Homeland Security
Science and Technology

Transportation Security Laboratory

Core Laboratory Capabilities

Human Factors Laboratory

Mission: The Human Factors Laboratory (HF) provides support to the Transportation Security Laboratory's research, development, test, and evaluation of explosive and weapons detection technology by optimizing human-machine interface for security systems.

Overview

The Human Factors Laboratory examines "human in the loop" issues in the development, test, and evaluation of security technologies. Activities include 1) perception and cognition research, 2) development of operator-centric requirement specifications early in the design process, 3) usability analyses of existing and emerging technologies, and 4) test design and analysis for human-in-the-loop behavioral and performance testing.

The Human Factors Laboratory focuses on evaluating and optimizing operator performance through:

- Screener Selection
- Screener Training
- Concepts of Operation
- Screening Procedures
- System-User Interfaces
- Visual Displays and Image Interpretation
- Workload and Fatigue

The Human Factors Laboratory also supports research, development, test and evaluation efforts by providing *usability analyses* and *human-in-the-loop performance testing.*

Testing screener patdown effectiveness

Facilities:

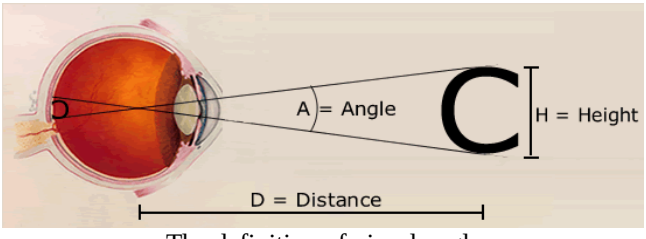
- Re-configurable Human Factors lab space
- Simulated operational environment (e.g., checkpoints)
- High Fidelity data recording
- Re-locatable pan, tilt, and zoom video cameras
- Digital videotape recorders and VHS Recorder
- CD/DVD/cassette player and recorder
- Time code generator (to sync video and audio files)
- Monitors, Routers, Amplifiers, and Sound Board

Expertise:

- Behavioral Research Design
- Statistics and Data Analysis
- Human Cognition and Perception
- Training Development
- Human-in-the-Loop Performance Testing
- Usability Analysis
- Security Screener Topics of Expertise
  - Visual Search for baggage screening
  - Object Recognition Training
  - Alarm Resolution Protocols and Conops
  - Advanced Imaging Displays
  - Screener Fatigue and Fatigue Detection
  - Whole Body Imager Operator Performance
  - Pat-down testing and effectiveness

Recent Activities

- Optimized display resolution specifications for Explosive Detection Systems (EDS) and X-ray machines
- Development of a Standardized User-Interface for Carry-on Baggage Screening Technologies (e.g. X-ray)
- Research on operator fatigue and the development of fatigue detection technologies
- Evaluations of advanced displays
- Research studies on how automated explosives detection technologies affect screener performance
- Development and field testing of new X-ray screener training methods
- Research on Target Frequency Effects
- Development of an X-ray screener attention focusing procedure
- Developing more efficient forms of the On-Screen Alarm Resolution Protocol (OSARP) for high resolution EDS
- Human-in-the-Loop test and evaluation of
  - Whole Body Imagers
  - Pat-Down Procedures
  - Advanced Technology X-ray
  - Hand-Held Metal Detectors
  - Automated Target Recognition Technologies
  - Multiple Cargo Screening Technologies
- Usability Analyses
  - Explosive Trace Detector (ETD) Portals
  - Bench-top and hand-held ETDs
  - EDT wands
  - Hand-Held Metal Detectors



The definition of visual angle

Transportation Security Laboratory

The mission of the Transportation Security Laboratory (TSL) is to enhance homeland security by developing and validating solutions to detect and mitigate the threat of improvised explosive devices. Established in 1992 at the William J. Hughes Technical Center, Atlantic City International Airport, the TSL's 12 acre secure campus includes specialized explosive storage and handling areas and a multi-laboratory infrastructure designed for research, development, and test and evaluation of technology for explosives and weapon detection and blast mitigation. TSL's team of physicists, chemists, engineers, research psychologists and mathematicians is internationally recognized for its unique ability to advance technology from conception to deployment through applied research, development, prototyping, test and evaluation, assessment, certification, and system qualification. Research areas at the TSL include

- Vehicle and Infrastructure Vulnerability Assessment,
- Automatic Explosive Detection in Checked Bag
- Containerized, Bulk, Palletized and Parcel Cargo Screening,
- Fast Noninvasive Screening of Passengers, and
- Blast Mitigation Technologies and Strategies.

With award-winning R&D and ISO 9001 Certified Independent Test and Evaluation TSL proudly contributes to America's Domestic Security.

Homeland Security
Science and Technology

From Science and Technology . . . Security and Trust

For more information regarding the Human Factors Laboratory and other capabilities and activities of the Transportation Security Laboratory, send e-mail to TSLinfo@dhs.gov