

# Advancements In Biometrics Technology to Enhance Domestic Security Globally

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# Post 9/11 - Trends and Issues

- **Increased Public Awareness and Responsibility**
- **Tightened Border, Building and Port Security**
- **Increased Need for Innovative Technical Solutions**
- **Necessitated Legislation: USA Patriot Act (2001) and Enhanced Border Security and Visa Reform Act (2002)**
- **Increased Focus on R&D and Pilot Projects for surveillance, identification, and access control**
- **Increased Communication, Collaboration, Cooperation, and Commitment Within and Between**
  - **Governments**
  - **Industry**
  - **Academia**

# Challenges for Biometric Solutions

- **Fingerprints**
  - Widely Deployed for Registry, Law Enforcement
  - Intrusive, Physiological changes, Equipment limitations
- **Hand Geometry**
  - Access and Border Control
  - Intrusive, Physiological changes
- **Face Recognition**
  - Limited Deployment for Identification and Access Control
  - Accuracy, Lighting, Aging, Appearance, Expressions
  - Operability with Legacy Databases of Photographic Images
- **Iris Recognition**
  - Limited Deployment for Identification and Access Control
  - Costly, Somewhat Intrusive, Lighting
- **Voice Recognition**
  - Limited Deployment for Access Control, Identification
  - Accuracy, Physiological changes

# Enhancing Biometric Solutions

## Iris Recognition



Evermedia Ever-cop II



LG Iris 3000



Oki Electric Co Ltd.  
WG and Irispass H



Panasonic  
Authenticam and BMET-500

# Enhancing Biometric Solutions

## Face Recognition Challenges



## Advances

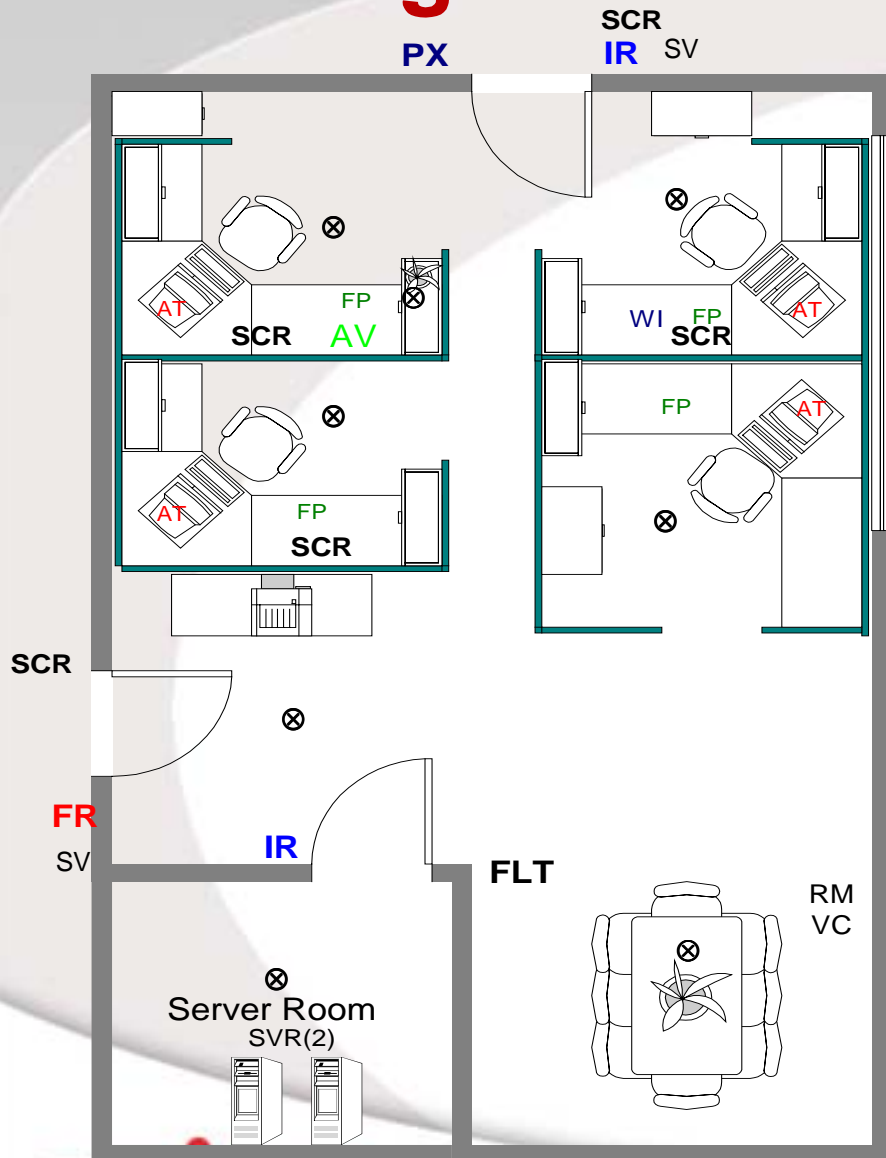
- 2D Solutions Continuing to Improve
- 2.5D H-Net
- 3D Solutions
- Surveillance and Identification



# **Integrated Intelligent Office R&D Project**

- **Process-Oriented**
  - **Linked Workflow Analysis and Technology Insertion**
- **Manage Access Control**
  - **Centralized Enrollment**
  - **Multiple Biometrics (Face, Fingerprint, Iris) and Products**
  - **Access Control – Physical and Logical**
  - **Personnel Tracking / In & Out Status Board**
  - **Sentient Computing**
    - **Detect Anomalous Behavior**
    - **Network Intrusion Detection**
    - **Provide Intelligent User Support**

# Intelligent Office Components



Symbol	Functionality	Hardware & Software Associated
⊗	Ceiling Camera	Cameras and associated developed apps
AT	Authenticam	Camera for Iris and face enrollment/recognition
AV	Avatar	GFE, flat screen with software for interface
CR	Card Reader	SmartCard readers
EN	Enrollment Station	Iris, face, fingerprint, and voice enrollment with associated information on the individual. Camera, microphone, computer, SmartCard printer, SmartCard encoder, SmartCard reader, and electronic signature pad.
ESB	Electronic Smart Board	Whiteboard and associated computer
FLT	Flat Screen	LCD and associated computer
FP	Fingerprint	Hardware and interface to computer
FR	Face Recognition	Camera, computer, & software
IR	Iris Recognition	Camera, computer, & software
PR	Printers	Printer & associated computer
PX	Proximity Card	Existing card readers
RM	Meeting Recorder	Microphones, computers and software
SC	SmartCard Access	Card reader and computer
SCE	SmartCard Encoder	Card encoder and computer
SCP	SmartCard Printer	Card printer and computer
SS	Safe Sensor	Switch on any classified container
SV	Surveillance Communications	Cameras and associated recording/monitoring equipment
SVR	Server	Computer with keyboard, monitor for system control and monitoring
VC	Voice Control	Microphone, actuators, and associated hardware (blinds, cabinet locks, temperature, windows, etc.)
VTC	Video Teleconferencing	Cameras, microphones, monitors, etc.
WI	Wireless Device	PDA's (Palm & iPAQ), computer interface cards, software

# **An Integrated Approach To Identification**

- **Develop an Enhanced Integrated Recognition Solution that Builds on Strengths of Current Non-invasive Recognition Technologies for Identification and Access Control**
- **Concurrent R&D Activities**
  - **Develop Detailed 3D Model from 2D Images for virtual enrollment**
  - **Incorporate Detailing, Expressions, Ageing**
  - **Add Variable Lighting**
  - **Vary Pose and Lighting**
  - **Incorporate Outer Ear Shape and Skin Texturing**
  - **Export Script to 2D and 3D Engines for Enrollment**
  - **Evaluate and Enhance 3D Recognition Engines and Capture Technology**
- **Virtual Team Composed of Experts for Industry and Academia**
- **DoD Offering Support to Other Government Agencies Globally**

# Other R&D Approaches

- **Signature Recognition**
- **Gait Recognition**
- **Gesture Recognition**
- **Ear Recognition**
- **Pattern Recognition**
- **Skin Texture**
- **Multi-modal**

# University R&D Programs

- Michigan State University
  - Purdue University
  - Rutgers University, NJ - Center for Advanced Information (CIAP)
  - San Jose State University - National Biometric Test Center (NBTC)
  - West Virginia University
  - Others..
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- Ecole Polytechnique Federale de Lausanne, (Switzerland)
  - Dalle Molle Institute for Perceptual Artificial Intelligence (Switzerland)
  - University of Karlsruhe, Institute for Industrial Information Technology (Germany)
  - Institute for Neural Information, Linguistic Data Consortium LDC, (Germany)
  - Catholic University of Louvain, Communications and Remote Sensing Laboratory (Belgium)
  - National Laboratory on Machine Perception - (China).
  - University of Helsinki: Department of Phonetics (Sweden)
  - University of Bologna (Italy) - Biometric Systems Laboratory.

# Industry R&D and Pilot Projects

- **Integrators**
- **Solution Developers**
- **Software Developers**
- **Hardware Developers**
- **Vendor/Suppliers**

*..... From Around the World*

# Government R&D and Pilot Projects

## United States

- Department of Defense
- Department of State
- Department of Justice
- Department of Transportation
- State and Local Governments
- *Transportation Security Administration*
- Others



## International

- Australia
- Canada
- China
- Germany
- Japan
- Netherlands
- New Zealand
- UK
- Hong Kong
- Malaysia
- Others

*Working Together for Domestic Security Globally*

# Domestic Security

## -- A Transcending Imperative

Requires global cooperation between industry, government and academia to develop and implement processes, infrastructure, and solutions that enhance security of citizens globally

