Fire Science and Decision Support

Science and Technology

WILDFIRES, A COSTLY PROBLEM

Wildfires along the Wildland Urban Interface (WUI) are becoming increasingly severe and costly. In fact, 13 of the largest and most destructive wildfires in California happened within the last five years. In 2020, fires swept across 10 million acres in the West, killing dozens and causing $16 billion in property damage. Urgent assessment and response are necessary to save lives and property and to inform the public. The U.S. Department of Homeland Security (DHS) has a need to support the development of accurate situational awareness data on wildfires to enhance assessment and response to these calamities.

The DHS Science and Technology Directorate (S&T) identified several key findings to substantially improve immediate life-saving efforts during WUI fire incidents, including broader use of existing fire modeling and forecasting tools for pre-incident planning. These efforts include building requirements that improve operational capabilities and incident response to save lives in WUI fires. They also include advancing S&T's ability to create high-confidence, timely WUI-specific models that can be used to inform response tactics during extreme conditions.

THE WIFIRE EDGE

The University of California San Diego is focusing on the development of the WIFIRE Edge, an integrated platform that leverages advances in edge computing. This platform is intended to assist S&T in the development of integrated sensing, leveraging existing DHS investments in field sensors and technology.

Edge computing is conducted on-site and near a particular data source, minimizing the need for data to be processed in a remote data center. The project will develop a concept demonstration for two scenarios: 1) initial attack response; and 2) prescribed burn planning and monitoring using commercially available sensing technology, edge computing, and next-generation fire modeling.

The objectives of this project are to: 1) develop the WIFIRE Edge Platform to assist with the development of S&T's integrated sensing; and 2) demonstrate initial attack and prescribed burns' concept scenarios deploying and utilizing the WIFIRE Edge Platform.

PROJECT IMPACT

- Wildfire models require accurate and localized data to effectively support the response tools necessary and allocate finite firefighting resources, safety procedures, and support decisions on fire incidents.
- This project is improving fire model accuracy through the provision of a field-sensor data collection system to increase capabilities to predict and monitor wildfire events.

ACCOMPLISHMENTS

- End-to-end testing of concept demo system burn unit map with sensor deployment and live ignition pattern tracking; live weather data sensing and monitoring.
- QUIC-Fire ensembles, dataset, and visualizations – Demo BurnPro3D.
- Validation of initial attack modules to assess the speed, accuracy, and effectiveness of the micro-scale weather data to execute a local FARSITE model and share real-time data with firefighters in the field.

UPCOMING MILESTONES

- Create QUIC-Fire ensembles to run a series of fire behavior simulations with QUIC-Fire by using a defined set of weather conditions desired for a prescribed fire in a specific part of Yosemite National Park in BurnPro3D. (Q1 FY24)
- Provide Synthesis Report of Edge finding including a detailed synthesis and analysis of concept demonstrations and project findings for final report. (Q2 FY24)

PERFORMERS/PARTNERS

- FEMA, Washington, DC
- Red Line Safety Systems, San Diego, CA
- University of California - San Diego, San Diego, CA