PASSWORD BASED CRICUIT BREAKER USING ARDUNIO

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Abstract

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.

Keywords: ARDUNIO UNO, RELAY, LED, KEYPAD.

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.

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.

Advantages:

- Save the life of line man.
- User friendly operation of main line.
- Easy to install and operate. Cost effective.
- Easy to maintain and repair

2. 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 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. 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.

3. PROBLEM STATEMENT

Circuit breakers play a vital role in maintaining system security. Since their malfunctioning could results in further component outages and may lead to the insecure operating conditions. During maintenance of distribution lines there is a chance of communication gap between the electric line and sub-station operator or staff. This communication gap may risk life of electric line man. The control to turn ON/OFF the line lies with the line man only.During maintenance the entire line is turned off this cause inconvenience to the consumers. Improper communication between maintenance staff and substation causes the electrical accidents.

At present if there is any maintenance work at the distribution the entire line will be turned off which causes inconvenience to the consumers. The entered password is compared with password stored in the ROM of the microcontroller. If the password entered is correct, then only the line can be turned ON/OFF. A relay is controlled by a relay driver IC, which is interfaced to the microcontroller also it is interfaced with the GSM modem .Whenever there is a maintenance work in the main line ,the line can be disconnected only when the password entered will match with the stored 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.

4. Solution

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. Since it has the provision of changing the password, person can give any password of his will and have his work done safer.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 In this project 4×3 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.

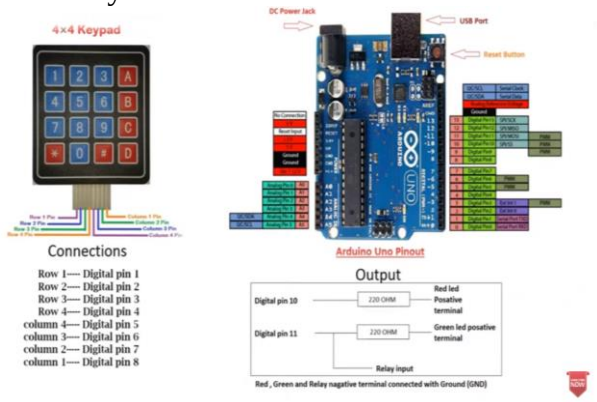

Fig.2Layout

5. Components

A. 4X4 Matrix Keypad Module

The 4*4 matrix keypad usually is used as input in a project. It has 16 keys in total, which means the same input values.

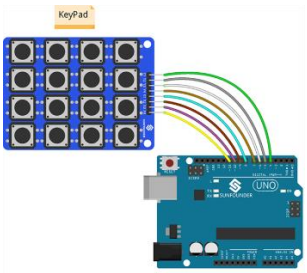

Fig.3 Keypad

B.ARDUINO:

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an 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 Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

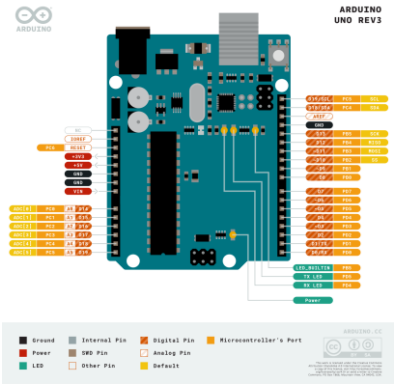

Fig.4 Ardunio layout

C. Light-emitting diode:

A light releasing diode is an electric component that emits light when the electric current flows through it. It is a light source based on semiconductors. When current passes through the LED, the electrons recombine with holes emitting light in the process. It is a specific type of diode having similar characteristics as the p-n junction diode .Which means that an LED allows the flow of current in its forward direction while it blocks the flow in the reverse direction.

Light-emitting diodes are built using a weak layer of heavily doped semiconductor material. Based on the semiconductor material used and the amount of doping, an LED will emit a coloured light at a particular spectral wavelength when forward biased

Fig. 5 LED

D. 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. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

The traditional form of a relay uses an electromagnet to close or open the contacts, but other operating principles have been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts.

Fig. 6 Relay

6. Result

When the circuit is powered on, it asks for password, you can see on the serial monitor (serial monitor is not mandatory but, can be used for testing purpose).

Enter the password which you entered in the program before compiling it. While you press the keys, green LED blinks for one tenth of a second, indicating that some key is pressed by the user. Once you entered the 6-digit password, press 'D' in the keypad which acts as 'Enter'. If your password is correct, the relay gets activated, green LED turns ON.

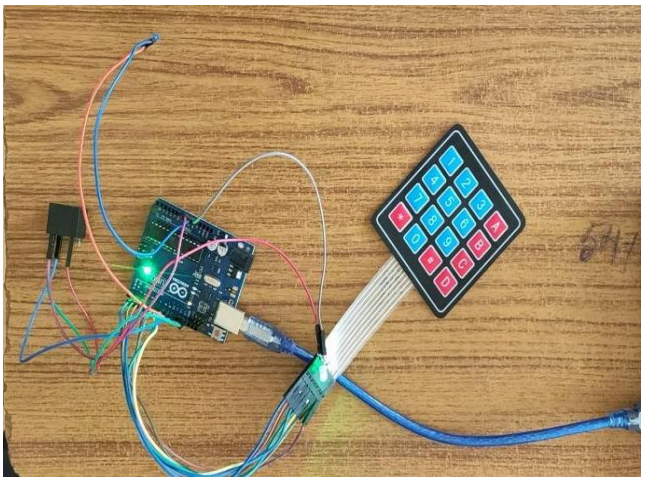

Fig.7 overall Kit

7. Conclusion

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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