

ELECTRIC LINEMAN PROTECTION USING USER CHANGEABLE PASSWORD BASED CIRCUIT BREAKER

MD Wasiaq Raza¹, Amit Naitam²
Prof . ENTC Dept, SPACE, Wardha
UG Student, ENTC Dept. SPACE, Wardha

Abstract

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. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit 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.

INTRODUCTION

1.1 Overview

Security is the prime concern in our day to day life. Everyone needs to be securing as much as possible. The electric line man safety system is designed to control a circuit breaker by using a password for the safety of electric man. 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. This proposed system provides a solution that ensures safety of maintenance staff, i.e., line man. The control to turn on or off the line will be maintained by the line man only because this system has an arrangement such that a password is required to operate the circuit breaker (on/off). The system is fully controlled by a microcontroller from AVR family. A matrix keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the password generated. If the password entered is correct, only then the line can be turned ON/OFF. The basic idea behind this project is shown in the following figure.1. To repair a particular section of the electric supply line, the lineman wants to turn off the supply to that line. For this he first put a request to the system. Then the system responds to him using the LCD display to enter the password. Then the system generates a password and it will be send to the phone (the no of which is stored in the program).The password based circuit breaker can also be implemented in automatic door locking system for providing high security. And also can be implemented to control electronic appliances to save the power.

PROBLEM STATEMENT

It is found that 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. Hence to avoid this we are implementing a password based circuit breaker.

AIM & OBJECTIVES

This proposed system should provide a solution, which can ensure the safety of the maintenance staff e.g. line man. The control to turn ON/OFF the line will lie with the line man only. This system should have 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.

LITERATURE REVIEW

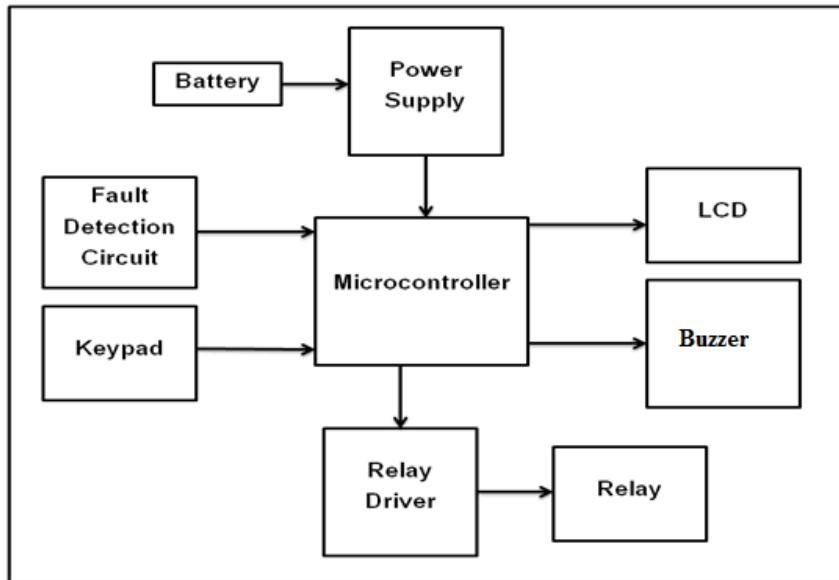
1. Ultra Fast Acting Electronic Circuit Breaker by HALESH G S1, NAVEEN G S2, VISHWANATHA A U3, SACHIN KUMAR B4, CHETAN H R in 2015 IJSETR

The steadily increasing population has more demand and consumption of electric energy in the market as raised and that of equipment's used like electrical and electronics are also costlier. So to protect the electrical system from overload or short circuit here is one possibility, which is by ultrafast acting electronic circuit breaker. A circuit breaker is automatic operated switch designed to shut down the power supply when overloaded. The tripping depends on the current passing through the CT's which is connected in series with load. It uses the PIC- microcontroller into which program is dumped for the operation.

2. Microcontroller Based Code Locking System with Alarm by Diarah Reuben Samuel, OsuekeChristian.O, Egbune Dickson in IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE),2014

The need for strict security measures has been necessary since the beginning of time. Access to certain places and items need strict restrictions to only the privileged few. This restricted zone can vary from strong holds and safes in financial institutions to doors leading to restricted areas. The various innovations in security access system include; code based lock, keycard lock, thumb print scan, retina scan. They come in handy in security systems. Code based locking system is best suited in most applications because of its simplicity and reliability. Since the code based locking system is always resident in the area to be protected, there are fewer chances of security breaches unlike the keycard lock system in which the access card can fall into unauthorized hands.

Block Diagram



PRINCIPLE

The main component in the circuit is AVR microcontroller. In this project 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. RELAY DRIVER: A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays.

Operation

For the operation of circuit breaker through a password, program is written in Atmel studio 6.0 software 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 "access denied". 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 'confirm password' 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.

Advantages and Application

Advantages

- 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

Dis-advantages

- If there is no network of GSM module the OTP will Not work.

Applications

- Can be use in the safety purpose.
- Can be used for security reasons.
- Used in Fault findings

RESULTS AND DISCUSSIONS

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.

CONCLUSIONS

The project titled 'ELECTRIC LINEMAN SAFETY BY USER CHANGEABLE PASSWORD BASED CIRCUIT BREAKER' gave the following conclusions.

- 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
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