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# An analytical Study for fire Monitoring system using IOT

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**Abstract**: Finding of fire in forest is essential to keep away from destruction of belongings due to fire accidents. Detection of fire can prove to be very important as it could mean the difference between life and death. Fires can occur from anywhere and at any point of time; hence the presence of Fire monitoring System helps in keeping forest safe. Some people don't see the need to have a fire alarm system. They just assume that they could smell the fire and run out in time. The average time for a forest to burn down nowadays is just 15-20 Minutes. So, by the time you smell the fire and try to run away, the fire has probably engulfed the forest. The Internet of Things (IoT) is a system of devices connected and accessible through the internet. The 'Thing' in IOT could refer to any physical device, varying from a toaster to an automobile. These devices can be connected through the internet and help us manipulate or collect data from them. In this paper, we will be using a wide variety of sensors to detect the presence of fire and alert its presence to the forest and fire officials. It discusses in detail about the functions of each module and its execution in an detailed manner. It also discusses the application of Iot Technology in relation to fire detection technologies.

**Keywords**: Fire Montoring system, Gas sensor, MCU, GSM, Temp Sensor.

## I. INTRODUCTION

Prevention of fire and fire risk level control difficulty are increased day by day. Fire-fighting and monitoring situations are very serious today. Public security keep on insisting in increase of technology in firefighting and monitoring. They give special attention to improve the science and technology in resisting fire disasters. They are concerned about the application of new technology such as IoT and wireless sensor network in fire-fighting and monitoring field. IoT is very suitable for fire-fighting with wide scope along with wireless sensor network (WSN). IoT has high degree of intelligence for maintaining many product categories, quantities, complex fire danger factors and large range of equipments for fire monitoring and fighting. IoT has high scalability and high resource sharing capabilities for handling various complex business information. IoT combined with WSN plays an important role in the fire alarm, fire control facility monitoring and fire equipment management. IoT technology is combined with fire fighting for hazard source monitoring, fire monitoring, fire-fighting rescue, fire early warning, prevention and early disposal. It is used effectively to enhance the fire brigade fire frightening and emergency rescue capabilities.

The new modern fire monitoring system is based on wireless sensor network in combination with Internet of Things. Because of modern advanced technology, the system minimizes the losses due to fire. Sensors detect the fire condition and transfer the data to the system. Fire brigade and building owners can do the interactions with the system. All the data from the sensor nodes located in the buildings are provided to the users. The historical data reference from building data base server provides final useful response mechanisms. The users can communicate with the system through different ways to monitor and control the environment and get more information about it.

## II. PRAPOSED METHODOLOGY

Fire Detection is an very important aspect to save the forest and forest belongers, in our sytem we have praposed the system with gsm. So that the text massege can be automatically forwarded to authority no, so that fire offcials and forest offical will be aware. In our work we have addpoted DTH Sensor, solar pannel for uniturupted power supply.

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## III. HARWARE IMPLEMENTATION AND WORKING

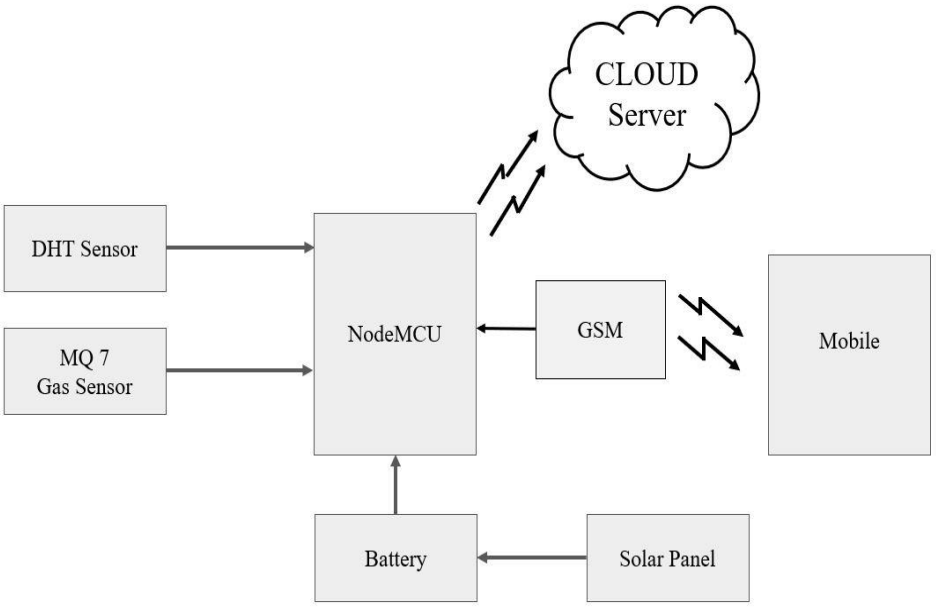


Fig. 1 Block diagram of Forest Fire Detection using IoT

Figures shows the block diagram of forest fire detection system, here DTH sensor senses the tempreture and humidity of enviornment.also Gas sensor also detect the present of gas or smoke in the enviornment.once sensor detect the presence of smoke it creat a alraming situation for the microcontroller alos at the same time DTH Sensor senses the humidity and tempreture.Increase tempreture and reduced Moisture or humidity give the intemation about the fire in forest.Same time data will be saved in cloud and sms will be text to concern authority. Also it will forward the phone call to the forest and fire officals.

Forest Fire Detection Monitoring System using IoT is based on the block diagram as shown in Fig.The data of forest environment is recognized by MQ3 sensor and DHT11 sensor are connected to Node MCUModule which is a Wi-Fi controller. We are using the Node MCU module as a main controller in our system.MQ7 sensor can sense CO i.e., Carbon Monoxide, and DHT11 can detect the temperature and humidity in the environment.

Node MCU will receive sensor data and send it to Cloud Server(000webhost). Simultaneously it will show sensor data on created webpage. We can monitor the system data with respect to time and this real time data will fetch to the server. The Node MCU is programmed for monitoring all sensors and it sends the data to Cloud Server using the IoT concept. The programming is done on Arduino IDE Software. Program consists of coding, interfacing and also it shows output. The output is displayed on the serial monitor which is present on Arduino IDE software.Now the program has Two conditions which are as follows:

1. The value range from 0 to 50% shown by the sensor stands for Normal quality of environment when there is not detected fire in ForestArea.
2. The value range of 50% and above shown by the sensor stands for “Gas is Detected” inforest environment when there is detected fire in Forest Area.

According to our system the 2 sensors work as input data, they transmit data for knowing which gas it is, what is the temperature and humidity. Serial monitors havean output of devices. Simultaneously GSM sendsalert massage to the mobile device and the cloud server when the percentage crosses above a threshold limit.The notification is sent in bulk via GSM.
So in this way we can saved the forest from fire and forest Belonger from these natureal disaster.

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## IV. COMPONENT USED

### A. Node MCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Luascripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open-source projects, such as lua-cjson and SPIFFS.

### B. Gas Sensor-MQ-7

The MQ-7 is a Carbon Monoxide (CO) sensor suitable for sensing CO concentrations in the air. It can detect CO-gas concentrations anywhere from 20 to 2000 ppm. It makes detection by method of cycle high and low temperature, and detect CO at low temperature. It is widely used in domestic CO gas leakage alarm, industrial CO gas alarm and portable CO gas detector.Sensitive material of MQ-7 gas sensor is SnO2, which has lower conductivity in clean air. The sensor's conductivity is higher along with the gas concentration rising. When high temperature (heated by 5.0V), it cleans the other gases adsorbed under low temperature. MQ-7 gas sensor has high sensitivity to Carbon Monoxide. The sensor could be used to detect different gases containing CO, it is low cost and suitable for different applications.The sensitivity can be adjusted by the potentiometer.

### C. DTH Sensor

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.

### D. 1W Solar Panel

This solar panel is made of single-crystal material that performs high solar energy transformation efficiency at 17%. It has a fine resin surface and sturdy back suitable for outdoor environments. A 2mm JST connecter is attached to the penal, which makes it perfect to team up with most of our can-use-solar-power-supply boards, like Seeeduino microcontroller series,Lipo Rider charging boards seriesandXBee carrier WSN products series. The typical open circuit voltage is around 5V, depending on light intensity. In those bright summer days with clear sky and big sun, the peak OC voltage can rush up to 10V. To prevent any damage to boards that accept a narrow range of input voltage, like Lipo Rider, its recommended to check whether the OC voltage is safe before any connection.

### E. GSM 800L

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boots up, searches for cellular network and login automatically. On board LED displays connection state (no network coverage - fast blinking, logged in - slow blinking).

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## V. HARDWARE IMPLEMENTATION

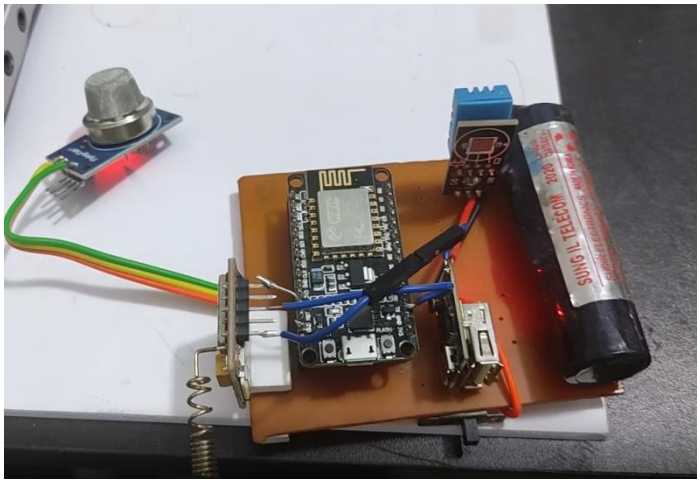


Fig. 2 Hardware implemenatation

## VI. ADVANTAGES

- Low cost/simple
- Easy to operate – reliable
- Historical datasets available
- Provide high resolution data
- On-line data collection possible
- End-to-end connectivity and affordability
- Notification and alert
- Easy to Install
- Updates On mobile phone directly
- Remote location monitoring

## VII. CONCLUSION

An overall conclusion IOT based forest fire monitoring System, or IOT technology has come a long way since it was conceptualized two decades ago. It has become more efficient, more applicable to today's applications and smarter. The work presented in this project was directed towards pushing IOT technology to the next level. The work has presented solutions to several problems and issues that have not been addressed in previous work.The system to monitor the weather and gas of the environment using Node MCU microcontroller, IOT Technology is proposed to act immediate on fire in forest. Using the same cloud data, the website is hosted and data is displayed on the website. Here, using the MQ7 gas sensor gives the sense of co gas and Node MCU is the heart of this project. Which controls the entire process. Inbuilt Wi-Fi module connects the complete task to internet world.

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