e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

DESIGN AND IMPLEMENTATION OF A MICROCONTROLLER BASED AUTOMATIC CHANGEOVER SWITCH

Prof. Prasanna Pothi[*1], Prof. Prasanna Titarmare[*2], Prof. Shital Yende[*3], Shubham Umbderkar[*4], Shubham Wakodiar[*5], Supriya Gadpayle[*6]

[*1,2,3]Ass. Prof. Department Of Electrical Engineering, Suryodaya College Of Engineering And Technology, Nagpur, India.

[*4,5,6]Students Department Of Electrical Engineering, Suryodaya College Of Engineering And Technology, Nagpur, India.

DOI : https://www.doi.org/10.56726/IRJMETS32878

ABSTRACT

Transmission lines are used to transmit power to large load centers over long distances. These lines are subject to interference from lightning strikes, short circuits, faulty equipment, operator error, human error, overload, and aging. To avoid this situation, we need the exact location where the error occurred. This problem is handled by a series of resistors representing the cable length in KM, and error generation is done by a series of switches for each known KM and checked for accuracy. The only way to solve this problem is to develop mechanisms that automatically detect faults in power lines and notify authorities of specific locations. In this project, we will develop a device that uses sensors to capture incoming and outgoing values and detect anomalies. The system will also be integrated with his IoT mechanism to provide real-time location information to personnel.

In addition, engineering losses occur naturally and are caused by power consumption in transmission lines, transformers, and other power system components. Technical losses in transmission and distribution are calculated using information about total load and total energy charges. It should be noted that while technology advances, so does immoral activity. Phase blackouts are a big problem in homes and industries, so our project aims to shift the load to another phase when one phase is disconnected. Also, when the load increases, the phase shifts.

Keywords: MCU Phase Selection Power Auto Changer.

I. INTRODUCTION

It is well known that in the event of a fault in an overhead power line system, high frequencies are generated by sudden voltage and current changes at the point of fault. Electromagnetic pulses, called traveling waves, propagate in both directions from faults along power lines. Power delivery infrastructure is severely compromised by many natural and abundant physical events

This can skeptically affect the overall performance and stability of the network. Low fault impedance. Fault current during a fault is relatively high. The current flow is directed into the fault, affecting the supply of adjacent zones. The voltage will be unbalanced. It is important to detect errors as early as possible. Therefore, kits of microcontrollers have been created to speed up the process. The resistance and inductance of transmission line conductors are evenly distributed over the length of the line. The method of locating traveling wave faults is generally suitable for use on long lines. Transmission lines longer than 80 km at 50 Hz are thought to have the property of voltage and current waves propagating along the line, and the voltage and current waves propagating in diffuse lines with a finite propagation velocity. increase. Traveling wave techniques for locating faults in power lines have long been reported. Subsequent developments use high-speed digital recording techniques by using traveling wave transients generated by faults. Power infrastructure is now more vulnerable to various forms of natural and malicious physical events that directly affect grid stability. There are several parameters that are affected. This drives the need to equip the legacy transmission line infrastructure with high-performance data communication networks to support future operational requirements, such as real-time attendance and control required for smart grid integration. Because of this technique, real-time monitoring is required. Many transmission companies have relied primarily on circuit indicators to identify faulty sections of transmission lines.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

However, there are still challenges in pinpointing the exact location of these errors. Although fault indication technology has provided a flexible means of identifying persistent faults, technical staff and patrol teams are still forced to physically patrol equipment over long periods of time to detect faulty sections of power lines. should be tested.

It is known that when a fault occurs in an overhead line system, the sudden change in voltage and current at the fault point generates high frequency. Electromagnetic pulses, called traveling waves, propagate in both directions along power lines from faults. Power infrastructure is severely undermined by many natural and abundant physical events. This can skeptically affect the overall performance and stability of the network. Low fault impedance. Fault currents during faults are relatively high. The current flow is directed into the fault, affecting the supply of adjacent zones. The voltage will be unbalanced. It is important to detect errors as early as possible. Therefore, kits of microcontrollers have been created to speed up the process.

This research provides an inexpensive basis for designing real-time data transmission networks. Sensors are used in various components of the power grid to monitor the state of the power grid in real time. These sensors can make fine-grained measurements of various physical or electrical parameters and generate a lot of information. Transmitting this information to the control center cost-effectively and in a reasonable time is a key challenge to overcome in order to build an intelligent smart grid. To ensure this, the project uses relays as transmission line sensing switches, when one phase breaks, the corresponding relay is turned off, the controller receives a notification, and a relay network is used to be shifted to another phase.

OBJECTIVE

The human effort involved in electrical wiring is high and the materials used in wiring are expensive. Therefore, it should be used very effectively. Therefore, this project is proposed to minimize human effort and avoid wire waste. The system can accurately measure the length of the wire and the cutting machine can cut the wire into multiple pieces. The system works very flexibly and uses the correct input from the keyboard to display the input on the LCD.

II. LITERATURE SURVEY

Automatic Multiwire Cutting Machine Using Pnuematic System and Arduino

This document provides detailed information on the design and development of automatic wire cutting machines. Traditional wire cutting and measuring methods are currently used, which are more time consuming and labor intensive. The accuracy obtained with conventional methods is also low. Automation systems solve labor problems, save costs, increase accuracy and reduce human error. By using automation, our goal is to have cost-effective cutting that works quickly and reduces cutting time. The actual goal of an automatic wire cutting machine is to cut the required length and number of wires [1].

Development and Designing of Automatic Wire Cutting System using Microcontroller,

The proposed system implements a state-of-the-art real-time automatic wire cutting system. This system is based on ARM 7. Preliminary results show that the Embed platform is a promising avenue for real-world implementation of “automated wire cutting system” applications.

Modern technology has greatly reduced human effort and error through automation. The development of automatic wire cutting systems reduces the human effort required to cut the wire to the correct length. The time required to cut wires of different lengths depends on the efficiency of the operator. Quality depends on the accuracy and skill of the workers. An ARM 7 microcontroller was used to control the operation of the system. This system saves the time required to cut wires. Labor costs can also be saved. This system increases efficiency in the industry by saving time and money. Results are analyzed with Proteus and real-time experiments. [2]

Inventive creation of arduino programmed gear cutting in drilling machine,

This paper describes the introduction of removable equipment to existing drilling machines for making spur gears and the elimination of manual labor. It is included. The removable structure consists of a special sleeve that holds the cutter and a compound slide for linear bed travel. The rotary indexing table is replaced by a DC stepper motor for incrementally indexing the workpiece. Automation of this interlocking process is achieved using the Arduino UNO. This project eliminates the need for separate machines for gear cutting and drilling. By

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

using this detachable structure on the drilling machine, the gearing operation can be performed on the drilling machine itself.[4]

III. PROBLEM STATEMENT

The Hindusthan Electric power solution company provide us the task to design the machine who cut the lamination pipes use in copper lamination in the specific length and number of quantity. We are designing the machine to cut the pipes inserted in the machine using Arduino controller[7;8;9;10].

IV. EXISTING SYSTEM

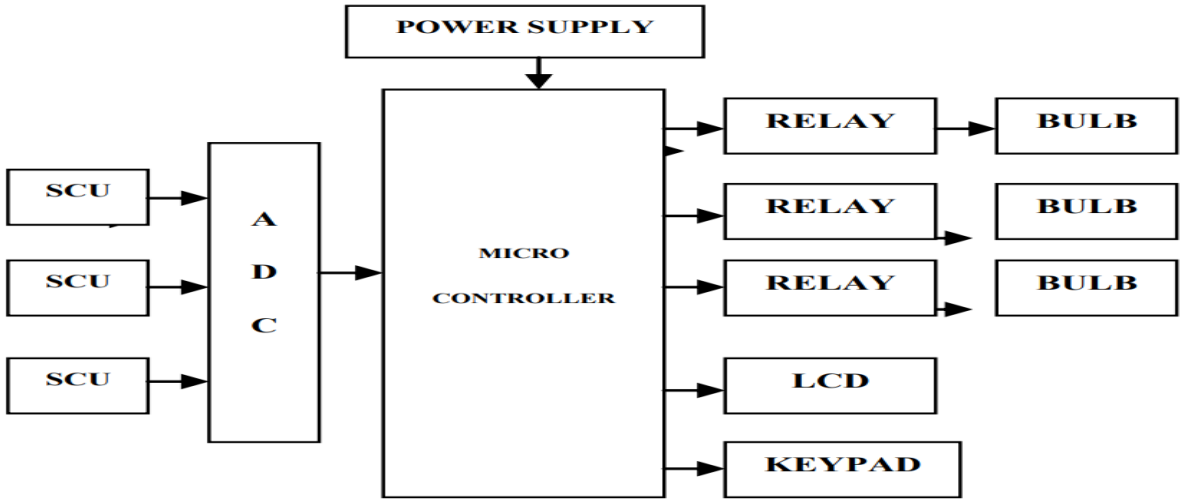

Fig 1: Block Diagram of Existing system

In our daily life, we focused on fixing the system and minimizing the situation in our private life. This is how the idea of an automatic phase changer was chosen. It can be used in three-phase applications. A three-phase device with a low supply voltage on one of the phases and wanting all devices to work properly. This device can help save this situation. Nevertheless, in three stages, i. H. Properly rated fuses must be used on the R, Y, and B input lines. The correct voltage is available at this point. Other low voltage phases will likewise transition to the correct voltage and operate all tools on a single phase within the building. The circuit consists of relay comparator, transformer.

V. BLOCK DIAGRAM

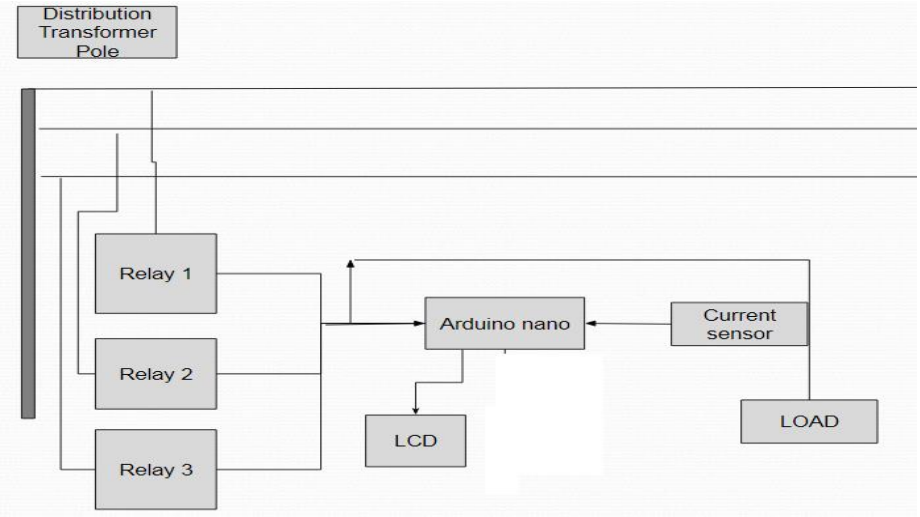

Fig 2: Block Diagram of proposed system

The main ATmega328 microcontroller is used on the Arduino board as shown. The tube is placed in a tube holder driven by a DC motor. Arrange the touch sensor according to the required pipe length. When the sensor

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

signals the controller, the pipe holder stops and the servo shaft descends to move the saw blade and cut the pipe. Cutting tube moves down. At the same time, there is counting programming to count the number of tubes.

VI. HARDWARE USE

Arduino UNO ATmega328, Relay, LCD, DC Gear Motor, 12V Power Supply, Servo Motor Software Used: Arduino IDE Compiler, AC voltage sensor, power supply, Arduino-Uno interface control, and LCD display.

Voltage Sensor Interfaces:-

voltage sensors include transformers, capacitors, variable resistors (pots), zener diodes, bridge ICs, etc. The secondary side of the transformer is connected to a W10 bridge IC for rectification. A capacitor is connected across the bridge IC. A variable pot connected in series with the power supply.

Arduino Uno Interface: -

The Arduino Uno R3 is an open source microcontroller board based on the ATmega328 chip. The board features 14 digital input/output pins, 6 analog input pins, an integrated 16MHz ceramic resonator, a USB connector, an integrated DC power jack, an ICSP header, and a microcontroller reset button.

Contains everything needed to support the microcontroller. Using the board is also very easy, just connect it to your computer with a USB cable, or power it up with a DC adapter or battery to get started. There are six sensors connected to the Arduino Uno analog port pins A0-A5. Power terminal connected to 5V and ground. Relay driver connected to pin number 8, 9, 10. The LCD is connected to digital pins 2-7.

Relay Circuits:-

The relay is an electrically actuated switch. Many relays use electromagnets to mechanically actuate the switching mechanism, but other operating principles are also used. Relays are used when a circuit needs to be controlled with a low power signal (where there is full galvanic isolation between the controlling circuit and the circuit being controlled) or when multiple circuits need to be controlled with one signal used for

VII. CONCLUSION

This arrangement of electrical and electronic components provides a three phase continuous single phase power supply from all available phases. We will also look at the operation of the op amp and the entire undervoltage protection kit, as well as the operation of the 3-way relay. In this work, an automatic phase changer with an LM324 comparator was designed, built, and tested. The system works smoothly as expected. Reliable, durable and portable. Costs associated with development make it much more affordable than comparable products.

VIII. REFERENCES

[1] "Real-Time Monitoring and Control of the Parameters of an Induction Motor", Department Of Electrical and Electronics Engineering, Technology of Faculty, Gazi University Teknikokullar Ankara, Turkey

[2] "Remote Controlling and monitoring of Induction motors using internet", Abdulkadir, Cakır, Hakan Cali's, Gokhan Turan Suleiman Demirel University, Faculty of Technology, Department of Electrical and Electronic Engineering, Isparta Turkey

[3] "Research on remote wireless monitoring system based on GPRS and MCU" , Zhong-Xuan, J. Xiau-Yu, H. Zhao-Fu, Z. Yan-Tao, D. Meng,Int. Conf. Computational Problem Solving ICCP 2010, Lijiang, China, Dec.

[4] Akatsu K. and Kawamura A., (1999), —Sensor less very low and zero speed estimations with on-line secondary resistance estimation of induction motor without adding any signal||, Proc. IEEE Ind. Applicant. Soc. Annual. Meeting, pp. 187–193.

[5] D. S. Ghataoura, J. E. Mitchell, and G. E.Matich, "Networking and application Interface technology for wireless sensor network surveillance and Monitoring," IEEE Commune. Mag., vol. 49, no. 10, pp. 90–97

[6] Thompson H. A, "Wireless and Internet communications technologies for monitoring and control", Control Engineering Practice, no. 12, pp. 781– 79, 2004.

[7] Bhambulkar, A.V. (2011). Municipal Solid Waste Collection Routes Optimized with ARC GIS Network Analyst. International Journal Of Advanced Engineering Sciences And Technologies, 11(1): 202-207.

[8] Ganorkar RA, Rode PI, Bhambhulkar AV, Godse PA, Chavan SL. Development of water reclamation package for wastewater from a typical railway station. Int J Innov Technol Res. 2014;2(2):841–846 http://ijitr.com/index.php/ojs/article/view/288/pdf.

[9] Rahul Mishra and Vaibhav Dewangan, —Optimization of Component of Excavator Bucket, International Journal of Scientific Research Engineering & Technology (IJSRET), Vol. 2, Issue2, pp 076-078, May 2013.

[10] John, B. (2012). Analysis of effectiveness and outcome of organizational development interventions in Bhilai Steel Plant. PhD Thesis; School of Management Studies & Research;MATS University, Raipur (India).