Turkish Journal of Computer and Mathematics Education Vol.11 No.3(2020),2931-2936

Research Article

ADVANCED RFID CIRCUIT BREAKER SYSTEM FOR EFFICIENT ACCESS CONTROL

[1]Easlavath Hathiram,[2]Dr. Kiran Jyothi Miryala,[3]Guguloth Akhil

[1]Assistant Professor, Department of EEE , Abdul Kalam Institute of Technological Sciences, Kothagudem, Telangana
[2]Associate professor, Department of EEE , Abdul Kalam Institute of Technological Sciences, Kothagudem, Telangana
[3]Student, Department of EEE , Abdul Kalam Institute of Technological Sciences, Kothagudem, Telangana

ABSTRACT: The safety of line workers has grown significantly along with the advancement of various electronic devices. Although line workers turn off circuit breakers to protect themselves, there is still a chance that someone could unintentionally turn the breaker on while the worker is still on the job. A basic project called the Rfid Based Circuit Breaker uses an Rfid to manage electrical lines. Due to a communication breakdown between the maintenance personnel and the electrical substation, lineman injuries from electrical mishaps are on the rise these days while fixing the electrical lines. In order to guarantee lineman safety, this project provides a solution to the issue. The lineman is located in this section of the electrical cables. This project is set up so that in order to turn on or off the electrical line, maintenance personnel or linemen must swipe the RFID. In the event that an electrical line malfunctions, the line man will now turn off the power supply by pulling the RFID, allow the line to be repaired without difficulty, and then, upon arriving at the substation, turn on the supply to that specific line. Every electrical wire has its own unique RFID.

I.INTRODUCTION

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit. Its basic function is to interrupt current flow after a fault is detected. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation Circuit breakers are made in varying sizes, from small devices that protect low-current circuits or individual household appliance, up to large switchgear designed to protect high voltage circuits feeding an entire city. The generic function of a circuit breaker, or fuse, as an automatic means of removing power from a faulty system is often abbreviated as OCPD (Over Current Protection Device). All circuit breaker systems have common features in their operation, but details vary substantially depending on the voltage class, current rating and type of the circuit breaker. The circuit breaker must first detect a fault condition. In small mains and low voltage circuit breakers, this is usually done within the device itself. Typically, the heating or magnetic effects of electric current are employed. Circuit breakers for large currents or high voltages are usually arranged with protective relay pilot devices to sense a fault condition and to operate the opening mechanism. These typically require a separate power source, such as a battery, although some high-voltage circuit breakers are self-contained with current transformers, protective relays, and an internal control power source A lot more research are going on developing new topologies and control strategies for the safety system.

II.LITERATURE SURVEY

An Electric circuit breaker is an automatically operated switch system designed to guard an electrical circuit against damage caused by overload or a short circuit on the transmitting lines. Its basic function is to find a fault condition and interrupts the current flow in between. Unlike a fuse, which operates once and so must get replaced, an electrical circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see dangerous electrical accidents to the lineman are raising during the electrical line repair because of the dearth of communication and coordination between the maintenance/upkeep staff and also the electric substation staff. So as to avoid such accidents, the breaker will be so designed such only an authorized person can operate it with a password. A 4*4 keypad matrix is used to enter the password and a relay to open or close the circuit, which is indicated by a lamp. Any wrong try and to open the breaker (by entering the inaccurate password) an alert is going to be actuated, indicated by another LED. Its basic working is to find a fault and interrupt into the current flow. Unlike a fuse, which operates once so then must get replaced, a circuit is often reset (either manually or automatically) to resume normal operation.

III.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.

- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.

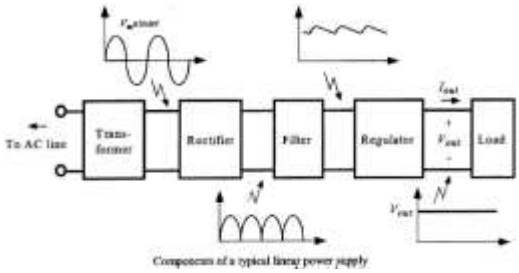


Fig: Block Diagram of Power Supply

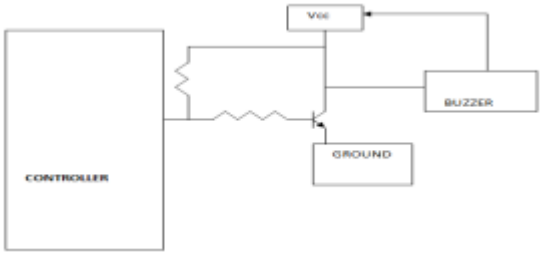
LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



WIFI MODULE:

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.[1]

The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple

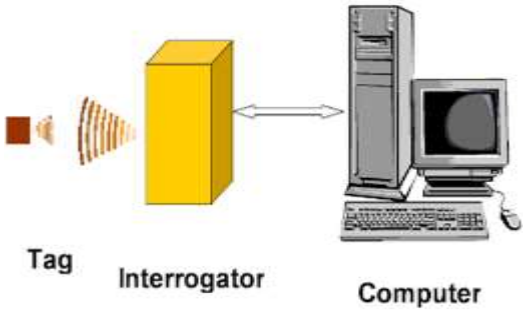
TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.[3]

The **ESP8285** is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.[4]

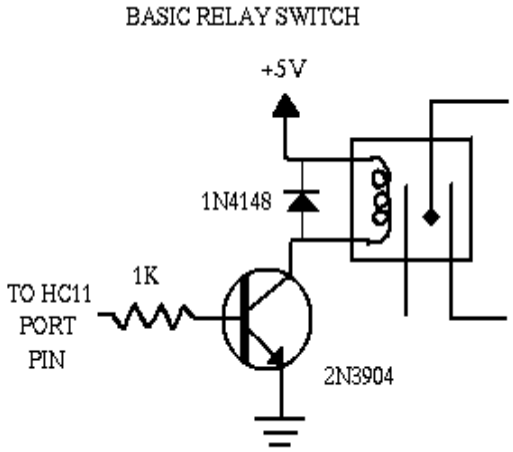
The successor to these microcontroller chips is the ESP32.

RFID (RADIO FREQUENCY IDENTIFIER)

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. Chip less RFID allows for discrete identification of tags without an integrated circuit, thereby allowing tags to be printed directly onto assets at a lower cost than traditional tags.



RELAY



The following schematic shows the basic circuit.

A relay is an electrically operated switch. When you turn it on, it switches on way. When it is off, it switches the other way. You can use a relay to switch on and off a high current device. A relay has an electromagnet, called a coil, and a lightweight switch inside it. When you energize the coil, a piece of the switch is attracted by the coil's magnetic field, which switches the switch on or off.

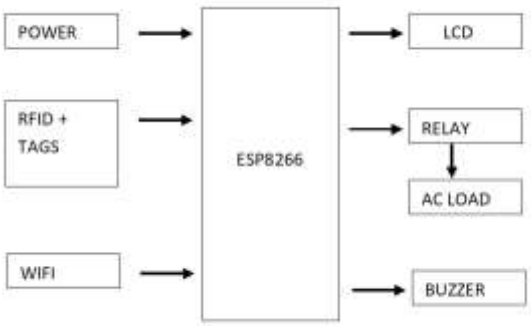
Mechanical relay:

Typical Mechanical Relay connection pin

This is a very important section. The introduction to this electrical control switch, call a Relay. It is basically a device to activate a mechanical switch, by electrical means. This is unlike a switch which is activated manually. In another words it is a device that convert electrical signal to a mechanical energy back to electrical signal again. Similar to mechanical switch, they can be described as 2P2T, single pole double throw, etc.

How it works? A electrical voltage will be applied to activate a coil in the relay. The coil being powered up, will generate a magnetic force that will attract the lever. This lever will be pulled towards the magnetized coil, causing an action that will switch the mechanical contact.

IV. BLOCK DIAGRAM:



Working: Line switching is used to connect and disconnect distribution substations to and from a distribution grid. This section of the paper contains the processes involved to get the system working. This section mainly deals with the designed aspect of the hardware and the analysis of individual unit that made up the device. Figure 1 shows a block representation of an Arduino Based RFID Line Switching Using Solid State Relay with Individual Phase Selection. 3.1.1 AC TO DC CONVERTER UNIT This is achieved via the use of a 12V step down transformer TR1 as shown in Figure 2. The main supply is step down from 220V to 12VAC. This is then converted to DC via the bridge rectifier BR1. The DC power produced still has some elements of AC which is then filtered off via the use of capacitor C1. Afterwards, voltage regulators of 9V and 5V are used since 9V is used to power the Arduino board while the 89C52 is powered with 5V.

V.CONCLUSION

Security/safety of the project. It's designed to regulate a circuit breaker with the assistance of a rfid. The maintenance staff e.g. Line man's for control to turn on/off. The transmitting wires works with the line man only this system is arrangement such that a card is required to run the circuit breaker (on/off). Line man can turn off the supply and comfortably repair it, and return to the substation, then activate the transmitting wires by entering the right card. The system fully controlled by a arduino. If the swiped card is correct, then the circuit will be turned (on/off). This technique provides a replacement approach to a lineman security for their life. The circuit can be used without any damage to a lineman. The circuit can be used with numerous load may also be controlled when required.

REFERENCES:

[1] M. Kezunovic, "Improving circuit breaker maintenance management tasks by applying mobile agent software technology"IEEE.

[2] Narendra Khandelwal, TanujManglani, Ganpat Singh, Amit Kumar, Dilip Khatri, "Automated load distribution with password protected circuit breakers" International Journal of Recent Research and Review, vol. VIII, Issue 1, March 2015.

[3] K.B.V.S.R.Subrahmanyam, "Electric lineman protection using user changeable password based circuit breaker" IJCESR, vol. 2, ISSUE-5, 2015.

[4] Michael faxa, "Application of disconnecting circuit breakers, p.11" Retrieved 9 July 2012.

[6] Muhammad Ali Mazidi and Janice GillispieMazidi, "The microcontroller and embedded systems", Person Education. 16F886 Data sheets. [5] Vincent Del Toro, "Electrical engineering fundamentals".