



**THALES**



# Hybrid Personnel Location and Tracking System

**GLANSER**



**Homeland  
Security**

***Precision Indoor Personnel Location and Tracking  
for Emergency Responders Technology Workshop  
Worcester Polytechnic Institute  
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*The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressly or implied, of the Department of Homeland Security or the U.S. Government.*

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- **GLANSER Challenges**
- **System Architecture and Design**
- **Year 1 Prototype Equipment**
- **Performance Results**
- **Next Steps**

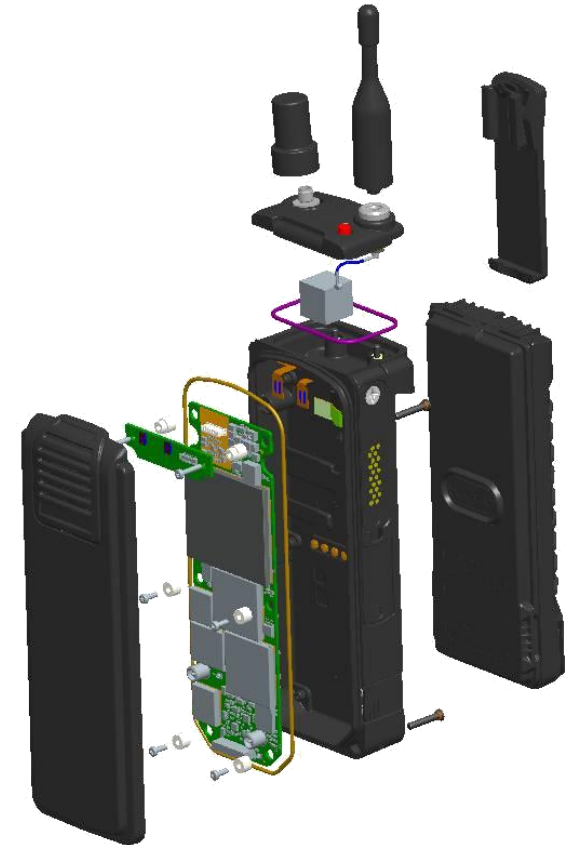
- Positioning accuracy and integrity
- Robust availability
- Accountability
- Simple operation
- Rapid deployment
- Size, Weight, & Power





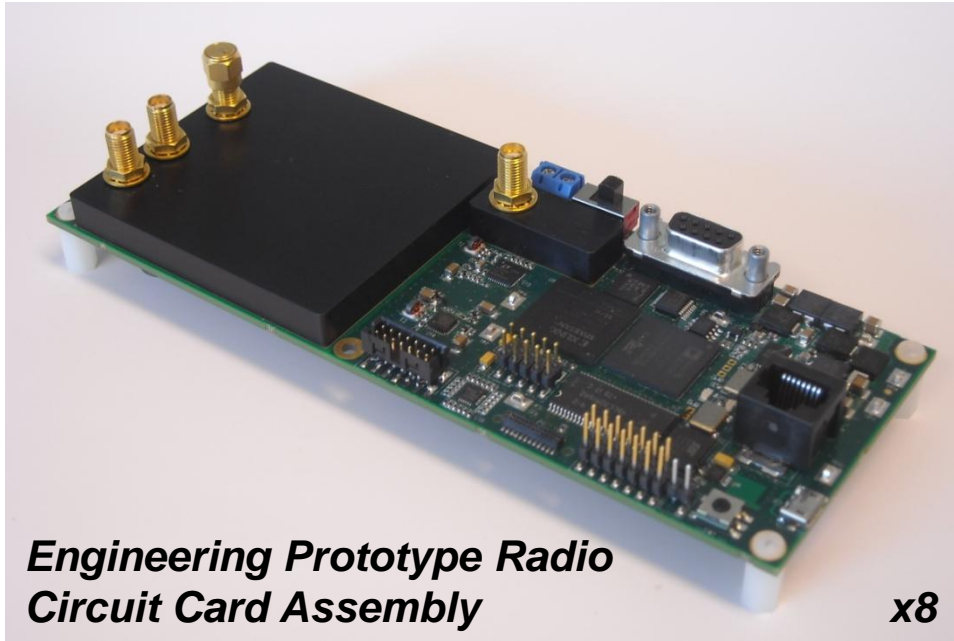


## Host Locator Assembly



- **2 Components:**
  - COTS Personal Computer
  - Host locator radio
- **Leveraging TRX's Sentrix™ command station**
  - Command, control, and 2D/3D visualization interface for scene commanders
  - Navigation and mapping algorithms
- **Open external interface for connection to other C2 and visualization systems**





**TRX Tracking Unit**



**Thales Battery**

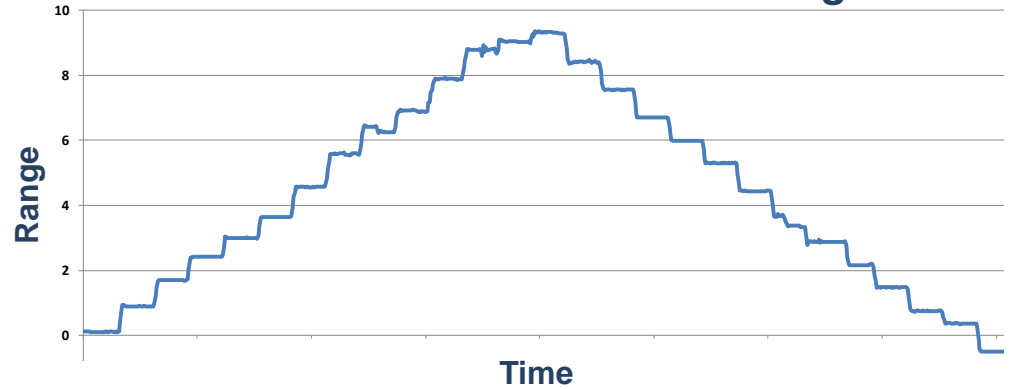


Sensor	Challenges	Mitigation	Limitation
RF Ranging	Multipath Range	SALSA Narrowband signal	Blockage
Inertial	Drifts Biases	Motion classification Mapping	Unclassified motion
Barometric	Drifts Local variations	Floor pinning Mapping	Decorrelates over time
Magnetic	Local disturbances	not much	Accuracy

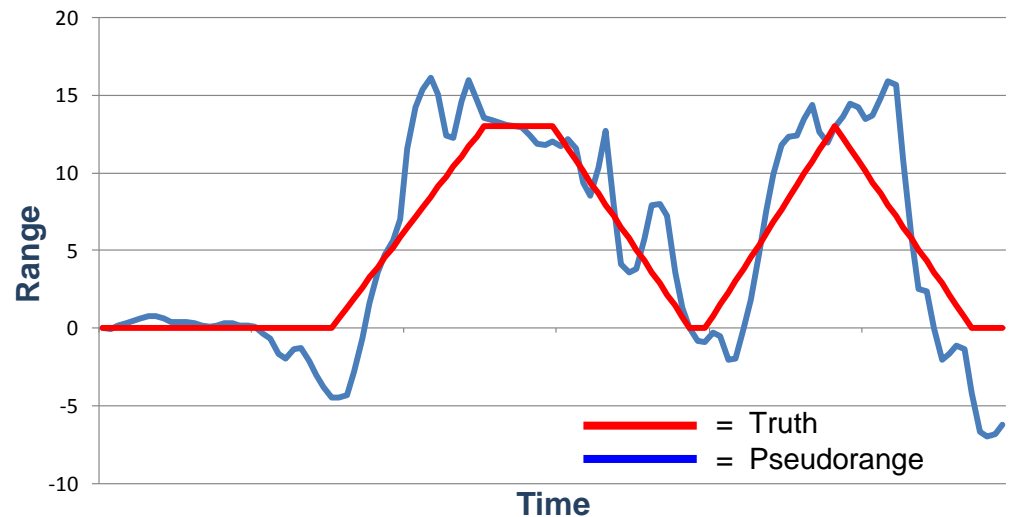
- **Each sensor has limitations; inertial and RF alone are insufficient**
- **Fusion of all sensors using a hybrid navigation solution is needed**
  - Merge heuristic navigation (inertial, motion classification, etc.) with more traditional RF ranging via Kalman filter
  - Two techniques complement each other's weaknesses to maximize navigation availability, integrity, and accuracy

- Centimeter-level precision in carrier tracking loops (ADR measurement)
- 3 m RMS level raw ranging accuracy in code tracking loop

*Raw Accumulated Delta-Range*

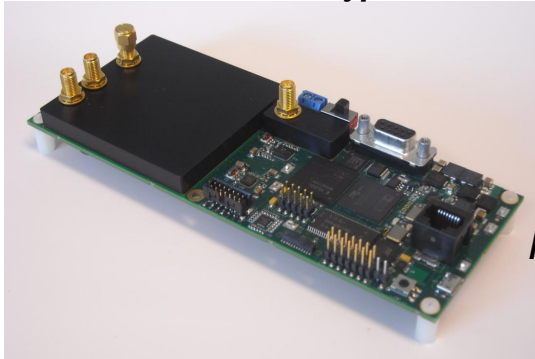


*Raw Pseudorange*

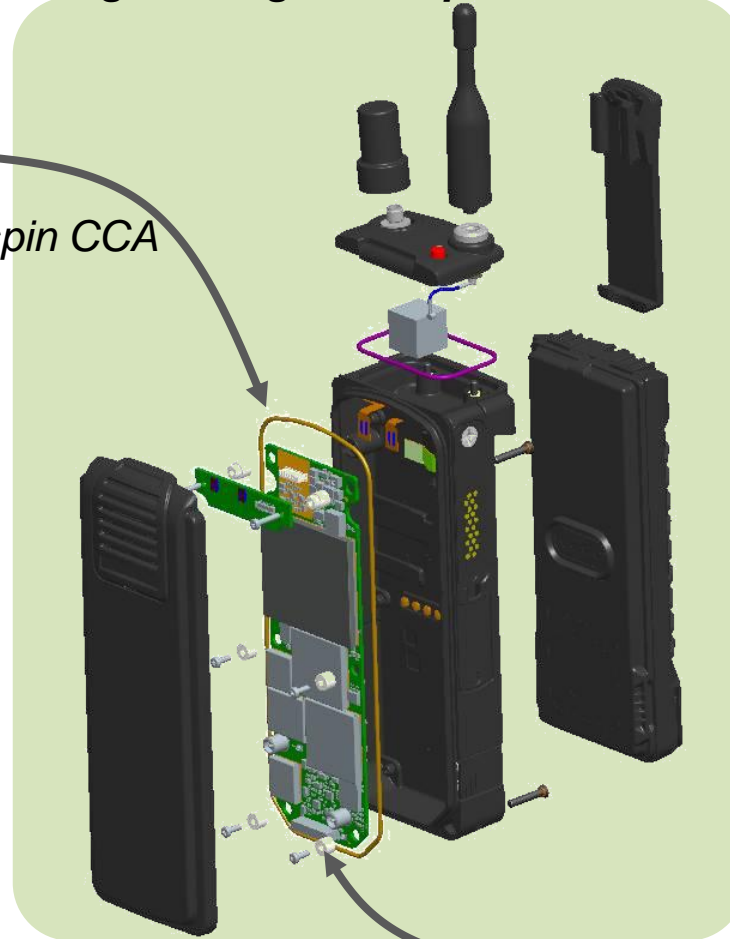




*Year 1 Prototype*



*Engineering Development Model*



*Respin CCA*

*Incorporate IMU and processing*



**TRX Tracking Unit**

- **Additional functionality for consolidated host device**
  - Networking
  - Multi-user ranging
  - GPS
  - Advanced multipath mitigation
- **Continue user community assessment**
  - CONOP refinement
  - Field test and evaluation
- **Complete transition plan**