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Password Based Circuit Breaker Using PLC-SCADA

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ABSTRACT: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. 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. The electric line man safety systems make use of a new concept of password. These passwords provide total control to the system to turn on or off the supply to each line. The maintenance staff e.g. line man has the control to turn ON/OFF the line. If there is a problem in any particular section of the supply line, then staff wants to turn off that line and repair it. For that the Using a matrix keypad he can enter it in the system. Then the system compares the entered password with the generated password. If the passwords are matched, then the supply to that line will be made OFF. Now he can repair the line more safely and after it is over he can turn on that line by using the password. This ensures security of the worker because no one can turn on the line without his permission. Password based circuit breaker 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 PLC and SCADA system. A matrix keypad is interfaced with the PLC to enter a password and operate relays. The complete circuit is built with onboard power supply. The power supply consists of a SMPS. That converts 230 V AC into 24 V DC and supplies it to PLC. Programming device is used to program the PLC and set the password.

KEYWORDS: Circuit breaker, Password, PLC, SCADA, Safety, Security.

I.INTRODUCTION

Power System fault is defined as undesirable condition that occurs in the power system. The system is designed to control a circuit breaker by using a password for the safety of electric line man. 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 worker and control room. This proposed system provides a solution that ensures safety of maintenance staff or line man. The line man has control of turning ON and OFF circuit breaker using a password. A matrix keypad is interfaced to the PLC to enter the password. The entered password is compared with the password stored in PLC Controller. System has control room for addition of new features also, as one PLC and SCADA can be used to collect data of various other parameters related to the circuit breaker and transmission line. For example digital counter for recording on/off of a circuit breaker which can be used to determine routine maintenance and life expectancy of circuit breaker. Time required for switching operation can be monitored to ensure the tripping mechanism is working properly.

II.OBJECTIVE

- To develop a circuit breaker system.
- To protect the line man who are predisposed to fatal electrical accidents. Turn ON/OFF the load with the help of a password.
- The entered password is compared with the stored password in the PLC & SCADA.
- To design animation of this project using SCADA.

III. BLOCKDIAGRAM

Blockdiagram of PLC based circuit breaker is,
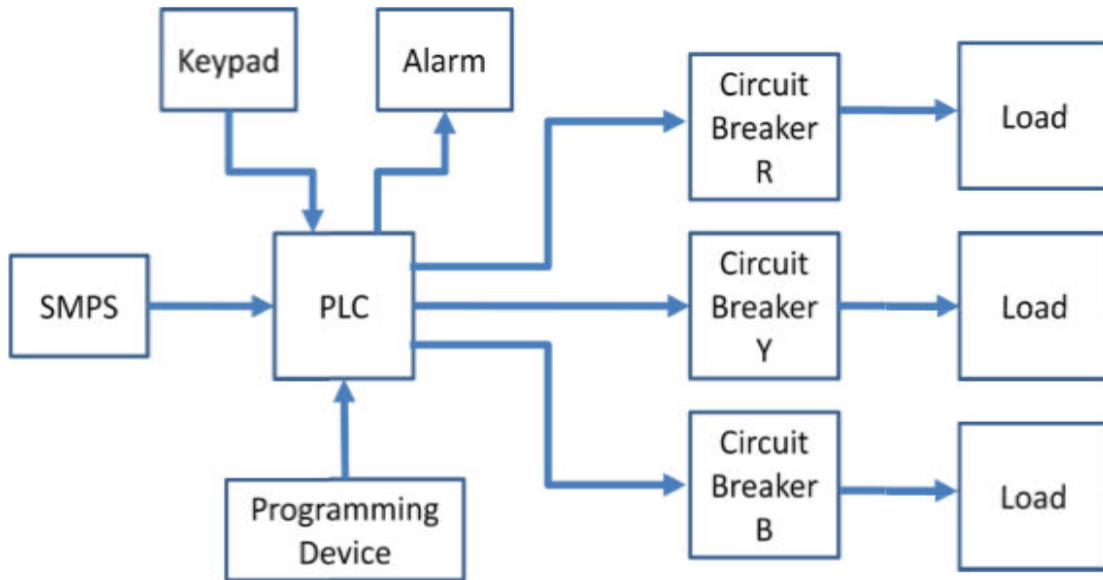

Fig1. Blockdiagram of password based circuit breaker using plc&scada

IV.WORKING

The working of this system is simple; for PLC based control the operator has to enter correct password on the keypad connected to PLC. It will provide a signal to the relay and circuit breaker is tripped. For indication of above process indicator lamp is used in system, lamp is turned off. The circuit breaker is tripped it will not close unless the same password is entered again. For remote control operation SCADA based operation is available a user ID and password is required to login in the system and then operate the circuit breaker. SCADA based control is not possible when the circuit breaker is opereted using PLC, because it means the line is under maintenance and only one having the password for PLC based control can close the circuit breaker. The SCADA based control is u sed when there is no maintenance work on the line. The password is provided to the lineman who is scheduled for maintenance. The user ID and password for logging into SCADA system is for higher authorities. The password is changed periodically to add extra safety.

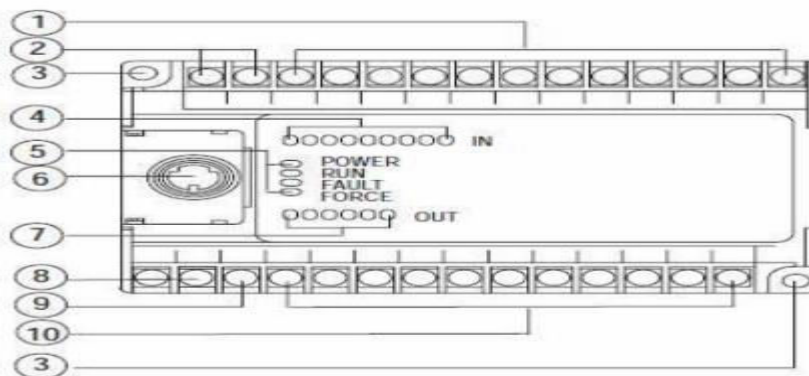### V. PIN DIAGRAM OF PLC

Pin diagram of plc,

Fig2. Pin Diagram of PLC Controller

VI. FUNCTION OF EACH PIN

1) Input terminals
2) DC output terminals(not used)
3) Mounting hole
4) Input LED's
5) Status LED's
6) RS-232 Communication Channel
7) Output LED's
8) Power Supply line power
9) Ground screw
10) Output terminals

VII. LADDER LOGIC

Ladder logic is a programming language that creates and represents a program through ladder diagrams that are based on circuit diagrams. It is mainly used in developing programs or software for PLC's. The complete ladder program looks like a ladder but it is an electrical circuit. The left and right rails indicate the positive and ground of a power supply. The rungs represent the wiring between the different components which in the case of PLC are all in the virtual world of the CPU. Screenshots of program shown below are the ladder logic for the proposed system.Ladder logic is a programming language that creates and represents a program through ladder diagrams that are based on circuit diagrams. It is mainly used in developing programs or software for PLC's. The complete ladder program looks like a ladder but it is an electrical circuit. The left and right rails indicate the positive and ground of a power supply. The rungs represent the wiring between the different components which in the case of PLC are all in the virtual world of the CPU. Screenshots of program shown below are the ladder logic for the proposed system.

VIII. I/O SYSTEM

The I/O system provides the physical connection between the equipment and the PLC. Opening the doors on an I/O card reveals a terminal strip where the devices connect. Inputs can consist of digital or analog devices. A digital input card handles discrete devices which give a signal that is either on or off such as push buttons, limit switch, sensors or select switches. Output devices can also be of digital or analog types. Typical output signals can ranges from 0-10 V DC or 4-20 mA.

IX.SCADA

A SCADA system is a common industrial process automation system which is used to collect data from instruments and sensors located at remote sites and to transmit data at a central site for either monitoring or and programs are stored in the main memory. The controlling purpose collected data from sensors and instruments is usually viewed on one or more SCADA host computers that are located at the central site. Based on the information received from the remote stations, automated or operator driven supervisory commands can be pushed to remote. Station control devices, which are often referred to as field devices. The I/O SCADA programming is used to change the supervisory software. In the basic SCADA system, all the data more advanced version of SCADA has additional secondary memories in the form of magnetic disc units. SCADA is a common process automation system which is used to gather data from sensors and instruments located to remote sites and to transmit data at a central site for either controller monitoring process. A collection of standard and/or custom software .Sometimes called Human Machine Interface (HMI) software or Man Machine Interface (MMI) software systems used to provide the SCADA central host and operator terminal application support the communications system, and monitor and control remotely located field data interface devices to SCADA system. Network connection acts as Communication Bridge for the elements in the SCADA architecture. Manual data input and sensor data inputs are interfaced with programming device. Feedback from sensors is essential for monitoring parameters of the system. Internet Protocols (IP) are used for communication between the master station and communication equipment. The facts that many networked SCADA systems are accessible from internet; the systems are potentially vulnerable to remote cyber-attacks. Due to usage of standard protocols security can be improved. However Local Area Network (LAN) connection is used in the proposed system.
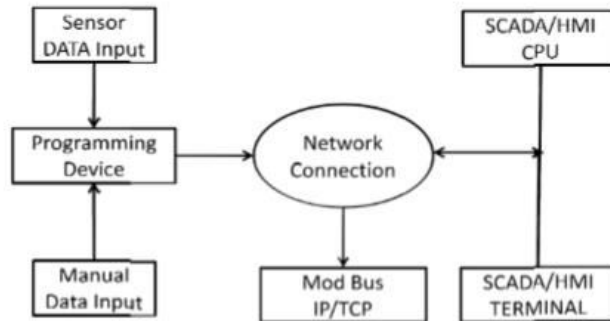
Fig3. SCADA Architecture Block Diagram

X. HARDWERE

XI. CONCLUSION

Password based circuit breaker control to ensure electric line man's Safety the PLC & SCADA. This proposed system provides automation and real time supervisory control over circuit breaker system.

XII. RESULT

| Sr. No.	Condition	Result	
		Load	Buzzer
1	If Password is correct	ON	Off
2	If Password is incorrect	ON	ON

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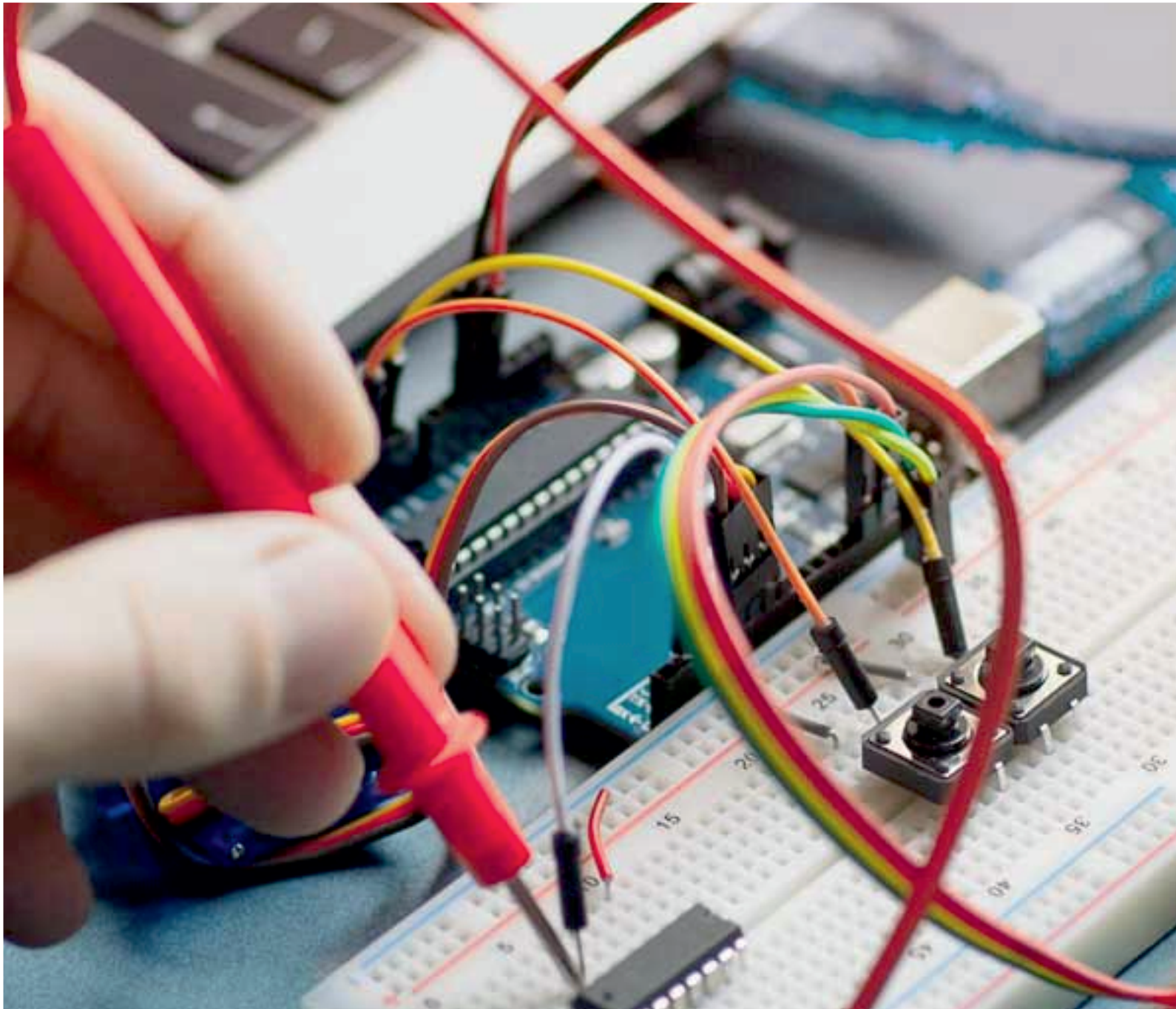
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