Secured Circuit Breaker

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Abstract- In our daily lives, security is the top priority when engaging in any activity. Accidental lineman deaths are frequently reported and documented in the current situation. In light of the current working style, it is determined that a safety measure to protect the operator is essential. Using a password, the electric lineman safety system is intended to operate the circuit breaker and control panel doors.

The project's goal is to use a password alone to operate a circuit breaker. To enter the password, a keypad is attached to the project. Due to a lack of coordination and communication between the maintenance crew and the electric substation team, the number of fatal electrical mishaps involving linemen is rising during electric line repairs. The solution offered by this suggested system can guarantee the security of the maintenance personnel, such as linemen. Only the line man has the authority to turn the line on or off.

INTRODUCTION

Inadequate communication between maintenance personnel along with the electrical substation has led to an increase in line operator casualties during repairs. To guarantee line worker safety, this project provides a solution to this issue. The line operator in this proposed system is tasked with managing the ON/OFF state of the electrical lines. Due to the project's configuration, maintenance technicians or linemen are required to input a password to activate or deactivate the electrical line. If an electrical line breaks, the lineman will use a password to cut the line's power supply before repairing the line comfortably. After arriving at the substation, the lineman will switch on the supply to the designated line. In recent years, worker safety has received more attention from researchers. For linemen, fixing electrical line faults has always been difficult. For the maintenance workers to be safer, the supply control and safety systems need to be updated. There have been numerous advancements in circuit breaker control and other control system technology for the safe and efficient operation of the substation and its employees. The goal of this project, which was constructed by Amit Sachan, is to use a GSM modem or phone to gather remote electrical parameters encompassing current, voltage, as well as frequency, sending them in real-time through GSM-network. It will additionally record temperature readings at the power plant. Additionally, this effort aims to shield electrical circuitry by activating this relay each time the electrical characteristics exceed the preset thresholds. A circuit breaker can be controlled by the relay to cut off the main electrical supply. By sending commands through SMS, the user can read the electrical characteristics of the remote object. This system can also send regular, automated SMS messages providing the current electrical properties, contingent upon the time settings.
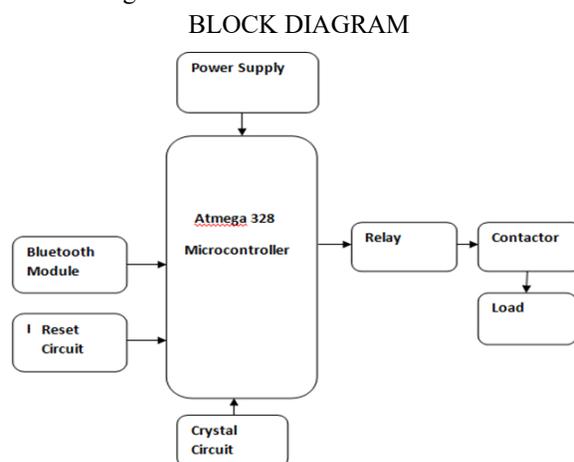
BLOCK DIAGRAM

Fig.1.-Block Diagram of Secure Circuit Breaker

In the above block diagram is secure circuit breaker, in above diagram the various block are show such as Bluetooth module, reset circuit, power supply antenna 328/microcontroller, crystal circuit, relay contactor and last one is load.

Based on the AVR enhanced RISC architecture, the ATmega48P/88P/168P/328P is a low-power CMOS 8-bit microcontroller that can execute complex instructions in a single clock cycle and achieve throughputs of nearly 1 MIPS per MHz, enabling the system to be designed to balance processing speed and power consumption.
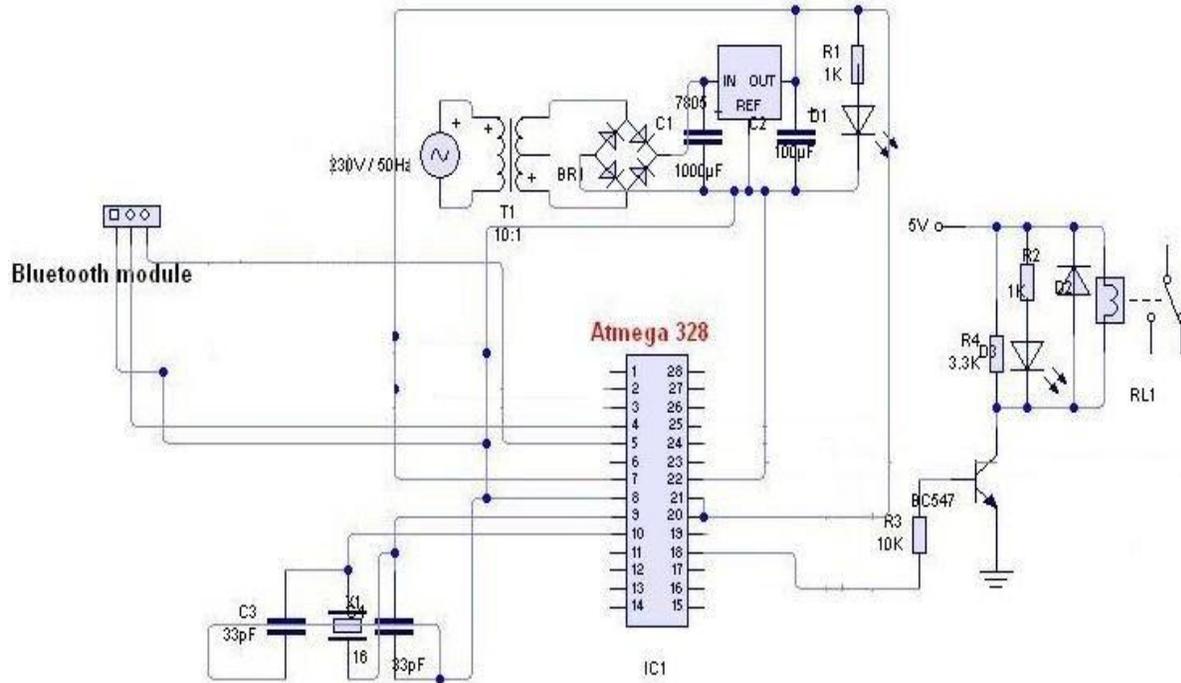

Fig.2.-Circuit Diagram of Secure Circuit Breaker

32 general-purpose working registers and a comprehensive instruction set are combined in the AVR core. Since the Arithmetic Logic Unit (ALU) is directly coupled to all 32 registers, two separate registers can be accessed in a single instruction that is completed in a single clock cycle. Compared to traditional CISC microcontrollers, the new architecture achieves throughputs up to ten times quicker while using less code. Features offered by the ATmega48P/88P/168P/328P include: In-system programmable flash with read-while-write capabilities that has 4K, 8K, 16K, and 32K bytes 23 general-purpose I/O lines, 32 general-purpose working registers, three flexible timer/counters with comparison modes, internal and external interrupts, a serial programmable USART, a byte-oriented 2-wire Serial Interface, 512/1K/1K/2K bytes SRAM, 256/512/512/1K bytes EEPROM, and an SPI serial

TECHNICAL DESCRIPTION

AVR's enhanced RISC architecture is the basis for low-power CMOS 8-bit ATmega48P/88P/168P/328P microcontroller. For balancing processing speed along with power consumption, ATmega48P/88P/168P/328P demonstrates powerful instructions within single clock cycle, attaining throughputs that are nearly 1MIPS/MHz. AVR-core integrates 32 general-purpose working registers along full instruction set. All 32 registers have been closely related to Arithmetic Logic Unit (ALU), aiding loading of 2 separate registers under single command that requires one clock cycle to execute.

Novel architecture provides throughputs up to 10x faster with less code in comparison to traditional CISC-microcontrollers.

ATmega48P/88P/168P/328P exhibits characteristics mentioned as: 512/1K/1K/2K bytes of SRAM,

256/512/512/1K bytes of EEPROM, 3 flexible timer/counters alongside compare modes, 32 general-purpose working registers, a serial programmable USART, internal as well as external interrupts, a byte-oriented 2-wire Serial Interface, an SPI serial, 4K/8K/16K/32K bytes of In-System Programmable Flash using Read-While-Write capabilities, 5 software-selectable power-saving modes, a programmable Watchdog Timer having internal oscillator, a 6-channel 10-bit ADC (8 channels in TQFP along QFN/MLF packages), among additional features. In idle mode, the CPU can still be used by Timer/Counters, SRAM, 2-wire Serial Interface, USART, SPI interface, as well as interrupt system. All other chip actions are halted until next interrupt occurs, oscillator is frozen, and register settings are maintained in power-down state.

INTRODUCTION TO ARDUINO

The open-source Arduino platform comprises adaptable, user-centric hardware and software designed for electronics prototyping. The intended audience comprises artists, designers, hobbyists, along with individuals interested in establishing interactive objects or environments.

Lights, motors, along with other actuators can be controlled by Arduino, which senses its environment and influences it by absorbing data through several sensors. Arduino Development Environment and programming language have been utilized for programming device's microcontroller. Arduino creations can interact with computer software or operate independently.

Numerous alternative microcontrollers are available. You might wonder why the Arduino was chosen. Arduino is a fantastic platform for amateurs since it makes constructing projects using a microcontroller much easier. Even if you have no prior electronics skills, you can begin working on one with ease. This Arduino guide is about it.

Apart from its ease of use, Arduino is also open-source, cross-platform, and reasonably priced. ATMEGA8 along with ATMEGA168 microcontrollers from Atmel serves as the foundation for the Arduino. Both experts as well as seasoned fans can develop their own versions of the Arduino, extending and improving it, since the module designs are made available under a Creative Commons license.

Unbelievably, even less experienced users may understand how the Arduino module works and save a little money by developing a breadboard version of it.

PERFORMANCE ANALYSIS

Testing:
The system is an essential element of the assurance protocol and functions as the ultimate evaluation of the design and specifications. To verify the outcomes both theoretically and practically, the system is evaluated using the aforementioned approaches. A comparison with a typical system is attempted.

System Principle:
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Principles of Testing: Before using the design test technique, it is necessary to comprehend the fundamental principles that underpin testing. The principles of testing consist of:
• Every test should be able to be linked back to the operator's needs. The most common flaw is when a program doesn't fulfil its requirements.
• As soon as the requirement model is finished, test planning can start, and test definition should be planned before testing starts.
• A thorough description of the exam has been established. Comprehensive testing is not feasible. For even or somewhat larger applications, the path permutation is extraordinarily large. As a result, it is feasible to provide sufficient coverage. The program's logic and to confirm that every prerequisite for reaching the final level has been met.

Testing Objectives:
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Testing Objectives: There are various testing objectives. The process of running hardware to identify errors is called testing. With the least amount of time and effort, we can identify an error that hasn't been found yet. If testing is done correctly, hardware errors will be found. As a side advantage, testing shows that the hardware function seems to have met the performance requirement and behaved according to the functioning specification. Furthermore, evidence gathered during testing is unable to demonstrate the absence of errors and defects. It may display both the measured value's accuracy and deviation. Examining the Power Supply Output: Use the DMM to check the voltage of the Power Supply output at the transformer bridge rectifier output and series voltage regulator.

Continuity Test:

The procedure for determining the presence of current in an electric circuit and verifying its accuracy is referred to as a continuity test within electronics. Continuity test has been performed by connecting chosen line in series with an LED or another sound-emitting device, such as a piezoelectric speaker, and applying a small voltage across it. An "open" circuit is impeded by excessive resistance, broken wires, or damaged components. Two instruments employed for performing continuity tests are multi-meters, for measuring current, along with specialized continuity testers, which are simpler and less expensive devices.

CONCLUSION

To sum up the project, the suggested system is an affordable, low-budget system with a straightforward design. As previously indicated, lineman safety and protection are our top priorities. Therefore, we made an effort to create a system that could guarantee it with complete precision. The job was finished in accordance with the specifications. Lastly, the project's goal is to prevent linemen from dying in accidents.

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