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Electronic Circuit Breaker for Lineman Safety Using Finger Print Scanner

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ABSTRACT

Electrical accidents to lineman are rising during electric line repair due to lack of communication between the maintenance staff and electric line man. This proposed system provides a solution that ensures safety of electric lineman i.e., line man on detecting a fault in electric line the line man senses his finger in fingerprint scanner and the main line is switched off which is again switched on after solving the fault by again sensing his finger, thus it saves the life of lineman working on electric line. The proposed system is fully operated on Arduino.

Keywords: Fingerprint scanner, Arduino, RFID Reader.

1. INTRODUCTION

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. The main objective of this project is to save line man by making such a protective system controlled through fingerprint scanner. In this proposed system if there is any fault in line the line man senses his finger due to which main line is switched off after that he works on line solving the problem and after that again senses his finger and switch on the electrical line. Nowadays, electrical accidents to the line man are increasing, while repairing electrical lines due to lack of communication between maintenance staff and electrical line man. This project gives a solution to this problem to ensure electric line man safety. It very simple to maintain so it is very useful for the line man. The parts which is required for our model is easily available in the market. The main concept of our project is to save the life of line man. The main component of our project is the Fingerprint scanner which is required to sense the finger.

2. EXISTING METHODOLOGY

If there is any fault in line the line man sends the password due to which the main line is switched off. After he works a SMS is send to switch on the electrical line. Due to many electrical lines the password for particular line may be collapsed. The network problem will affect the proper working of the system, Since it contain a GSM modem. There should be sufficient balance in the SIM also.

2.1. DISADVANTAGE OF EXISTING METHOD

Nowadays there is no security the password may be hacked. While sending SMS some tower problem. In case of emergency this is not suitable.

3. PROPOSED METHODOLOGY

This below figure is an overall block diagram of arduino based electronic circuit breaker which consists of finger print scanner.

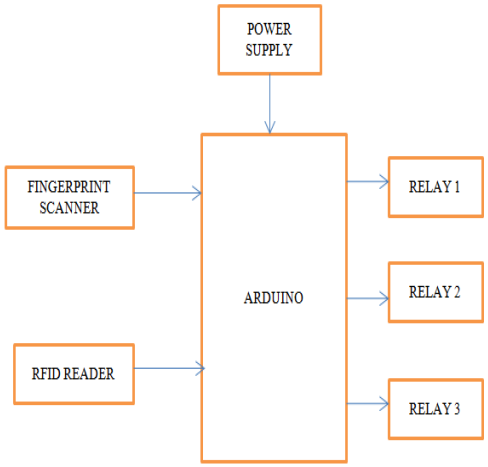


Figure 1: Block Diagram of circuit Breaker

In the above block diagram, finger print is enrolled by a lineman. This module is connected to the arduino. If the finger print stored in the scanner is matched with the authenticated finger print, arduino is turned on .This makes on or off the relay which helps to control the electric line. After the completion of the work, above process is repeated in the same manner by the lineman. When a person's finger physically changed, finger print scanner does not take this into consideration. In such cases, person can have the difficulty to identify themselves and gaining access. In such cases, RFID tag is used.

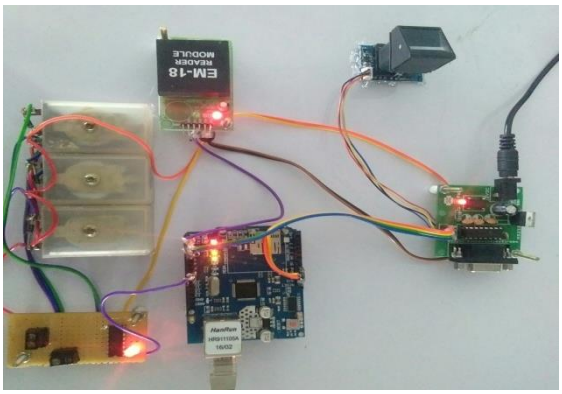


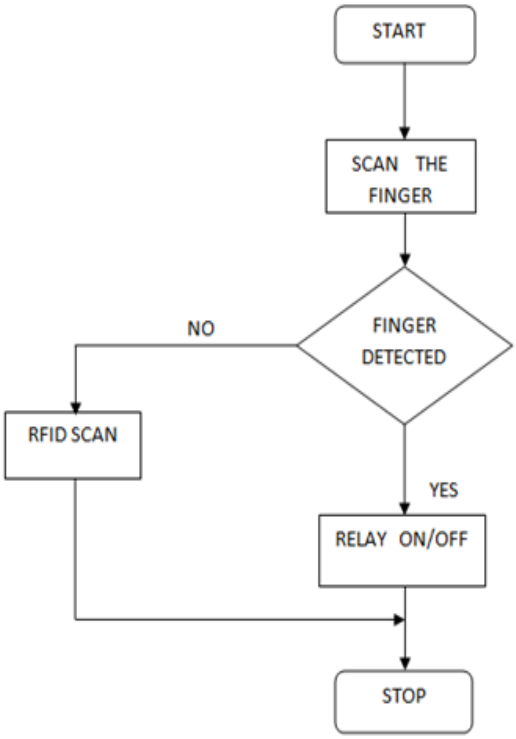
Figure 2: Electronic circuit Breaker with fingerprint scanner

The proposed system also used to upload the power usage in the internet in a timely manner.

4. OBJECTIVE

The main objective of this project is to provide security thereby saving life of the lineman. The previous techniques produces manual errors. With the help of finger print scanner, the proposed system provides solution that ensures safety of lineman. In addition to this, power usage is also uploaded in the internet in a timely manner.

4.1. FLOW CHART



The above flowchart mainly describes about the finger print authentication.

4.2. ARDUINO

Arduino is an open hardware. Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on chip flash memory. SRAM memory is used by the aurdino. The operating voltage of ATMEGA 328 is 5V. The recommended input voltage is 7-12V and limited input voltage is 6-20V.

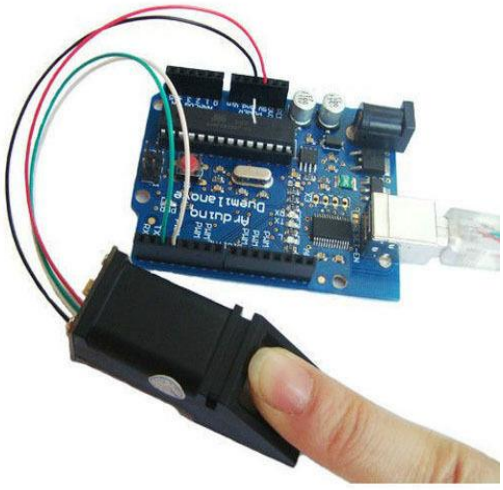


Figure 3: Diagram for arduino with finger print scanner

There are 14 digital input output pins and 6 analog input pins. Flash memory is 16KB for ATMEGA168 and for ATMEGA328 is 32KB of which 2KB used by SRAM for ATMEGA168 is 1KB and for ATMEGA328 is 2KB. EEPROM is about 512 bytes for ATMEGA168, and 1KB for ATMEGA328. The clock speed is 16MHz.

4.3. FINGER PRINT SCANNER

Finger print scanners are security systems of biometrics. This is used because every persons finger print is unique in nature. Data duplication is eliminated by using this scanner. This module performs many functions like enrolment of the finger, processing, finger matching, searching and template storage. Up to 162 finger prints can be stored in the on board FLASH memory.

4.4. RFID READER

RFID uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. These tags collect energy from a nearby RFID reader's interrogating waves. Active tags contain battery and it operate hundreds of meters from the RFID reader. The tag need not be within light of sight of the reader.

Figure 4: Diagram for RFID card reader

RFID is used for security purpose. It consists of microchip and coil. To recognize the identity of RFID tag, RFID tag sends the signal to reader, the signal is received by coil and unique ID is identified by chip. If is predefined the gate is open otherwise the gate is not open. It is widely used in identification badges.

4.5. RELAY

Relays are electrically controlled switches. In usual type, a coil pulls in an armature when sufficient coil current flows. Relays are available for dc or ac excitation, and coil voltages from 5 volts up to 110 volts are common. The electrical relay offers a simple on / off switching action in response to a control signal. When a current flows through the coil of wire a magnetic field is produced.

4.6. MAX 232

For long distance communication parallel data communication is faster. But for this there may be more channels are necessary. Therefore the cost of the communication system also increases. So UART serial communication is preferred. The MAX 232 serial port to signals suitable for use in TTL compatible digital logic circuits. It provides a connection between a serial port device to serial port that uses RS232 standard.

5. CONCLUSION

Thus the "ELECTRONIC CIRCUIT BREAKER FOR LINEMAN SAFETY USING FINGER PRINT SCANNER" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. It provides a new approach to the security of the lineman and it completely eliminates the electrical accidents to the lineman during the electric line repair. In order to note the power usage in a particular area in a timely manner, this power usage is uploaded in the internet.

6. FUTURE SCOPE

This paper can be extended for many electrical lines. All electrical lines can be controlled using corresponding area lineman. The power usage in these electrical lines all together can be uploaded in single server for monitoring purpose. The ON/OFF TIME information about the particular electrical line can be sent through SMS to the corresponding users mobile.

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