Biometric Research in Darmstadt

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2025-06-03

IT-Security in Darmstadt

National Research Center for Applied Cybersecurity (ATHENE)

- **400+ scientist** from 47+ countries

TECHNISCHE UNIVERSITÄT DARMSTADT — CYSEC research group at TU Darmstadt — CYSEC Cybersecurity TU Darmstadt

Fraunhofer SIT — Fraunhofer Institute for Secure Information Technology SIT

Fraunhofer IGD — Fraunhofer Institute for Computer Graphics Research IGD

h_da HOCHSCHULE DARMSTADT UNIVERSITY OF APPLIED SCIENCES — da/sec research group at Hochschule Darmstadt — da/sec BIOMETRICS AND INTERNET-SECURITY RESEARCH GROUP
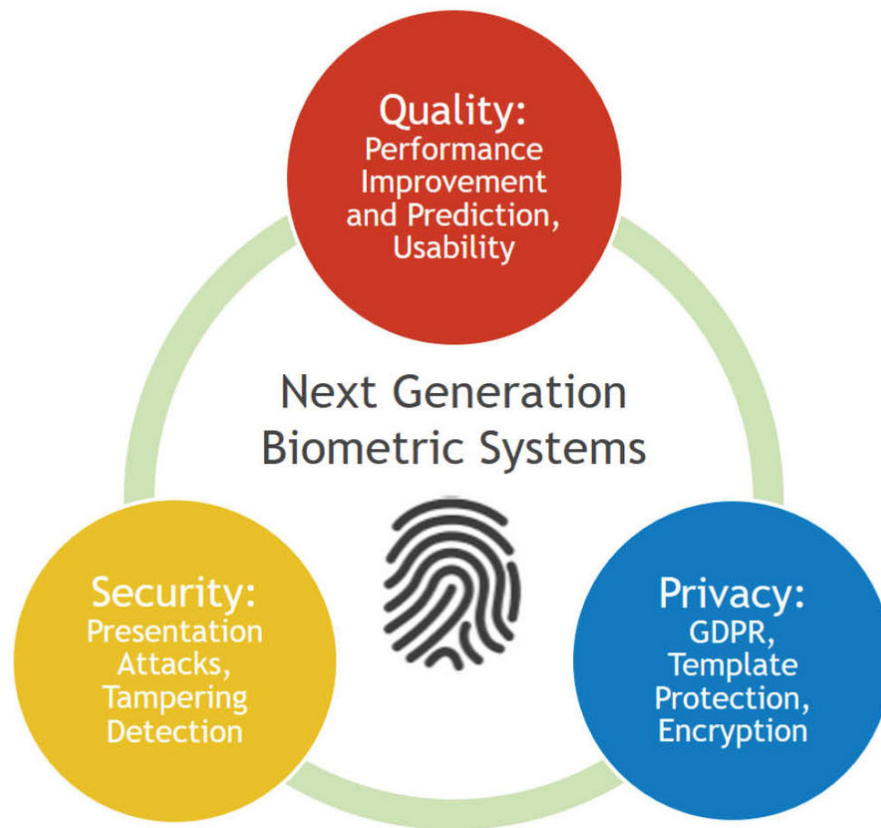
GOETHE UNIVERSITÄT FRANKFURT AM MAIN — GU Frankfurt

IT-Security in Darmstadt

National Research Center for Applied Cybersecurity (ATHENE)

- **25 scientist** working on biometrics from HDA and Fraunhofer IGD


https://ngbs.athene-center.de/

Research Area Biometrics

What is biometrics?

- International Organization for Standardization defines:

  ▸ **Biometrics**:
  "*automated recognition of individuals based on their behavioural and biological characteristics* "

  ▸ Remark: behavioural has to do with the function of the body
  biological / anatomical has to do with the structure of the body
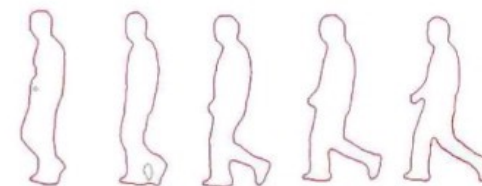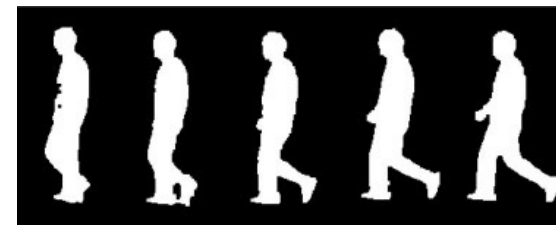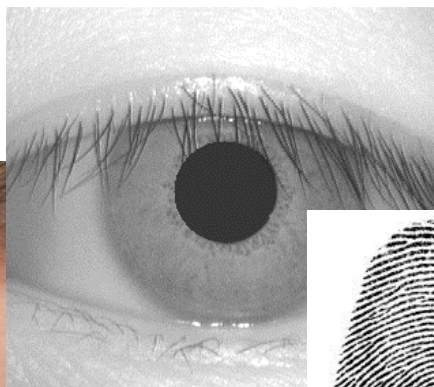
EU Projects

History of EU-Projects @ HDA

Project Series

FIDELITY

2012-02 to 2016-01

https://christoph-busch.de/projects-fidelity.html

SOTAMD

2019-02 to 2020-01

https://christoph-busch.de/projects-sotamd.html

iMARS

2020-09 to 2024-11

https://christoph-busch.de/projects-iMARS.html

EINSTEIN

2024-01 to 2026-12

https://christoph-busch.de/projects-EINSTEIN.html

CarMen

2024-09 to 2027-08

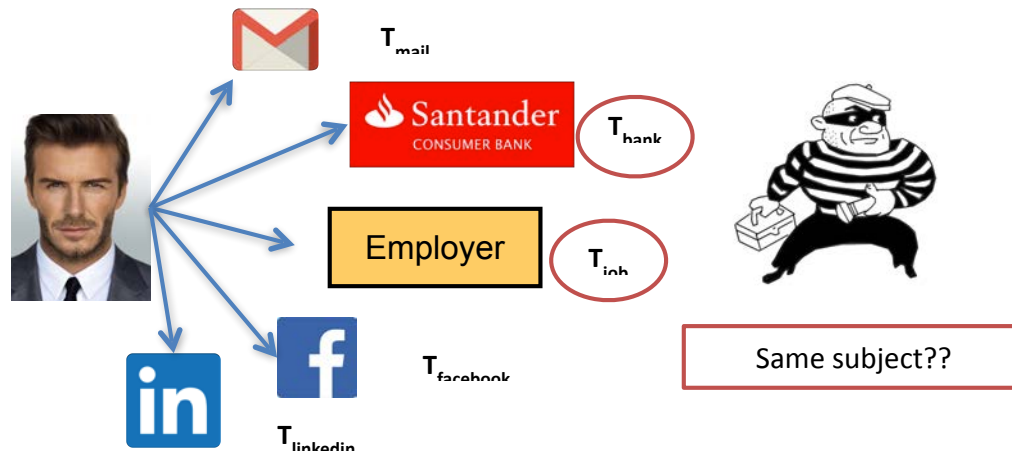https://christoph-busch.de/projects-CarMen.html

Research Topics

Biometric research

- Covering various physiological biometrics:
  - ▶ 2D- and 3D-face recognition,
  - ▶ fingerprint recognition,
  - ▶ iris and periocular recognition,
- Focus on
  - ▶ biometric template protection
  - ▶ presentation attack detection
  - ▶ morphing attack detection

Same subject??

Application Oriented Research
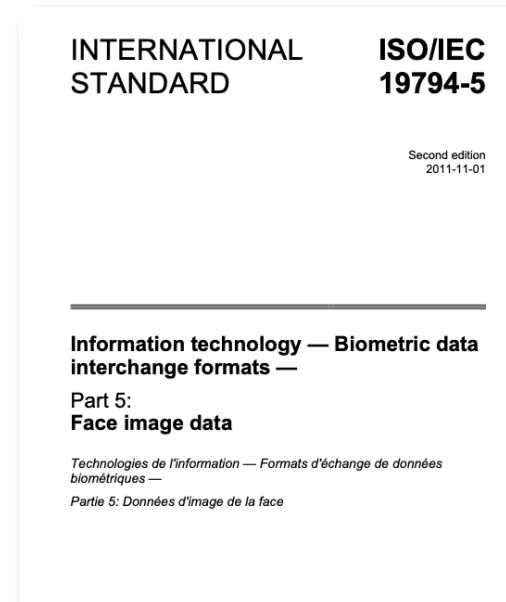
Image Quality in the EU Entry Exit System

The objective in the EES implementing decision 2019/329

- *„The quality of the facial images, … and with the image requirements of ISO/IEC 19794-5:2011 Frontal image type"*

What does that mean?

Data subjects need actionable feedback

- If quality is poor, then what went wrong?

INTERNATIONAL STANDARD — ISO/IEC 19794-5

Second edition 2011-11-01

Information technology — Biometric data interchange formats —

Part 5: Face image data

Technologies de l'information — Formats d'échange de données biométriques —

Partie 5: Données d'image de la face

Compliant image | Pose | Eyes open | Mouth open | Inhomogenous background

Source: ISO/IEC 39794-5

ISO/IEC 29794-5: Face Image Quality

## Standardize and develop quality measures

- https://www.iso.org/standard/81005.html
- https://github.com/BSI-OFIQ/OFIQ-Project
- https://christoph-busch.de/projects-ofiq.html
- Unified quality score
- Capture-related quality measures
- Subject-related quality measures
- Contribution from our research:
  ‣ Quantify expression neutrality

a) Compliant image b) Low contrast

source: ISO/IEC 39794-5:2019, Annex D
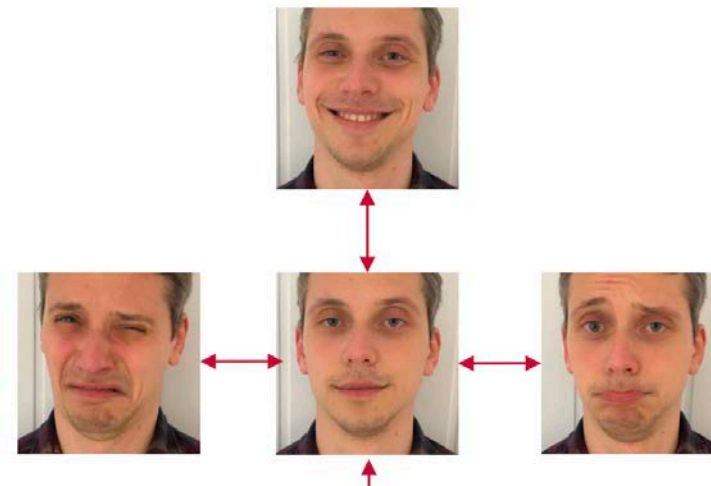
[GRVB2023] M. Grimmer, C. Rathgeb, R. Veldhuis, C. Busch: "NeutrEx: A 3D Quality Component Measure on Facial Expression Neutrality", in Proceedings of International Joint Conference on Biometrics (IJCB), (2023)

[GVB2024] M. Grimmer, R. Veldhuis, C. Busch: "Efficient Expression Neutrality Estimation with Application to Face Recognition Utility Prediction", in Proceedings of 12th International Workshop on Biometrics and Forensics, (2024)

Contact