Volume 9, Issue 2, April 2022 ISSN: 2348-8565 (Online)
International Journal of Modern Engineering and Research Technology
Website: http://www.ijmert.org Email: editor.ijmert@gmail.com

Monitoring and Electric Switch Using IoT

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ABSTRACT

This project consists of Internet of Things (IoT) based monitoring and control of circuit breakers. It is important in Electrical systems for providing circuit protection and switching. In order to ascertain the reliability of circuit breaker preventive maintenance need to be carried out at time intervals. Internet of Things is at the forefront in the areas of real-time monitoring, situational awareness, and intelligent control. The idea is to design a Circuit Breaker that can monitor and shut down the supply while overloading. For sensitive loads, it is important to activate a tripping mechanism in the shortest possible time. In this project, we propose to develop a monitoring & control scheme of a typical circuit breaker using Arduino, a Bluetooth module for integration of the Internet of Things. The Circuit breaker monitors the data so the monitored data is uploaded to the Internet of Things platform "Thing Speaks" in order to make circuit breaker data available on the fly for effective decision making. Monitored circuit breaker parameters are observed so as to determine the health of the circuit breaker in order to ascertain its reliable operation & to its replacement/ maintenance needs. Additional features like password protection, and fault detection is to be later can be proposed in the project.

Keywords:—*Internet of Thing (IoT), Circuit Breaker, Arduino, Thing Speak, Arduinopower line safety, fuse.*

1. INTRODUCTION

Circuit breakers are used for protection & switching in electrical systems. Hence, reliable operation of the circuit breaker is essential. Failure of circuit breaker can cause huge damage to the electrical system including revenue loss & fatality. In this project, an attempt is made to develop a

monitoring & control scheme of a typical circuit breaker using open-source Arduino embedded along with Ethernet Shield for integration of the Internet of Things. The monitored data are uploaded to the Internet platform "Thing Speaks" in order to make circuit breaker data available on the fly for effective decision making. Monitored circuit breaker parameters are used so as to determine the health of the circuit breaker in order to ascertain its reliable operation & to determine its maintenance/replacement needs. This paper is made to develop automated circuit breaker monitoring & control systems that diagnose the electrical and mechanical health of circuit breakers in real-time.

II. Block Diagram

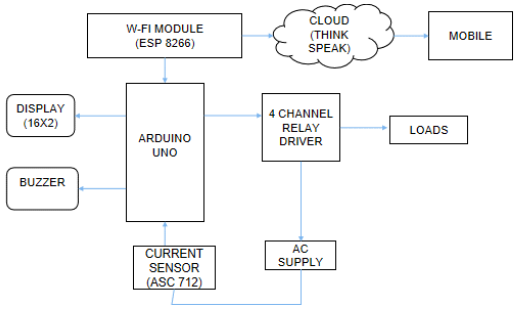

Figure 1: Block Diagram

III. Hardware Requirement

The system consists of the following parts:

Sr.no	Component
1	Arduino
2	Display
3	Relay
4	Wi-Fi Module
5	Buzzer
6	Adapter
7	Push Buttons & Switches
8	ACS712 Current Sensor

IV. Hardware

(a) Arduino:

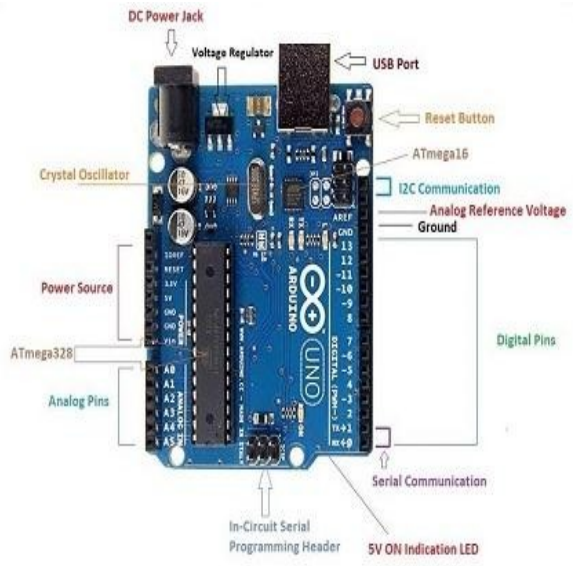

Figure 2: Arduino Device

Arduino is a device that refers to an open-source electronics platform or board and the software used to program it. Arduino Boards are designed to make electronics-based projects more accessible to artists, designers, hobbyists, and anyone who are interested in creating interactive objects or environments.

(b) Display:

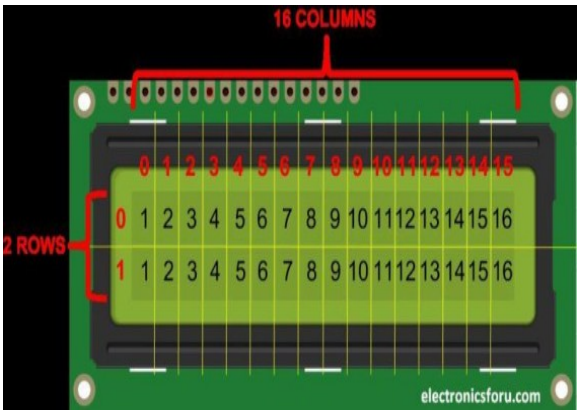

Figure 3: Display Device

A display device is an output device used on daily basis for the presentation of information in visual or tactile form

(c) Relay Module:

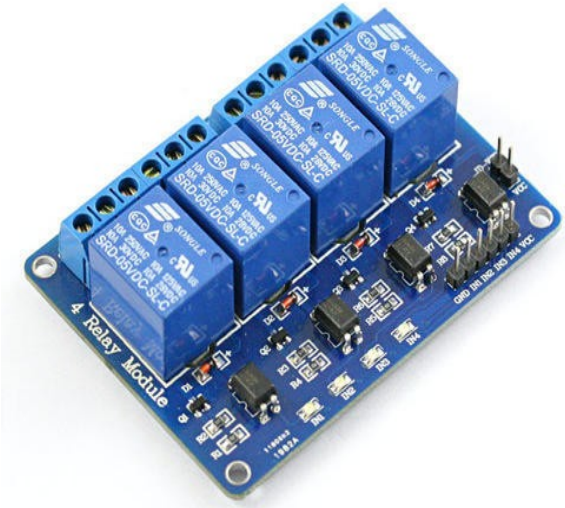

Figure 4: Relay Module

An electrical device, typically incorporating an electromagnet, is activated by a current or signal in one circuit to open or close another circuit.

(d) Current Sensor:

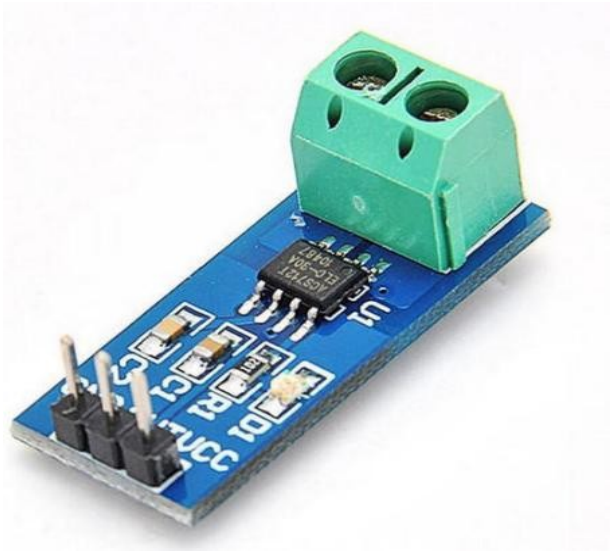

Figure 5: Current Sensor

A current sensor is a device that senses and converts current to an easily measured output voltage, which is proportional to the current through the measured path. When a current flows through a wire or in a circuit, a voltage drop occurs.

(e) Wi-Fi Module:

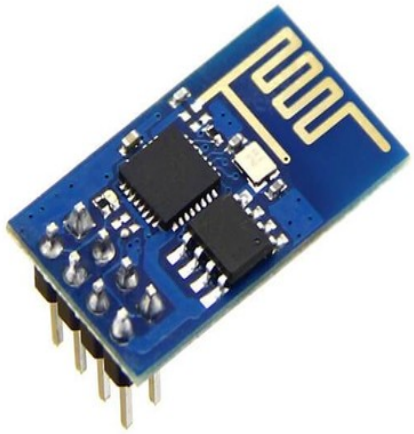

Figure 6: Wi-Fi Module

Wi-Fi module, also known as serial to Wi-Fi module, which belongs to the transmission layer of IoT. The function is to convert serial port or TTL level into embedded module which can conforming to Wi-Fi wireless network communication standard, with built-in wireless network protocol IEEE802.

V. SOFTWARE USED

Arduino software is used to employ the place of the instruction of whole functions of this system to the microcontroller. The program for executing this project has been written in C language. We have used Arduino IDE version 1.8.9 for writing programs for Arduino.

Advantages:

- Efficient and low-cost design.
- Real time monitoring.
- Improve circuit breaker reliability and needed as a maintenance approach.
- Minimize condition monitoring costs through monitoring of various parameters for the entire circuit breaker and a faster response.

VI. CONCLUSION

This conceptual implementation of IoT based circuit breaker and monitoring which will reduce the concern regarding security and which will facilitate the concept of as needed maintenance approach. As this is connected to mobile through an app which eases the user for execution. Regarding the safety with a quick response through Wi-Fi module makes it better and faster.

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