

EARLY WARNING FLOOD SENSORS

Flooding is the nation's leading natural disaster, accounting for the greatest loss of life, property damage and economic impact. Current flood damage for the 30 year period (1985-2015) is estimated at \$8.2 billion in damages and more than 105 fatalities per year. Deployable Internet of Things (IoT) technology monitors flood-prone areas in real time for rapid detection to alert officials, industry and citizens to potential threats can enhance investments in flood mitigation.

GOVERNMENT, INDUSTRY MEETING COMMUNITY NEEDS

Over the last three years, the Department of Homeland Security Science and Technology Directorate (S&T) worked with companies that were awarded Small Business Innovation Research (SBIR) funds to design, develop and test a network of inexpensive, deployable flood inundation sensors. The sensors were part of a scalable wireless mesh network that rapidly measures rising water and can report flood conditions back to operations centers, first responders and citizens.



AWARE Flood sensor with IoT communications module (LTE-M) and plug-n-play water level pressure sensor.

The Flood Sensor Project includes three phases:

- SBIR Phase 1: Developed prototype flood sensors.
- SBIR Phase 2: Refined Phase 1 prototypes to harden the sensor housing, increase power through energy harvesting, expand communications network range, transmit imagery, provide GPS location, implement open data exchange standards and monitor performance diagnostics. In 2018 and 2019, more than 600 sensors were deployed to eight state/local jurisdictions for operational test and evaluation.
- SBIR Phase 3: S&T down-selected to one small business based upon Phase 2 stakeholder feedback and commercial viability. Additional enhancements and sensors will be deployed to new jurisdictions for further evaluation and commercialization.

PHASE 3 FOCUS: PRODUCTION AND COMMERCIALIZATION

SBIR Phase 3 will result in the development of modular sensors designed for maximum configuration flexibility to meet stakeholder environmental conditions. The goals of SBIR Phase 3 include:

- 1) Extend flood sensor functionality to incorporate additional enhancements identified by stakeholders during SBIR Phase 2 field tests and evaluation.
- 2) Develop QA/QC performance testing and validation procedures to address a number of key parameters for each of the sensor sub-systems (e.g., sensing capabilities, power, communications, data transmission, mounting / installation and construction).
- 3) Demonstrate a scalable, production-ready manufacturing capacity for volume-based sensor production.
- 4) Perform operational field tests and evaluation with selected state, local and international stakeholder jurisdictions.

Once completed, these systems can be deployed for years with little-to-no maintenance. Sensor costs, depending upon configuration, are expected to be orders of magnitude less expensive than many permanent flood sensors used today.

INDUSTRY PERFORMER SENSOR PROFILE

Intellisense Systems' AWARE Flood is a real-time, water monitoring system that supports a self-healing mesh topology of sensor nodes with submersible flood sensors via a variable length cable to monitor waterway conditions. It operates autonomously via continuous solar and battery power, communicating wirelessly between nodes and emergency data centers using satellite, radio, or cellular networks. (www.intellisenseinc.com)