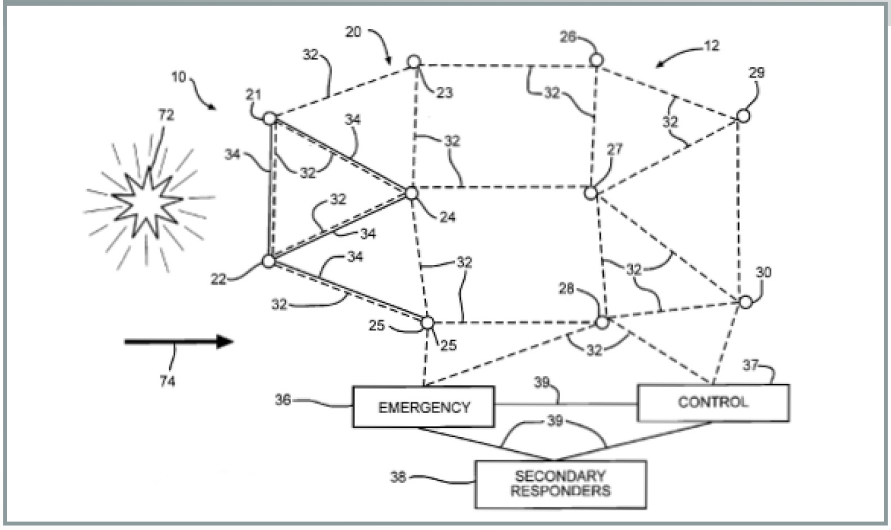
Intelligent Software Agents for Enhancing Sensor Networks Monitoring of Changing Conditions

UT-B ID 200301325



Technology Summary

Intelligent software agents developed by ORNL researchers can be used with sensor networks in distributed and centralized computing systems to enhance detection and response by sensors to changing, and potentially hazardous, environmental conditions. The software components are imbedded at the sensor network nodes in surveillance systems used for monitoring unusual events. When an event occurs, the software agents can establish a new concept of operation at the sensing node, post the event status to a "blackboard" for software agents at other nodes to "see", and then react quickly and efficiently to monitor the scale of the event.

This technology addresses a current challenge in sensor networks that prevents a rapid and efficient response when a sensor measurement indicates that an event has occurred. By using intelligent software agents—which can be stationary or mobile, have behaviors, interact socially, and adapt to changing situations—the technology offers features that are particularly important when systems need to adapt to active circumstances. To enhance response efficiency for both on-going and unusual measurements, more attention needs to be given to the event status at the event node and at nodes adjacent to it. The invention imbeds the software in several nodes of the system, each of which also has processing, storage and multiple communication features.

For example, when a chemical release is detected, the local software agent collaborates with other agents at the node to exercise the appropriate operation, such as: targeted chemical detection, increased detection frequency, decreased detection frequency for other non-alarming sensors, and determination of wind speed and direction so that adjacent nodes can be informed that an event is occurring and when it will arrive. The software agents at the nodes can also post the data in a targeted manner, so that agents at other nodes and the command center can exercise appropriate operations to recalibrate the overall sensor network and associated intelligence systems.

Advantages

- Uses the strengths of intelligent software agent technologies with the power of distributed processing, storage, and multiple communications of sensor network architectures
- Unique ability to push intelligent information processing in an efficient manner that will accommodate multiple sources of information at remote, distributed locations
- Enhanced ad hoc network communications and cooperative decision-making

Potential Applications

- All forms of monitoring and response activities; e.g. Homeland Security, environmental, process control, traffic control (land, air, and waterways), inventory status, delivery status, commerce applications, national security, logistics

Patent

James J. Kulesz and Ronald W. Lee. *Method and System for Monitoring Environmental Conditions*, U.S. Patent 7,834,754, issued November 16, 2010.

Inventor Point of Contact

James J. Kulesz
Computational Sciences and Engineering Division
Oak Ridge National Laboratory

Licensing Contact

David L. Sims
Technology Commercialization Manager, Building, Computational, and Transportation Sciences
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865. 241.3808
E-mail: simsdl@ornl.gov

PARTNERSHIPS