A4Vision

Overview
• Delivers products for secured access control and identification
• Has developed unique intellectual property: real-time 3D face recognition technology

Locations
• Headquarters Sunnyvale, California, USA
• Moscow, Russia
• Geneva, Switzerland

Investors
• Menlo Ventures
• Tako/Oracle
• In-Q-Tel
• Motorola
• Sunrise Capital
• Singapore Technologies
• Logitech
• MyQube
• NTT
• Hanna Capital
Advantages of Face Recognition

Face image mandated as PRIMARY biometric by ICAO because:

- Non-intrusive & no contact required
- Facial image is socially acceptable internationally, especially for ID documents (no privacy issues)
- May be compared to watchlist for criminal checks
- Manual (human) verification of biometric against the photo/ live person is possible
Improvements in Face Recognition

- **ICAO foresaw improvements in the technology itself:**
  - “Given rapid state of technology change, any specifications must allow for changes resulting from technology improvements” (Biometrics Deployment of MRTD, ICAO TAG MRTD/NTWG May 2004)

- **Face does have the potential for UNIQUE identification**
  - Natural & oldest human biometric identifier (3D vision)
  - Humans use geometry relations of only 14 facial points for unique ID in database of 4 million (IEEE testing)
  - Computerised 3D vision more precise than human
    - 3D algorithm uses 10,000+ recorded facial points
    - Ability to differentiate between “identical” twins (US government testing)

- **3-Dimensional Face Recognition is the next step:**
  - All new government testing focussed on 3D (US, Germany, Asia)
  - 3D enhances existing ICAO & SC37 standards for face
  - 3D images will be “backwards compatible” with 2D photo images
3D Facial Standard Accepted

- American ANSI/M1
  - Committee accepted proposal to amend current face standard (ISO/IEC JTC 1 /SC37/WG3) in March 2005
  - A4Vision US consortium included:
    - Unisys, Logitech, Motorola, Oracle
  - Co-editors A4Vision & Identix
- ISO July 2005
  - Standards proposal submitted to ISO July 2005
    - Supporting country partners: United States, France, Italy, Australia, Russia, Germany
  - Actions were taken immediately to:
    - Select editorial team by ISO comprised of 11 co-editors representing 11 countries
      - Call for comments by October 15 on proposal
      - Editorial team must finalize comments by November 25 and publish changes
      - Working document to be voted and potential approval by January 2006
Enhancing Face Standards

- Current ICAO storage space –
  - 2D face image - 12-20 KB
  - Fingerprint - 10 KB
  - Iris - 30 KB

- A4Vision: An additional area for 3D Face Image (geometric mesh) should be reserved
  - 3D Face Image ➔ INTEROPERABLE RAW DATA

- 3D Face Image with sufficient resolution for high performance 3D face recognition may be compressed & stored in 5-7KB
  - Decompressed at high speed
  - No loss of recognition performance
  - Globally interoperable data storage standard
Technology Evaluation & Results

• Compelling results in evaluation testing of technology and usability by third parties have led to deployments and contracts
• Government testing in process
  • Asian Government
  • Two European Governments
  • 1 US agency
• Internal based testing on-going
  • Total enrolled: 6,335+ with 15 varying poses, illumination conditions and varying mimics
    • 50% men & women
    • Statistically representative ages & races
  • Simultaneous 2D & 3D image capture*
• Select official 3rd party results will be published before year end 2005
A4Vision
Technology Overview
Hardware: 3D Camera Technology

Proprietary 3D video camera based on structured light

- Invisible near IR light - non-invasive & user friendly
- System eliminates lighting problems & permits both night & day vision
- Real-time video feed (25 frames/second):
  - Ensures minimal cooperation
  - Robustness to angles & motion
  - Permits close-range monitoring applications
- Compact 3D camera system is low cost and flexible to deploy
Software: 3D Identification Technology

Real-Time Reconstruction & Analysis of the 3D face surface

• Face geometry reconstructed in sub-millimeters (real ground-based measurement capturing x-y-z axes)
• Facial feature extraction based on underlying cranial structure (unique & unchanging over time)
• Compact biometric template extracted (less than 5KB)
• Real-time face analysis, feature extraction & matching – identification in under 1/10 second
Reference Installations

- 22 installations and pilot programs in process
- 4 Airports in Europe
- 3 Airports in US
- 1 Airport in Asia
- 3 Banks in Europe
- Registered traveler application in Asia and EU
- Casinos in US and Middle East
- Transportation control centers
- Transportation financial center
- 2 Government buildings in Asia and EU
- Corporate headquarters
  - Aircraft design facility
  - Hotel corporate IT center
- 35 integrators world wide
- 4 OEM projects
Physical Access Control
Products & Solutions
Access Control Solutions

• End-to-end 3D face recognition solution: high security with high user convenience
  • **Enrolment Station:**
    • Captures 2D JPEG image (photo) plus 3D face image or 3D template
    • Available with automated lifter or tripod
    • Visual user feedback on screen for easy positioning
  • **Face Reader:**
    • Supports verification or identification modes
    • Able to be attached to or embedded in wall at fixed position
    • Visual & audio feedback for easy positioning
      • Current Face Reader has mirror for visual positioning
      • Future Face Readers will incorporate LCD for positioning & written feedback, plus instant messages (available September 2005)
    • Hands free
    • Able to provide photo image of intruders for audit
    • Recognition in under 1/10 second for high throughput
Access Control Products

Enrolment Station

New Face Reader with LCD

Face Reader with mirror

Kiosk Lyon Airport, France

Access Control into Bank
Access Control Software

• SecureSite Enterprise *(available end 2005)*
  • Scalable enterprise access control and alarm management solution
    • Scalable to 1000 doors and 250,000 users
    • Multiple Administration workstation capability
    • Add-on modules - DVR Module, Officer Post, Visitor Management, Dashboard
    • Enhanced location and alarm maps

• SecureSite Lite
  • Access control solution for small businesses or pilots
    • Configured to be simple to install and use
    • Enrollment, access schedule and user management capabilities
    • 8 doors and 1000 user record limit

• Vision Access 3DI
  • Integration module for easy configuration with legacy access control systems

• Vision Access SDK
  • C and C++ Environment for developing your own custom applications
Civil ID Solutions

- Secure document creation, and identification of document holder to stored biometric template or photograph
  - Applications
    - Trusted Traveler
    - National ID’s
    - E Passport
    - Visa’s
Hardware and Software for Civil ID

Hardware
- Enrollment Station
- Kiosk
- Mobile ID

Software
- 2D to 3D Fusion Software
- Vision Access SDK
- 3D integration Module
3D 2D Software Engine I

3D-2D COMPATIBILITY FOR DEALING WITH LEGACY SYSTEMS

• 3D-2D ENGINE - NORMALISATION
  • Captures 3D probe image, normalizes angles & lighting, and compares to 2D gallery (enrolled) image.
  • Compatibility with ICAO standards for travel documents
  • Provides enhanced accuracy over 2D-2D engine, especially in real-world environments

• Application Usage
  • Automated e-passport verification at border crossings – airports, sea ports, etc.

Under development with international partners - available Q3 2005
**3D 2D Software Engine II**

**IMPROVED SURVEILLANCE: 3D ENROLMENT AGAINST 2D IMAGE**

- **3D-2D ENGINE - MORPHING**
  - Single 3D mesh captured by 3D camera
  - Morph 3D image into multiple 2D “photos”
  - Additional factors (lighting, beards, etc) can be added
  - 3D image can be compared to photo in passport, in police watch list or from CCTV surveillance camera

---

**Single 3D Image**

**Multiple Extrapolated 2D images**

---

*Under development - available Q3 2005*
Contacts

**US Headquarters**
840 W. California Ave Suite 200
Sunnyvale, CA 94086
Tel:  +1 408 446 1133
Fax:  +1 408 329-4571

**Europe**
Rue Maunoir 26
1207 Geneva, Switzerland
Tel:  +41 22 849 1050
Fax:  +41 22 849 1060