CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

J1023

Project Title

IOT Based Fast Wildfire Detection System

Abstract

Objectives

The goal of the project is to detect a wildfire within first 5 minutes and send alert messages to the fire department and emergency service officials. If a wildfire can be detected quickly, then human lives and property losses can be prevented. Continuous monitoring of a fire outbreak is needed in critical fire-prone forest environments. Placing a smart sensor system every square mile allows an alarm to be generated as soon as a small fire ignites anywhere within this monitored area. The received alarm will enable a dispatch center to quickly mobilize a coordinated response, thereby reducing the probability of this small fire growing into a devastating wildfire.

Methods

Raspberry Pi as host cloud PC, Arduino module as sensor connect device, rechargeable battery, 3 different sensors to capture temperature, flame, smoke readings. Miniature WiFi/Zigbee module for wireless communication. Installed "MeshCentral" software agent on Raspberry Pi to remotely monitor/control via IOT Cloud service. MeshCentral is a open source cloud service software managed by Intel Corporation. Tested sensor module circuits in a controlled fire environment.

Results

This design was tested in a safe and controlled fire environment. Sensors were calibrated and repeated testing trails have shown that a fire can be detected with in a minute as long as fire is within the sensor range. Fire alert messages were generated and verified over the internet. Through IOT cloud (Meshcentral) service demonstrated that sensor modules can be remotely monitored and managed.

Conclusions

In this project, the results demonstrated that a network of smart sensor modules will detect an increase in the amount of temperature and smoke in less than a minute. Using MeshCentral cloud service the wildfire alert messages can be sent to first response teams in a matter of seconds. This experimental project idea can be further expanded into full blown Forest fire detection system. When Wireless sensor networks are integrated into IOT cloud then multiple sensor modules will join the internet, this will help monitor large forest areas in California.

Summary Statement

I developed a smart wildfire detection and alerting system which can detect a fire within first 5 minutes.

Help Received

I designed and built the prototype after searching internet on techniques. My dad funded the project and my science teacher Mrs. Dina Nelson helped reviewing the results.