TRX Team

We are committed to building a reasonably priced tracking system for firefighters!
TRX’s mission is to provide first responders with the highest quality personal locating device at a reasonable cost.

- Working with Maryland Fire and Rescue Institute's Center for Fire Safety Research and Development to design a tracking system that meets firefighters needs
- Modular design facilitates integration of other sensors
  - New tracking sensors
  - Health monitoring

*Development funded by TSWG/DHS, DOD, MTTF, MFRI/DHS, NSF, NGA*
Objectives

3-D Location Anywhere

- Reduced the time to reach a lost or injured firefighter
- Improved Incident Command
- No pre-installed infrastructure
- Rugged, reliable, easy to operate
- Reasonable cost
- Reasonable timeline
Sentinel Tracking System

- Small sensor and data radio worn by each firefighter
- Monitors status, movement, location, and communicates in real time
- Tracks indoors and outdoors with display on a (networked) laptop
- Requires no pre-installed infrastructure
- Data replay for training purposes
- Mesh network formed by data radios

Software practical and easy to use
Designed with firefighters
New Hardware

- Data Radio
  - Larger alarm button
    - Large enough to actuate with gloves
    - Difficult to accidentally press
  - 85 dB Alarm
  - Visual device status

- Tracking Unit
  - Automatic on
  - Visual device status
Hardware – NFPA 1800

  - 500°F for 5 minutes
  - Submerged 10 ft. – maintain 95dB
  - Cold-hot cycling (-4°F to 160°F)
  - 442 lb compressive load
  - 10 ft. drop test
  - Vibration testing
  - Direct flame exposure

- Top alarm
  - Difficult to accidentally press
  - Large enough to actuate with gloves during emergency

- Visual signals of device status
- Side alarm cancel
- 85dB alarm
- DC Charging Jack

- Waterproof
- Thermal resistant
- Battery life 4 to 6 hrs
Integrated Positioning

- GPS
- Inertial (accelerometers, gyros)
- Magnetic
- Pressure
- Received Signal Strength
- Maps

Modular Software Design

Facilitates integration with other COTS systems (e.g., triangulation based methods – UWB, MC-UWB)
Operational Scenario

- **Incident Commander** monitors location and status information from (all) teams/firefighters at the incident.

- **Base Station** on fire truck tracks each firefighter on the team and shares data with Incident Commander.

- **Each firefighter** wears a tracking sensor and data radio.
  - Location, alarms, and other system and firefighter health data are collected and transmitted to base station on fire truck.

The system can make use of established communications infrastructure.
Testing at FDNY July 2007

Number of personnel on each floor

8th to 7th floors of FDNY Building

INU path remains accurate to 1m over test lasting ~15 minutes
Rescue Scenario at MFRI 4/07

[Map Image]
Indoor Tracking and Monitoring

- Plots on a floor plan when one is available
- Automatically detects floor changes
- Provides status information & two way alarming
- Has enhanced PASS functions

Data from live demonstration: WPI - August 2007
Demonstration
Metro Chiefs Conference
April 2008
New Incident Command Interface

- Automatically tracks every equipped firefighter and vehicle at incident
- Organized by team
- **Touch screen** with large buttons
- Displays status information
- Displays floor plan on GIS footprint
- On alarm **automatically** highlights in red
  - **Downed firefighter and their path**

Commander knows instantly when a firefighter is in trouble, where they are, and who is nearest to them
Data communications test in Chateau apartment building Silver Spring, MD
- 95% coverage with 6” command station antenna
- Maximum 1 hop in network

18 story high rise apartment building
The C&O Canal Paw Paw Tunnel is 0.95 km long (3118 feet)

Figures to the right show aerial and entrance view images

Figures below show GIS views of tunnel with and without Sentinel INU tracking enhancement

2 people walking in line

Sentinel tracking through tunnel

GPS signal disappears as soon as tunnel is entered

GPS cannot track through tunnel
Sentinel Map Building

Real time generation building map based on historical path data

Accumulated error less than 3 meters after 25 minutes
Sentinel Map versus Floor Plan

25 minute walk in Kim Engineering Bldg

Map overlay on GIS
Deployment Schedule

- **July 2008**
  - Alpha testing with local firefighters at Maryland Fire & Rescue Institute

- **Fall/Winter 2008**
  - Beta testing with local departments
  - Prince Georges, Montgomery Counties, Washington DC, ...,

- **Spring/Summer 2009**
  - Pilot testing at select departments around the country

- **Fall/Winter 2009**
  - Commercial distribution
Let Us Know Your Requirements

- Must have capabilities?
- Operational Model?
  - 4 tracking units + spare and computer on truck
  - Network commanders at the scene
- Current/planned radio networks?
  - Transition to 700MHz?
  - High bandwidth data networks?
- Building types with biggest safety issues?

Please contact MFRI or TRX if you are interested in doing a pilot in 2009.