

Smoke Detection System

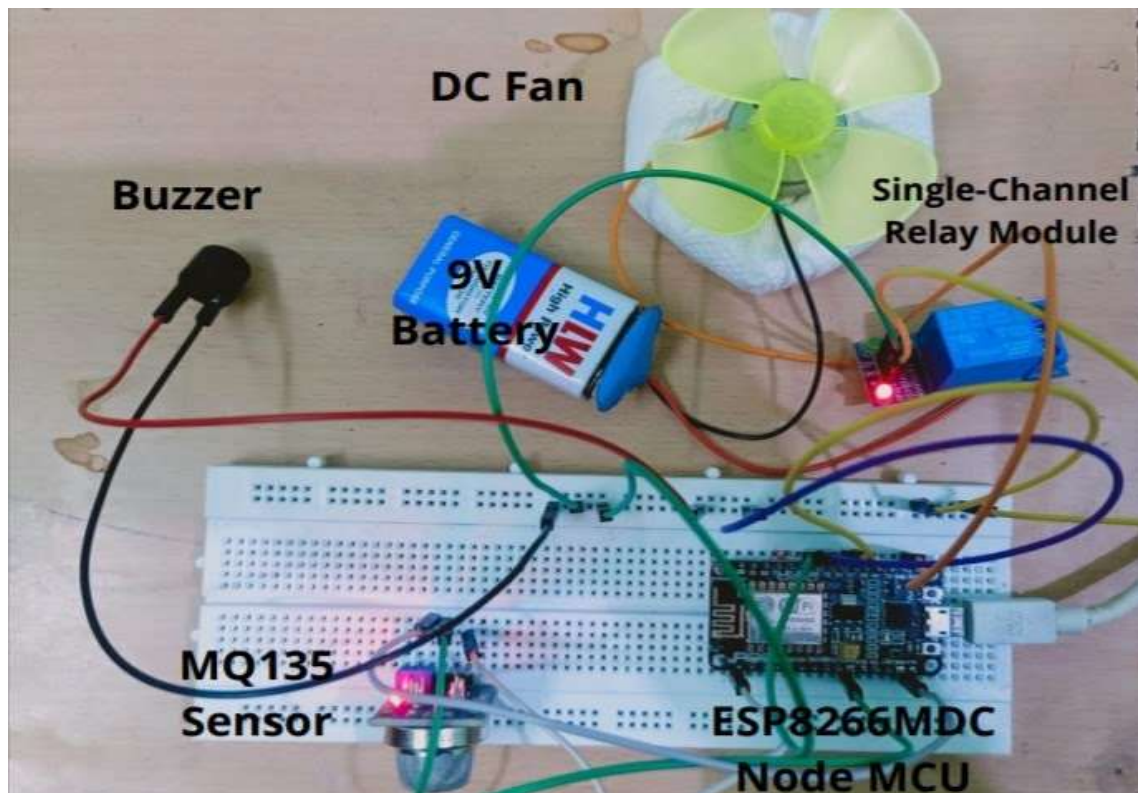
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Switching Theory Mini Project

I have made a Smoke Detection system which uses an MQ135 sensor connected with ESP8266MCD which turns on a fan and a buzzer and sends a notification to our mobile devices using Blynk when the smoke level rises to more than the advised safe value.

For the purpose of this project, the value of 190 units was chosen as the threshold to trigger the smoke sensor after experimental observation.

Circuit and Components

The circuit is given as follows.



Components:

1. Node MCU (ESP8266MCD)
2. MQ135 Smoke Detection Sensor
3. Single Channel Relay Module
4. Buzzer
5. 9 Volt Battery with a DC Fan

Software Requirements

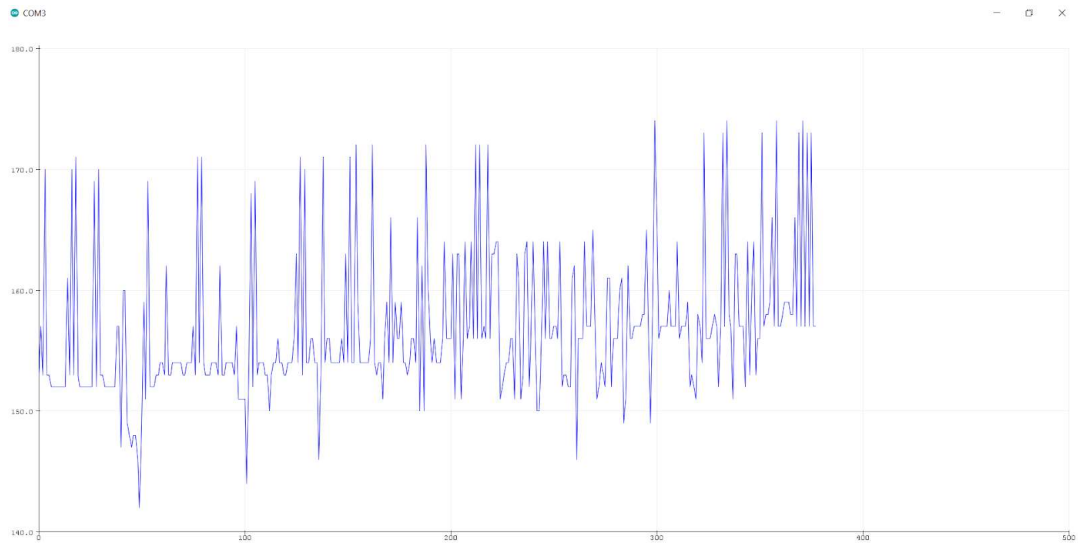
1. Arduino IDE
2. Blynk Software App

Working:

1. The [MQ135](#) sensor is used to detect smoke and different types of poisonous gases present in air. The analog signal of the sensor varies within the range of (0,1023) and is connected to the A0 of the NodeMCU.
2. Tests were done by exposing the sensor to a considerable amount of smoke.

The following is the sample of readings recorded for 5 minutes at every 2 seconds for fresh air, without any infiltration.

00:38:41.274 -> 159.00	00:41:03.352 -> 157.00
00:38:43.282 -> 162.00	00:41:05.355 -> 164.00
00:38:45.271 -> 157.00	00:41:07.338 -> 153.00
00:38:47.275 -> 165.00	00:41:09.351 -> 163.00
00:38:49.298 -> 158.00	00:41:21.339 -> 157.00
00:39:01.280 -> 158.00	00:41:33.371 -> 157.00
00:39:03.287 -> 158.00	00:41:47.358 -> 158.00
00:39:05.275 -> 161.00	00:41:49.373 -> 174.00
00:39:19.311 -> 153.00	00:41:51.354 -> 158.00
00:39:21.286 -> 165.00	00:42:09.363 -> 158.00
00:39:23.319 -> 165.00	00:42:11.380 -> 168.00
00:39:37.285 -> 157.00	00:42:13.377 -> 159.00
00:39:39.289 -> 157.00	00:42:27.404 -> 160.00
00:39:41.321 -> 157.00	00:42:29.375 -> 160.00
00:39:49.305 -> 149.00	00:42:31.401 -> 159.00
00:39:51.307 -> 166.00	00:42:33.395 -> 150.00
00:39:53.309 -> 165.00	00:42:35.390 -> 162.00
00:40:39.332 -> 157.00	00:42:37.397 -> 158.00
00:40:41.321 -> 157.00	00:42:47.383 -> 160.00
00:40:43.344 -> 158.00	00:42:49.405 -> 160.00
00:40:45.330 -> 159.00	00:43:01.393 -> 159.00
00:40:47.349 -> 157.00	00:43:17.396 -> 160.00
00:40:59.350 -> 158.00	00:43:33.416 -> 160.00
00:41:01.328 -> 161.00	



The average found of these recording was

162.455223881

The above readings and graph was found from Arduino IDE Serial Monitor and Plotter

The below readings were taken by choosing **190** as the threshold for the trigger.

Note: This data is calculated using Incense Stick for creating a smoke like environment

```
01:48:54.289 -> 169.00
01:48:56.308 -> 171.00
01:48:58.311 -> 175.00
01:49:00.315 -> 173.00
01:49:02.311 -> 177.00
01:49:04.312 -> 183.00
01:49:06.290 -> 186.00
01:49:08.316 -> 184.00
01:49:10.292 ->
199.00Firing message
01:49:10.292 -> [36088]
Connecting to Vinod
01:49:10.292 -> [36088]
Connected to WiFi
01:49:10.292 -> [36088]
IP: 192.168.1.7
01:49:10.292 -> [36088]
01:49:10.292 -> _____
```

```
01:49:10.326 -> /_)//_
_____//_
01:49:10.326 -> /_ ///
/_V'/_
01:49:10.326 ->
/_//_/_/_\
01:49:10.326 ->
/_// v0.6.1 on
NodeMCU
01:49:10.326 ->
01:49:10.326 -> [36098]
Connecting to
blynk-cloud.com:80
01:49:16.445 -> [42224]
Connecting to
blynk-cloud.com:80
01:49:16.584 -> [42378]
Ready (ping: 75ms).
01:49:33.737 ->
```

```
01:49:33.737 ->
243.00Firing message
01:49:33.737 -> [59513]
Connecting to Vinod
01:49:33.737 -> [59514]
Connected to WiFi
01:49:33.737 -> [59514]
IP: 192.168.1.7
01:49:33.737 -> [59514]
01:49:33.737 -> _____
01:49:33.737 -> /_)//_
_____//_
01:49:33.737 -> /_ ///
/_V'/_
01:49:33.737 ->
/_//_/_/_\
01:49:33.737 ->
/_// v0.6.1 on
NodeMCU
```

01:49:33.737 ->	01:51:00.320 ->	01:51:37.628 -> 166.00
01:49:33.737 -> [59525]	/___/__, /_/_/_\	01:51:39.622 -> 164.00
Connecting to	01:51:00.320 ->	01:51:41.591 -> 158.00
blynk-cloud.com:80	/___/ v0.6.1 on	01:51:43.609 -> 165.00
01:49:33.887 -> [59682]	NodeMCU	01:51:45.594 -> 166.00
Ready (ping: 77ms).	01:51:00.320 ->	01:51:47.628 -> 166.00
01:49:51.029 ->	01:51:00.320 -> [146088]	01:51:49.617 -> 166.00
01:49:51.029 ->	Connecting to	01:51:51.627 -> 165.00
211.00Firing message	blynk-cloud.com:80	01:51:53.607 -> 164.00
01:51:00.276 -> [146074]	01:51:00.443 -> [146249]	01:51:55.623 -> 164.00
Connecting to Vinod	Ready (ping: 78ms).	01:51:57.629 -> 164.00
01:51:00.276 -> [146074]	01:51:17.594 ->	01:51:59.602 -> 163.00
Connected to WiFi	01:51:17.594 -> 181.00	01:52:01.611 -> 156.00
01:51:00.276 -> [146074]	01:51:19.614 -> 181.00	01:52:03.629 -> 162.00
IP: 192.168.1.7	01:51:21.606 -> 180.00	01:52:05.635 -> 162.00
01:51:00.320 -> [146075]	01:51:23.588 -> 178.00	01:52:07.617 -> 162.00
01:51:00.320 -> ___	01:51:25.615 -> 176.00	01:52:09.631 -> 161.00
___	01:51:27.606 -> 175.00	01:52:11.613 -> 161.00
01:51:00.320 -> /_)//_	01:51:29.617 -> 170.00	01:52:13.637 -> 161.00
___ //___	01:51:31.621 -> 171.00	
01:51:00.320 -> /_ ///	01:51:33.605 -> 169.00	
/_V '/_	01:51:35.599 -> 168.00	

The states of the gas were recorded by the following snippet

```

if(h <=190){
    gasStatus = "Normal";
    gasState = 0;
}

else if(h <=250){
    gasStatus = "Critical";
    gasState = 1;
}

else{

    gasStatus = "Dangerous";
    gasState = 1;

}

```

On triggering, or when the gas state is 1,

- The fan turns on
- The buzzer turns on
- The Blynk App sends a notification about the alert to our mobile phones with extra information about the PPM level of the air . (Connected of WiFi)

```

if(gasState == 1){

    digitalWrite(relay, LOW);
    tone(14,300,500);
    Serial.println("Firing message");
    String statusToSend = "Gas Levels is " + gasStatus + "\n" +
"PPM Level is " + String(ppm);
    Serial.println(statusToSend);
    Blynk.connectWiFi(ssid,pass);

    while(!Blynk.connected()){
        Serial.println(".");
        delay(500);           //Check every 0.5 seconds
    }

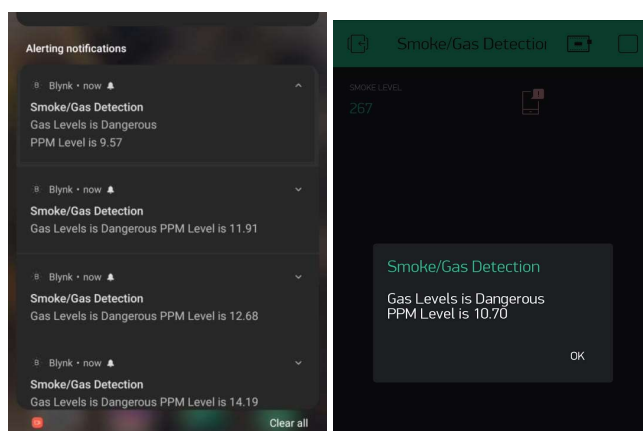
    Blynk.run();
    Blynk.notify(statusToSend);
    Serial.println("Message sent");

    delay(5000);
}

```

This process goes on for 5 seconds (Assuming this to be the safe time for the fan to run for re caliber itself)

Below attached is the screenshot of the Notification received:



The zip folder contains the video demonstration.