

Wildlife Monitoring and Anti-Smuggling System for Trees in Forest with Deforestation, Fire and Smoke Detection with Fire Suppression System

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Abstract: Remote sensing has presented a systematic, replicable, and geographically comprehensive picture of the expected large amount of biodiversity. Materials, planning data, policies, and monitoring the forest sector would be more beneficial for appropriate estimations of forest efficient expenditure. A wildfire is an uncontrolled fire that harms both natural and societal resources. When the fire begins to burn and spreads quickly over the forest, it causes enormous damage. Some of the causes of wildfire include lightning, extremely hot and dry weather, a lack of rain, and human ignorance. This project creates an IOT foundation for a system that detects jungle fires. The fire detection system that has been described allows for the early identification of fire before it spreads across a large region. After the fire is discovered, water starts pumping ferociously. With the use of a GPS module, the institution receives the device's precise position. Included the is an Internet - of - things solution for escaping tree trafficking.

Keywords: Wildfire, Anti-Smuggling, IOT, GPS module.

I. INTRODUCTION

Forests are usually isolated, uninhabited areas filled with trees, dry and parching wood, leaves, and so all this acts as a fuel source which are the problems of forest fire. All these elements form a highly inflammable material and serve the perfect condition for initial-fire ignition which acts as fuel for later phases of the fire. Some reasons are to destroy forest it may be caused from natural reason or may be human action like smoking or barbeque parties or by natural reasons such as high temperature in a balmy summer day or a broken glass working as a collective lens are focusing by sun light build on span of time thus leading to catch fire. Once fire begins, the burnable material may simply fuel to encourage the fire then becomes wider and bigger in the central area. The fire set off uncontrollable and destroy the landscapes may look right on excessive and could end for a very long time counting on prevailing the territory and weather conditions. Mostly, the primary stage of fire is normally known as "surface fire" phase. Then lead to fuel on neighbouring trees and the flame will become higher and extreme, thus becoming crown fire.

The forest has suffered great destruction over the past few decades, with forest fires accounting for the majority of those tragedies. While 35.71 percent of India's forests have not yet been exposed to fires of any real significance, 54.40 percent of India's forests are identified to odd fires, according to the forest inventory system, which also show that 7.49 percent of forest lands are exposed to reasonably regular fires and 2.405 to highest prevalence levels. According to the forest survey of India's data on forest fires, 50% of the forest lands are at risk for fire. Around 558 forest fires occurred in India between the months of January 1 and February 26, 2019. These incidents demonstrate that there are inadequate fire protection mechanisms in woods.

II. LITERATURE SURVEY

The freedom of IoT architecture for Tracking and Alert System [1] - In this article, they describe how they created a fantastic fire monitor using Arduino in combination with a smoke sensor, temperature sensor, and buzzer. By linking the entire monitoring process to the webpage developed by the PHP tool and controlled by the Arduino code, they attempted to make it smarter with the aid of IoT technology. Due to technological advances in sensing technologies, the system is

constructed in this study and analyzed for both efficacy and scalability. The most recent technology is discussed in this article as a way to prevent massive fire mishaps. The method is more effective and practical like an outcome of advancements in IoT smart sensors.

Platform for surveillance and IoT-enabled wild fire prediction [2] - By analysing the heat and CO₂ levels, the project's goal was to locate the forest fire as quickly as possible. To determine the temperature that triggers an ignition alarm and the quantity of carbon dioxide gas, they have employed heat and smoke sensors (CO₂).

The first and only method to avoid significant losses from a firestorm is early warning and quick action. Therefore, early and accurate fire system capable of detecting are the most crucial objectives in fire monitoring. While an exact site of a fire's origin and when it is still little, it is much simpler to put it out. For controlling the fire throughout all of the phases, knowledge more about flame's development is also quite useful. The firefighting crews may be directed to extinguish the fire on goal using this knowledge.

Arduino Uno based IOT-based fire alert and authentication method for workhouses [3] - In this study, they used a Arduino Uno to build and construct a factory fire alarm system. For detection of fire, they employed thermal, flame, and smoke detectors, while PIR motion sensors and cameras were used for attack detection and verification. To prevent any false alarms, they have offered confirmation of the fire suspected system, and system will begin firing suppression system, such as opening extinguishers water valves, when fire develops.

III. EXISTING SYSTEM

The present methods for detecting forest fires or the existing system are not effective enough to catch the fire in its early stages. Only until the fire is severely harming the forest can it be detected. This led to extensive destruction. However, these gadgets are incredibly expensive. The primary drawback of these systems is that they do not utilize IOT. It can identify and warn of the flame in its early stages if it uses the IOT. Even the start of the fire may be predicted.

IV. SYSTEM DESIGN

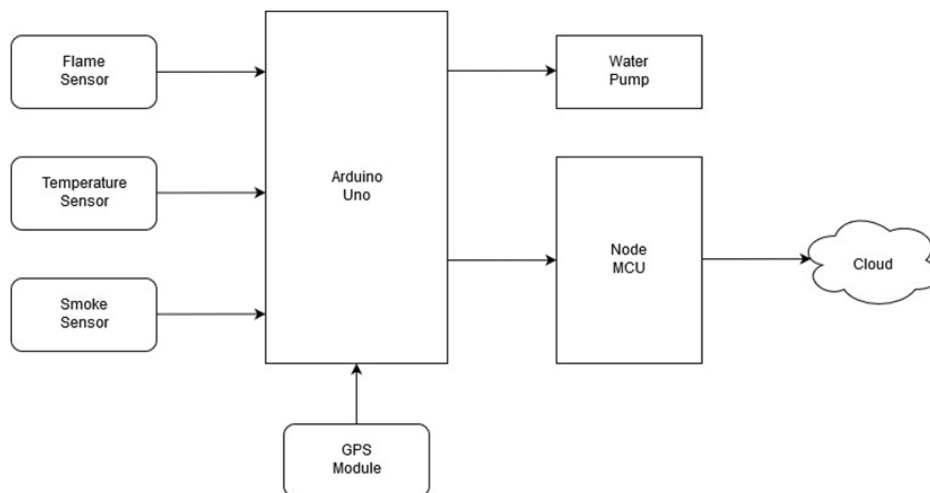


Fig 1: Block diagram of System Design

The Arduino Uno serves as the system's brain in this work. Several sensors, including an a smoke sensor, IR sensor, a temperature sensor and a GPS module, are linked to this microcontroller. Identifying the presence of a flame or fire requires the use of a sensor called a flame detector. The LM35 temperature unit will be utilized as the temperature sensor in this work. The temperature data from the LM35 is more accurate than the data from a thermistor. One of the gas sensors in the MQ sensor series that is often used is the Gas Sensor MQ2. As the detection is dependent on a change in the resistance of the sensing material when the Gas comes into contact with the material, it is a Metal Oxide Semiconductor (MOS) type Gas Sensors also known as Chemiresistors. In reality, GPS receivers function by calculating their distance from a number of satellites.

V. COMPONENTS USED

Total 7 components are used in this work.

5.1 Arduino UNO



Fig 2: Arduino UNO

The ATmega328P serves as the basis for the Arduino UNO microcontroller board. The device contains a 16 MHz ceramic resonator, 6 analogue inputs, 14 digital input/output pins of which 6 may be used as PWM outputs, a USB port, a power connector, a reset button and an ICSP header. It comes with all required to support the microcontroller; to get began, just plug in an AC-to-DC converter or battery, or use it to power a desktop through USB. If something goes wrong when you're tinkering with your UNO, one can always replace the chip for a few bucks and starting over.

5.2 NodeMCU

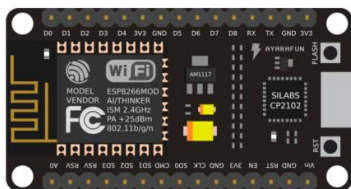


Fig 3: NodeMCU

For the ESP8266 wi-fi gadget, a LUA-based open-source software named NodeMCU was developed. The ESP8266 Development board/kit, commonly known as the NodeMCU Control board, comes with NodeMCU firmware so that you may learn more about the capabilities of the ESP8266 chip. Anyone may modify, customize, or produce the hardware of the NodeMCU online and open source system. The NodeMCU Device Kit/Board includes the wi-fi-capable ESP8266 chip. To find out more about the ESP8266, utilise the Wi-Fi Module.

5.3 Temperature Sensor

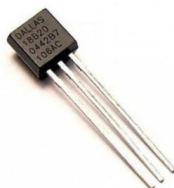


Fig 3: Temperature Sensor

Common temperature sensors include thermocouples and resistive temperature detectors, which monitor temperature and output the value as an usable electrical signal. A thermometer, the most basic sort of temperature meter, is used to determine how hot or cold something is.

5.4 Fire Sensor

The ability to detect a fire is made possible by a sensor called a flame detector. Depending on the installation, possible reactions to a flame detection include sounding an alert, turning off a fuel line and turning on a fire suppression system. Although they may be used to switch off the ignition system, their primary function in applications like industrial furnaces is to certify that the furnace is operating as intended. In many circumstances, however, they do not take any more action beyond alerting the control system.



Fig 4: Fire Sensor

5.5 GPS Module



Fig 5: GPS Module

Location and timing data are provided by the Global Positioning System (GPS), a satellite-based radar system. Anyone having a Gps device and a clear visibility to at least 4 GPS satellites is able to use the network. By accurately timing the GPS satellite transmissions, a GPS receiver determines its location. Nowadays, GPS is widely utilised and has integrated into handsets.

5.6 Smoke Sensor

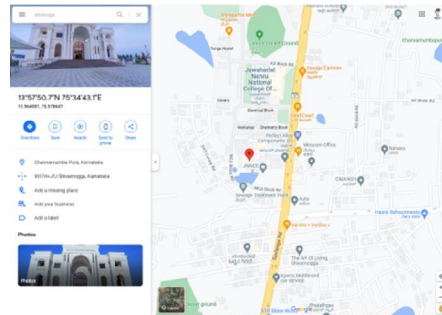
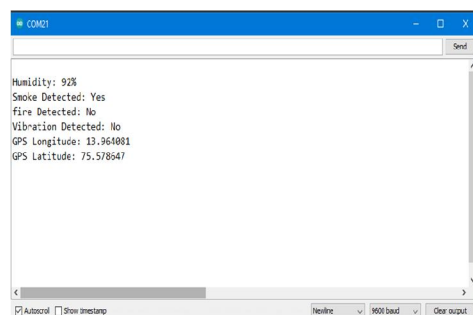


Fig 6: Smoke Sensor

Propane, LPG, Alcohol, hydrogen, methane, NH₃, smoke, benzene, and are just a few of the gases that may be detected using a group of sensors called MQ gas sensors. These sensors are made of an electrode with a sensing material applied on top, which is heated to improve the detecting material's sensitivity and reactivity.

VI. RESULT

In this proposed system, it will monitor the activity of wildlife and it check the forest trees are safe from smugglers or not. If forest fire occurs in any part of the wild then GPS module will sends the latitude and longitude degree's to authorities, and it monitors humidity, temperature, smoke , fire and vibration.



VII. CONCLUSION

Forest fires are anticipated by this strategy. It is far more inexpensive and efficient than the present approach. As a result, it is highly recommended to use in order to detect and stop forest fires. Since these detectors may easily be attached to

any sort of equipment, the setup process is less complicated. Connecting it to Arduino and Node MCU is easy. deployment and Installation and of this device are fairly straightforward as compared to earlier systems.

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