# Advanced Seminar in Biometrics

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da/sec - Biometrics and Security Research Group, Hochschule Darmstadt

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## Contact and Website

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▶ Website:
https://dasec.h-da.de/

▶ Seminar website:
https://dasec.h-da.de/
advanced-seminar-prof-rathgeb-ws24-25/

## Procedure

▶ Students select preferred topics and groups (up to 2 students depending on the topic)

▶ Required materials will be handed over by the supervisors: databases, software, evaluation scripts etc.

▶ **Progress reports** have to be sent to the supervisor(s) before the following dates:
   1) 29th November
   2) 17th January

▶ Additional appointments shall be arranged individually and on demand.

## Procedure (cont'd)

▶ Each group has to prepare a term paper (6-8 pages) using the IEEE conference template: https://www.ieee.org/conferences/publishing/templates.html

▶ The term paper must be submitted by **1st March**

▶ The final presentation will be 45 minutes per group + 15 minutes discussion of the results

▶ Suggested dates for the final presentations: **mid March** (Doodle voting)

▶ A grade will be given based on the term paper and final presentation

▶ Introduction, related work (one third), method, evaluation

▶ Figures and tables

▶ 15-30 Citations

## Overview

▶ Face completion for VR glasses

▶ Survey on biometric recognition in virtual reality

▶ Hand recognition in virtual reality

▶ User attribute inference through eye tracking data

# Face completion for VR glasses

Virtual Reality (VR) headsets allow users to interact with the virtual world. However, the device physically blocks visual connections among users, causing huge inconveniences for VR meetings. How do these headsets need to be "removed" by image processing, such that face recognition still works?

▶ Tasks: Implementation of headset segmentation (e.g. by using SAM)

▶ Implementation of face completion

▶ Face recognition evaluation

▶ Documentation: Term paper, presentation

▶ Handout: Face recognition software, evaluation software, ISO biometric standards

▶ Supervisors: C. Rathgeb

## Survey on biometric recognition in virtual reality

The use of biometric recognition in virtual reality applications is still in statu nascendi. Some scientific works have been published in the field. A structured overview of existing works along with a thorough discussion of (dis)advantages as well as open challenges is missing.

▶ Tasks: Review existing literature in the field of biometrics and VR

▶ Categorisation and survey of proposed works

▶ Discussion of open issues and challenges in the field

▶ Documentation: Term paper, presentation

▶ Handout: Literature

▶ Supervisors: C. Rathgeb, M. Grimmer

# Hand recognition in virtual reality

Segmenting and displaying users' hands in VR applications improves the quality of experience. Moreover, it has been shown that hand images can be employed for biometric authentication. That is, both approaches could be used to improve usability and security at the same time.

► **Tasks**: Collection of hand database

► Implementation of recognition pipeline

► Recognition performance evaluation

► **Documentation**: Term paper, presentation

► **Handout**: Evaluation and recognition software, Meta Quest Pro

► **Supervisors**: C. Rathgeb

## User attribute inference through eye tracking data

Many head-mounted displays use eye-tracking data to improve usability, functionality, and security. However, studies show that this data can also expose sensitive information, such as identities or mental states.

- ▶ Tasks: Conduct literature review

- ▶ Design and run data collection

- ▶ Implement feature extraction pipeline

- ▶ Documentation: Term paper, presentation

- ▶ Handout: Meta Quest Pro, starting literature

- ▶ Supervisors: M. Grimmer

## Select your own topic

▶ Students are also invited to proposed their own topic!

## Topic selection process

▶ Send your topic choice to christian.rathgeb@h-da.de by the end of the week

▶ First come, first serve – so you might choose more than one topic (1st and 2nd choice)