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Forest Fire Detection and Alerting System

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Abstract - *Forest is considered as one of the most important resources. As a human being its our duty to protect the animals , trees in the forest from any natural calamities. The main natural calamities or the one caused by human being was the forest fire.*

This IoT project overcomes or proposes the new method of detecting forest fire using some sensors and it intended to send messages to near by areas and to hospitals. The students will also be able to register for the events through this app. The students will also be notified about the events.

Key Words: Forest fire, IoT. Fire Detection, Fire.

1. INTRODUCTION

Forest fires play a natural and useful role in the life-cycle of a forest and its ecosystem. But fire can also have a devastating long-term effect on ecosystems that are not adapted to such patterns of burning. Frequent and large-scale fires, mainly caused by increased human activity, affect many forests and peat lands around the world.

In a mature forest, a fire might burn only the forest floor, destroying ground and young trees, but leaving the larger trees undamaged. But in very dry conditions, where plant debris provide a lot of fuel on the ground, the flames are hot enough to reach the forest canopy and then rapidly spread over large areas.

This application helps to solve the above problems. With the help of different sensors it is able to sense the fire occurrence, detect and solve before it become worse.

2. PROBLEM DESCRIPTION

In this application with the help of Arduino and GSM module, the fire been detected and messages will be sent to nearby areas like hospitals, emergency contact persons, etc.

In the existing system, Raspberry is used which is cost-efficient and it is one of the problem statement.

In the proposed system, the WIFI module is encoded with certain coding. It sends messages to nearby fire stations, hospitals etc.

Forest fire is the dominant disturbing factor in almost all forest vegetation zones causing environmental and biological consequences

Massive destruction of forest is caused mostly by the forest fire

Forest departments do not have an automatic system to detect fire and alert the fire service

3. RELATED TECHNOLOGY

3.1 Arduino UNO

ARDUINO UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins(of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

3.2 Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board jack.

3.3 Flame Detector

Flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit.

3.4 Gas Sensor

This is a simple-to-use liquefied petroleum gas sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. This sensor has a high sensitivity and fast response time.

3.5 LCD Display

LCD's have made displays thinner than CRT's. Even while comparing the LCD screen to an LED screen, the power consumption is lesser as it works on the basic principle of blocking light rather than dissipating.

3.6 SOUND DETECTION SENSOR

The sound sensor module provides an easy way to detect sound and is generally used for detecting sound intensity. This module can be used for security, switch, and monitoring applications.

3.7 GSM

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of

output taken.

3.8 WIFI Module

The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices.

4. SCREENSHOT

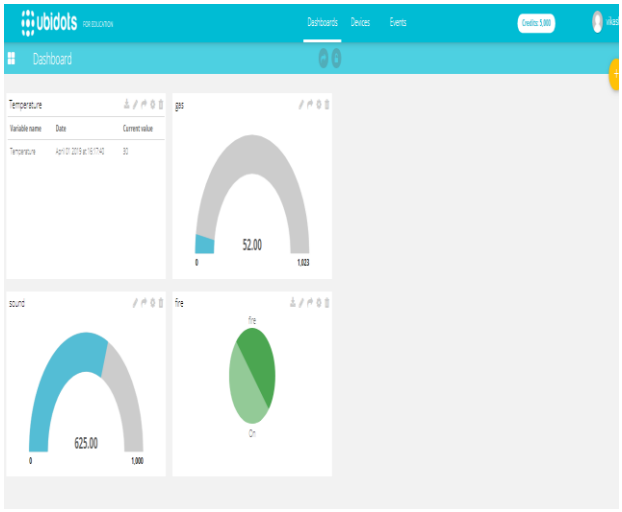
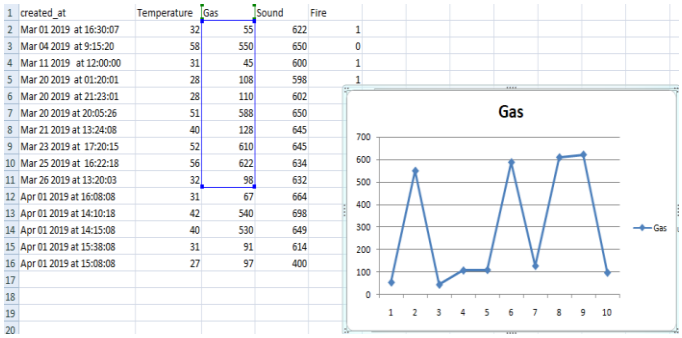


Fig 4.1 Ubidots channel



created_at	Temperature	Gas	Sound	Fire
Mar 01 2019 at 16:30:07	32	55	622	1
Mar 04 2019 at 9:15:20	58	550	650	0
Mar 11 2019 at 12:00:00	31	45	600	1
Mar 20 2019 at 01:20:01	28	108	598	1
Mar 20 2019 at 21:23:01	28	110	602	
Mar 20 2019 at 20:05:26	51	588	650	
Mar 21 2019 at 13:24:08	40	128	645	
Mar 23 2019 at 17:20:15	52	610	645	
Mar 25 2019 at 16:22:18	56	622	634	
Mar 26 2019 at 13:20:03	32	98	632	
Apr 01 2019 at 16:08:08	31	67	664	
Apr 01 2019 at 14:10:18	42	540	698	
Apr 01 2019 at 14:15:08	40	530	649	
Apr 01 2019 at 15:38:08	31	91	614	
Apr 01 2019 at 15:08:08	27	97	400	

Fig 4.2 Gas Sensor

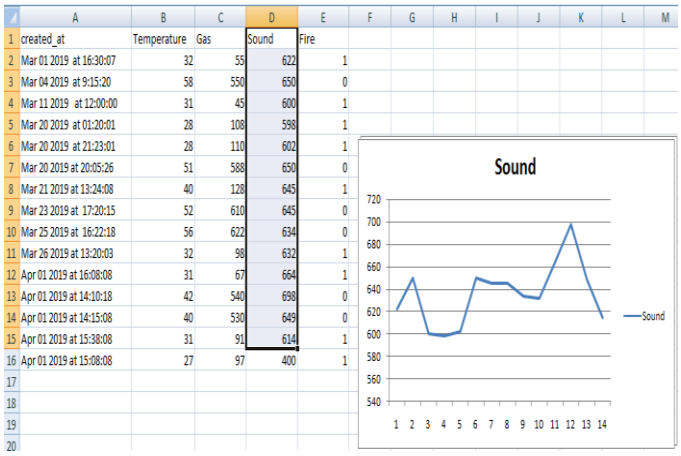


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Fig 4.3 Sound Sensor

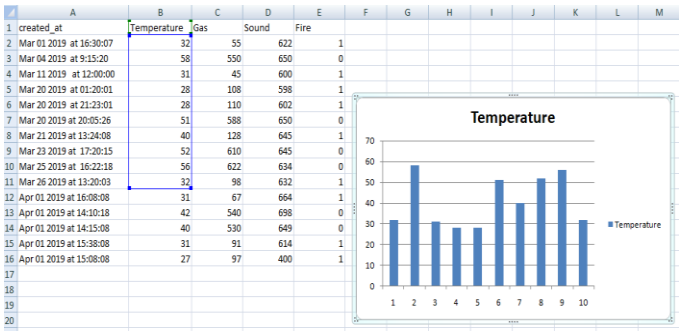

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Fig 4.4 Temperature Sensor

5. ADVANTAGES AND DISADVANTAGES

5.1 Advantages

Less power consumption and it automatically trigger events.

It provides effective safety system.It provides an additional features of sensing environment easily.

5.2 Disadvantage

Sometimes the false alarm will be activated eventhough there is no fire detection.

6. CONCLUSION

The whole system designed with effectiveness as well as scalability and the system is compact and can be implemented with low cost.The idea behind making use of sensors is because of quick response time, easy deployment and to equally save time and cost.

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