

# ELECTRIC LINEMAN SAFETY PASSWORD BASED CIRCUIT BREAKER USING ARDUINO UNO

Dr. M. Dilip kumar <sup>1\*</sup>

Associate Professor, Dept. of EEE  
St. Peter's Engineering College, Hyderabad,  
India manikdilip@gmail.com

J Anvesh goud<sup>2</sup>

UG Scholar, Dept. of EEE  
St. Peter's Engineering College, Hyderabad,  
India anveshsunny007@gmail.com

M G Manish Chandra <sup>3</sup>

UG Scholar, Dept. of EEE  
St. Peter's Engineering College, Hyderabad,  
India mogiligoallamanishchandra@gmail.com

J Sumanth <sup>4</sup>

UG Scholar, Dept. of EEE  
St. Peter's Engineering College, Hyderabad,  
India sumanthjala666@gmail.com

**ABSTRACT-** *In our daily lives, safety is our top priority when engaging in any activity. In the current situation, reports of linemen dying accidentally are common. Looking at the current working style, it is determined that a safety measure to protect the operator is absolutely important in this area. The control panel doors and circuit breakers are controlled by the electric lineman safety system utilizing a password for security. A lack of coordination and communication between the maintenance crew and the workers at the electric substation may be the cause of the rise in serious electrical accidents involving linemen during electric line repair. The suggested technique offers a remedy that ensures linemen's safety. The line's ability to turn ON or OFF is kept by the guard. The device has an layout that makes using a password to operate the door necessary. (ON/OFF) of the circuit breaker and control panel. a protected. The control room is contacted to obtain a password, and thea lineman for the repair or service site. This request has been submitted. And a password is transmitted to the lineman's control panel and mobile device for subsequent work The password is inputted using The Arduino Uno is connected to the matrix keypad. Microcontroller. The password entered is compared to Arduino on the control panel got a password. Should the enter If the password is right, the circuit breaker will turn on and off. The lineman can do repairs with the OPEN/CLOSE option enabled.*

**Key words:** *Arduino, Relay, LCD, 4\*4 key pad, Embedded Systems , crystal ascillator.*

## 1.INTRODUCTION

Due to a lack of communication between the electrical substation and maintenance employees, electrical mishaps involving linemen are now becoming more common while they are fixing the electrical lines. This idea offers a solution to this issue in order to guarantee lineman safety. The lineman in this suggested system is responsible for turning the electrical wires on and off. This project is set up so that a lineman or maintenance worker must input the password in order to turn on or off the electrical line. Now, if there is a problem with an electrical line, the line man will turn off the power supply

to the line by entering a password and repair the line comfortably. When he returns to the substation, the line man will turn on the supply to the specific line.

Currently, if an electrical line malfunctions, the lineman will input the password to turn off the power supply to the line, safely repair the electrical line, and then return to the substation to turn on the supply to the specific line. The LEDs will signal if the relay is ON or OFF, and it will also notify the receiver when the line has been disconnected. When the maintenance is complete, the lineman should enter the same password that was previously used to disconnect the line.

Benefits: User-friendly main line operation; saving the life of the lineman.

- User friendly operation of main line.
- Easy to maintain and repair

## 2.LITERATURE SURVEY

B. Sai kumar et al., [1] Security is the prime concern in our day to day life while performing any activity. In the current scenario, accidental death of lineman is often read and evidenced. In this direction, a safety measure to safe guard the operator is found very necessary looking into the present working style. The electric lineman safety 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. This ensures security of the worker because no one can turn on the line without his permission. 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. Any wrong attempt to open the breaker (by entering the wrong password) an alert will be actuated, indicated by another LED. system is designed to control the control panel doors and circuit breaker by using a password for the safety.

Mallikarjun G. Hudedmani et al.,[2] Security is the prime concern in our day to day life while performing any activity. In the current scenario, accidental death of lineman is often read and evidenced. In this direction, a safety measure to safe guard the operator is found very necessary looking into the present working style. The electric lineman safety system is designed to control the control panel doors and circuit breaker by using a password for the safety. Critical electrical accidents to lineman are on the rise during electric line repair may be due to lack of communication and co-ordination between the maintenance staff and electric substation staff. The proposed system provides a solution that ensures safety of lineman. The control to turn ON or OFF the line is maintained by the lineman. The system has an arrangement such that a password is required to operate the doors of the control panel and circuit breaker (ON/OFF). A secured password is requested and received from the control room by the lineman for the point of repair or service. This request is registered and a password is sent to the lineman's mobile and control panel GSM module for the further work. The password is entered through the matrix keypad which is interfaced to the Arduino Uno microcontroller. The entered password is compared with the password received by the control panel GSM receiver. If the entered password is correct then the circuit breaker ON/OFF and door OPEN/CLOSE feature is enabled for the lineman to take up repair. Any intruder tries to operate the mechanism with the wrong password by three times it will display a message in the LCD display and a message is sent to the control room regarding unauthorized accessing of the system for the safety reasons.

Pramod M. Murari et al.,[3] 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. This ensures security of the worker because no one can turn on the line without his permission. The system is fully controlled by the 8 bit

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Prof. Hemant P.Pawar et al.,[4] 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 co-ordination 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. Any wrong attempt to open the breaker (by entering the wrong password) an alert will be actuated, indicated by another lamp.

### 3.PROPOSED METHODOLOGY

We referred all the previous researches done in this domain.

- Literature review on Operations of Arduino based protection.
- Searched about a different type of controlling circuit systems, Relays and other components.
- Designed the block diagram
- Designed a Model Circuit with all the components.

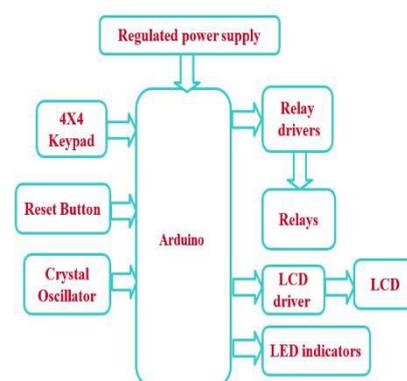


Figure 1: Block diagram Page 1686

3. **KEYPAD** -The matrix keypad acts as the input device. It has 12(3x3) or 16(4x4) keys in total, which means that it has unique value for each key and hence the password can be entered through this. The entered password or the button clicked will be displayed in

the LCD

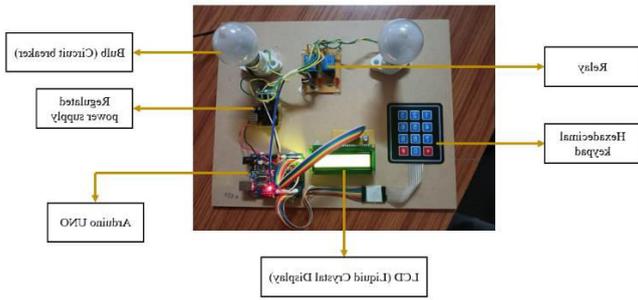


Figure 2: Hardware kit

1. **REGULATED POWER SUPPLY**- A **regulated power supply** is an embedded circuit; it converts unregulated AC (Alternating Current) into a constant DC. With the help of a rectifier it converts AC supply into DC. Its function is to supply a stable voltage (or less often current), to a circuit or device that must be operated within certain power supply limits



Figure 3: Regulated power supply

2. **RELAYS** - A circuit used to switch on and off a light bulb or any other load connected to main supply. It works on the principle of electromagnetic operation where magnetic field is created to operate the lever to control the flow of current in specific direction to turn on/off the load. Here the load given is LED to specify the on/off conditions of relay



Figure 4: Relay

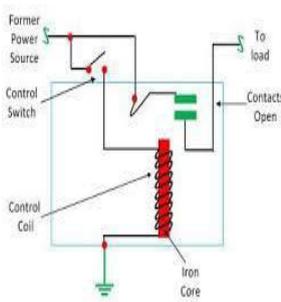


Figure 5: Trip circuit of relay



Figure 6: 4x4 keypad

4. **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.



Figure 7: Arduino UNO

5. **LIQUID CRYSTAL DISPLAY**- Liquid crystal display (LCD) is also called as flat panel display which works on the principle of blocking light. It is used for displaying numeric and alphanumeric characters in dot matrix and segmental way. The entered password will be processed by the Arduino and will be displayed by the LCD. It consists of 16 rows and 2 columns to display the numeric and alphanumeric contents.

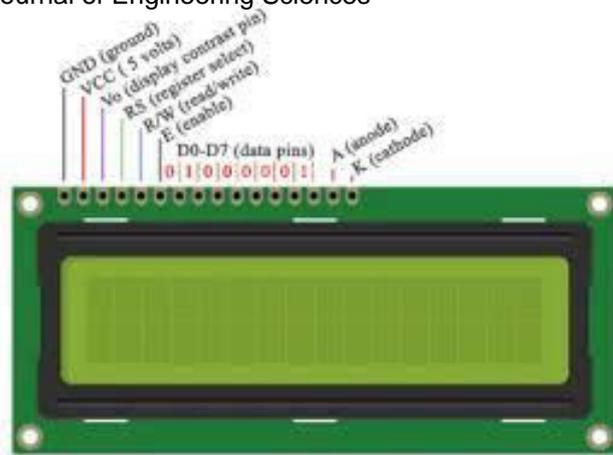


Figure 8: LCD 16x2

## 5.WORKING

In this Regulated power supply is used as source which will convert 230V AC supply to 12V DC supply by using Step-down transformer, rectifier, filters and voltage regulators. This 12V DC supply is essential to run the Arduino. Now a hexadecimal keyboard is interfaced to the Arduino to enter the password. The entered password will compare with stored password in the Arduino uno. If the password entered is correct, the respective circuit breaker will be activated. The activation/deactivation of the breaker is indicated by a lamp because instead of circuit breaker we used lamps to indicate. The status will display on lcd screen.

## 6.RESULT

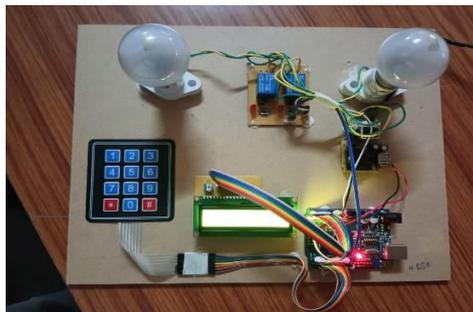


Figure 9: Turn off kit



Figure 10: Turn on kit

## 7.CONCLUSION

For repairing the electric lines, the lineman and his safety plays a major role Technology is ruling the world now days, but it should not erase problems for our development. Human safety is the most important factor. We have completed the project as per the requirements of our project. Finally, the aim of the project to avoid the

It can work on a single given known password. The password to operate can be changed and system can be operated efficiently with the changed password. No other person can reclose the breaker once the changed password is given into system other than the person who had changed it. It gives no scope of password stealing. It is effective in providing safety to the working staff. It is economical. It can be easily installed.

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