



## Password based Circuit Breaker Using Arduino For Electrical Lineman Safety and Load Sharing

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**Abstract**— A password-based circuit breaker is a security mechanism designed to prevent unauthorized access to electric circuit. It uses a password as a means of authentication, and if the correct password is not entered, the circuit breaker remains closed and the circuit breaker remains inaccessible. Once the correct password is entered, the circuit breaker opens and the electric circuit becomes accessible. Password-based circuit breakers are commonly used in industrial settings to protect sensitive equipment and ensure that only authorized personnel have access to the equipment. They can also be used in residential settings to the equipment. They can also be used in residential settings as an additional layer of security for home electrical systems.

**Keywords**— *Circuit breaker, Manual load sharing, Voltage Regulator, Arduino, Relay, LCD*

### I. INTRODUCTION

Our system proposes a password based circuit breaker system. Here we connect the circuit with a keypad through which we enter the password. There is a substantial increase in the number of fatal accidents involving line men due to electric shocks resulting from the lack of coordination between maintenance staff and the electric substation staff.

This system provides a solution to this problem to ensure line man safety. Here the control of the circuit is provided at the substation. A circuit breaker is used along with a keypad. The line man can enter the password to switch OFF the circuit. He may now safely work out the repairs and may return to the substation to switch ON the circuit. He again needs to enter the password in order to switch ON the circuit. Here, there is also a provision of changing the password.

### II. LITERATURE SURVEY

#### A. Arduino Uno:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a

computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The USB controller chip changed from ATmega8U2 (8K flash) to ATmega16U2 (16K flash). This does not increase the flash or RAM available to sketches. Three new pins were added, all of which are duplicates of previous pins. The I2C pins (A4, A5) have been also brought out on the side of the board near AREF. There is a IOREF pin next to the reset pin, which is a duplicate of the 5V pin.

The reset button is now next to the USB connector, making it more accessible when a shield is used.

#### B. Overview of Password Circuit Breaker Using Arduino:

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.

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.

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.

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.

### III. HARDWARE COMPONENTS

#### A. Arduino Uno Board

The Arduino Uno is one kind of microcontroller board based on ATmega328, and Uno is an Italian term which means one. This board includes digital I/O pins-14, a power jack, analog I/ps-6, ceramic resonator-A16 MHz, a USB connection, an RST button, and an ICSP header. All these can support the microcontroller for further operation by connecting this board to the computer. The power supply of this board can be done with the help of an AC to DC adapter, a USB cable, otherwise a battery.



Figure 1- Arduino UNO Board

#### B. Relay

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal.



Figure 2- Relay

#### C. LCD Display

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.



Figure 3- LCD display

#### D. Keypad

A keypad is a set of buttons arranged in a block or "pad" which bear digits, symbols or alphabetical letters. Pads mostly containing numbers are called a numeric keypad.



Figure 4- keypad

### IV. RESULT

This proposed system provides a solution for ensuring the safety of maintenance personnel, such as linemen. The line man is the only one who has the ability to turn the line on and off. This system is set up in such a way that a password is required to operate the circuit breaker (ON/OFF). The lineman can turn off the supply and comfortably repair it before returning to the substation and turning on the line by entering People can change their passwords because it allows them to do so. Give any password he wants and his work will be completed.

This project can be used to ensure the safety of maintenance personnel, such as linemen. Only the line man has the ability to turn the line off and on. This system is configured in such a way that a password is required to operate the circuit breaker (ON/OFF). Linemen can safely turn off the power supply and repair it before resuming service by entering the correct password

### CONCLUSION

A password-based circuit breaker can be an effective means of providing additional security to a circuit breaker system. However, it is important to ensure that the password is strong and not easily guessable, and that the password is protected and not accessible to unauthorized users. It is also important to have backup methods of accessing the circuit breaker system in case the password is forgotten or lost. Ultimately, the effectiveness of a password-based circuit breaker depends on the implementation and security measures in place.

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