

ELECTRIC LINE MAN SAFTY WITH PASSWORD BASED CIRCUIT BREAKER AND INTIMATION OF HT WIRE SAG USING GSM.

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Abstract - Electric line workers are exposed to significant safety risks, particularly the danger of electrocution during maintenance and repair of power lines. This project proposes an integrated safety system consisting of a password-based circuit breaker and a GSM-based wire sag detection mechanism to enhance worker protection and operational reliability.

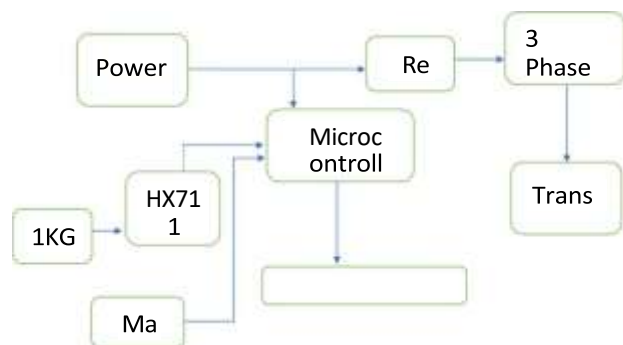
The password-based circuit breaker restricts access to authorized personnel only, ensuring that electrical lines are handled by trained technicians. This reduces the risk of accidental energization and unauthorized intervention. In addition, the GSM-based wire sag detection system continuously monitors the condition of high-tension power lines using sensors. When abnormal sagging is detected beyond a predefined limit, the system sends real-time alerts to concerned authorities, enabling prompt corrective action.

By combining secure access control with real-time monitoring, the proposed system aims to minimize electrical hazards, prevent accidents, and improve the overall safety and efficiency of power line maintenance operations. This approach contributes to the development of a smarter and safer electrical infrastructure.

If you want, I can also make a shorter (100-word) or more technical IEEE-style abstract.

1. INTRODUCTION

Nowadays, electrical accidents to the line man are increasing, while repairing the electrical lines due to the lack of communication between the electrical substation and maintenance staff. This project gives a solution to this problem to ensure line man safety. In this proposed system the control (ON/OFF) of the electrical lines lies with line man. This project is arranged in such a way that maintenance staff or line man has to enter the password to ON/OFF the electrical line. Now if there is any fault in electrical line then line man will switch off the power supply to the line by entering password and comfortably repair the electrical line, and after coming to the substation line man switch on the supply to the particular line by entering the password. Separate passwords are assigned for each electrical line.



Block diagram for password based circuit breaker and HT wire sag using GSM

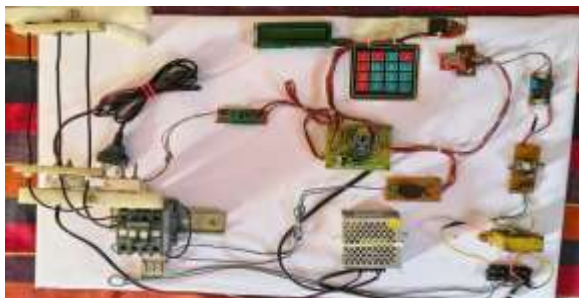
This proposed system provides a solution, which can ensure the safety of the maintenance staff. The control to turn ON/OFF the line lies with the line man only. This system has an arrangement such that a password is

required to operate the circuit breaker (ON/OFF). Line man can turn off the supply and comfortably repair it, and return to the substation, then turn on the line by entering the correct password.

The system is fully controlled by a microcontroller from 8051 family. A matrix keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the password stored in the memory of the microcontroller. If the password entered is correct, then only the line can be turned ON/OFF. Activation deactivation of the circuit breaker are indicated by a lamp (ON/OFF).

With the advancement in information and communication technologies, traditional power system network has undergone a transformation towards smart grid systems. The integration of intelligent technologies has been a major contributing factor in managing the growing complexities of the power system network. One of the critical components in the power transmission and distribution network is the transmission line, the reliability of which is essential for effective power system operation. The reliable performance of the transmission lines can be inhibited by a number of events such as electric faults, switching surges, insulation breakdown or thermal stresses .

generate invoices directly within the cart. By reducing dependency on manual billing counters, the system minimizes waiting time and improves operational efficiency in retail stores.



Project Digram

2.NEED STATEMENT

There is a growing need to enhance the safety of electrical line workers involved in the maintenance and repair of power transmission and distribution systems. Due to increasing incidents of electrical accidents caused by miscommunication, human error, and lack of proper control mechanisms, it has become essential to develop a system that ensures safe and reliable operation of electrical lines.

A secure mechanism is required that allows only authorized personnel to control the ON/OFF operation of power lines, thereby preventing accidental energization during maintenance work. At the same time, there is a need for improved monitoring of transmission line conditions to detect abnormalities such as faults, sagging, and thermal stress in real time.

With the advancement of smart grid technologies, integrating microcontroller-based access control systems become necessary to improve coordination, reduce risks, and enhance overall efficiency. Therefore, a system that combines secure access control with intelligent monitoring is essential to ensure the safety of line workers and the reliability of the electrical power system.

3.OBJECTIVES

Along with the rapid development in modern science and technology, the equipment in every manufacturing industry and field has been constantly renewed and upgraded. It is the same case with the equipment of power enterprises, which have been enhanced under the

general background of scientific and technological development. However, along with the scientific and technological development and constant renewal of equipment, the model for electric power overhaul has not been improved. Such old operating mode can no longer meet the demands for power system overhaul, thus leading to the frequent failures in substation equipment maintenance and repairs

reduce the traffic accidents at traffic signals.

To improve the safety while working with HV Equipments in substations.

To allow only the authorized person to operate the circuit breaker. This will solve miscommunication issue during working with HV Equipments.

4. LITERATURE REVIEW

Electric lineman protection using user changeable password based circuit breaker: A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit .Mr. Tarun Naruka, Vivek Kumar Sharma, Vikram Singh, Vishnu Sharma "PASSWORD BASED CIRCUIT BREAKER" This project control system is a system that access only specified password to control the circuit breaker. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit microcontroller from 8051 family which has an 8KB of ROM for the program memory. A matrix keypad is interfaced to the microcontroller to enter the password, while a relay driver IC is used to switch ON / OFF the loads through relays.

The complete circuit is built with on board power supply. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator which is required for the operation of the microcontroller and other components. Athira P Nair, Josephin J, Electric line man safety system with OTP based circuit breaker, IJRET: International Journal of Reach in Engineering and Technology. This project focuses on the safety of the lineman while working so they do not feel the sudden electric shock. As lineman has to deal with live wires very often, the chances of critical accidents are already very high. However, with the right amount of coordination among lineman and substation, a lot of these

accidents can be avoided. The project aimed at providing the solution that ensures the safety of maintenance staff. Here, as soon as the lineman detect the fault in the electric line, an SMS will be sent to the substation staff, who would switch off the line and turn it on when the fault is being resolved, thus reducing the chances of accidents

and saves the power as well.

The proposed system is fully operated on a microcontroller. Electric lineman protection using user changeable password based circuit breaker: 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.

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 8 bit microcontroller of 8051 family.

The password is stored in an EEPROM, 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 Electric line man safety using micro controller with gsm module: 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. This proposed system provides a solution that ensures safety of maintenance staff, i.e., line man on detecting a fault in electric line the line man sends sms and the main line is

switched off which is again switched on after solving the fault it can also prove a boon to save power thus it saves the life of lineman working on electric line. The proposed system is fully operated on microcontroller. Password based circuit breaker:

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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 8 bit microcontroller of 16f877A family. The password is stored in an EEPROM, 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, indicated by another lamp. Index terms: Resistors, Capacitors, Diodes, Transistors, Voltage regulator, Rectifier, Microcontroller, EEPROM, Relay, Relay Driver , electrical accidents to the line man are increasing, while repairing the electrical lines due to the lack of communication between the electrical substation and maintenance staff. This project gives a solution to this problem to ensure line man safety. In this proposed system the control (ON/OFF) of the electrical lines lies

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password. Before going to know about this circuit PROPOSED SYSTEM: This **system is fully** controlled by a microcontroller from the PIC16F877A family. A matrix keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the password stored 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. 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.

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5. SYSTEM DEVELOPMENT

The proposed system is developed to improve the safety of electrical line workers by integrating secure access control with reliable power line operation. The system is designed using an 8051 microcontroller as the central processing unit, which controls all operations of the circuit breaker based on user authentication.

A matrix keypad is interfaced with the microcontroller to allow the line man to enter a predefined password. The entered password is verified with the one stored in the microcontroller's memory. If the password matches, the microcontroller activates a relay driver circuit that controls the circuit breaker, allowing the line to be switched ON or OFF. If the password is incorrect, access is denied, ensuring that only authorized personnel can operate the system.

The system also includes visual indicators such as lamps or LEDs to display the status of the electrical line (ON/OFF), providing clear feedback to the user. Separate passwords can be assigned for different lines to enhance security and control.

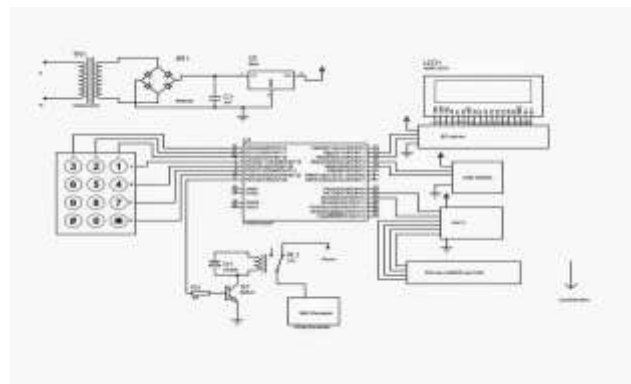
The hardware components include the microcontroller (8051), matrix keypad, relay module, power supply unit, and indicator lamps. The software is developed using embedded C and is programmed into the microcontroller to handle password verification, control logic, and system responses.

This system ensures that the control of electrical lines lies directly with the line worker during maintenance, thereby reducing the risk of accidental energization and

6. WORKING PRINCIPLE

The proposed system operates on the principle of secure access control using a microcontroller-based password authentication mechanism to manage the ON/OFF operation of electrical lines.

Initially, the system remains in a standby state, waiting for input from the line worker. When maintenance is required, the line man enters a predefined password using the matrix keypad connected to the 8051 microcontroller. The microcontroller reads the entered



Circuit diagram for password based circuit breaker and HT wire sag using GSM

password and compares it with the stored password in its memory.

If the entered password is correct, the microcontroller sends a signal to the relay driver circuit, which in turn operates the circuit breaker to switch OFF the electrical line. This ensures that the line is completely de-energized, allowing safe maintenance work.

If the password is incorrect, the system denies access and the circuit breaker remains unchanged, preventing unauthorized operation.

After completing the repair work, the line man again enters the correct password to switch ON the electrical supply. The relay is activated accordingly, restoring power to the line.

The system includes indicator lamps or LEDs to display the status of the line (ON/OFF), providing visual confirmation to the user. Separate passwords can be

assigned to different lines for enhanced security.

Overall, the system ensures that only authorized

personnel can control the power supply, thereby reducing the risk of accidental energization and improving the safety of electrical line workers.



Software view for circuit designs

7. RESULTS AND DISCUSSION

The proposed password-based circuit breaker system was successfully designed and implemented using an 8051 microcontroller. The system was tested under various conditions to evaluate its performance, reliability, and effectiveness in enhancing line worker safety.

During testing, the system accurately accepted the correct password entered through the matrix keypad and successfully controlled the ON/OFF operation of the circuit breaker via the relay module. When an incorrect password was entered, the system denied access and no switching action was performed, demonstrating effective protection against unauthorized operation.

The response time of the system was found to be quick, and the switching operation was reliable without any noticeable delay. The indicator lamps (LEDs) provided clear visual feedback regarding the status of the electrical line, helping the user easily identify whether the line was energized or de-energized.

The system also ensured that control of the electrical line remained with the line worker, reducing dependency on substation communication and minimizing the chances of accidental energization during maintenance. This

significantly improves safety compared to traditional methods.

However, some limitations were observed. The system relies on manual password entry, which may cause slight delays in emergency situations. Additionally, the use of a basic microcontroller limits scalability and advanced features such as remote monitoring or real-time alerts.

Overall, the project demonstrates a simple, cost-effective, and reliable solution for improving the safety of electrical line workers. With further enhancements such as integration of GSM communication, IoT-based monitoring, or biometric authentication, the system can be made more robust and suitable for modern smart grid application

8. CONCLUSIONS

Password Based Circuit Breaker Control the Line Man's Safety. This system provides a solution, which can improve the safety of the project. It is designed to control a circuit breaker with the help of a password. The maintenance staff e.g. Line man's for control to turn ON/OFF. The line works with the line man only this system is 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 return to the substation, then turn on the line by entering the correct or same password. The system fully controlled by a AT89C51 IC. If the password entered is correct, then the line can be turned (ON/OFF). Security is prime concern in our day-to-day life. Everyone wants to be more secure as to be possible. This system provides a new approach to a lineman security for their life. The circuit can be used without any fail of a lineman. The circuit can be used without any load can also be controlled when require.

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