CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)	Project Number
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	38300

Project Title

A Data Analysis Approach to Wildfire Prediction

Abstract

Objectives/Goals

In order to prevent wildfires, this project develops a mathematical model to predict the ignition of a wildfire based on fire indicator factors including relative humidity, temperature, dew point temperature, and wind speed, which can be measured frequently through deploying small sensor devices in diverse geographical locations. The data measured is then transmitted to data collection centers for further analysis to accurately predict the possibility of the spark of a fire.

Methods/Materials

A computer study was performed to benchmark the proposed mathematical model to the existing prediction formulas The Angstrom Index and The Nesterov Index using existing data from the National Weather Service.

Results

The result of this study indicated that using the proposed model, the wildfire risk could have been predicted for the 2003 Cedar Fire and the 2017 Thomas Fire up to ten days before they occurred, with severe levels of risk five days before the fire occurred. This was a much earlier and accurate prediction when compared with the existing wildfire prediction methods, which rely on limited in-person field measurements performed by environmental agency personnel.

Conclusions/Discussion

This project will expand to include small sensor devices that measure fire indicator factors and transmit the measured data along with a sensor ID/location and the time of the measurement, to data collection centers, for which high level architecture has already been completed.

It is envisaged that for matters of practicality, the sensor devices are operated by small, solar-power rechargeable batteries, creating a self-sustained system, free of maintenance needs for at least five years. The benefit of the proposed system includes (a) providing time for firefighters to be deployed to the high risk locations ahead of time, enabling them to stop wildfires as they spark, preventing them from spreading and causing damage and casualties; and (b) warning residents in advance, allowing them to evacuate areas at high risk of fire.

Summary Statement

In order to prevent wildfires, this project develops a mathematical model to predict the ignition of a wildfire based on fire indicator factors, measured frequently through deploying small sensor devices in diverse geographical locations.

Help Received

I received high level guidance on the practicality and marketability of my project from my biology teacher, who aided me in recognizing my project constraints after I presented my idea.