Analytical Instrumentation, Methods & Materials

ENERGY HARVESTING MULTISENSOR WILDFIRE MONITORING SYSTEM

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Overview

Wildfires occur naturally in many ecosystems worldwide; however, the frequency of wildfires has increased in recent years. The United States National Interagency Fire Center reports that the total burned area has doubled in the last 20 years. Devastating wildfires have far-reaching ecological, social, and economic impacts, such as the loss of human lives, homes, property, and infrastructure, as well as adverse effects on animal health and air quality. Electric power infrastructure is particularly important in the context of wildfires because such systems can both initiate and be disabled by wildfires.

The Invention

UW-Madison researchers have developed a system for remote monitoring for wildfires that dynamically schedules sensor acquisition times to co-optimize sensor accuracy and energy storage. This complex tradeoff is handled by a machine learning algorithm trained over long event times punctuated by rare wildfires as would occur in practice. In one embodiment, the machine learning algorithm uses reinforcement learning resulting in a lightweight optimizer consistent with energy and hardware limited remote devices. A power management circuit operates to read the environmental parameters and monitor energy in the energy store to schedule the power consumption of each sensor from the energy store according to a schedule provided by a model trained with a training set of environmental parameters of wildfires and harvestable power over multiple predefined episodes.

Tech Fields

- Analytical Instrumentation, Methods & Materials : Sensors
- Clean Technology : Energy storage, delivery & resource efficiencies

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867