

Wearable Alert and Monitoring System (WAMS)



Homeland Security

Science and Technology

CHALLENGES FOR IMPROVED SITUATIONAL AWARENESS

The pervasive availability of Internet of Things (IoT) devices over the next few years will enable seamless situational awareness for first responders operating in dangerous environments. There are a significant number of challenges facing the industry to achieve seamless situational awareness. How do we access IoT sensors, some of which were not developed for first responder use? How do we create an intelligent network that can rapidly adapt to a changing environment? How do we optimize limited communication and human bandwidth, and prioritize network traffic based on first responder and incident management needs?

WEARABLE ALERT AND MONITORING SYSTEM: TRACK, MONITOR AND INFORM

The Wearable Alert and Monitoring System (WAMS) currently under development by the Department of Homeland Security Science and Technology Directorate (S&T), in partnership with NASA's Jet Propulsion Laboratory (JPL), is a distributed, intelligent IoT communication system that will bring seamless situational awareness to first responders. WAMS works with JPL's Assistant for Understanding Data through Reasoning, Extraction & Synthesis (AUDREY) system. AUDREY uses human-like artificial intelligence to understand the needs of first responders and incident managers and provide feedback based on that understanding.

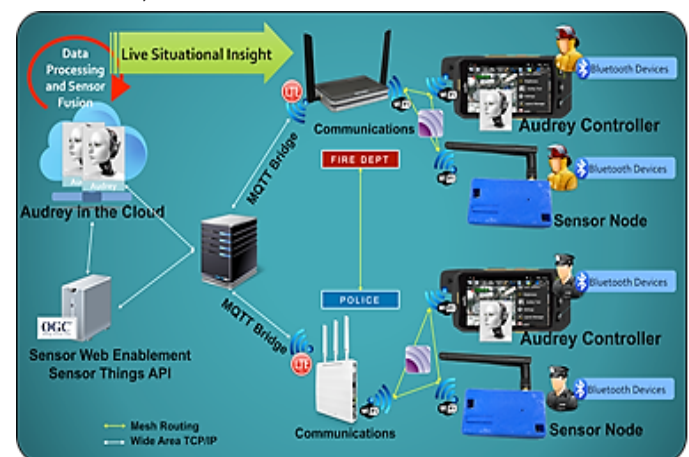
Composed of an array of sensors, WAMS connects to controller software working with both local and remote AUDREY systems in the cloud to provide on demand communication and computing based on first responder needs. The sensor nodes connect to an IoT device to monitor and track environmental and physiological factors like oxygen, carbon monoxide, heart rate, body temperature and respiratory rate. The controller software operates in mobile devices and provides distributed intelligence closer to the end user to enable efficient use of communication and human bandwidth. The combination of sensor nodes and controllers enable unparalleled interoperability of intelligent networks and sensor nodes to

adapt to rapidly changing environments. WAMS is a key element in enabling a Next Generation First Responder (NGFR) eco-system to discover, connect, fuse and understand different IoT domains.

PROOF OF CONCEPT DEMONSTRATIONS

In 2016 S&T successfully demonstrated end-to-end communication of AUDREY agents and sensor nodes at the Public Safety Broadband Stakeholders Meeting as well as connected prototype communications hubs to a Band Class 14 Deployable Long-Term Evolution (LTE) network at the meeting location. First responders and incident commanders will now be able to receive actionable intelligence on the FirstNet network, from distributed AUDREY artificial intelligence agents, through WAMS that process and learn from large amounts of IoT sensor data to be used and shared across FirstNet.

S&T is currently working on implementing controller software that works with Android phones, third-party sensor nodes and AUDREY in the cloud. WAMS was showcased as part of the NGFR Apex Program Spiral 2 technology experiment and demonstration in Grant County, Washington, in November 2018. This was followed by the Spiral 3 technology integration experiment in Houston, Texas in December.



WAMS Architecture

MOVING FORWARD

NASA's JPL continues to refine the software to ensure compatibility with commercially available sensors and optimization on Android devices. The results of the Spiral 3 experiment will assist in this effort.

