MSE | MASTER OF SCIENCE IN ENGINEERING

Research project for the profile Computer Science

Virtual reality for crime scene investigations

Background

Instead of documenting crime scenes using 2D photography with many geometric and radiometric distortions, more and more police teams adopt scanning the scene with LIDAR and modeling it using photogrammetry. This allows 'freezing' the crime scene in time as realistically as possible, which protects the information that may be relevant when the incidents are still fresh. Such efforts allow unlimited crime scene visits for interrogations, witness testimonies and legal team deliberations using modern visualization and interaction techniques, and offers unique experience based insights. Various governmental institutions and university departments in Zurich have established a "3D center" focusing on creating such 3D content for legal teams, forensics research and investigations and for police training (https://3dzz.ch/). In this project, in collaboration with the 3DZZ, we will examine how we can streamline and automate 3D content creation efforts, especially from front-end engineering and design perspectives to ensure that viewers receive the information they need, and the visualization / interaction designs do not mislead them.

Goals / Methods / Approach

In the context of this master project, we envision a virtual reality environment in which various scenarios are developed and, and the interface is optimized for the context above, supported by eye tracking and collaborative extended reality solutions. 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 viewers' expressions to help assessing if the viewer displays unexpected anxiety, surprise or other reactions that may be of relevance to the interrogation and witness testimonies. Once the virtual content is created and interactions are designed, we will conduct experiments to understand if the crime scene visits function and facilitate the intended outcomes. You will work with the state of the art virtual headsets, and most likely will program in Unity. You will have access to some crime scene models that have been created, and experts will be available to you for interviews to establish the context.

Required skills: Analytical thinking, willingness to learn 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 established with our partners at the 3DZZ / UZH (Dr. Lars Ebert) further collaboration is foreseen 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 7 (interaction concepts, virtual content creation), 8 (scenario development, prototypes, initial user testing) and 9 (final prototype, controlled experiments)

Study type: [x] Full time
[x] Part time 50%

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

Work place: Windisch

Advisor: Prof. Dr. Arzu Çöltekin, arzu.coltekin@fhnw.ch

Schweizer Fernsehen

Zurück an den Tatort