WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Electric Line Man Safety with Password Based Circuit Breaker

Shreya Laxman Dasar[1], Rutu Gomateshwar Kadage[2], Minakshi popat Mane[3], Purva Shital Athane[4], Mr Pravin Kumar Karve [5]

[1, 2, 3, 4] Department of Diploma in Computer Engineering, Third Year, Sharad Institute of Technology, Polytechnic Yadrav, Ichalkaranji, Kolhapur, Maharashtra, India

[5] Lecturer, Department of Diploma in Computer Engineering, Sharad Institute of Technology, Polytechnic Yadrav, Ichalkaranji, Kolhapur, Maharashtra, India

ABSTRACT:

The project aims to enhance electric lineman safety by implementing a password-based circuit breaker system. This system will allow authorized personnel to control electrical circuits by entering a password, thereby preventing unauthorized access and ensuring the safety of workers. The abstraction involves simplifying the complexity of circuit breaker operation and safety mechanisms through a user-friendly interface, while also integrating safety measures such as fail-safe mechanisms and emergency shut-off procedures. Additionally, monitoring and logging features will be implemented to track circuit status and safety events for analysis and compliance purposes. The core feature of this proposed system is its ability to grant control over the activation and deactivation of electrical lines exclusively to the line workers. This empowerment is facilitated through the implementation of a password-protected mechanism for operating the circuit breaker, thereby allowing only authorized personnel to initiate ON/OFF operations. Ultimately, the project focuses on providing a secure and efficient solution for controlling electrical circuits while prioritizing the safety of electric linemen.

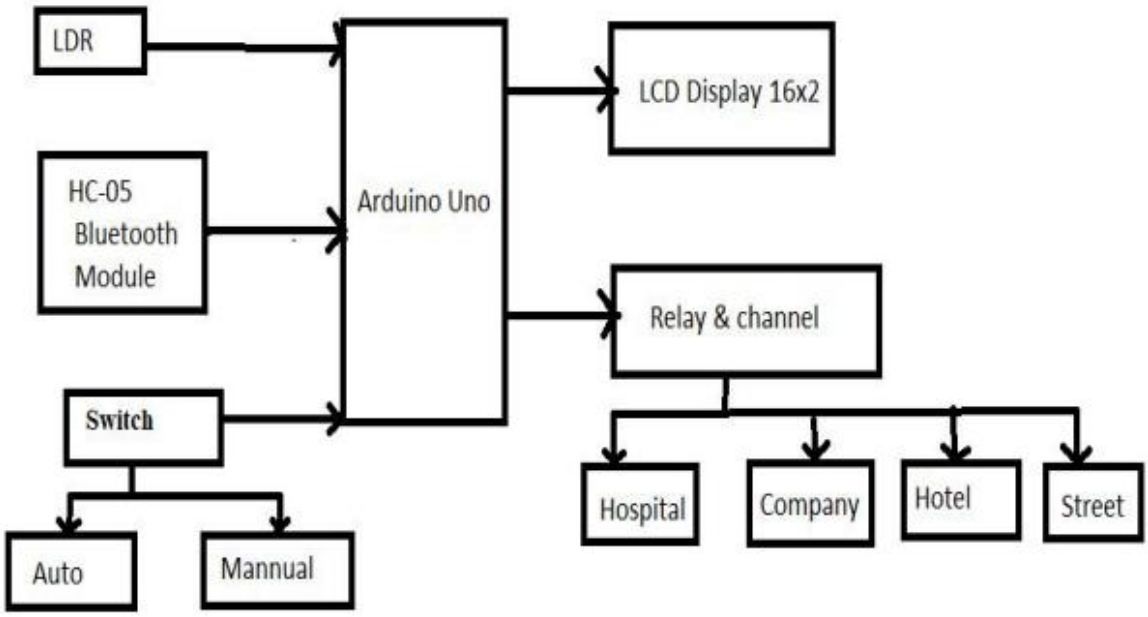
Introduction:

Electric linemen face significant safety risks when working with live electrical systems, necessitating constant innovation in safety measures. One promising solution gaining attention is the implementation of password-based circuit breakers. Traditional methods of de-energizing circuits involve physically removing fuses or using manual switches, often requiring linemen to work near live components, which poses inherent dangers. The proposed approach integrates modern technology to enhance safety by giving linemen greater control over energization and de-energization processes, reducing the risk of electrical accidents. This project aims to design, develop, and implement password-based circuit breakers tailored to lineman operations. Objectives include creating a secure authentication system, user-friendly interfaces, stringent safety protocols, and comprehensive testing. By improving safety measures, this project contributes to safeguarding linemen and enhancing operational efficiency within the electric utility industry, ultimately creating a safer working environment for all personnel involved.

Need of Project:

This project addressing electric lineman safety through password-based circuit breakers is essential due to the inherent risks associated with live electrical systems. Linemen often face hazards when maintaining or repairing such systems, necessitating close proximity to live components. By introducing password-based circuit breakers, only authorized personnel can control electricity flow, significantly reducing accident risks. Moreover, user-friendly interfaces will simplify operation, and stringent security measures will prevent unauthorized access. Ultimately, this initiative aims to enhance lineman safety and improve overall workplace safety standards in electrical maintenance.

Block diagram:



Methodology:

The methodology for our project on electric lineman safety using password-based circuit breakers involves several key steps. First, we plan the project by setting goals and timelines. Then, we research existing safety methods and gather requirements for our system. Next, we design the system, both its hardware and software parts, and integrate them together. After that, we thoroughly test the system to make sure it works properly and meets safety standards. Once testing is complete, we deploy the system and provide training and documentation for its use. Finally, we monitor and maintain the system to ensure it continues to work safely and effectively. Through these steps, we aim to develop and implement a reliable solution to improve electric lineman safety.

Planning:

- Define project objectives, scope, and timeline.
- Develop a detailed project plan.

Research and Requirements Gathering:

- Study existing safety methods and technologies.
- Gather requirements for the password-based circuit breaker system

Design and Development:

- Design system architecture and specify components.
- Develop hardware (e.g., PCB, authentication modules) and software (e.g., firmware, user interfaces)

Integration and Testing:

- Integrate hardware and software components.
- Conduct comprehensive testing for functionality and security.

Deployment and Training:

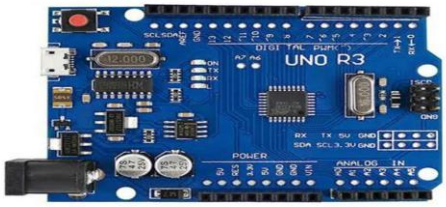
- Deploy the system in a controlled environment or pilot project.
- Provide training on system usage and maintenance.

Monitoring and Maintenance:

- Implement monitoring systems for ongoing performance.
- Schedule regular maintenance to ensure continued safety and functionality.

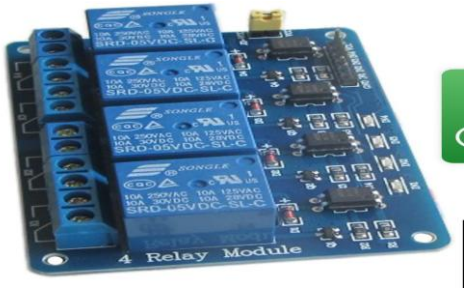
Hardware Components:

Arduino Uno:



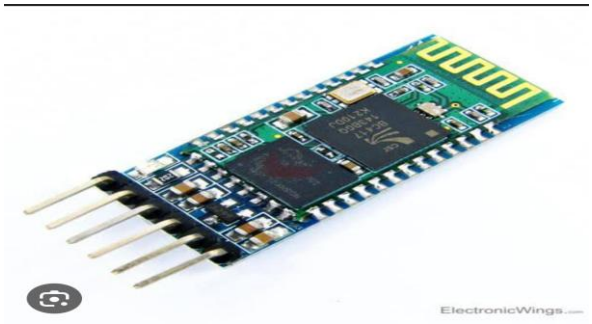
The Arduino Uno is used to control the circuit breaker and access to the breaker is protected by password. The lineman needs to enter the correct password to operate the circuit breaker ensuring that only authorized personnel can control the electrical power supply enhancing safety measures for the lineman and electrical system

Relay driver:



These are the relay drivers when the lineman enters the correct password using Arduino Uno, the microcontroller signals the relay drivers to actuate the relays. these relays are connected to the circuit breaker, allowing the Arduino to remotely control the power supply. Essentially the relay driver helps microcontroller to communicate with and control the physical circuit breaker ensuring a secure & password protected operation for lineman safety.

Bluetooth HC05:



The HC-05 module is connected to the Arduino Uno, serving as a wireless communication link. Lineman can input the password wirelessly using a smartphone or another Bluetooth-enabled device. The HC05 receives this password information. The Arduino Uno processes the received password & checks if it matches the authorized code. If the password is correct, the Arduino sends a control signal to the relay drivers, allowing the circuit breaker to be operated. The HC05, acting as a Bluetooth bridge, enables remote control without the need for physical contact with circuit breaker, enhancing safety for the lineman.

LCD Display:

The LCD provides a visual interface for displaying information such as the status of the circuit, password entry, and system feedback.

DC-DC Booster:

Power for the boost converter can come from any suitable DC source, such as batteries, solar panels, rectifiers, and DC generators. A process that changes one DC voltage to a different DC voltage is called DC to DC conversion.

LDR:

Light Dependent Resistors are often used as light sensors. LDR sensor working when it is required to detect the presence and absence of light or to measure the light intensity. Examples are night lights and photography light meters.

Software Requirement:

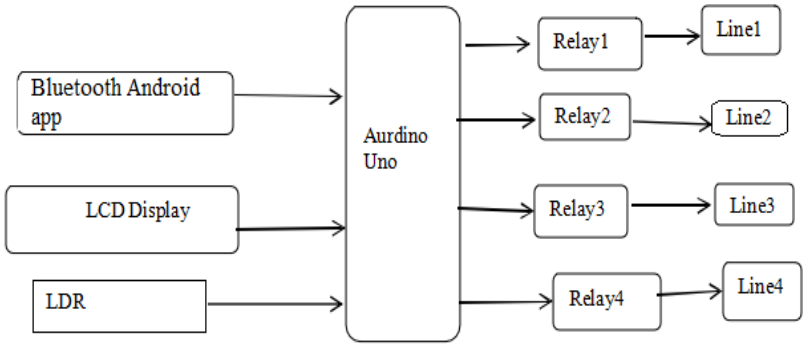
Arduino Bluetooth control

Arduino Bluetooth Control is an application that allows you to control your Arduino via Bluetooth, and so to create awesome and fully customized projects, with the new features available within the app. The settings section allows you to adapt the application to your needs, through a very simple and intuitive interface.

Result and Discussion:

Firstly, the project confirmed the operational effectiveness of the password-based circuit breaker system, facilitated by Arduino Uno's microcontroller capabilities. This system allowed users to authenticate themselves, manipulate circuit breakers, and monitor system status via the Arduino Bluetooth Control App. Real-time monitoring of ambient light levels using the LDR enhanced safety measures by adjusting protocols based on lighting conditions. Assessments of reliability, efficiency, and user experience provided valuable feedback for system refinement. The project underscores the importance of integrating hardware and software solutions for enhanced safety in electrical maintenance tasks, laying a foundation for future advancements in the field.

System Design:



To design a password-based circuit breaker system for electric lineman safety, several key components and considerations must be addressed. Firstly, hardware components such as a microcontroller, relay module, keypad for password input, and optionally, a display unit for status messages should be selected. Software design entails implementing secure password management, input handling, authentication logic, and control logic to manage circuit connection and disconnection. Safety features like a timeout mechanism to prevent brute-force attacks, emergency shutdown capability, fault detection, and proper isolation mechanisms are crucial for ensuring lineman safety. An intuitive user interface with clear prompts and messages on the keypad and display unit enhances usability. Testing and calibration are essential to verify system functionality and reliability, including simulations, sensor calibration, and real-world field testing. Comprehensive documentation, user manuals, and training programs are necessary for lineman understanding and compliance. Regulatory compliance with industry safety standards and regulations is paramount, as is establishing maintenance schedules and technical support mechanisms for ongoing system upkeep and troubleshooting. By following this system design approach, a robust and effective password-based circuit breaker system can be developed to enhance electric lineman safety.

Conclusion:

The lineman and his safety play a major role Technology is ruling the world nowadays, but it should not erase problems for our development. Human safety is the most important factor. We have completed the project as per the requirements of our project. Finally, the aim of the project to avoid the fault accidents for line man. 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.

REFERENCES:

1. T. B. Smith, “Electricity theft: a comparative analysis,” Elsevier Journal Energy Policy, vol. 32, no. 18, pp. 2067-2076, Dec. 2004.
2. J. Dick, “Theft of electricity-how UK electricity companies detect and deter,” in proceedings of European Convention on Security and Detection, pp. 90-95, May 1995.
3. C.J. Bandim, J.E.R. Alves Jr., A.V. Pinto Jr., F.C. Souza, M.R.B. Loureiro, C.A. Magalhaes, and F. Galvez-Durand, “Identification of energy thef and tampered meters using a central observermeter: a mathematical approach,” in proceedings of IEEE PES Transmission and Distribution Conference and Exposition, vol. 1, pp. 163-168, Sept. 2003.
4. S.S.S.R. Depuru, L. Wang, and V. Devabhaktuni, “A conceptual design using harmonics to reduce pilfering of electricity,” in proceedings of IEEE Power and Energy Society General Meeting, pp.1-7.