

Tower-Based IR Spectral Imaging Sensor for Perimeter Security and Force Protection

- Spectrum Photonics -

Ed Knobbe

Project Sponsor: HTDV

Start Date: Dec 2008

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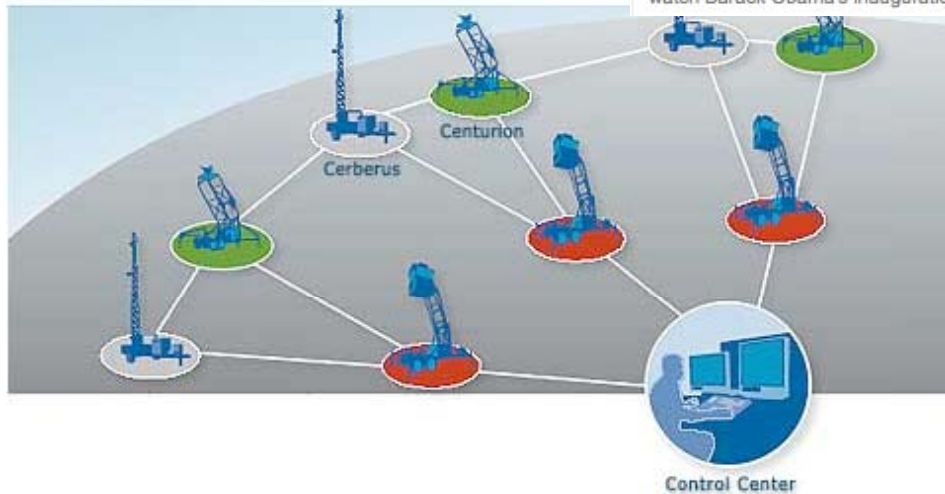
Problem

- Operations in era of asymmetric warfare
 - Perimeter security
 - Personnel protection

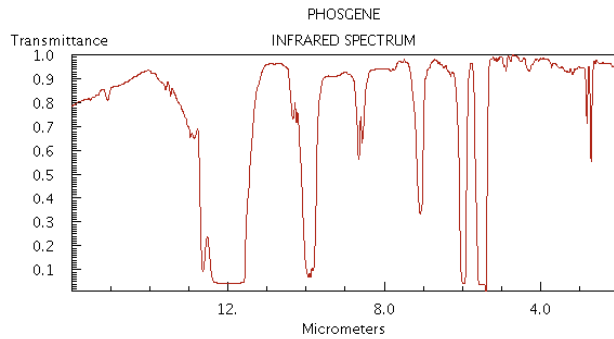


A security tower stands over the crowd that came to watch Barack Obama's inauguration.

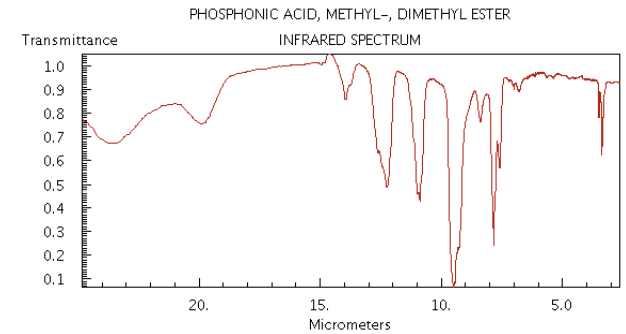
- Conventional passive barriers easily defeated
 - Covert human intruders
 - Robots
 - Wind-borne agents
 - CWAs
 - BWAs
 - TICs and TIMs



Layered perimeter security system
- active surveillance/protection
via instrumented towers



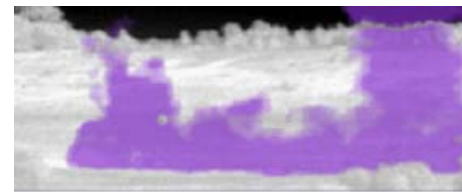
Approach



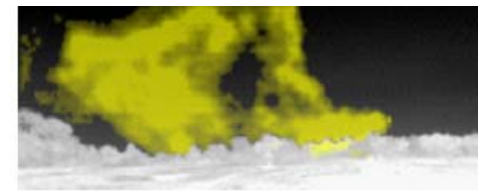
- Detection of wind-borne agents particularly problematic
 - Not visible to humans or radar
- CWA and TIC spectral signatures distinctive in the long-wave infrared (LWIR) region (8-12 μm)
- Conventional FTIRs and LWIR hyperspectral imagers (HSIs) are expensive, often very large and heavy
- Our approach: Sagnac interferometer-based LWIR HSI
 - Invented by Prof. Lucey, UH, patent issued in 2004
 - Licensed by Spectrum Photonics

Telops: COTS LWIR HSI System

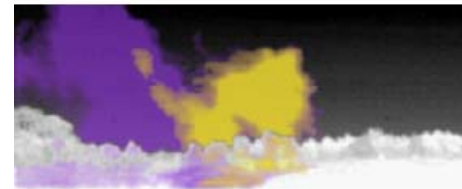
- Michelson interferometer
- Demonstrated CWA (simulant) and TIC Detection/ID
- Unit cost: ~ \$1M



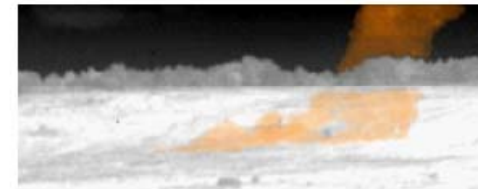
SF₆



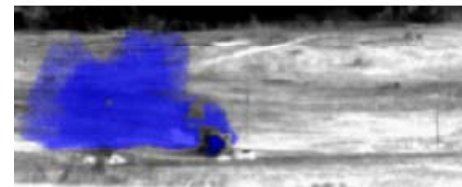
NH₃



Mix SF₆ and NH₃



Phosgene



TEP



DMMP

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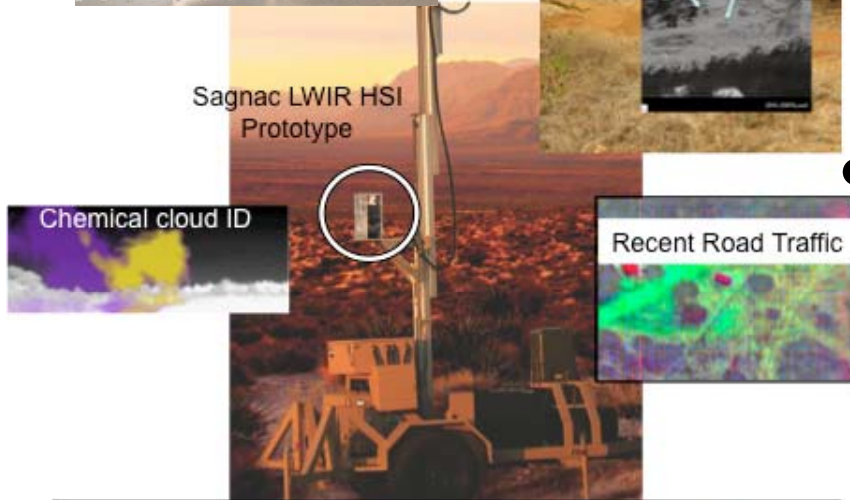
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Our Project Team

- Collaborating with ICx Technologies
 - Integrate onto Cerberus unmanned tactical platform
- Unique advantages
 - providing tower
 - security product deployed “in theater”
 - existing customers/sales channels



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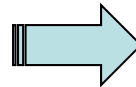
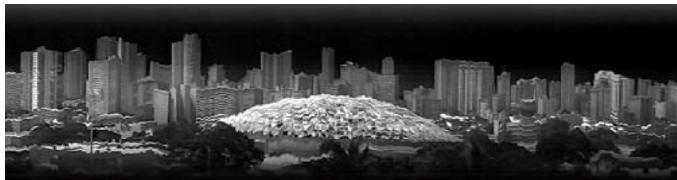
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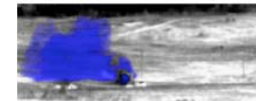
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Status

- Achieved to date
 - Translation of base UH-developed algorithms into “clean” executable code
 - Autonomous error correction
 - Goal: quasi real-time spectral image processing



- Next major milestones
 - Systems-level hardware integration
 - Tower-borne field demonstration
 - Standoff cloud detection



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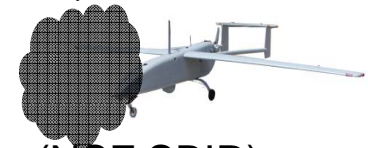
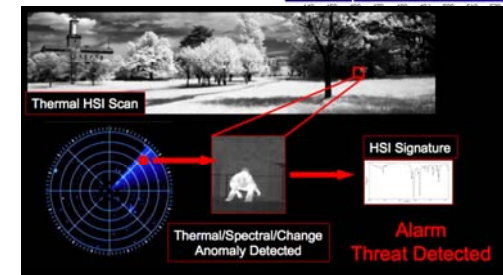
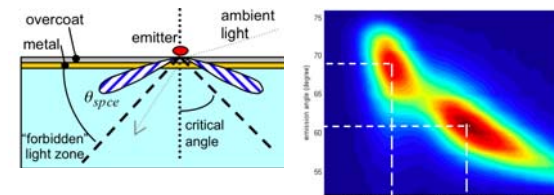
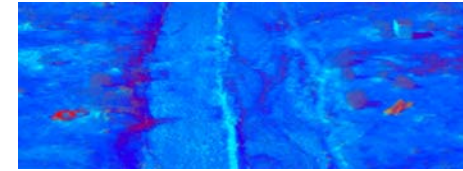
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Company Profile

- Company name: Spectrum Photonics, Inc.
- Date Founded: 10 June 2008
- No of employees: 4
- Other DBAs: none
- Business areas: Sensor Development
 - C/B/E threat sensors
 - Perimeter and Force Protection
 - Nonmilitary applications of standoff and trace detection
 - Chemical process QA and control, agribusiness, environmental
- Other Relevant Projects:
 - Mobile sensors for standoff and remote IED detection (NVESD; Army SBIR)
 - Underwater explosive trace detection (Navy SBIR)
 - Mobile sensor for standoff Chemical Weapon Detection (CBD SBIR)
 - Resonantly-enhanced photonic transducer for trace explosives detection (NSF SBIR)
 - Compact/Lightweight Spectral Imager (DARPA seedling)
 - Persistent Operational Surface Surveillance and Engagement (DARPA seedling)
- Company logo: work in progress



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