

Research project for the profile Computer Science

Virtual driving school for older adults

Background

Virtual, augmented, and mixed reality (i.e., 'extended reality' or XR) environments can facilitate learning various skills that involve visuospatial and motor function, from surgery through flying an airplane to repairing mechanical devices. Because XR can be used for training successfully, a "virtual driving school" is entirely imaginable (some companies are already experimenting with this idea, including one we collaborate). In this context, we foresee two future developments that will potentially matter: 1) autonomous cars may become much more common, 2) 20-30% of the population will be over 65 in a few decades. Aging and technology do not always 'mix well', and operating future cars will be a lot about operating a complex app. To stay ahead of the curve, it is necessary to conduct research on how to design and program the best human-computer interaction tools that enable older people to learn how to drive, retain their skills, and intervene with autonomous cars when needed.

Goals / Methods / Approach

In the context of this master project, we envision a virtual reality app in which various driving scenarios are simulated, and the interface is optimized for older drivers. Optimization involves both thinking about visualization and interaction paradigms that prevent cognitive load, utilize machine learning based real time eye tracking and face recognition technologies to detect drivers' fitness levels / fatigue, and alert them. Once the virtual content is created and interactions are designed, we will conduct experiments to understand if the 'virtual driving school' functions (usability, desirability) and facilitates learning in older adults as intended. You will work with the state of the art virtual headsets (most likely you will program in Unity, but if you prefer other technologies there are no restrictions). We have some city models that have been created in previous experiments which will be available to you, and new city models can be generated based on procedural modeling. Some experimentation with using mixed reality for remote assistance is also envisioned.

Required skills: Analytical thinking, experience in statistical approaches to problem solving, programming, interest in visualization and visual analytics, interest in scientific research (conceptual thinking, structuring of ideas)

Others: The project language is English. A collaboration is foreseen with SwissSIMU, and with our colleagues at the MIT CSAIL / Cognitive & Brain Sciences in Cambridge, USA.

Tasks for the MSE candidate

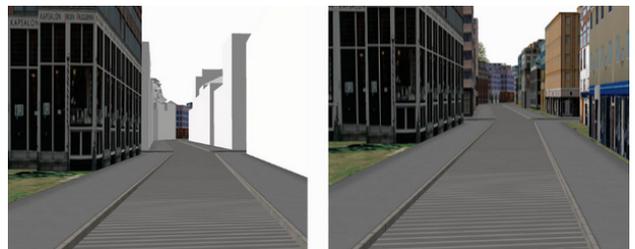
The project can be implemented in 2 to 3 stages: Projects P7 (interaction concepts, virtual content creation), P8 (driving simulation scenarios, prototypes, initial user testing) and P9 (final prototype, controlled experiments)

Study type: Full time
 Part time 50%

Project organization: Single and/or in a project team both possible

Workplace: Windisch

Advisor: Prof. Dr. Arzu Çöltekin



VISUALIZATIONS BY LOKKA & ÇÖLTEKIN