

# IoT BASED CIRCUIT BREAKER

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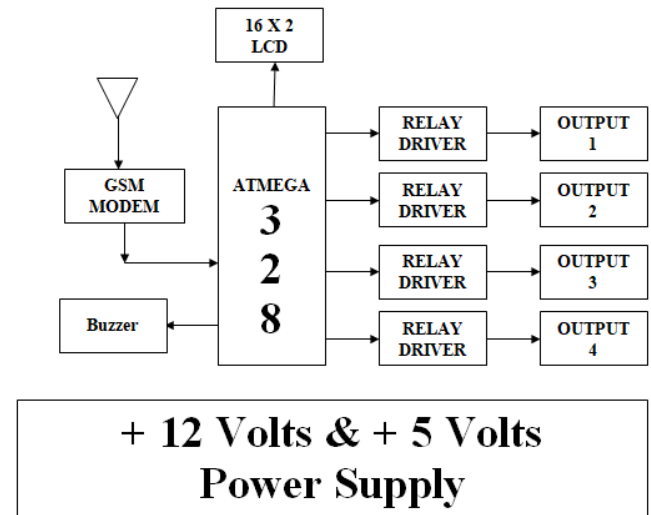
**Abstract** - The project is designed to shut down a power supply when it is overloaded by using a super-fast electronic circuit breaker. The concept of electronic circuit breaker came into focus realizing that the conventional circuit breakers such as MCBs take longer time to trip. Therefore, for sensitive loads, it is very important to activate a tripping mechanism at the shortest possible time, preferably instantaneously. The electronic circuit breaker is based on the voltage drop across a series element proportional to the load current, typically a low-value resistor. This voltage is sensed and rectified to DC, and then is compared with a preset voltage by a level comparator to generate an output that drives a relay through the MOSFET to trip the load. The relay use in place of a semiconductor switch is preferred because such solid state switches would invariably fail in case of accidental short circuits. A circuit breaker is automatic operated switch designed to shut down the power supply when overloaded. The tripping depends on the current passing through the CT's which is connected in series with load. It uses the PIC-microcontroller into which program is dumped for the operation. The unit is extremely fast and over comes the drawback of thermal type circuit breaker like MCB based on a thermal bimetal lever-trip mechanism which is very slow.

**Key Words:** IoT, Arduino, GSM

## 1. INTRODUCTION

This article is aimed to design and demonstrate a simple password based superfast electronic circuit breaker + gsm. The input signals or the commands are sent from a transmitter using main computer or the centre location called a HUB, processed and used to drive the loads. At both the transmitter and receiver, a microcontroller is used to process the signals. The circuit works on the principle of GSM Wireless communication as well as manual communication. Communication involves transmitting signals using signal as the carrier. The input signal from switches is processed by the microcontroller, encoded by the encoder, modulated and transmitted by the transmitter. At the receiver, the modulated signal is demodulated by demodulator, decoded by the decoder and processed by the microcontroller to control the output load.

## 2. Block Diagram



## 3. Hardware Requirement

The system consists of the following parts:

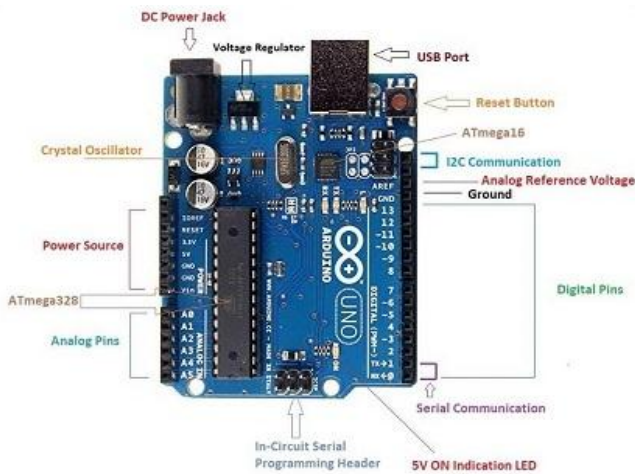
Sr. No.	Components	Quantity
1.	Arduino Uno(ATMEGA 328P microcontroller)	1
2.	GSM Module	1
3.	Relay	4
4.	LCD 16 X 2	1
5.	Adapter	1

TABLE I: Hardware requirements

### 3.1 Arduino Uno (ATMEGA 328P microcontroller):

Microcontroller acts as the brain of the robot and its movement is decided by the microcontroller. We have used Arduino Uno microcontroller in our project. The Arduino Uno is an open-source microcontroller board based totally on the Microchip ATmega328P microcontroller and developed by Arduino.cc (Figure1). The board has units of digital and analog input/output (I/O) pins that can be interfaced to various enlargement boards and other circuits. The board has fourteen Digital input/output pins (out of which six can be used as PWM outputs), six Analog enter pins, and programmable with the Arduino IDE (Integrated

Development Environment) by way of a kind B USB cable. It additionally has a sixteen MHz quartz crystal, a electricity jack, an ICSP header and a reset button. Embedded C programming is used for programming the microcontroller. It is the most widely used and user friendly microcontroller. [3]



### 3.2 GSM module.

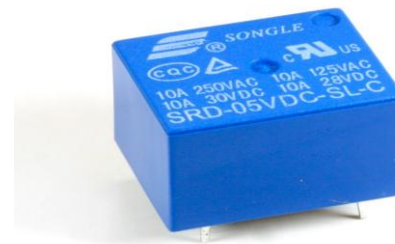
A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here.

These modules consist of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computer. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.



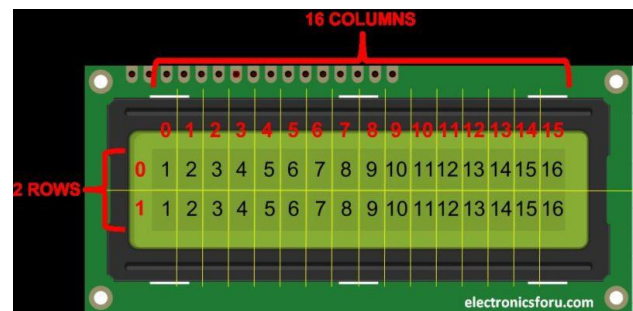
### 3.3 Relay:

2-Channel 5V Relay Module is a relay interface board, it can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on. It uses a low level triggered control signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in an automatic control circuit. To put it simply, it is an automatic switch to control a high-current circuit with a low-current signal. 5V relay signal input voltage range, 0-5V. VCC power to the system. JD-VCC relay in the power supply. JD-VCC and VCC can be a shorted.



### 3.4 Lcd 16X2:

LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits. The 16x2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix.



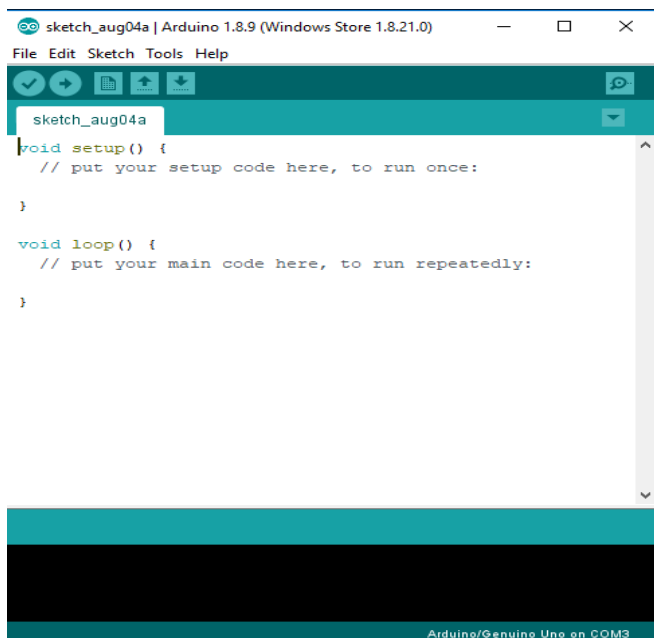
### 3.5 Adapter:

All of the power supplies we sell are 12V DC. They take any input from 100V up to 220V AC, which is what comes out of your wall socket, and output 12V DC. This is what most digital devices such as LCD screens, DVD players, Hard Drives, Audio Gear, and most other digital devices use. We only carry 12V DC power supplies, so if your unit is not 12 Volt, you will not find the correct adapter here.

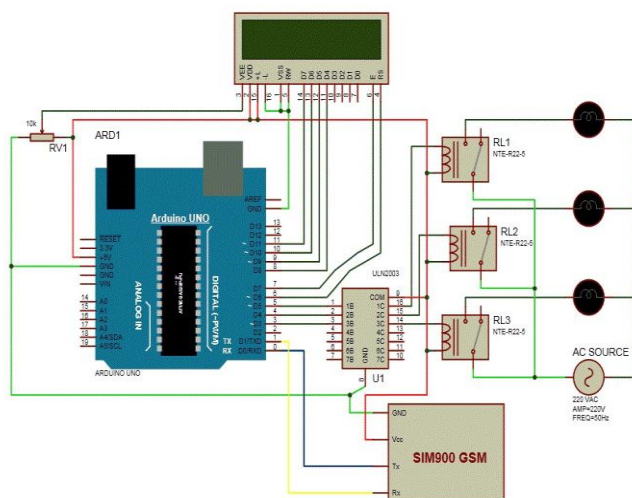


#### 4. Software used:

The software used here is Arduino (Version 1.8.9). Arduino software is employed to place the instruction of whole functions of this system to the microcontroller. The program for executing this project has been written in C language. In android application when we tilt the phone in a particular direction (i.e a gesture). Motor driver switches accordingly the data bit, if the data bit is low then the corresponding pin of the motor driver doesn't work else high bit then the corresponding pin of the motor driver is on. We have used Arduino IDE version 1.8.9 for writing program for Arduino. There are two steps of the programming. First set up section, we define all the variables in this section. Second loop part where the program runs continuously.



#### 5. Circuit Diagram:



#### 6. Brief operation of system for testing

In order to control the ON-OFF action for electric pole, you need to send the SMS. We will send SMS like \*POLE 1 ON#. This SMS is received by GSM Modem and given to microcontroller. Microcontroller will decode the SMS and turns ON the RELAY 1.

If we send SMS like \* POLE 1 OFF#. This SMS is received by GSM Modem and given to microcontroller. Microcontroller will decode the SMS and turns OFF the RELAY 1 OFF.

#### 7. CONCLUSIONS

By performing this project we can say that this project is used to operate the Electrical devices from very far distance. We can control the devices from any location of world just by sending SMS.

In this system, the time and life of the maintenance worker is saved. Maintenance worker will switch off the electric supply of pole by sending SMS. He will do the maintenance work easily without any risk. After completing the maintenance he will send the SMS to switch on the electric supply of pole.

So circuit break operation can be done by sending SMS using GSM. So our system is IoT based as we can control the switching any time and from any place.

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