



Authentication through Behavioral Biometrics in XR

Project Group at HCI-Essen (AG Schneegaß)

Scope

- Many applications in XR (e.g., AR or VR) require User Authentication
- Systems and apps need to know who (which person) uses them
- Password-based Authentication dominates, however, is clumsy



Objective: How to make Passwords obsolete?

- Behavioral Biometrics allow for implicit and continuous user authentication or – identification
- „Implicit“: user does not actively deal with authentication
- „Continuous“: system can frequently check their users without bothering them

Objective: How to make Passwords obsolete?

- Behavioral Biometrics allow for implicit and continuous user authentication or – identification
- „Implicit“: user does not actively deal with authentication
- „Continuous“: system can frequently check their users without bothering them

How?

VR Activities for Behavioral Biometrics: Bowling



Hand-tracking based Interaction with UI Elements



Identifying Users by Hand Tracking Data
in Augmented and Virtual Reality

Scope of this PG

- Explore Behavioral Biometrics in XR (AR, VR, MR).
- We will determine the concrete activity setting soon.
- What you will **most likely** (subject to change) do:
 - Write a seminar thesis on human-centered security (biometrics).
 - Create a prototype for XR (using Unity and C#).
 - Run a user study (at min. N=16) to elicit behavioral data from people.
 - Create an analysis for the elicited data.
 - ... maybe using Machine Learning or Deep Learning techniques (Python)
 - ... maybe using statistics (Python, R)
 - Create a written report.

What we offer

- What we offer:
 - Introductions, help, and close support in conducting your work (e.g., support in applying statistics correctly, help in planning a user study, etc.).
 - Hardware to create and test your prototypes (e.g., you might lend a VR headset for the summer)
 - The HCI-Lab (SM211) as a working environment with short distances to helpful people 😊
 - Access to the HCI-Numbercruncher (machine-learning server with 32 cores, 512GB RAM, 3x NVIDIA A40 with 144 GB VRAM, 10TB storage)
 - Be part of a planned academic publication to the highest-ranked conference in HCI (CHI 2023, A* ranking).

What we offer

- What we offer:
 - Introductions, help, and close support in conducting your work (e.g., support in applying statistics correctly, help in planning a user study, etc.).
 - Hardware to create and test your prototypes (e.g., you might lend a VR headset for the summer)
 - The HCI-Lab (SM211) as a working environment with short distances to helpful people 😊
 - Access to the HCI-Numbercruncher (machine-learning server with 32 cores, 512GB RAM, 3x NVIDIA A40 with 144 GB VRAM, 10TB storage)
 - Be part of a planned academic publication to the highest-ranked conference in HCI (CHI 2023, A* ranking).
- What we expect:
 - Interest to learn new things.
 - Programming experience (ideally in Python or Unity/C#), knowing Git, etc.
 - To develop and keep a good schedule.

Timeplan

- 03.04.2022, 14-16 o'clock: **KickOff** (SM211)
- **Milestones (M) – preliminary dates:**
 - M1: Seminar Report finished (beginning of May)
 - M2: Prototype finished (end of June)
 - M3: Small-Scale Pre-Study (i.e., Prototype testing; Beginning of July)
 - M4: Main User-Study (Mid-End July)
 - M5: Analysis finished (August)
 - M6: Project Group Report finished (August/September)
- Plan: start early and finish early.

Contact / Infos

- For questions, please contact jonathan.liebers@uni-due.de.
- Group size: 5-8 students
- Language: German, English