven in current scenario. In view, safety measures to protect operators are considered to be very necessary in current working. Using passwords for security, Electrical lineman security systems are used to control circuit breakers. Serious electrical accidents occurs becoming increasingly, when repairing power lines. It is happen due to lack of communication and coordination between maintenance and substation personnel. In the proposed system, the on and off line turning operation with the lineman to ensure the safety of linemen. For that, a secure password is required to operate the breaker operation and maintenance point of view. First request is registered and password is sent to the line operator's mobile phone and GSM module by AVR microcontroller. Entered password and password received by the GSM receiver are compare. If password is match, the operation of circuit breaker will be smoothly operate. The operator gave three chances for incorrect password otherwise message will appear on the LCD display for security purposed. It also sent the message control room regarding unauthorized access to the system.***
Keywords: Lineman Safety, GSM, Password Security, ATmega328p Microcontroller, Circuit Breaker Controlling*.*

I. INTRODUCTION

The purposed of circuit breakers to protect electrical circuits from damage due to overloads or short circuits in Electrical system. The main feature of circuit breaker is to detect faults and block current flow. [4] [5]

The fuses are easily replace and circuit breakers can be reset (manually or automatically). Due to lack of communication and coordination between maintenance and substation personnel, the ratio of fatal electrical accidents of linemen are more in manual operation. To avoid such incidents, Circuit breakers can be designed using a password [6] [7].The operation of password circuit breakers can be design and fully controlled by an 8-bit microcontroller from the ATmega328P family. The password is stored inside the microcontroller under EEPROM and password can changed any time during operation and stored in microcontroller [8][9]. The keypad is used for entering the password and circuit breaker operation. If you enter the incorrect password the buzzer will sound an alarm [10] [11].

In the proposed system, circuit breakers control of the wire is assigned to the line operator. The project is designed not only for lineman safety but also maintenance point of view. If a fault occurs in a system, lineman enters the password to turn off the power supplied to the line, repairs the system comfortably.

II. LITERATURE SURVEY

Research work related to Smart Safety with Password Based GSM Module Controlling Circuit Breaker were studied and reviewed.

1) Mr. Tarun Naruka, Vivek Kumar Sharma, Vikram Singh, Vishnu Sharma reviewed in paper title “Password Based Circuit Breaker” that to control the circuit breaker, only specified password used and also provision of changing the password. For the program memory, 8 bit microcontroller 8051 family which has an 8KB of ROM is used for controlling. For password entering matrix keypad is interfaced to the microcontroller and relay IC driver is used to switch the loads through relays. Step down transformer (230/12V), is used to down the voltage to 12V AC and is converted to DC using a Bridge rectifier with capacitive filter for removed ripples. The voltage regulator (+5V) is used for microcontroller and other components [1]

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2) Athira P Nair, Josephin J, reviewed in paper title "Electric line man safety system with OTP based circuit breaker" of International Journal of research in Engineering and Technology that for lineman safety while working, sudden electric shock do not feel. The chances of critical accidents are already very high due to live wires and poor coordination between lineman and substation. This paper give the solution for safety of maintenance staff and the lineman detect the fault in the electric line by SMS will be sent to the substation staff for switch off /on the line and fully operated on a microcontroller [2]
3) Bhagwan Kharat, Durvankur Sarwade reviewed in paper title "Internet of Thing (I.O.T) Base Controlling & Monitoring of Circuit Breaker that modern control centres system operators get alarm messages from many devices in real time. From alarms, it is still very hard to find out location and type of the potential equipment problem. One needs an automatic way of processing the events to identify whether sequences of equipment operation were as expected. Instead of many alarm messages, only one report should be sent to the operators with concise information about success or failure of a switching sequence. In the case of breaker, report will offer more detailed message whether the breaker failure logic worked out properly and finally disconnected faulted section. This kind of analysis enables tracking of every CB operation allowing reconstruction of an entire sequence of operations. In our project we studied designed to attain real time control &monitoring of Circuit Breaker. Measure and record loading of your output of C.B and prevent overloading & increasing whole system life [3].

III. PROBLEM STATEMENT

Based on our literature survey, the following problem area has been finalized

1) *Preventing Unauthorized Access and Accidental Activation of Circuit Breakers:* Mitigate risks of electrical hazards and ensure safe working conditions for personnel.
2) *Enhancing Safety for line Workers During Maintenance:* Ensure circuit breakers remain deactivated until workers complete tasks, reducing the risk of electrical shocks or injuries.
3) *Protecting Sensitive Equipment and Systems from Unauthorized Tampering:* Secure critical infrastructure and prevent potential damage or disruptions.

IV. OBJECTIVES OF PROJECT

The objectives of the project are:

1) *Enhanced Security:* Prevent unauthorized access to the circuit breaker by requiring a password for control. Protect against tampering and accidental activation, especially in hazardous environments. Improve electrical safety for personnel working on electrical systems.
2) *Remote Control:* Enable remote operation of the circuit breaker from any location with GSM coverage. Facilitate troubleshooting, maintenance, and load management without requiring physical presence. Offer flexibility and convenience for users.
3) *Real-Time Monitoring:* Track the status of the circuit breaker (on/off) in real-time. Receive alerts for unauthorized access attempts or abnormal conditions. Implement preventive measures and prompt responses to potential issues.
4) *Cost Reduction:* Minimize the need for manual intervention and site visits for control and monitoring. Reduce travel expenses and optimize resource allocation.
5) *System Integration:* Integrate the circuit breaker control with other systems or devices (e.g., home automation, building management).Foster a more comprehensive and interconnected smart environment.

V. METHODOLOGY

A. *Existing Methods*

In existing method, lineman need to visit power station and inform the in charge to ON/ OFF. Then station in charge can be the inform to station operator and after the official procedure the line will be ON/OFF. But these method was so old. there are the after latest technology give the password base method or finger finger prints scanner method so different types of method to operated but sometime loss connectivity lost signal or unskilled worker through likely not properly communicating so propose system give surety of controlling circuit breaker fully security based ON/OFF.

B. *Proposed Methodology*

The proposed system methodology provides a solution to ensure worker and safety. Lineman. Line ON/OFF control is performed only by the line operator.

This system is designed to require a password to control the circuit breaker ON/OFF. The lineman can switch off the power and make repairs comfortably, and can also turn the line back on by entering the correct password after returning to the substation. Since you can change your password, you can set your desired password and work more safely. In the proposed system, control (ON/OFF) of the wire is assigned to the line operator.

The project is designed in such a way that maintenance personnel or linemen must enter a password to turn the wire on or off. Now, if there is a problem with the wire, the lineman enters the password to cut off the power supplied to the line and repairs the line comfortably. When the lineman arrives at the substation, the lineman supplies power to the line. Specific line. This project uses a 4x3 keyboard to enter the password. Compare the entered password with the preset password. If the entered password is correct, the corresponding wire will turn on or off. In this project, each wire has a separate password. Switching on and off a line (circuit breaker) is represented by a load.

C. Components Description

1) Power Supply

A transformer is an electrical device that takes electricity from one voltage and converts it to another voltage. The AC and DC voltages of the power supply are actually achieved by converting and combining transformers. Basically, a transformer uses two properties of electricity to convert electricity from high voltage to low voltage and from low voltage to high voltage. The system requires power to operate. The microcontroller requires only 5V DC to operate. So the incoming AC current is rectified, filtered and regulated by the 7805 IC.

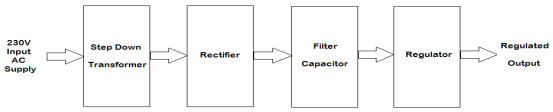


Fig. 1.Block diagram of Power Supply

2) Relay

A relay is an electrically operated switch. When current flows through the relay coil, it produces a magnetic field that attracts a lever and alters the switch contacts. Relays feature two switch positions and are double throw (change over) switches, as the coil current can be on or off.

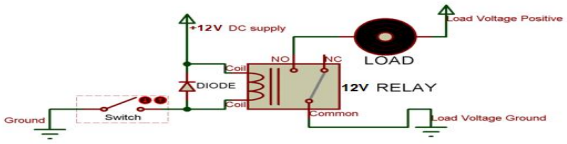


Fig. 2.Schematic diagram of Relay

3) Buzzer

A buzzer is mechanically shaped like a tiny, round or rectangular enclosure and has an electrical connection that allows it to be mounted directly on a sturdy printed circuit. It needs a DC voltage to function; depending on the model, it should typically be between 3 and 28 V.

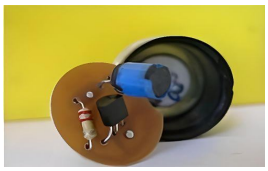


Fig. 3.diagram of Buzzer

4) Microcontroller ATmega328P

Atmega328 is the microcontroller used to implement this system. It has an 8-bit version. A 32KB flash memory on-chip for programming the microcontroller, operate according and stored in the micro controller by OTP generation. It will switch a relay if the passwords are matched or not.



Fig. 4.diagram of ATmega328P

5) GSM Modem

A GSM modem (wireless) is operates on a GSM modem (wireless) and work on dial-up. The function of dial-up modems is to send and receive data from fixed telephone lines through radio waves like GSM phones, GSM modems and also require Sim card.

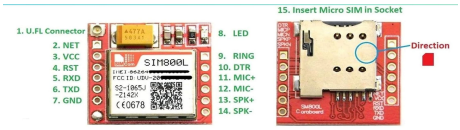


Fig. 5.diagram of GSM Modem

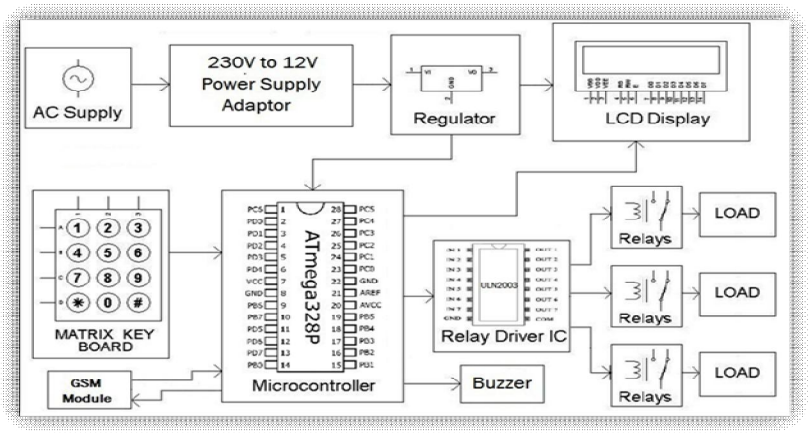


Fig. 6. Block diagram of Smart Safety with Password Based GSM Module

D. Operation of Architecture

The figure 1 shows the architectural block diagram of the proposed "Smart Safety with Password-Based GSM Module Controlling Circuit Breaker" We devised a system that requires the lineman to transmit the OTP in the format 1234. This format is used to represent an OTP. The deactivation feeder numbers 1, 2, 3 are where they stand. A lineman needs to generate a four-digit password that's protected. The same thing happens when a lineman needs to send the same password in '1234' to activate the feeder. The four-digit number must match to activate the line that has been disabled. When the utility worker transmits this data via text message to the power Station where the GSM module is installed, the main authority will receive another message at the same time containing the latest LC's specifics, in order to avoid difficulties in case the utility worker forgets the password or loses the password, as well as to save the particulars. The lineman can't do this without the boss's blessing. Even though he's trying to charge the line without notifying the operator, he's going to get caught because the operator's number will be fed into the program, giving them his complete information about the line charge.

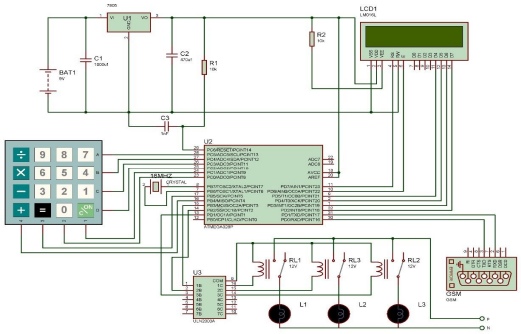


Fig. 7. Circuit diagram of Smart Safety with Password Based GSM Module

VI. RESULTE

The implementation of a Smart Safety with Password Based GSM Module controlling circuit breaker utilizing ATmega328P microcontroller , relay, keypad, LCD display, and printed circuit board would be result in a fully operational circuit breaker that necessitates the input of a password before permitting the flow of electrical current. the circuit breaker would be under the control of an microcontroller, with the password being inputted via a keypad. the LCD display would provide instructions to the user for inputting the correct password. upon entering the correct password, the relay would be triggered, enabling the flow of electrical current. in the event of an incorrect password input, the relay would not be activated, thus preventing the flow of electrical current. this circuit breaker would serve as a valuable tool for safeguarding electrical devices or appliances and deterring unauthorized access.

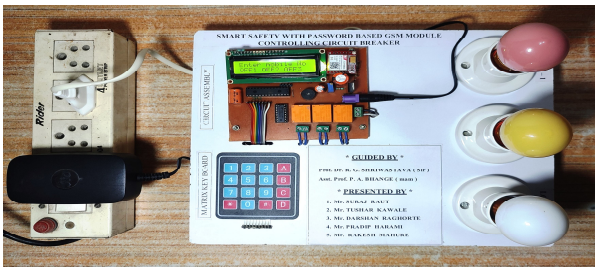


Fig. 8. Operation Begin & Enter The Mobile No.

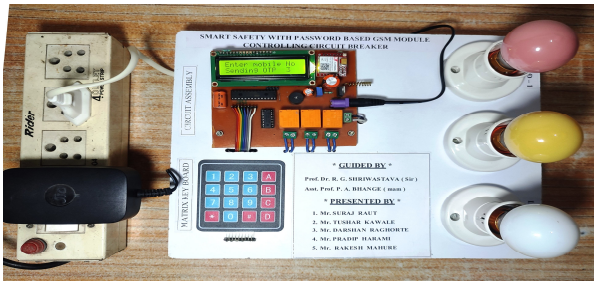


Fig. 9. Sending The OTP & After Match the OTP

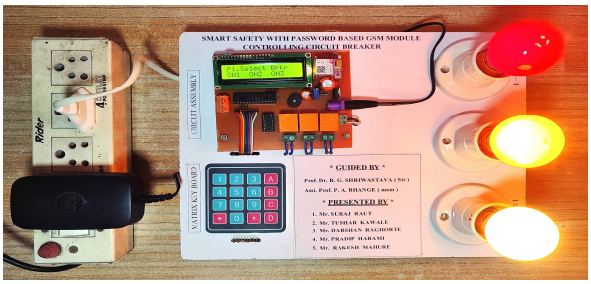


Fig. 10. Selected Breaker is ON

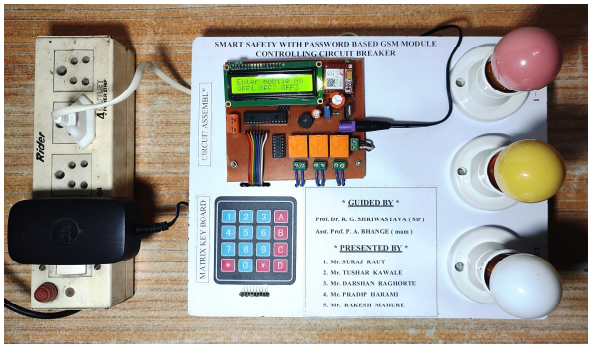


Fig. 11. Selected Breaker is OFF

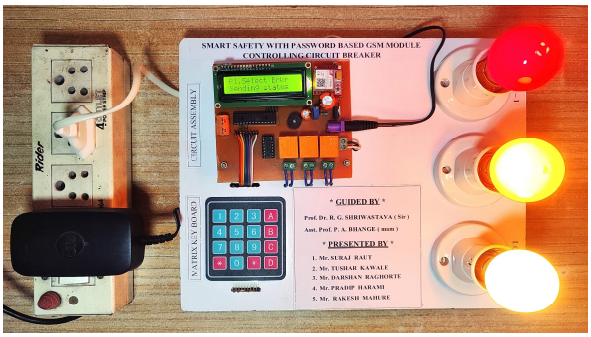


Fig. 12. Sending The Breakers Status For Registered Mobile NO.

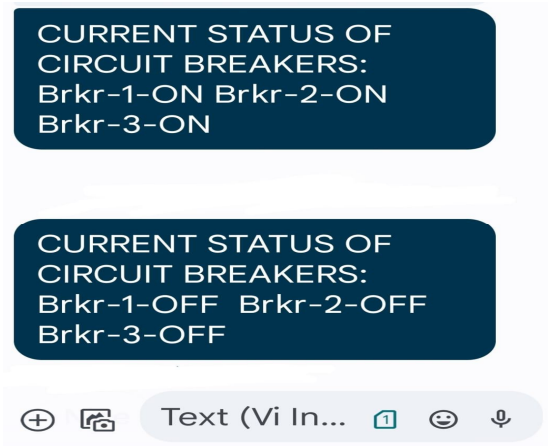


Fig. 13. Receive The Status For Registered Mobile NO.

VII. CONCLUSIONS

This paper focus on Smart safety with password based GSM module controlling circuit breaker. Serious electrical accidents occurs becoming increasingly, when repairing power lines. It is happen due to lack of communication and coordination between maintenance and substation personnel. In the proposed system, the on and off line turning operation with the lineman to ensure the safety of linemen. For that, a secure password is required to operate the breaker operation and maintenance point of view.

VIII. FUTURE SCOPE

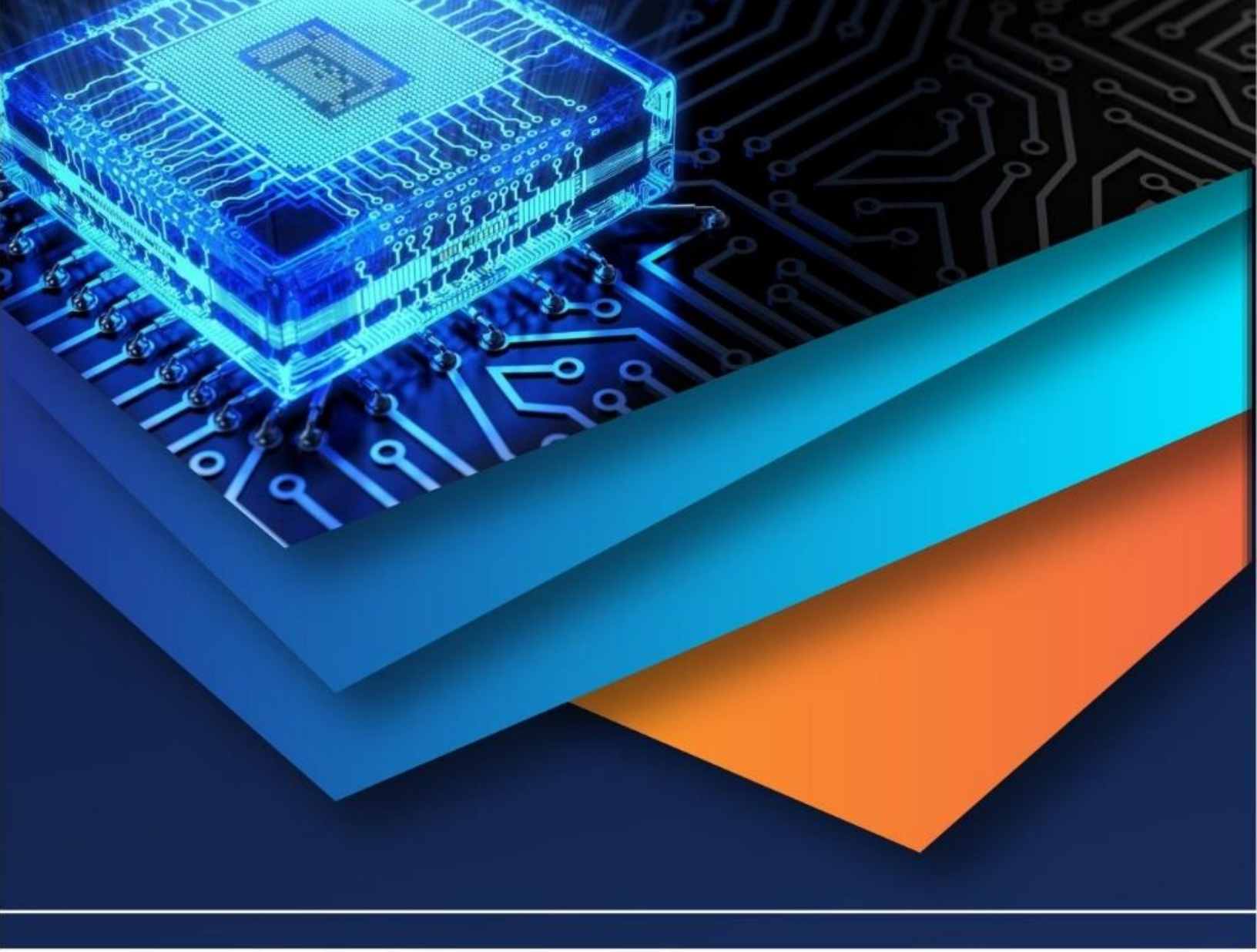
Integration of the SCADA system with the line will streamline fault detection and realization, enabling the lineman to promptly disable the faulty line using the circuit breaker. Additionally, incorporating a GSM module will allow for automatic SMS alerts to be sent to the workstation in case of line failure, facilitating a faster response time for the repair process.

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