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Title: Revolutionize Situational Awareness in Emergencies

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Revolutionize Situational Awareness in Emergencies

Integrated system provides real-time actionable information to first responders

BACKGROUND & MOTIVATION

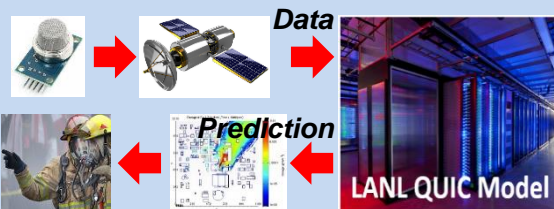
Railroad chemical accidents can have catastrophic impacts on communities



- The amount of crude oil and chemicals shipped by rail, and with it the number of accidents, have increased dramatically
- 1 in 4 residents live/work in evacuation zones
- High situational awareness is critical to first responders in order to rapidly make the correct decisions in an emergency

INNOVATION

Integrate a contamination dispersion model (QUIC) with a robust sensor and data network to provide real-time actionable information to communities



- A network of chemical and wind sensors sends data via satellite to remote server
- QUIC makes a prediction on the spread of contamination in real time
- This real-time actionable information is relayed back to the community to enable an optimum emergency response

DESCRIPTION

We will integrate three LANL technologies to form an advanced predictive real-time sensor network:

(1) Compact chemical & wind sensors in a low cost rugged package for outdoor installation:

- Builds on LANL's extensive experience with chemical, bio, and radiological sensors
- Configured for the specific needs of the customer



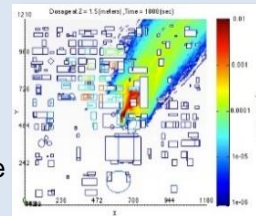
(2) Flexible, robust communication architecture linking sensors in near-real time to globally accessible servers:

- Processing of raw data at the sensor into high-quality compact information
- Key algorithms: cross-correlation, data compression, queuing
- Robust data communication from urban scene via satellite to globally accessible servers for modeling



(3) LANL's QUIC code predicts contamination transport and dispersal in urban environments in near real time:

- One of the most validated plume modeling codes for urban areas
- Accuracy greatly improved by real-time data feed from many sensors
- Computationally highly efficient code with existing building models for 130+ US cities



Current Technology Readiness Level (TRL) 4

- Detectors and sensor-to-server satellite link demonstrated
- QUIC code experimentally validated

ANTICIPATED IMPACT

Real-time actionable information will revolutionize situational awareness in emergencies and optimize the emergency and cleanup response.

- This technology can save lives, minimize damage to infrastructure and the environment, and speed up the recovery after an accident
- Railroad or oil companies benefit from reduced lost revenue, liability, and costs of cleanup and environmental remediation
- This technology can provide highly valuable data for the development of emergency response plans prior to accidents

PATH FORWARD

Development path and critical demos:

- Phase 1:
 - Assess and define customer-specific application needs
 - Develop application-specific sensor units
- Phase 2:
 - Establish an integrated pilot system in a representative environment
 - Test and qualify the system performance using controlled releases of surrogate substances

Potential End Users:

- Railroad and oil companies
- State and local emergency services

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