S&T Stakeholders Conference

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Future Attribute Screening Technology

Mobile Module (FAST M²)

Innovation/HSARPA HIP

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From Science and Technology… Security and Trust

Homeland Security

Homeland Innovative Prototype Solutions

Future Attribute Screening Technology Mobile Module (FAST M^2)

Systems

- Queue management
- Behavioral identification
- Rapid risk assessment
- Screening methodologies

Operational Characteristics

- Discover screening methods for intent
- Avoids All Privacy Issues
- Simple to operate and use

Functions

- Attribute measurement
- Risk determination
- Behavior focused screening

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Future Attribute Screening Technology Mobile Module (FAST M²)

Description: Provide mobile means for research, development and integration of new behavior/physiological based screening methods for field use in multiple low and high traffic venues.

Goals:
- Improve user experience and throughput
- Automate behavior based screening techniques
- Integrate multiple screening technology systems
- Validate technical requirements analysis
- Establish performance metrics for screening systems.

Technologies:
- Current/future Observation Techniques
- Hostile Intent Detection Technology
- Physiological Sensors and
- Interviewing/Questioning Techniques

Payoff: Automation of behavior detection and screening processing will *detect people who are unknown threats* at security checkpoints such as airport, border crossings, transportation portals, and other critical infrastructure

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Why FAST M^2?

Revolutionary Integration of Screening Methods

- Behavior based screening
- Increase screening speed
- Fusion of Multiple Inputs
- Assist on site evaluators

Automating Observations

- Remove subjectivity from the process
- Behavior indicated by movement/action
- Minimize divestment (i.e. coat, shoes, etc)

Real Time/Real Venue Execution

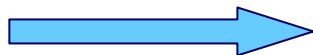- Portable for Special Events
- Adjustable based on Need

Privacy Protection

- Ensure the privacy of all citizens is protected

FAST Mobile Module Laboratory

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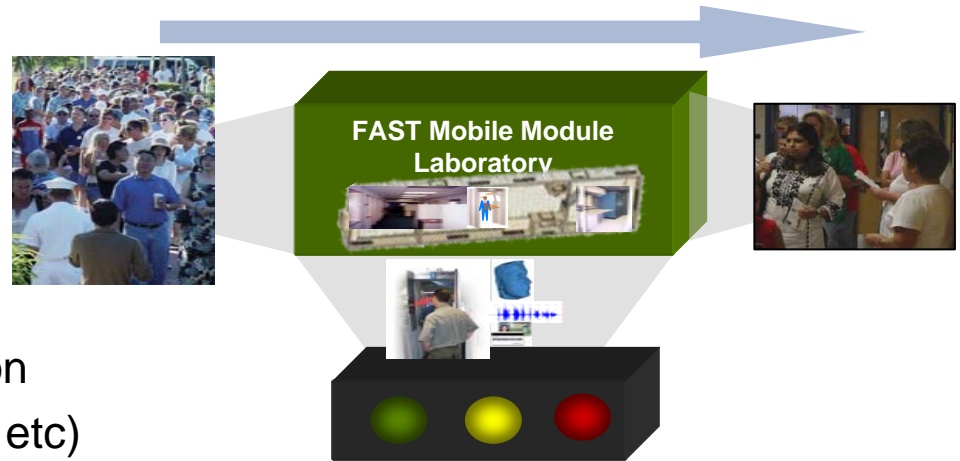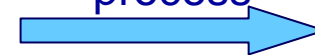
Innovation Overview

Integrate and Test new screening methods & technologies for accuracy, speed & throughput

Intelligent Sensor Metric Fusion

Screening Technologies

Prototype Integration (FAST)

System of Systems

Transition validated results to augment the existing passenger screening process

Behavioral Sensors (Hostile Intent)

Question Tree

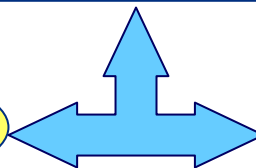**Observation**

Verbal

Physiological Sensors

Respiratory

Cardio

Counter Measures

Motion

Iris

Thermal

Reach out to Research

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FAST M^2 Components

Intelligent Fusion

- Sensor output integration and synthesis
- Predict likelihood of individual negative behavior in a contextual situation
- Link observed behaviors and sensor metrics in relationships that are quantifiable
- Create content-based decision mechanisms to provide input to screening authority

Behavioral

- Hostile Intent - Real-time, multi-modal, culturally independent hostile intent detection (micro facial, auditory, speech) to identify unknown or potential threats terrorists --- Accurate, real-time, & non-invasive
- A multi-modal intent detection framework that can be implemented across DHS operational mission space

Physiological

- Real time, multi-sensor measurement of physiological metrics
- Sense at a distance, non-invasive
- Minimize impact on public

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FAST M^2 Sensors

Sequence: 001, Frame: 001
2D SIMT   2D AFFINE   3D SHAPE   2D APP

Remote Physiological Sensing:

- Thermal Sensing
- Physiological measurement
  - Cardio vascular/respiration
  - Eye movement
  - Gate/Body movement
- Subject Tracking
- Miniaturization
- Processing Algorithms
- Countermeasure detection
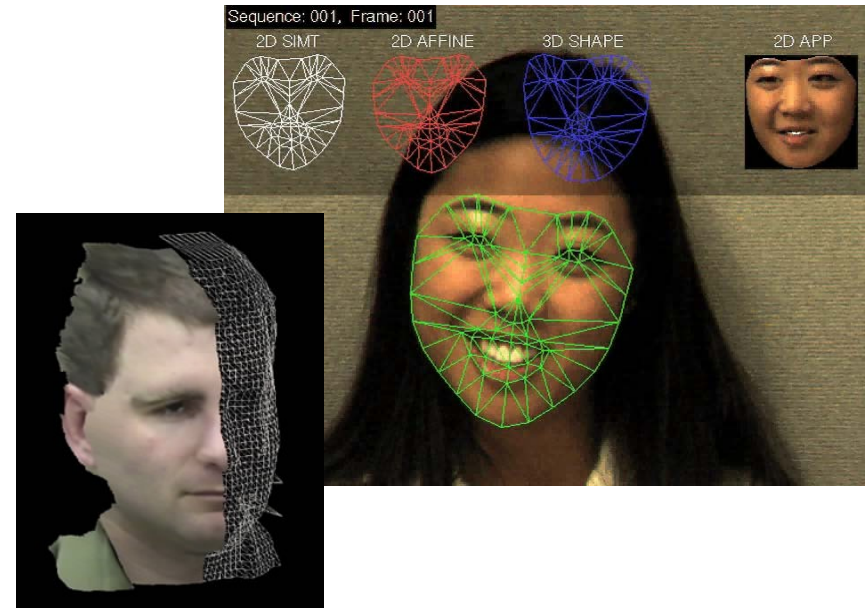
Remote Behavioral Sensing

- Integrated video based sensors
- Automated video extraction algorithms (face and body)
- Computer-based fusion to support Human-In-the-Loop assessment
- Validated behavior-based indicators of deception
- Face & body gestures

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FAST M^2 - Mobile Module

Product Description

- Portable Research/Test Facility
- Reconfigurable/Expandable
- IT (Computer and Network infrastructure)
- Modular Construction
- Plug and Play Test Bed/Modules
- Tailorable to Operational and Through Put Requirements

Planned Demos/Deliverables/Transitions

- Phase 1
  - Module Design Phase
  - Initial/Refined Prototype Design and Fabrication
  - Baseline Experiments in Controlled Venue
  - Capability Demonstrations
- Phase II
  - Robust Prototype Delivery
  - Explore new screening methodologies/ tools
  - Uncontrolled Venue
- Phase III
  - Prototype Laboratory Delivery
  - Cross Venue Experiments

FAST Mobile Module Laboratory

- **Payoff**
- Testing in a Real Time Environment
- Ongoing Screening Technology Test Bed for S&T
- Remove Lab constraints
- Work directly with First Responders and front line Interviewers
- Mobile to support special security events or events of high risk

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Potential Partners and Customers

Customers

- DHS Office of Security
- Transportation Security Administration (TSA)
- Immigration and Customs Enforcement (ICE)
- Department of Defense (DoD)
- Customs and Border Protections (CBP)
- United States Secret Service (USSS)
- State and Local Law Enforcement Agencies

Current and future partners

- TSA
- ICE/Detention and Removal
- OSD Counter Terrorism Technology Task Force
- Intelligence Community
- Defense HUMINT Management Office

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Characteristics of FAST M^2

Mobile	• Take the testing out of the Lab to the real world venues
	• Establish behavioral screening process flow path
	   • Transportable to support the event
	   • Increase current screening through puts

Real Time Screening	• Automation of behavior detection and screening processing to
	   • Detect people who are unknown threats
	   • Detect earlier in the screening process
	   • At security checkpoints (both permanent and temporary) such as transportation portals, special events, border crossings, and other critical infrastructure points

Reconfigurable	• Test new screening methods & technologies for accuracy, speed & throughput • Adaptable for Operational Component Use

Technology Integration	• Combine current and future screening sensors, systems and methodologies to provide an innovative System of Systems
	   • Observation Techniques
	   • Suspicious Behavior/Anomalous Behavior Detection Technology
	   • Physiological Sensors
	   • Speech

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FAST Potential Follow-On Projects

Sensor Integration/Analysis

- Intelligent Sensor Metric Fusion

- Removing the Human from the Analysis Loop

- Evaluation of Group Emerging Dynamics

- Evaluation of the Individual to Group Baseline

- Machine Learning, Ability to Adjust to Changing Parameters in Operational Environment

Sensors

- Analysis of Gait and Body Movement

- Human Body Chemical Analysis – Breath, Skin Residue, etc

- Persistent Track without Recording

- Sensors that can be rapidly integrated into System Architectures meeting the Broadest Possible Range of Operational Environments

Module

- Total Operational Self Sufficiency – Power, Connectivity, Operator Support

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