An Autonomous Wildfire Detection and Containment System

Gates, Margaret (School: Wantagh High School)

In August of 2019, there were 79,000 wildfires and up to 90% of them resulted from unpredictable human-related activity. Spreading at rates of up to 22 kilometers per hour, early detection of these fires is critical. A system of autonomous rods with Infrared cameras and environmental sensors could serve as an early wildfire detection and containment system and could gather data for improved wildfire risk assessment. This research focused on assessing the accuracy of the system's environmental sensors at determining an area's risk as well as determining the financial viability of such a system. Experimental soil moisture, temperature, and relative humidity values from a prototyped soil moisture and environmental sensor were compared to data from a standard soil moisture probe, hygrometer, and thermometer. The soil moisture sensor had an average percent error of 3.35%, the relative humidity function of the environmental sensor had an average percent error of 1.28%, and the temperature function had an average percent error of 1.10%. Additionally, the serial monitor of the coding software used for these sensors was able to accurately print a risk warning when temperatures were above 86?, soil moisture was less than 50%, or relative humidity was below 30%. In total, this system would only cost $9,174 to protect one square kilometer of land. In comparison to the $285 billion lost each year in the United States due to wildfires, this system can be considered as an accurate and cost-effective means of wildfire prevention.

Awards Won: