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Wildfire Early Detection System (WildEDS)
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ABSTRACT

Wildfire Early Detection System (WildEDS) is just that. It is an IoT platform that would take data from multiple sensors and transmit that data to a cloud server. Then utilizing a machine learning model that data could be used to predict an area's susceptibility to a wildfire. Wildfires are a growing problem in our world today and many factors like temperature, soil moisture, humidity and pressure can be attributed to them [1]. The goal of this project is to develop an IoT platform that would monitor these features using multiple sensors in order to give firefighters and environmental scientists an edge in predicting where a fire may start.

USERS, PROBLEM DEFINITION, FEATURES AND OUTCOMES

The WildEDS is intended for firefighters and environmental scientists. These groups lack a resource that can gather data and predict where a fire may occur. The WildEDS aims to gather the surrounding area's temperature, soil moisture, humidity and pressure and determine the likelihood of a fire occurring. This will provide environmental scientist live data and give firefighters an edge in responding to wildfires and potentially eliminating the wildfire before it gets out of control. The WildEDS will need to be a self-sustaining system that provides the surrounding data and its location.

The tasks for this project will be divided between Joss and Baldeep. Joss will be responsible for the design and coding of the microcontroller that will aggregate the sensor data. Baldeep will design and code the portion of the device responsible for transmitting the data.

PROJECT RISKS

One big risk with WildEDS is how we will power the device in the field. The goal is for the WildEDS to be implemented in remote areas that can not always be closely monitored by humans so the device must be low maintenance, this means that it will need to power itself and not have a battery constantly in need of changing. Luckily peak wildfire season is normally a sunny time of year so the device could possibly recharge its battery via a solar panel. We would also need to

implement some safety features into the device that prevent the battery from causing a fire since that would completely negate the purpose of WildEDS.

Another risk is the range of the wireless of the device. A previous project, similar to the one we are proposing, uses a BOLT development board to transmit sensor data. However, as the authors state in their closing remarks, this device has limited range [2]. Since our device will need to be able to transmit over large distances we will need to utilize a wireless protocol with more range. We could also give the device the capability to communicate with other WildEDS devices in order to relay data if unable to reach the cloud server directly.

DESIGN CONSIDERATIONS AND RESPONSIBILITIES

When designing the WildEDS factors such as cost, availability and efficiency need to be considered. Cost is the most important factor when designing a project such as the WildEDS; due to the amount of land susceptible to wildfire it will require multiple devices to cover a large area. Another factor would have to be availability due to the global pandemic. While cost is important, what's available will be the determining factor on what's used to design the WildEDS. The last design consideration is efficiency because our system must be self-sustaining, we must design our system in a way that it does not waste energy.

As designers we have a responsibility to consider the user and the impact of our design. With the WildEDS we must consider the environment in which we wish to monitor and not harm or disturb the wildlife. We must also design in such a manner that our system is low maintenance and not a source for a wildfire.

BIBLIOGRAPHY

[1] M. Mhawej, G. Faour, and J. Adjizian-Gerard, "A novel method to identify likely causes of wildfire," *Climate Risk Management*, vol. 16, pp. 120–132, 2017.

[2] V. Zope, T. Dadlani, A. Matai, P. Tembhurnikar and R. Kalani, "IoT Sensor and Deep Neural Network based Wildfire Prediction System," 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS), 2020, pp. 205-208, doi: 10.1109/ICICCS48265.2020.9120949.