Bachelor / Master

**MULTI²: Multi-User Multi-Surface Interaction Techniques**

**Scenario**
Bill and Mary meet at a café to work on a seminar paper. Both of them already found some papers at home and brought them to the meeting – stored on their personal devices. Bill starts to sort and arrange related documents based on their topic to get an overview. Mary places both of her tablets and her smartphone on the table and moves some papers to these devices to cluster them. Arranging their documents, they find similarities, differences, and doppelgangers. Bill and Mary use all of their devices together to simultaneously solve their task while the underlying system takes care of user identification, interactions, and information exchange across devices.

**Project Goal**
The outcome of this project is a sound state-of-the-art analysis on the topics of cross-surface interaction techniques, user identification techniques, and group work. The development of a prototype allows for further evaluation.

**Task**
- Literature research, state-of-the-art analysis (seminar presentation & paper)
- Development of software (project presentation & paper)
- Conduction of study & analysis (thesis & thesis defence)

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MEET ME AT THE WHITEBOARD: AR as Remote Collaboration Bridge

Scenario

Whiteboards are part of everyday office life: They are used to take notes, discuss sketches with co-workers, or to pin post-its and print-outs that enhance existing content. Interactive whiteboards allow to enrich that activities with digital content such as videos and to make use of computational power (e.g. copy, paste, or storage). This also enables remote collaboration activities, where collaborators are distributed to multiple offices. While some collaborators might use interactive whiteboards or mobile devices, others might have ordinary whiteboards, leading to the question if augmented reality (AR) can facilitate collaboration in such a scenario.

Project Goal

The outcome of this project is a sound state-of-the-art analysis on the topics of (remote) collaboration, awareness techniques, and multi-display environments. The development of a prototype allows for further evaluation.

Task

Literature research, state-of-the-art analysis (seminar presentation & paper)
Development of software (project presentation & paper)
Conduction of study & analysis (thesis & thesis defence)

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Bachelor / Master

NAVI 2.0: Smart Blindman's Stick

Scenario
Visually impaired persons often navigate through their environment using a so called blindman's stick. It is used, e.g., to detect obstacles or to scan the surroundings. Enhancing such a stick with e.g. a smartphone can provide further information or enable navigation using speech input as well as output while relying on trained habits.

Project Goal
The outcome of this project is a sound state-of-the-art analysis on the topics speech input and output and a requirements analysis of visually impaired persons. The development of a prototype allows for further evaluation.

Task
- Literature research, state-of-the-art analysis (seminar presentation & paper)
- Development of software (project presentation & paper)
- Conduction of study & analysis (thesis & thesis defence)

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Announcement April 16th 2018
Motivational messaging in small groups

Scenario
Mobile health applications for behavior change target healthy eating and physical activity. These applications often consist of a tracking part and a feedback part. Interventions which are designed to induce a behavior change towards a healthier lifestyle are often based on automatically generated visual or textual feedback about the user’s performance. Novel research additionally investigates the effectiveness of interventions based on the performance of small groups (e.g., families) instead of the performance of a single person. In this context an open question is if a group messaging functionality which enhances the automatic generated performance feedback which the possibility to send motivational messages to group members can raise the intervention’s effectiveness.

Project Goal
The goal of this project is to enhance an existing mobile health application (android) with a real time group messaging functionality. The massager should allow for sending text messages as well as status reports or recommendations based on the individual user’s or the current group performance.

Task
- Literature research and state-of-the-art analysis (seminar thesis)
- Design and discussion of several interaction and visualization concepts (project work)
- Implementation of a prototype for Android (project work)
- Conduction of study & analysis (thesis & thesis defence)

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Bachelor / Master

Group, aggregate and filter: Data preprocessing in mixed realities

Scenario
Immersive Analytics is a research strain which investigates novel approaches to analyze complex information in mixed realities. Several previous work focused on the visualization of large datasets in virtual or augmented environments. Also the interaction to configure the visualization and explore the information was already partly tackled. However, for an effective data analysis not only the visualization but also the preprocessing of the dataset as well as the possibility to fluently repeat or adapt preprocessing steps like grouping, aggregation and filtering are an integral part of the analysis workflow.

Project Goal
The project is embedded in a bigger research project which considers the creation of a visual data analysis pipeline (similar to e.g., KNIME, SQUIDY, FacetStreams) in an mixed reality environment. The analysis pipeline consists of nodes which are connected to each other and in which the dataset is transformed or visualized. The goal of this project is to design, implement and evaluate nodes to group, aggregate, or filter the dataset using mixed reality devices.

Task
Literature research, state-of-the-art analysis (seminar presentation & paper)
Concept design, implementation (web technology/Unity) of concept(s) (project presentation & paper)
Conduction of study & analysis (thesis & thesis defence)
Bachelor / Master

ChangingPerspective: Motor Learning from different Viewpoints

Scenario
Viewing motion data from different perspectives can help learners to gain different insights. Egocentric information might allow a direct analysis of discrepancy between a learned motion and the current body position. In contrast, an exocentric representation allows for getting an overview from different angles through control over the viewpoint. In this topic you will explore the use of mixed reality technology to support motor learning from different perspectives.

Project Goal
Survey literature about egocentric and exocentric interactions and the interplay between both in mixed reality. Based on your findings, build a novel system which addresses given shortcomings. Conduct an evaluation of your implementation.

Task
Literature survey, state-of-the-art analysis (seminar presentation & paper)
Create, implement and test a prototypical system (project presentation & paper)
Conduct an evaluation, analyze/interpret results (thesis & thesis defence)

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Bachelor / Master

Tap & Teach: Interactions for remote teaching and learning in mixed reality

Scenario
Remote teaching and learning of motion sequences (e.g., in sports, physiotherapy, etc.) can help to conduct lessons with participants which have far distances between one and another. In this topic you explore the use of mixed reality technology for the support of lectures with multiple students placed at different locations. The idea is that teacher movements are recorded and streamed to students in real time. Students can subsequently view a 3D representation of the teacher on different devices and interact with the teacher, e.g., by tapping on his/her body parts, asking questions, etc. The teacher receives input from the students via haptic, visual, or auditory feedback and can react on it. You will have to think about suitable interactions between different devices, define an interaction concept, implement and finally evaluate it.

Project Goal
Survey literature about interactions for remote teaching and learning of motion sequences through mixed reality technology. Based on your findings, build a novel system which addresses given shortcomings. Conduct an evaluation of your implementation.

Task
Literature survey, state-of-the-art analysis (seminar presentation & paper)
Create, implement and test a prototypical system (project presentation & paper)
Conduct an evaluation, analyze/interpret results (thesis & thesis defence)

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Announcement April 16th 2018
Bachelor / Master

**Immersed? Motor Learning in different contexts & degrees of immersion**

**Scenario**
To simulate different contexts and change the degree of immersion might have an influence on how realistic users perceive a virtual scenario, how strongly they feel present in the virtual environment and might also impact their performance during learning. In this topic you create a system to measure users reaction and explore how different contexts and degrees of immersion might influence motor learning.

**Project Goal**
Survey literature about the influence of different contexts and degrees of immersion on motor learning. Based on your findings, build a system. Conduct an evaluation of your implementation with a focus on inquiring about the effect of context and immersion on motor learning.

**Task**
- Literature survey, state-of-the-art analysis (seminar presentation & paper)
- Create, implement and test a prototypical system (project presentation & paper)
- Conduct an evaluation, analyze/interpret results (thesis & thesis defence)

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** field with flowers**
**hospital setting**

https://pxhere.com/en/photo/927030
http://www.kokilabenhospital.com/images/rooms_img4.jpg
Bachelor / Master

FollowMe: Egocentric Hints for Motion Guidance

Scenario
Mixed Reality Technology allows the display of egocentric information in front of learners. In this topic you explore the learning of motion sequences with multiple actors (e.g. a caregiver transfers a patient) in mixed reality. You will inquire about suitable interactions with recordings of collaborative motions (fbx-files for caregiver/patient motions can be provided) as well as possibilities to provide feedback (e.g. haptic, visual or auditory feedback to communicate touch, as well as the current state of the learning progress). Based on the results of a literature-analysis, you will implement a concept and evaluate it.

Project Goal
Survey literature about egocentric motion guidance in mixed reality, as well as the provision of feedback. Based on your findings, build a novel system which addresses given shortcomings. Conduct an evaluation of your implementation.

Task
Literature survey, state-of-the-art analysis (seminar presentation & paper)
Create, implement and test a prototypical system (project presentation & paper)
Conduct an evaluation, analyze/interpret results (thesis & thesis defence)

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https://fulldivegamer.com/platforms/oculus-teases-haptic-feedback-gloves/
Bachelor / Master

The Effect of Working in Virtual Environment on Health

Scenario
Despite the fast development of virtual reality (VR) or augmented reality (AR), many open questions remain. One fundamental question is about the effect on human health when using VR/AR in different scenario. In the case of office workers or college students, screen based work (e.g., Reading papers using a laptop) forces us to be sedentary. With the property of VR/AR environment that the position of the displayed digital content can be adjusted (e.g., Near and far, up and down), we are interested in the potential of VR/AR devices (e.g., Meta 2) on changing the unhealthy work styles.

Project Goal
The outcome of this project is to answering the following questions:
- What is the advantages and disadvantages of using VR/AR for office work in terms of health?
- What is the potential for improving VR/AR devices to better support healthy work style?

Task
- Literature research, state-of-the-art analysis (seminar presentation & paper)
- Development of software (project presentation & paper)
- Conduction of study & analysis (thesis & thesis defense)

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Announcement April 16th 2018
**Bachelor / Master**

**Reminders for Changing Sedentary Behavior**

**Scenario**

Sedentary behavior is the new smoking. Increasing evidence has shown that physical activity (PA) and sedentary behavior (SB) are independent factors for many chronic diseases. Therefore, supporting people to reduce prolonged SB is as important as promoting overall PA. We are interested in how to use persuasive technology (PT) to support users to reduce their prolonged SB at work in the perspective of HCI. According to our systematic review, PC-prompts based reminders are the most commonly used methods in related studies and the PT is not well explored in this field.

**Project Goal**

The outcome of this project is to answering the following questions:
- What is the advantages and disadvantages of the reminders in different modals (e.g., PC prompts, smartphone notifications, wearable vibration)?
- How to evaluate the user experience of reminders under reasonable metrics (e.g., acceptance rate, perceived disruption)?

**Task**

- Literature research, state-of-the-art analysis (seminar presentation & paper)
- Development of software (project presentation & paper)
- Conduction of study & analysis (thesis & thesis defense)

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Bachelor / Master

Design and Evaluation of a Mixed Reality System for Museums

Scenario
Mixed Reality (MR) is an enabling technology for a much more interactive and intuitive experience of museum exhibits, that allows museum visitors to interact with exhibits, without using complex virtual interaction metaphors. In a current cooperation with the HTWG Konstanz new exhibition concepts are developed. You will work in a interdisciplinary team (Designers, Architects). You will create an innovative mixed reality installation for the new exhibition concept.

Project Goal
Implementation of an interactive mixed reality installation which can be evaluated with real user in the wild.

Task
Concept creation (seminar presentation & paper)
Development of software (project presentation & paper)
Installation and evaluation of the system (thesis)

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Announcement April 16th 2018
Bachelor / Master

UX Evaluation Toolkit for Museums

Scenario
Museums often evaluate various aspects of their audiences’ experiences, be it what they learn from a program or how they react to an exhibition. Each museum program or exhibition has its own set of goals, which can drive what an evaluator studies and how an evaluation evolves. When designing an evaluation, data collection methods are purposefully selected to provide the data needed to measure those goals and answer the evaluation questions at hand.

Project Goal
Creation of a collection of established tools. Creation of new tools for the evaluation of interactive systems in museums.

Task
Collection of established tools (seminar presentation & paper)
Development of new tools (project presentation & paper)
Toolkit for evaluation (thesis & thesis defence)

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