**SMOKE DETECTOR**

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**MOTIVATION:**

The main motivation of our project came right from the real life situation that happened in the campus itself , a fire accident in the server room, then we thought of how if we can make an alerting system that can sense the surroundings and gives various alerts in a small fraction of time.. This course became helpful for getting a clear idea of implementing that.

**WORKING:**

This project works only on the microcontroller code and not much of hardware implementation, and the software(ESP-32) connects GSM-MODULE and MQ2 and sends mails and calls accordingly, and the sensor values will be uploaded to the cloud and every month the mail will be sent to the authorities regarding the changes and current values that came in around atmosphere, even there is no incident such as fire accident happens.

**COMPONENTS REQUIRED:**

ESP-32 (microcontroller)

MQ2 (smoke sensor)

GSM-SIM900A Module

LED lights(green, red)

Jumper cables

**MQ2:**

Firstly, the MQ2 smoke sensor is connected to the microcontroller ESP-32. This works as a bridge for nature and the software to sense the change and report. This detects gases such as hydrogen, LPG, smoke, methane, propane, butane and other industrial combustible gases. The MQ2 sensor is made up of Aluminium Oxide (Al2O3) and Tin Oxide (SnO2) as electrodes in which they act as heating elements and main sensing layer.

**GSM-MODULE:**

This acts as a bridge between the user and software to make an alert by a call or send a message using the sim card inserted in it, so that someone gets the alert some faster , because we may not be verifying the mail because of internet issues, but the message will be definitely delivered.

**ESP-32:**

Here ESP-32 works to combine the GSM-MODULE and MQ2, by connecting to the internet, and sends the data to Thingspeak, similarly acts as a medium between the software and hardware, ie.MQ2 and GSM-module.

**IMPLEMENTATION:**

**Step 1:-**

MQ2 gives out the analog output based on the strength of the smoke detected , this can be taken as an input to esp32 by **analogread()** function.

**Step 2:-**

The input read from the sensor is processed in the Esp32 board and if the values have risen greater than the surrounding threshold value(we got 4096 as threshold) then a danger alert will be sent(i.e by using a variable).

**Step 3:-**

The analog output of the smoke detector is used to plot the readings of the smoke. This is done by using Thingspeak which is a cloud software, used to store data. Our microcontroller can direct the data to Thingspeak and it stores the data in a regular time interval. The plot will be of a **line plot** which can be easily understood.

**1.Connecting to Wifi :-**

An inbuilt ‘wifi.h’ library is present for connecting to wifi ,In this by providing the **ssid** and **password** of the wifi provider .The setup will be done for connecting.

**2.Connecting to the ThingSpeak Server :-**

Once WiFi is connected, we use the Arduino library ​ ThingSpeak.h​ to connect to our ThingSpeak channel using Channel Number and the WriteAPIKey.

**3.Plotting the analog smoke values :**

Now the required analog value can be sent as a parameter to a function **Thingspeak.writefield()**,which writes data as line plot to the specified field and channel of the thingspeak.

**Step 4:-**

Once the smoke reading is raised above a certain value, the microcontroller ESP32 does the following

1. **It controls the GSM module to make a phone call to notify the person :**

This is achieved using a GSM-sim900A module ,The communication is setup in the Esp32 as whom to call (using ATG,ATM...) ,

1. **It glows the RED LED at the place where it is located and the accident happened.**
2. **It sends an email to the person when the threshold limit is crossed in Thingspeak:**

The communication used is smtp which we had learnt in the course.There will be many functions for **setsender()** , **setSubject() , addRecipient(), setMessage() etc.** for respective operations. The **setcallback()** function sends the status of the mail.using this we can know the status.

**Real life problem in implementation:**

Sometimes due to fire accidents, the main power might get shut down thereby making our smoke detector dead. This can be resolved by providing a power supply through a power bank. As the power goes off, this can behave as an ‘inverter’ providing power.

And also sometimes there might not be a fire accident in actual but danger alert might be given due to some reasons such as small paper smoke etc. but we thought that alerting would be a good thing .

**Major Advantage :**

Since the data from Thingspeak can be accessed from anywhere using the internet, it can be easy to identify any changes that are going to happen.

**CONCLUSION:**

This project is really helpful to deal with real life situations .We as students are very much happy by getting an hands on experience on iot parallelly solving real life problems. This also reports the air pollution based on the values reported by MQ2, as this is much cheaper than the original ones