



PASSWORD-BASED CIRCUIT BREAKER

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ABSTRACT:

The project is about password-based circuit breakers. It is most helpful for the field assistant, who will work under 230 volts. This can be controlled by the microcontroller by using the password programmed in the microcontroller. The major electrical accident that happened to the field assistant was caused by a lack of communication between the electrical substation and the field assistant staff. The power from the transformer (on or off) can be controlled by the field assistant by using a password. If the fault occurs in the transmission line or in the transmission pole, the field assistant should arrive at the particular transformer and cut off the supply by entering the password and comfortably mending the fault in the line. After mending the fault in the line by re-entering the password, the supply will flow continuously to the load. The system originated with four outputs and four different passwords. At apiece, all outputs are connected to the relay and are used to fragment the supply to the loads. At present, the demo piece is made with four loads, each controlled independently.

KEYWORDS:

MICROCONTROLLER, RELAY, LCD, KEYPAD.

INTRODUCTION

The whole project is based on Embedded Systems. Electricity is transferred through the transmission lines for different purposes. It can be designed for commercial, industrial, or residential uses. Transmission is used to transfer voltage, like 230 volts, 440 volts, and high voltage and high current. The proximity of the lines causes a spark to jump through the atmosphere to the nearby items. The process of installation, maintenance, services, and mending of distribution lines at the various places in the transmission can be managed by the field assistant. At the time the field assistant reaches the repaired place, the power passing through the line can be cut off by the substations. Due to a lack of communication between the substations and the field assistant, this may cause injury or death. It can be overcome by installing this project, which can make life easier for the field assistant. The field assistant reaches the fault region and, by itself, cuts off the supply by entering the password. It places the field assistant in a safe region. After mending the fault, the field assistant comes down, and after re-entering the password, the supply will flow through the line in a regular fashion.

LITERATURE SURVEY

An embedded system, which is built around a microprocessor, has its own execution. The embedded systems are made for the important hardware projects to make the human work easy and to control the casualties to the human at work time. In that the microcontroller or microprocessor can be programmed in a language like C, C++, etc. It is small in size and contains 16-bit memory. This project also covers the basics of embedded systems. The fault that occurs in the transmissions can be repaired by the field assistants. By clearing the fault, the field assistant can be affected by the current due to the absence of communication between the substations. This can be overcome by this project. Before the field assistant climbs to clear the fault in the transmission pole, the power will be cut off by the substation stations, or the field assistant can manually adjust the rod in the transformers. It can be totally eliminated by entering a password. By entering the password, the supply will be cut off by the relay. The relay is playing a major role in the tripping of the circuit. If the password is entered on the keypad, that will give a signal to the microcontroller and the controller will give a signal to the relay, which will cut off the supply in the transmission lines.

A) MICROCONTROLLER

A microcontroller is a small chip on a single VLSI IC chip. It is mostly made for embedded systems. It can be programmed through the micro bot USB cable A. It can control all the systems that are connected to the circuit that is fixed to perform the work. It stores the program in the RAM, EEPROM, NOR flash, or OTP ROM. In ultramodern technology, a microcontroller looks similar to, but is less sophisticated than, a system on a chip. The chip can be used in automatic systems like remote control projects, industrial machines, household products, and all embedded products. If in need of an input or output port, RAM, a microprocessor, or memory in different components to be connected to make a system, but the microcontroller manages those components connected in separate ways that can be implemented in the microcontroller. It can be managed through digital control. It can act as both a controller and a processor. It is a sparing and common means of collecting data, operating, and observing physical work done by edge devices. In a microcontroller that will contain a 4-bit processor and work at a low frequency of 4 kHz, it will operate with less potential consumption.

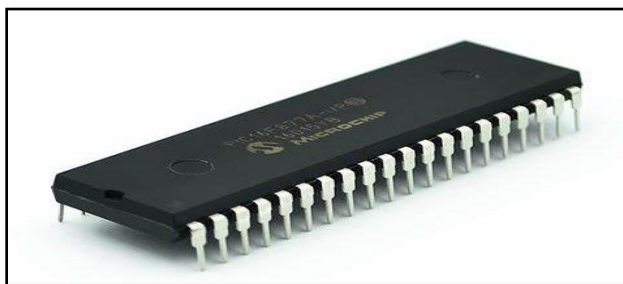


FIGURE 1: MICROCONTROLLER

B) RELAY

The relay works as an electrical switch. It is used to turn the power on or off the circuits. It consists of a couple of input terminals for one or more control signals. In olden days, the relay was made with a coil so that the coil would burn when the over current was flowing through the transmission lines. The modern relay will trip off when the over current passes through the transmission line. The ancient type of relay works on the principle of electromagnetism with a moving contact. The modern relay is made of solid-state relays and used as a semiconductor switch without any moving contact. here are 17 types of relays. In this project, a solid-state relay is used.

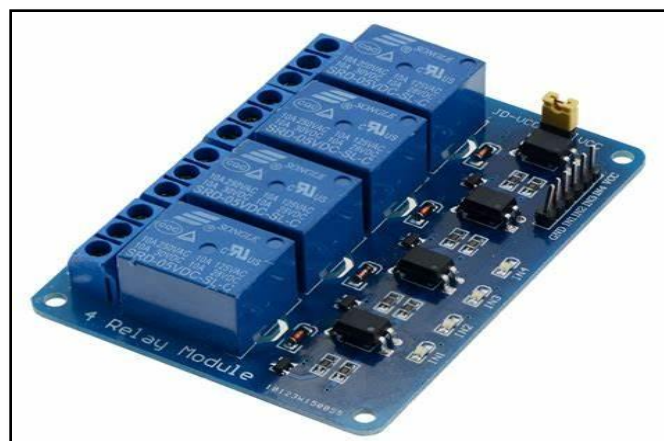


FIGURE 2: RELAY BOARD

C) LCD

LCD (liquid crystal display) is a flat-panel display. It uses liquid crystals as the key form of operation. It is made up of 100 million pixels. The quality of the display depends on the number of pixels assembled. A pixel that is made up of three sub pixels, like red, blue, and green, is called RGB. When all the sub pixels are combined to make a multiple color. A quick ON/OFF of the switch can create an image. It is made up of passive and active-matrix display grids. The active is also called a thin film transistor (TFT) display. A current is passed across the two conductors in the grid to control the pixel light. The supply is given to the liquid crystal. There are nine types of layers. The light ray passes from the backlight source to the polarizer, and the ray passes to the negative electrode, then it passes through the liquid crystal. The liquid crystal makes the light, at which time the pixel is on or off. The light ray from the crystal is given to the positive electrode, and it moves through the polarizer to display the image on the display. In this, the LCD is used to display the password and the command that is given to the password. In this LCD, a 16x2 display is used to display.

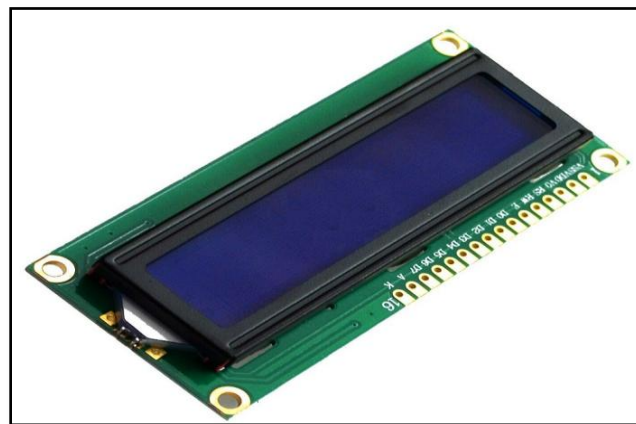


FIGURE 3: LIQUID CRYSTAL DISPLAY

D) KEYPAD

A keypad is made of buttons with a matrix of digitals, symbols, and alphabetical letters. The keypad is mostly made up of numbers and is used for some password

projects and in the numerical keypad used in computers. In this, the keypad is used to put the password on it. The password is given to the controller, and the signal is given to the relay to cut off. In this 4×4 matrix keypad is used. In those 8 pins, 4 pins are used for rows, and another 4 pins are used for columns. If the key is pressed, the switch will be closed. The signal will flow through the closed circuit, and the number will be displayed on the display.

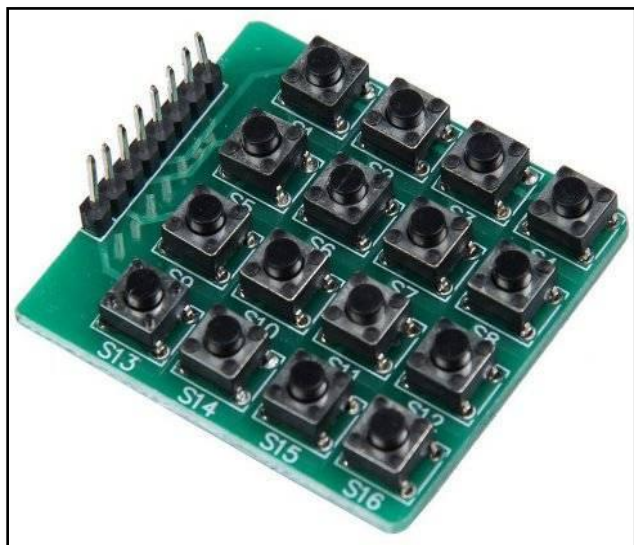


FIGURE 4: KEYPAD

CIRCUIT DIAGRAM

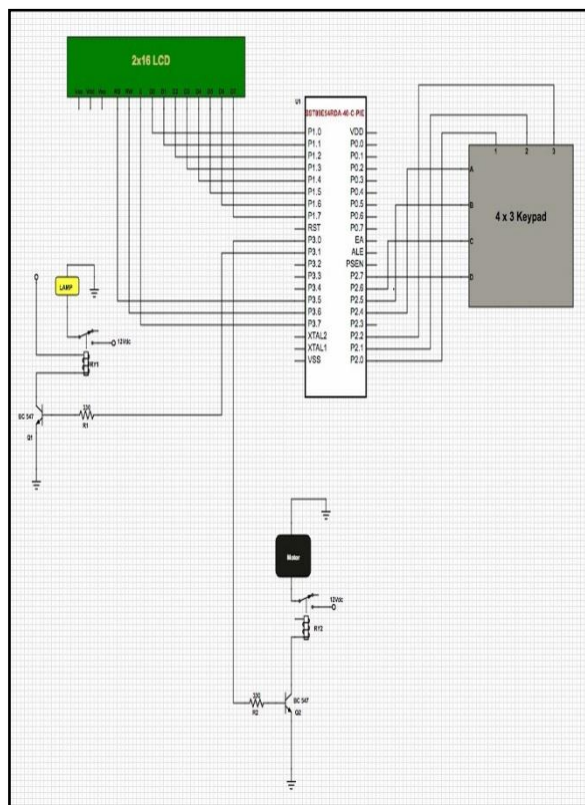


FIGURE 5: CIRCUIT DIAGRAM FOR PASSWORD-BASED CIRCUIT BREAKER

CONSTRUCTION

The project is constructed by the microcontroller, relays, keypad, and LCD. The controller can be programmed with the developer kit through the Arduino cable. The microcontroller has four ports, as in Port 0, Port 1, Port 2, and Port 3. The relay board is made up of a 1K resistor, a diode (IN4007), and a transistor (BC547). The relay board has four inputs: s1, s2, s3, and s4, with ground and supply. Each switch is given as the input for the relays. The LCD is connected to the I2C, and then the I2C pins will connect to the port on the controller. The keypad is this 44-digit matrix, which contains numerical numbers and some letters. It is made up of four rows and four columns. The microcontroller is the main component, and the relay board is connected to port 0. In that the VCC and ground are commonly connected to the controller. The four input pins for the relay board are connected to the four pins from the controller at port 0. Port 0 is an address, and the data pins on those four pins will be used for the relay. Then the LCD is connected to port 1. Port 1 is a bidirectional pin that will be connected to the eight data pins from the LCD that will be connected to the controller. If in the project an Arduino is to be used, the I2C port should be used because a minimum number of pins will be available in the Arduino. After that, the keypad should be attached to input the password, and port 2 should be used for it. Port 2 is an address pin, so the keypad will give an address to the controller to trigger the circuit. Then the 230-voltsupply of the load is given to the relay circuit with the connection of four loads with the four relays.

BLOCK DIAGRAM

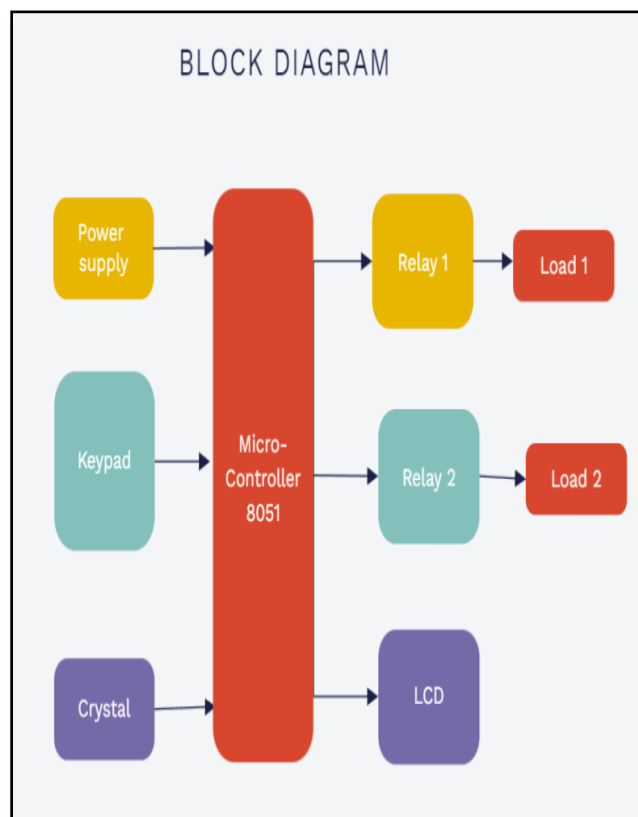


FIGURE 6: BLOCK DIAGRAM FOR PASSWORD-BASED CIRCUIT BREAKER

WORKING

The purpose of the project is to cut off the supply by using a relay with the password. If the fault occurs on the transformer or in the transmission line, the field assistant should come to the fault region in the transmission. The supply is cut off by two methods: communicating with the substation and using a rod in the transformer. If the field assistant communicates with the substation to cut off the supply at the time of any communication breakdown between them, that can put the field assistant in a high-risk region. By pulling the rod in the transformer, the manual work should be eliminated. This project can provide solutions to these problems. In the event that the supply flows through the loads, we need to cut off the supply to the load. The password should be entered in the keypad, the signal flows to the controller, and the controller recognizes whether the password is correct or incorrect. By the same token, the display will show what process is going on. If the password is correct, the display will display "welcome master," and the supply will be cut off to the related relay. Otherwise, the display will display the wrong password, and the supply will not be cut off. Through this project, the field assistant can repair the fault region in the comfort zone. The field assistant can put in the password and repair the fault; after clearing the fault, the field assistant can come down and re-enter the password, and then the supply will flow continuously. The supply ON/OFF is under the control of the field assistant at the work time.

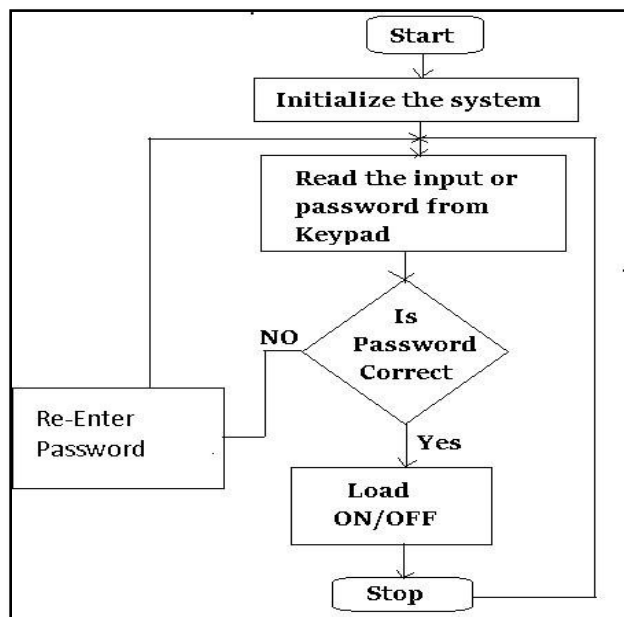


FIGURE 7: FLOW CHART OF PASSWORD-BASED CIRCUIT BREAKER

RESULT

This project is a safety project for the field assistant who works on the transmission line. It makes the field assistant

feel comfortable enough to work freely at the top of the transmission lines. Because the password is entered, all 230-volt loads are turned on or off. This process can be followed by the above-mentioned process.

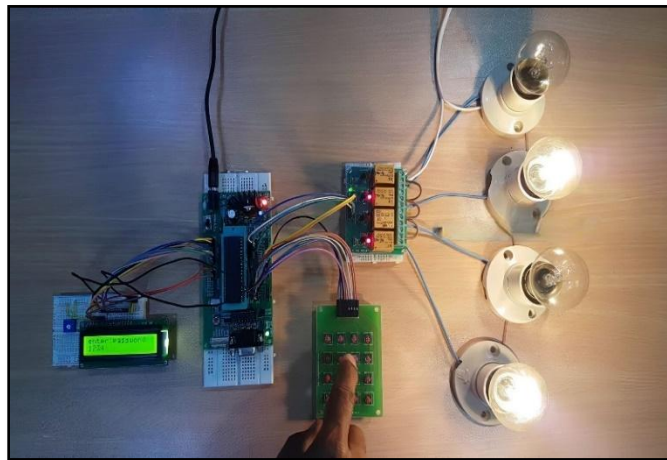


FIGURE 8: OUTPUT FOR PASSWORD-BASED CIRCUIT BREAKER

CONCLUSION

The main goal of this project's processes is to ensure the safety of the employees. The circuit can be controlled by the person who knows the password. The other person cannot control the breaker without knowing the password. It can provide effective safety to the staff and those who work under it. It is used to save more casualties in electrical maintenance.

FUTURE WORKING

Instead of this, the LORA will be used to control or enter the password on the mobile itself. By using LORA, the system can be controlled at a distance of 10km.

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