FireWatch: A Low-cost Wildfire Monitoring System for High-resolution Fire Localization Using Data Sparsity and Feature Matching

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Forest Fires are an ever-persistent problem around the world. In just the United States, wildfires cause 16.5 billion dollars in damage and kill nearly 100 people annually. In the state of California, an estimated 4.5 million homes are at high or extreme danger from wildfires. Climate Change has been proven to accelerate the number and intensity of wildfires every year. Recent research has shown that the key to controlling wildfires is to have first responders at the fire as soon as possible. In order to have first responders on the scene quickly, the United States has invested heavily in fire detection infrastructure. However, this infrastructure costs hundreds of millions of dollars and other nations are unable to afford such expenses. FireSafe is an alternative to existing fire detection methods that can provide the same accuracy at a fraction of the price. Fire Safe has four cameras that provide it with a 360-degree view. The system contains a 2500 mA hour battery which is charged by a 2 Watt photovoltaic system. FireSafe uses a Semantic Segmentation algorithm along with a convolutional neural network to identify nearby fires in images taken by the cameras. This novel combination of using two algorithms instead of one allows for a decreased false positive rate and lower energy consumption. After detecting a fire, FireSafe then a wireless modem to alert first responders. FireSafe is a closed system and is currently deployable and ready to be used by first responders.

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