



technology opportunity

Award-Winning Sensor Web 2.0

Imagine allocating fire-fighting resources with the ease of doing a Web search.



Developed by a team of researchers led by NASA Goddard Space Flight Center, Sensor Web 2.0 is a revolutionary open source software architecture that allows users to access and control global sensors quickly and easily over the Internet. Sensor Web 2.0 gathers data from a variety of sensors and assimilates them into a network that detects fires, floods, volcano eruptions, and other threats to the Earth as well as human and animal life and vegetation. Sensor Web 2.0 makes collecting, analyzing, and disseminating lifesaving data more cost effective, user friendly, and time sensitive. *R&D Magazine* named Sensor Web 2.0 one the 100 most innovative technologies for 2008.

www.nasa.gov

Benefits

- **Accessible:** Makes sensors accessible and controllable over the Internet.
- **Versatile:** Integrates space-based, ground-based, and unmanned aerial vehicle (UAV)-based sensors.
- **Fast:** Dramatically reduces the time required to analyze sensor data.
- **User friendly:** Allows users to set up sensor webs quickly and easily via a point-and-click interfaces.
- **Cost effective:** Frees up highly skilled programmers and engineers for more technically demanding tasks.

Applications

- Detection, mapping, and mitigation of natural phenomena:
 - Wildfires
 - Volcano eruptions
 - Floods
 - Hurricanes
 - Tsunamis
 - Space-weather events
- Detection and mitigation of oil spills
- Mineral and other natural resource detection
- Agricultural surveys

Technology Details

Sensor Web 2.0 offers a user-friendly, cost-effective approach to detecting wildfires and other adverse weather phenomena and disasters that have a large impact on human life. It enables automated workflows and more widespread use of sensor data due to its user-friendly nature.

How It Works

Sensor Web 2.0 utilizes simple, open Web 2.0 capabilities and service standards to enable a network of heterogeneous sensors to operate as a cohesive whole for a variety of science goals. In addition to leveraging the Internet, Web services, and Open Geospatial Consortium (OGC) Sensor Web Enablement (SWE) standards, Sensor Web 2.0 uses Workflow Management Coalition (WfMC) workflows to hide the details of integrating and using an ad hoc set of sensors, enabling easy-to-use point-and-click interfaces. The pre-designed workflows serve as “recipes” for tasking and combining data from various sensors into customized data products and also contain the knowledge of how to accomplish the task.

Why It Is Better

Until now, a scientist or emergency worker typically spent months or years together with a team of programmers to assemble sensors and data-processing algorithms into workflows to accomplish a task. Sensor Web 2.0 allows users to assemble customized Sensor Web applications in minutes or hours with no programming or engineering staff. This user-friendly approach to building sensor webs means that highly skilled programmers and engineers can be assigned to more technically demanding tasks, freeing up resources and helping to allocate them more cost-effectively.

Sensor Web 2.0 can be used with sensors and imaging instruments on space-based satellites, ground-based sensors, and even unmanned aerial vehicle (UAV)-based sensors. Furthermore, the development team has worked closely with sensor interoperability groups to ensure compliance with emerging standards.

Successful Demonstration

In 2007, NASA researchers worked alongside the National Interagency Fire Center (NIFC) and the U.S. Forest Service to conduct five missions demonstrating Sensor Web 2.0. In a very real-time, real-life demonstration with real consequences and lives at stake, Sensor Web 2.0 gathered data from the MODIS space-based satellite being used to detect California wildfires and then tasked NASA’s EO-1 satellite and Ikhana UAV to gather even more detailed information on the rapidly spreading wildfires.

Sensor Web 2.0 quickly integrated the various data sets at different times, allowing investigators to take a more detailed look at how the fires progressed. Because Sensor Web 2.0 automated the data flows, the time it took to analyze the data was significantly decreased—from 2 weeks to less than 10 hours

For More Information

If you are interested in obtaining more information about the Sensor Web 2.0 technology (GSC-15535-1), please contact:

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