CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

S1119

Project Title

Mesh Network Based Wildfire Monitoring and Prevention System

Abstract

Objectives/Goals

In 2017, California faced one of the most devastating fire outbreaks in the history of the state, destroying 1.3 million acres of land and stripping thousands of people from their homes. The losses due to the fires have amounted to an astounding $13 billion. The damage that Californians have faced, has prompted me to design a simple, inexpensive, and reliable wildfire monitoring and detection system to prevent wildfires and minimize losses.

Methods/Materials

The wildfire detection system is a smart solar powered wireless device based on a microcontroller in a mesh network. These network devices monitor flame, temperature, humidity, and smoke and relay the data to nearby mesh nodes. The mesh nodes are connected to a central wireless router and extend the network to monitor a hazardous area. The router is connected to the internet and pushes captured data to the cloud for analysis and detection.

Results

During the testing phase, I found that the fire detection device could accurately obtain data regarding flame, temperature, humidity, and smoke and was able to provide mobile alerts. The sensor was tested in various conditions to ensure accuracy. Even when some of the mesh nodes and sensors were down, other nodes and sensors continued to successfully send data to the cloud.

Conclusions/Discussion

I have made a mesh network of sensors that can effectively detect fires by collecting data on flame, temperature, humidity, and smoke across a vast area. Additional variables can be added to the wildfire monitoring system to further enhance the detection mechanism. An infrared image sensor can be used to visually confirm that a fire is present. Furthermore, a GPS can be implemented in each of the microcontrollers to allow for fire personnel to easily locate the exact location of the fire. Research shows that wildfires are currently detected through the sole use of an infrared camera. My project builds on such detection mechanisms by adding sensors that measure temperature, humidity, flame, and smoke simultaneously through a mesh network, allowing for expandability and reliability. Through the creation of an inexpensive and reliable smart device, future wildfires can be detected and prevented, saving billions of dollars and ensuring public safety.

Summary Statement

I have made a mesh network of sensors to effectively detect wildfires and send a notification for early prevention.

Help Received

None. I created and programmed the mesh network sensors myself.