3D Face Project

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Overview

- Background
- Objectives
- Workpackages
Biometrics and Border Control

Biometric ePassport
- EU-Council Regulation No 2252/2004 - of 13 December 2004 on standards for security features and biometrics in passports and travel documents

- Biometrics well accepted by operator and citizens if it provides:
  - Security and trust
  - Efficient
  - Comfort

- ISO 19794-4
- ICAO
- NDB
- EAC
- Ageing
- ISO 19794-5
- BAC
- Country S CA
- RFID
- ISO 14443
- Chip ID
- MRZ

Border control

- UNITED KINGDOM: BORDER CONTROL - IRIS
- AUSTRALIA: BORDER CONTROL - SMARTGATE
- FRANCE: BORDER CONTROL - PEGASE
- FRANCE / BELGIUM: VISA PILOT - BioDev

- Security and trust
- Efficient
- Comfort
In practical
Existing application with 2D facial

- SmartGate - Kiosk
  - Verification against template on Passport
State of the Art

• Performance depends on many factors
  • Quality of the capture device
  • Quality of the algorithms
  • Cooperation of the user
  • Environment factors

• Typical ranges of performances for the three main biometric technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Fingerprint</th>
<th>Iris</th>
<th>Face</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTE</td>
<td>0.1%</td>
<td>1-2%</td>
<td>0%</td>
</tr>
<tr>
<td>FA</td>
<td>0.01%</td>
<td>0.0001%</td>
<td>1.00%</td>
</tr>
<tr>
<td>FR</td>
<td>0.5%</td>
<td>2%</td>
<td>2-10%</td>
</tr>
</tbody>
</table>

Authentication (1:1)

3D Face
Biometric Research

- Authentication with ePassport and
  - 2D Face-Recognition
  - Fingerpint-Recognition
- 2D face recognition does not provide any robust mechanisms, to allow liveness detection
- ICAO - RFI 10'2004:
  - “… new technologies is now sought … Technologies and processes that are suitable for automated self-identification at international borders that will enable unattended border crossing”

Unattended border crossing can only be achieved, if additional (biometric) characteristics are observed

Need for robustness
3D Face Recognition approach

- 3D face scanning
  - Observation of the texture (Image information)
  - and the shape (Geometry)
- Multimodal Analysis
  - Link different information channels

The 3D Face Project

- Integrated Project (026845)
  - 36 month project started April 2006
  - Research on 3D facial recognition to address needs of airports for processing biometric passports
- Consortium of 12 partners
  - Industry (Bundesdruckerei, Philips, Sagem, L1-Viisage)
  - SMEs (Cognitec, Polygon)
  - Research Centres (Fraunhofer-IGD, CGC)
  - Universities (Kent, Napoli, Twente,)
  - Berlin Airport
  - 3 additional end-users to join the project soon: BKA, JRC and Salzburg Airport

Berlin Airport
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Project Objectives

- Explore multimodal facial data
  - 3D, 3D+2D
  - Face texture
  - Multiple algorithms

- Improve biometric performance
  - FAR < 0.25%, FRR < 2.5%
  - Internal competition of labs
  - Selection of best results by independent evaluation

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Project Objectives (cont.)

- Template Protection
  - Highest degree of privacy protection

- Validation at airports
  - Operational performance
  - Social and operational issues

- Standardization
  - Direct influence on international standards
Technical goals 3D Face Project

- Develop existing approaches to full operational 3D face recognition technology with higher biometric performance (3D vs. 2D).
- Realize multimodal feature analysis (surface metrics combined with texture metrics).
- Prove performance improvements with technology testing and scenario testing programs.
- Research towards fake resistance to allow technology for use at critical infrastructure installation.
- Develop compact coding format for 3D face template and submit format to the standardization body (ISO/IEC JTC1 SC37 WG3).
- Be backwards compliant to existing installations (older Passports with 2D template).
- Explore an innovative approach for the protection of privacy, through the design of biometric template protection.
- Bring technology to a level where it can be used operationally at airports.

Organisation of the project
Status / progress of the project

- Original schedule is met
- A 3D sensor mock-up is available
- Some issue solved for data collection (regulation)
- Some first lab results
  - 3D sensors overview
  - Faking scenarios
  - 3D face recognition
  - Face texture
  - Fusion
  - Template protection
- Challenge is now to reach the target results and demonstrate the efficiency on the field with end-users

More Information on the project is available at:
http://www.3dface.org