ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 7, July 2019

Automated Circuit Breaker with Password Based Operation for Commercial and Industrial Lineman Safety

Jitesh Hemant Narkhede

Diploma Student, Dept. of EE, KCES'S College Engineering and IT, Jalgaon, Maharashtra, India

ABSTRACT: The password based circuit breaker control system is a system that access only specified password to control the circuit breaker. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit microcontroller from 8052 family which has an 8KB of ROM for the program memory. A matrix keypad is interfaced to the microcontroller to enter the password while a relay driver IC is used to switch ON / OFF the loads through relays. The complete circuit is built with on board power supply. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator which is required for the operation of the microcontroller and other components.[7]

Safety of human life is of a paramount importance. In high current switching system, switch gear protects electrical circuit. However there is need to provide confidence to working engineers during installation work on high voltage installations. To prevent accidental switching on of switch gear by unauthorized workforce, this paper proposed a more life secured switching password-enabled device that strengthen working confidence and inactivate unauthorized person from hazardous switching of electrical power installation without the notice of field working engineers.[11]

KEYWORDS: Microcontroller, Circuit breaker, Password, Safety

I. INTRODUCTION

Circuit breakers play a crucial role in switching for the reasons of both the routine network operation and protection of other devices in power systems. To ensure circuit breakers are in healthy condition, periodical inspection and preventive maintenance are typically performed. The maintenance schedules and routines usually follow the recommendation of circuit breaker vendors, although the recommended schedules may be conservative. Security is the prime concern in our day to day life. Everyone needs to be secure 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 PIC microcontroller from. 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. To repair a particular section of the electric supply line, the line man 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.[5]

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 7, July 2019

II.LITERATURE SURVEY

Mr. TarunNaruka, Vivek Kumar Sharma, Vikram Singh, Vishnu Sharma presents paper on "PASSWORD BASED CIRCUIT BREAKER" This project control system is a system that access only specified password to control the circuit breaker. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit microcontroller from 8051 family which has an 8KB of ROM for the program memory. A matrix keypad is interfaced to the microcontroller to enter the password, while a relay driver IC is used to switch ON / OFF the loads through relays. The complete circuit is built with on board power supply. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator which is required for the operation of the microcontroller and other components. Athira P Nair, Josephin J, Electric line man safety system with OTP based circuit breaker, IJRET: International Journal of Reach in Engineering andTechnology. This project focuses on the safety of the lineman while working so they do not feel the sudden electric shock. As lineman has to deal with live wires very often, the chances of critical accidents are already very high. However, with the right amount of coordination among lineman and substation, a lot of these accidents can be avoided. The project aimed at providing the solution that ensures the safety of maintenance staff. Here, as soon as the lineman detect the fault in the electric line, an SMS will be sent to the substation staff, who would switch off the line and turn it on when the fault is being resolved, thus reducing the chances of accidents and saves the power as well. The proposed system is fully operated on a microcontroller [6].

III. SYSTEM MODEL AND PROBLEM FORMULATION

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 the 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. Separate passwords are assigned for each electrical lines[2].

SYSTEM MODEL:

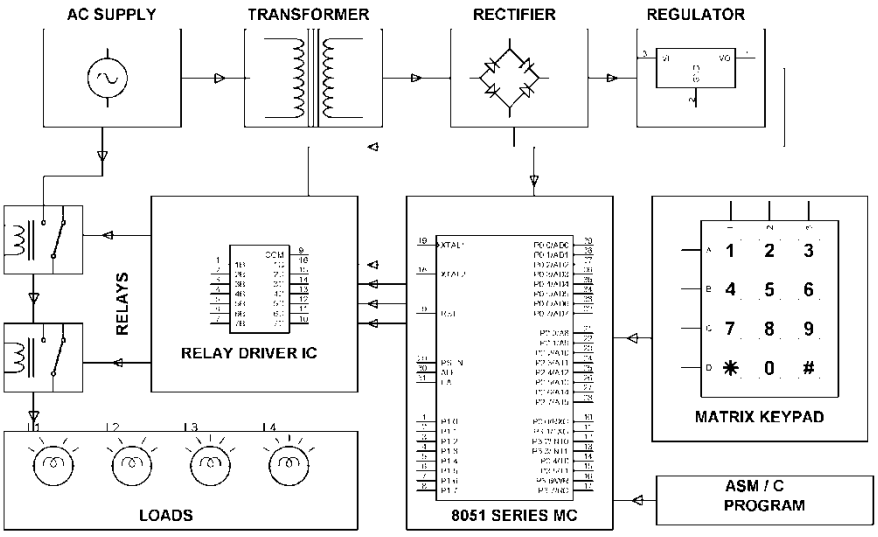

Fig 1.Block diagram of password based circuit breaker

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 7, July 2019

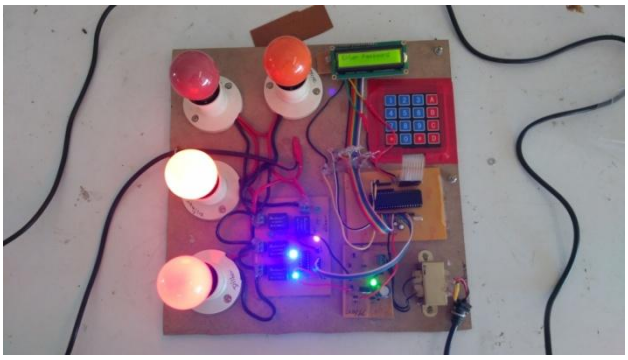

Image 1. Model Photo

- Power supply
  - As we know the power supply is the main part of any system. Without power supply the system will not work.
  - If the source is not given then how will system work? In given block diagram power supply is given to the microcontroller for proper working of the system.

- Microcontroller
  - Microcontroller is nothing but the brain of the system which store the data in memory from input and send it to output.
  - With the use of Microcontroller time to time response from the system is nicely done.

- Reset circuit
  - Reset circuit is use to create electrical signals with precise frequency as per the requirement of transformer they provided.

- Rectifier
  - A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.

- Regulator
  - A voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

- 4x 4 matrix keypad

  - Keypad is used as an input device to read the key pressed by user and to process it.
  - 4x4 keypad consists of 4 rows and 4 columns. Switches are placed between the rows and columns. A key press establishes a connection between corresponding row and column between which the switch is placed.
  - To read the key press, we need to configure the rows as outputs and columns as inputs.
  - Columns are read after applying signals to the rows in order to determine whether or not a key is pressed and if pressed, which key is pressed.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 7, July 2019

IV.ADVANTAGES

They are smaller in size than fuses. Avoids electrical accidents to lineman and used in electrical substations to ensure lineman safety.[10]

V. APPLICATIONS

Using wireless communication this system can be operated from other areas besides the substation such as on the transformer.The SCADA is a system used in the communication channels to help easy troubleshoot to locate the fault location directly and the line man can easily rectify it.[9]

VI.FUTURE SCOPE

By using IOT we can operate the relays from any area as we can directly connect to the server. Wireless ultrasonic and PIR sensors can be also used.We can use SCADA system, to help easy trouble shoot, to identify the fault location directly and line man can easily rectify it we can also use EPROMS that can be interfaced to system so the circuit breaker cannot only operate from the substation,but also from other location through wireless communication.[12]

VI. CONCLUSION

The ARDUINO microcontroller and GSM based work demonstrate the security of the lineman as switching ON/OFF of circuit breaker and opening or closing of control panel door is done for the purpose of repair or maintenance. The method overcomes the deficiency of existing system of LC opening and closing request for the line. The secured authentic password from the substation to the working lineman ensures the operation of the panel doors and circuit breaker for the beginning of work. Similarly, a request to close the lines after the work by authentic password and charging up of the line by the substation operators is done. The method double cross checks the completion and ensures the safety. Any unauthorized access into the system by wrong password for specific number of trials send a message to the LCD display and a message to substation for the security purpose.[4]
The implementation of this project gives an idea of security. Thus proposed system can be used to maintain one time password that cannot be stolen .The control over power supply is maintained continually.It can be used with SCADA system to atomizes the operation and enhance the security.[8]

ACKNOWLEDGEMENT

I would like to thank my guide Mrs.BhavnaBhavsar and Ms.Prajakta Patil for helping me through my entire project not only by providing me knowledge and also by giving me moral support. Also I , would like to thanks entire diploma staff of KCES"s Engineering College for valuable support, also thanks to of KCE"s Engineering College to provide lab and instruments for my project. And at last but not least thanks to my parents for their valuable support.

REFERENCES

[1] kcepoly.wordpress.com
[2]J.Veena, G.Srivani,Afreen, M.Sunil Kumar, J.Santhosh, K.B.V.S.R.Subrahmanyam"Electric lineman protection using user changeable password based circuit breaker"ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-2, ISSUE-5, 2015
[3] https://www.slideshare.net/shivkapil/password-based-onoff-ckt-breaker
[4]Mallikarjun G. Hudedmani*, NitinUmmannanavar, Mani DheerajMudaliar, ChandanaSooji, Mala Bogar"Password Based Distribution Panel and Circuit Breaker Operation for the Safety of Lineman during Maintenance Work"Department of Electrical and Electronics Engineering, KLE Institute of Technology, ISSN: 2456-7108 Volume 1, Issue 1, pp. 35-39, January 2017
[5]Jay Kumar, Surya Kumar, VivekYadav, Naveen Kr. Singh, Prashant Kr. Gaur, Praveen Kr. Tyagi"Password Based Circuit Breaker "International Journal of Recent Research Aspects ISSN: 2349-7688, Vol. 3, Issue 1, March 2016, pp. 80-85 © 2016
[6]Mane Kirti M., Attar Arifa U, DandileAishwarya A., GhogalePragatiS., Prof. JagtapSujit P. "Password Based Circuit Breaker"ISSN: 2321-9653; Volume 6 Issue IV, April 2018
[7]Mr. Tarun Naruka, Vivek Kumar Sharma, Vikram Singh, Sumit,Vishnu Sharma. "Password Based Circuit Breaker" Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-4, 2017 ISSN: 2454-1362

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 8, Issue 7, July 2019

[8]Abhijeet Redekar, Vaibhav Kamble, Irshad Mirza, Upendra Pange, Rushank Sardesai Students, Electrical Engineering Dept, Seti panhala, Maharashtra, (India) "electric lineman protection using keypad and gsm based circuit breaker"novateur publications international journal of innovations in engineering research and technology [ijiert] ISSN: 2394-3696 volume 5, issue 4, apr-2018
[9]Sushmita Deb1, Divya P N2, Sindhu G3, Kanthraj T S4 Department of EEE, SJMIT, Chitradurga, Karnataka, India " Electric Lineman Safety System With OTP BasedCircuit Breaker" 2017 IJRTI | Volume 2, Issue 6 | ISSN: 2456-3315
[10]Yash Pal Gautam Electronics and Communication Engineering IEC College of Engineering and Technology, Dr. A.P.J Abdul Kalam University"Password Based Circuit Breaker with GSM Module"ISSN: 2454-132X Impact factor: 4.295 (Volume3, Issue3)
[11]Blessed Olalekan OYEBOLADepartment of Computer Engineering Technology, Gateway (ICT) Polytechnic Saapade, Nigeria "PASSWORD BASED ELECTRIC LOAD SWITCHING GEAR FOR THE SAFETY OF LINEMAN"ISSN- 2456-8651OYEBOLA, Vol. 1(1): January, 2017
[12]Pramod M. Murari, Mahabal V. Kinnerkar, Prashant S. Koppa, Vishal S. Kamble, Rashmitha R. Mendan Department of Electrical & Electronics EngineeringHirasugar Institute of TechnologyBelagavi, India "Electric Line Man Safety with Password Based Circuit
Breaker and Intimation of HT Wire Sag using GSM"ISSN: 2455-2631 Volume 2, Issue 7