JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Password Based Circuit Breaker Using Arduino

[1]Azeem Khan, [2]Dilip Sharma, [3]Rajnish, [4]Abhishek Kushwaha, [5]Mahesh Kumar Singh

[1]UG Student, [2]UG Student, [3]UG Student, [4]UG Student, [5]Assistant Professor
[1]Department of Electronics and Communication Engineering,
[1]Buddha Institute of Technology Gida, Gorakhpur, India

Abstract : The project's goal is to operate a circuit breaker alone with the use of a password. To enter the password, a keypad is attached to the project. Because of poor communication and coordination between the maintenance crew and the electric substation employees, fatal electrical mishaps involving linemen are becoming more common during electric line repairs. A solution that can guarantee the safety of the maintenance personnel, such as linemen, is offered by the proposed system. The line man alone is in charge of turning the line ON or OFF. This system is set up so that a password is needed to turn the circuit breaker on or off. When a lineman returns to the substation after comfortably fixing a problem, the supply can be turned back on.

Keywords : Line man, Arduino, Keypad, circuit breaker, Relay, LCD.

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.1 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 coordination 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.

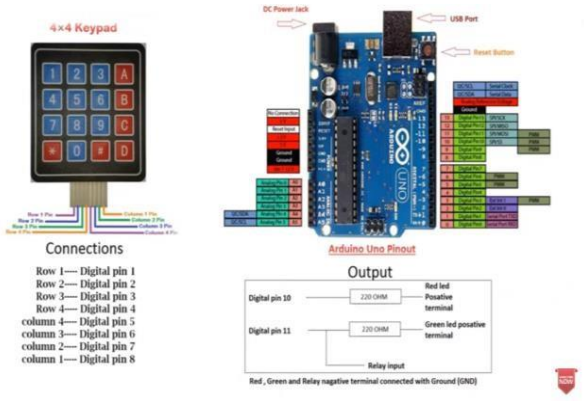

Fig.2 Layout

5. COMPONENT

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.

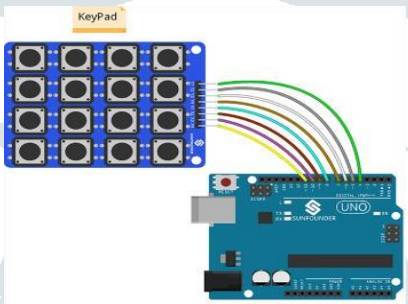

Fig.3 Keypad

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.

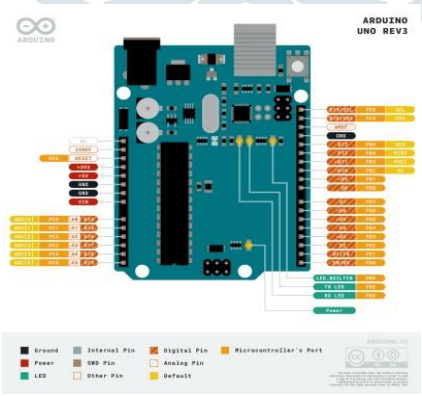

Fig.4 Ardunio layout

C 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.5 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.

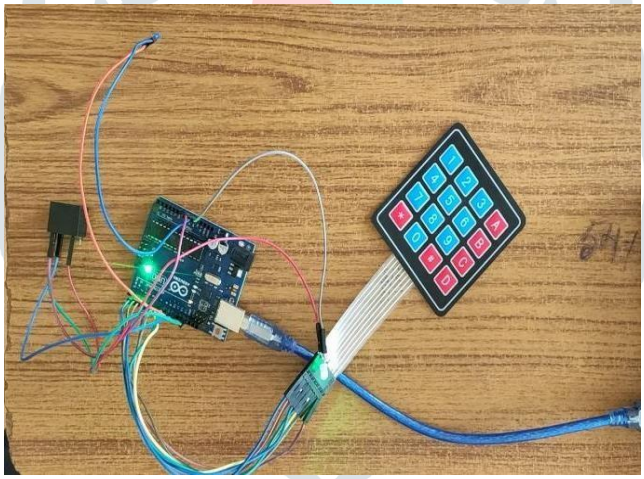

Fig.6 Overall Kit

7.REQUIREMENTS FOR SOFTWARE

Keil compiler: Keil developed the first C compiler made specifically for the 8051 microcontroller from the ground up. An ANSI C compiler, macro assemblers, debuggers and simulators, linkers, and evaluation boards are just a few of the development tools that Keil provides for the Intel 8051, IntelMCS-251, ARM, and XC16x/C16x/ ST10[3] families.

8.USED LANGUAGE

Embedded Using the C programming language, we can define an embedded system as a computer-based application that has at least one programmable computer (usually in the form of a microcontroller and microprocessor or digital signal processor chip) and is utilised by users who are typically ignorant that the system is computer-based.

9.WORKING

When the power is on, the LCD displays the reception screen and asks you to enter a password to unlock it. In our case, the password was reset. Using Keyboard, the password is also entered as we type the password appears on the LCD. If the wrong password is entered, it will display an incorrect message and ask you to enter it again. When the correct password is entered, a large circuit breaker screen is opened. Now the status of 1 Arduino load connected to the LCD is shown on LCD whether it is ON or off. By pressing the same password, the load can be locked. The GSM modem is an integral part of the proposed 'A' instructions obtained by Arduino. By default, permission is received via SMS sent depending on the status and permission of the senders. The LCD screen is used here to display full functionality.

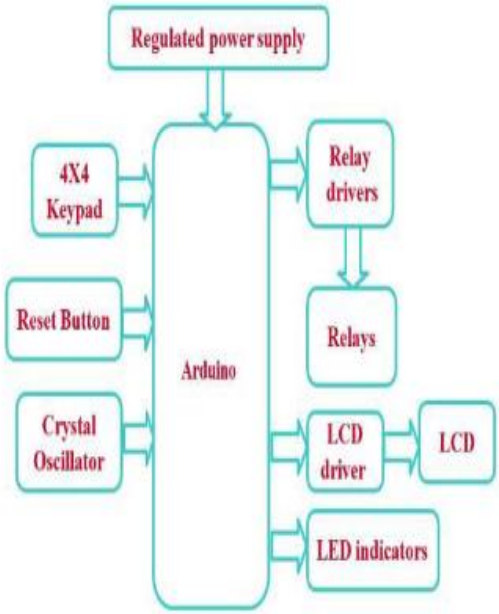

Fig.7 Block Diagram

10.APPLICATIONS

This system is utilised in homes, buildings, and electrical substations to secure the safety of linemen.
Employed at hotels and shopping centres to conserve energy.
Utilised in electrical substations to protect lineman from harm.
This technology is utilised in homes and buildings to conserve energy, as well as in hotels and commercial centers.

11.CONCLUSION

Circuit breakers can function with a single, well-known password, inference. The system can be efficiently used with a new operational password after the current one has been changed. No one else but the person who changed the password can reopen the circuit breaker once it has been entered into the system. Password theft is not an issue because of it.

12. REFERANCE

[1] M. Kezunovic, “Improving circuit breaker maintenance management tasks by applying mobile agent software technology”IEEE.

[2] Narendra Khandelwal, TanujManglani, Ganpat Singh, Amit Kumar, Dilip Khatri, “Automated load distribution with password protected circuit breakers” International Journal of Recent Research and Review, vol. VIII, Issue 1, March 2015.

[3] K.B.V.S.R.Subrahmanyam, “Electric lineman protection using user changeable password based circuit breaker” IJCESR, vol. 2, ISSUE-5, 2015.

[4] Michael faxa, “Application of disconnecting circuit breakers, p.11” Retrieved 9 July 2012. [6] Muhammad Ali Mazidi and Janice GillispieMazidi, “The microcontroller and embedded systems”, Person Education. 16F886 Data sheets.

[5] Vincent Del Toro, “Electrical engineering fundamentals”