



United Technologies Research Center

Intelligent Building Response – Detection Systems Rapid Response to an Adapting Adversary (ADSA19)

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So What? Who Cares?



- Space: Scalable Intelligent Building Response
- Problem: *65% of attacks are on Soft Targets; 5.6 million buildings in US*
- Solution: *Leverage distributed sensors to localize and respond*
- Results: *Building systems provide automated responses at a relevant time scale (seconds not hours)*
- TRL: 3-9
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Concept of Operations

Detect and respond in seconds (TRL 3-5)

1 Trigger

Low fidelity detection: Biometrics, Video feed, manual call station, smoke detectors, CBRNE, analyzed for intent.



2 Tiered Response I

Automated Response: Enact low-regret responses appropriate for detected threat: reroute person/people, delay ingress/access, increase monitoring.



3 Data Collection

Situational Awareness: Goal identification, provide path planning, video monitoring, evacuation guidance, data and video.



6 Forensics

Data Analysis: Indexed video feeds allow for rapid analysis.



5 Tiered Response II

Separate People and Threat: Issue interdiction, evacuation/ shelter in place protocols; notify security.



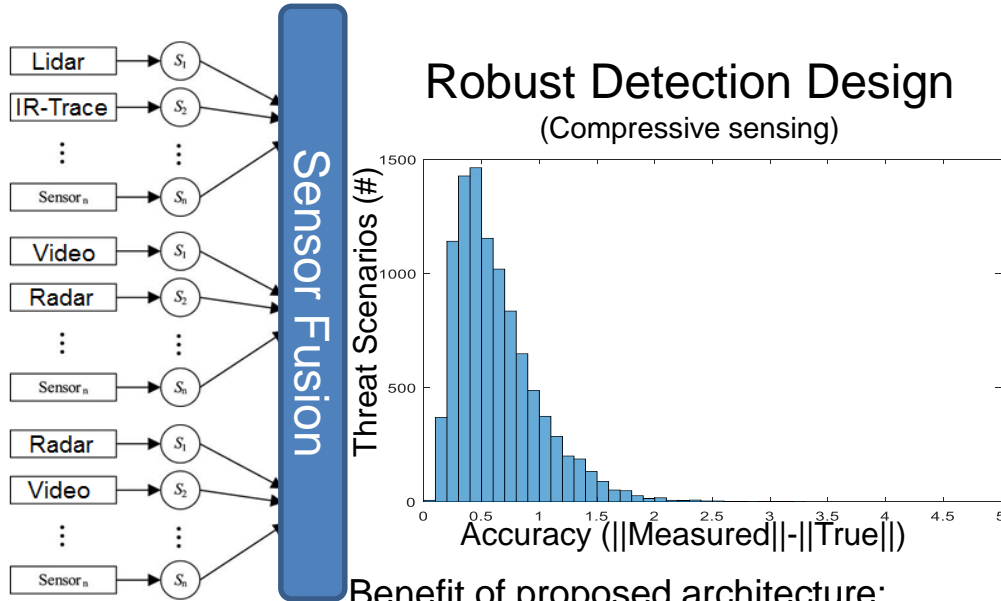
4 Confirmer

High Fidelity Detection: confirmation of threat/activity.



Approach

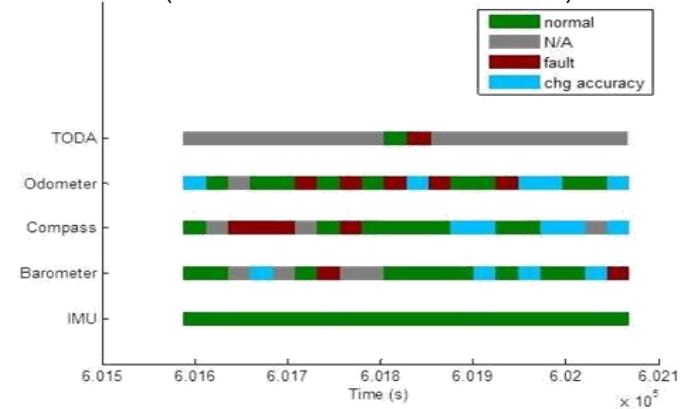
Adapting to the evolving threat



Benefit of proposed architecture:

- **Early detection of anomalies** – leverage sensor data to enable early weak alarm threshold
- **Processing at the edge** - Reduce number and complexity of purpose built sensors
- **Resilient architecture** – Addresses disparate data sources and adapting to future threats

Fast Localization (Modular estimation framework)

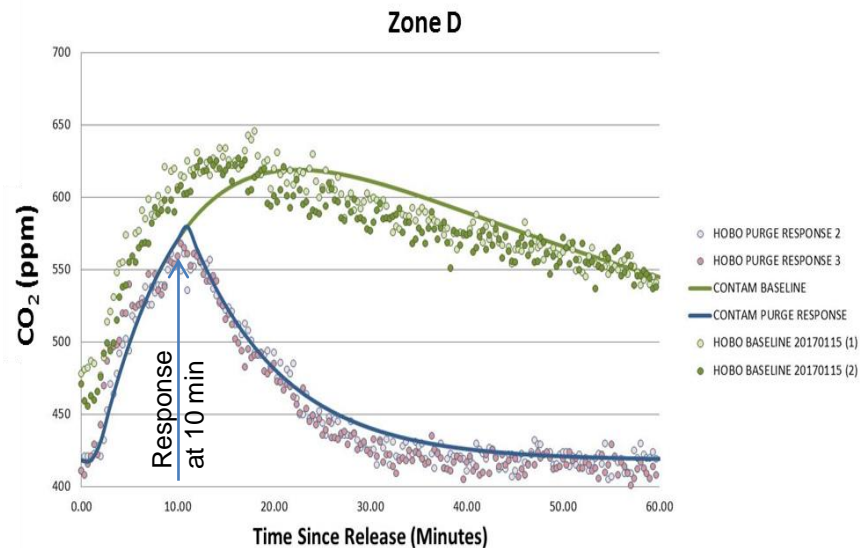
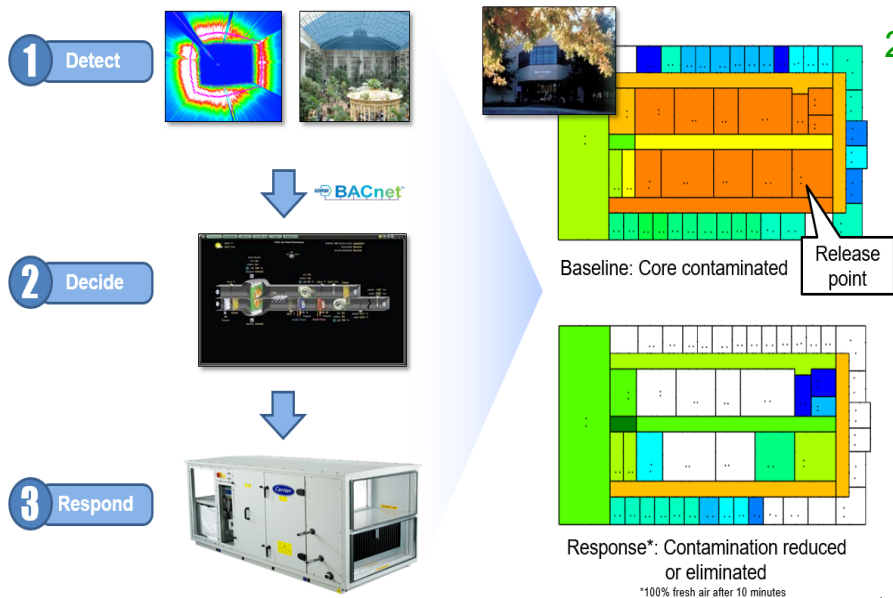


Example: Addressing Chem/Bio Attacks*

Leverage the HVAC and fire protection system (TRL-5)

Full building testing of two CO₂ releases:

1. Baseline - No HVAC response
2. Ventilation response – Fresh air 10 minutes after release



*DHS supported – SenseNet



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