

The Center for Security Technologies

Centered at

Washington University in Saint Louis



WUSTL Expertise

devices, design, analysis, computation, electronics, systems ...

- Materials and devices
- Sensing and electronics
- Signal processing and algorithms
- Imaging Science
- Information storage/retrieval
- Network/Internet
- Communications Systems
- VLSI/programmable logic . . .

Focus of the Center

Electronic sensing of signals from a range of inputs, their generation, management, transmission, storage, and processing to provide judgment and control critical to the security of people, objects and intellectual assets

Center Approach

- Have a long-term, research-oriented, pre-competitive, systems focus
- Can respond to critical needs from government and industry
- Broad-based scope
- More than a collection of individuals

Center Leverage

- Provides an exciting forum for new ideas and collaborations
- Assists with grant proposals, travel, etc.
- Provides seed funding for new ventures
- Proactively identify new directions for government agencies
- Access and steer standards initiatives
- National leadership in Missouri

Selected Center Projects

- Forensics
- Sensing (optical, HSI)
- Object identification
- Voice/face recognition
- Airport screening
- Satellite imagery, vision
- Encryption/data security
- Network security

Faculty Breadth

13 Electrical Engineering

10 Computer Science

4 System Science and Mathematics

3 Arts and Science

2 Social Work

1 Medicine

2 Law

Networks of Distributed Sensors

- Existing or future sensor networks
- Networks of waterway sensors
 - Detect pollution, bioterrorism, chemical spills
 - Communicate problems, source identification
 - Real-time response to evolving situations
- Networks of Cameras
 - Video or low-rate, complex or constrained scenes
 - Local vs. distributed computation, communication, information extraction,
 - Dynamically reconfigurable systems



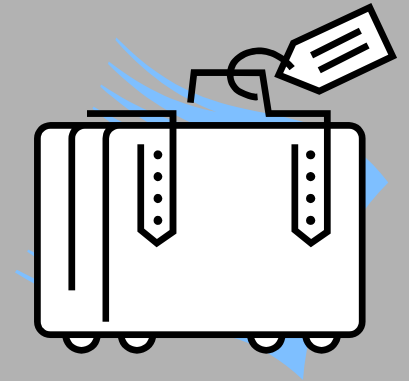
Application – Fingerprints

- Court ruling
 - fingerprint recognition not a science
 - Need new scientific foundations for biometrics-based recognition and object recognition
- Consider complete system
 - optical or ultrasound image
 - computational algorithms
 - hardware implementation
 - management/transmission of data
 - performance prediction



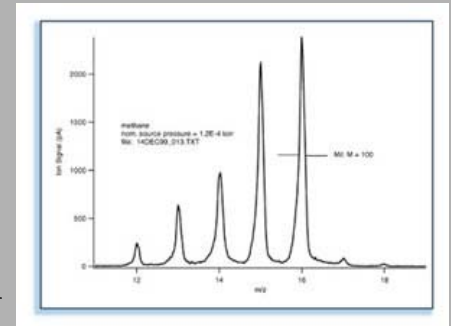
Application – Baggage Scanning

- All baggage is now scanned
- What do we need to look for?
- How do we discriminate?
 - ATR, imaging
 - fast computation, fast searching
 - hardware, software, systems issues



Application – Rapid Analysis

- Airport, pollution, biological
- (Chemical) analysis with inputs from
 - HSI
 - optical
 - mass spectrometry
- Search large data set, perform complex computation



Engineering Test Beds

- Connect all parts
 - End-end demonstration
1. Searching Massive Databases for Critical Information
 2. Network of Wireless Sensors
 3. Networks of Video Cameras
 4. Biometrics/Physics-Based Recognition Systems
 5. Network and Computer Security
 6. Security of the Food Supply

Immediate Opportunities

- Forensics
- Sensing (optical, HSI)
- Article identification
- Voice/face recognition
- Airport screening
- Satellite/medical imagery, vision
- Encryption/data security
- Network security . . .

Collaborations and Funding

- NSF –ERC
- DARPA, ONR, ARO
- CIA, FBI, Secret Service
- NIST
- Battelle
- SBC, Boeing, . . . many other large corporations
- Local/small companies: Cernium, NLS, Mass Sensors, BECS, Brick, Hackett Security . . .

Additional Security Applications

- WMD
- Transportation infrastructure
- Building security

Structure

- WUSTL-wide
- SEAS-based
- May involve other institutions, local/national
- Research-based management
- Not burden PIs; will *not* hinder research!

Goals

- \$7-10 M *additional* annual funding
 - NSF, NIST, DARPA, State
- 20 *core* faculty
- In place *April 2002*

Organizational Structure

- Associate Director, Assistant Director
- Research Thrust Leaders
- Testbed Leaders
- Administrative Director
- Educational Program Director
- University Outreach Coordinator
- Industrial Liaison
- External Advisory Board
- Industrial Board

University Outreach

- SLU
- UMSL
- UM Rolla
- UT El Paso
- Clark Atlanta University
- UMC, FLW, UIUC, ?



Washington University

Center for Security Technologies

- Critical mass in security technologies
- Many complementary ongoing projects
- Widespread applications
- Fundamental scientific issues
- Gigantic momentum

Washington University
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Scientific and Engineering Resource

