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# Password Based Circuit Breaker

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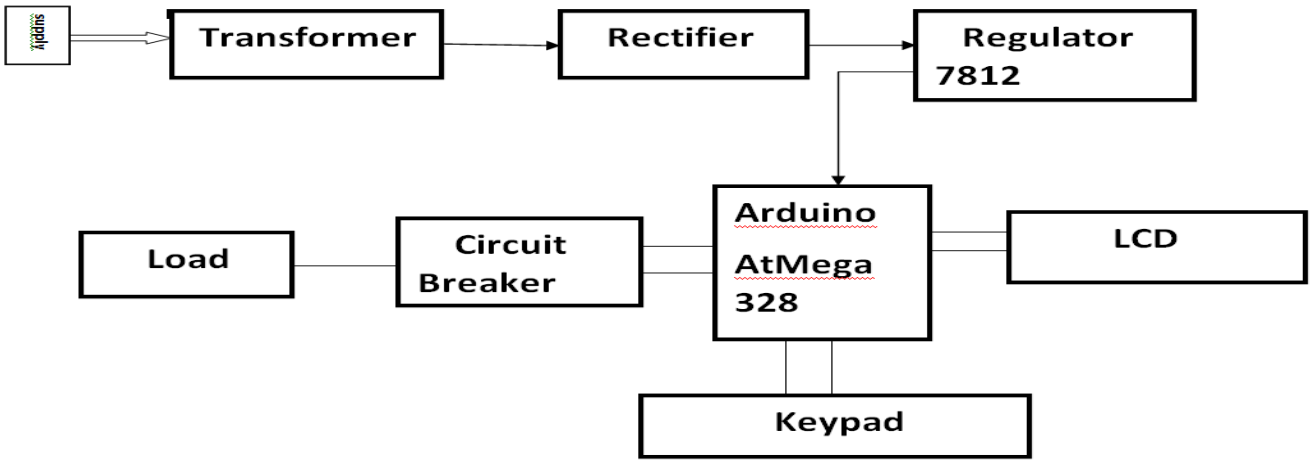
***Abstract*—Security is the prime concern in our day to day life while performing any activity. The project is designed to control a circuit breaker with help of a password only. In the current scenario, accidental death of lineman is often read and evidenced. Fatal electrical accidents to the line 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. This proposed system provides a solution, which can ensure the safety of the maintenance staff e.g. line man. 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.**

**Keywords:***ARDUNIOUNO,RELAY,LED,KEYPAD,C-PROGRAMIING*

## I. 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. The relay ON/OFF operation will be indicated by the LED's; also it sends a message to the receiver about the line disconnection. As soon as the maintenance work is finished then line man should enter the same password as used to disconnect the line earlier.



## II. COMPONENTS

**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 been 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.

Fig. Arduino Uno

**B. LCD Display:** LCD is derived from the term "Liquid Crystal." It is actually a mixture of two states of matter: solid and liquid. They have the properties of both solids and liquids and maintain their respective states in relation to one another. This system employs an electronic display module to facilitate user interaction.16x2 LCD is used in this case. This means that 16 characters per line can be displayed in two lines. One character is displayed using a 5x8 pixel matrix. An LCD is associated with two registers, such as data and command. Because they are easily programmable, these modules are preferred. This is unavoidable when providing visual assistance to the lineman.

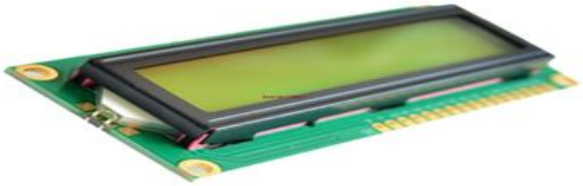


**Fig. LCD Display**

**C. RELAY:** Relays are electrically operated switches that open and close circuits in response to electrical signals received from outside sources. Some people may associate the term "relay" with a racing competition in which team members take turns passing batons to complete the race.

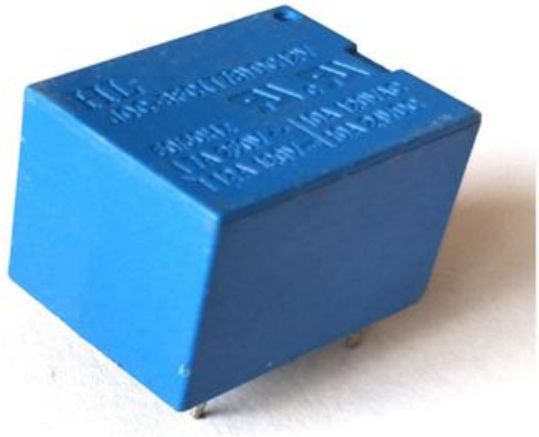


Fig. Relay

**D. KEYPAD:** When we want to connect one key to a microcontroller, we need one GPIO pin. However, if we want to interface a large number of keys, such as 9, 12, or 16, it may acquire all of the microcontroller's GPIO pins.We can use a matrix keypad to save some GPIO pins on the microcontroller. A matrix keypad is nothing more than a series of keys arranged in a row and column.


Fig. Matrix Keypad

**E. Rectifer:** A rectifier is a component of power electronics that converts alternating current (AC) to direct current (DC). This process is known as rectification. A diode is a one-way current that flows in only one direction.

## III. Languages Used

- **Embedded C Language**: An embedded system is a computer-based application that contains at least one programmable computer (typically in the form of a microcontroller and microprocessor or digital signal processor chip) and is used by people who are generally unaware that the system is computer-based.

## IV. PRINCIPLE

The main component in the circuit is AtMega328 microcontroller. In this project 3×4 keypad is used to enter the password. The password which is entered is compared with the predefined password. If entered password is correct then the corresponding electrical line is turned ON or OFF. In this project a separate password is provided to each electrical line. Activation and deactivation of the line (circuit breaker) is indicated by the load.

## V. OPERATION

For the operation of circuit breaker through a password, program is written in C Programming and created into a .hex file that is further burnt onto the controller with the help of flash magic. Connections are given as per the circuit diagram. While giving the connections, it should be made sure that there is no common connection between AC and DC supplies. 5V power supply circuit is to be used to provide regulated 5V DC to the controller. Now both the AC and DC supplies are switched on. Relay output pins gets 230V, so they should not be touched. LCD displays "enter password". Enter the password with the help of keypad, you can see "*"for each digit. Now if the password is correct then the circuit breaker state changes and displays status line on the LCD screen. If the password is wrong then it displays "Password not Verified". Since this is a user changeable one, to change the password click on "*", "#". It will display "enter password".

Here the circuit is provided with a master code that is used to access the circuit by anyone. For changing the password, this master code is to be entered. Then after entering the master code, LCD displays, "new password". Now any password of will can be entered. After that it displays "Password Verified" i.e., the new entered password is going to be stored and the person can change the status of circuit breaker only by this new password.

**TABLE 1**
**LIST OF COMPONENT**

| Sr. no. | Components | Specification | Purpose |
|---|---|---|---|
| 1. | Relay | 10 Amp<br>4 v. dc. | ON/OFF Ckt |
| 2. | Capacitor | 220µF<br>47µF<br>0.01µF | Filter |
| 3. | Bulb | 100W,<br>220V | Load |
| 4. | Buzzer | 5v | Indication |
| 5. | LED | 2v | Indication |
| 6. | Resistor | 2.2kΩ,120Ω,<br>230 Ω | Voltage Drop |
| 7. | 3*4 keypad | | Input Password |
| 8. | Transformer | 220v/9v | Power Supply |

## VI. RESULTS AND DISCUSSIONS

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 changing the password, person can give any password of his will and have his work done safer.

## VII. CONCLUSION

Circuit breakers can operate on a single known password. The operating password can be changed, and the system can be used effectively with the new password. Once the changed password is entered into the system, no one else can reclose the breaker except the person who changed it. It eliminates the possibility of password theft.

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