Research statement VR4Sec

Our research statement is formulated regarding the topics: "Behavioral Biometrics for AR/VR" and "Conducting Security and/or Privacy-related Research in AR/VR". These statements were made based on findings in previous research.

Operators in closed-circuit television (CCTV) control rooms have to monitor large sets of video feeds coming from an ever increasing number of cameras. To assist these operators in their demanding day-to-day tasks, AI-driven support systems accompanied by user-centric interfaces are being developed. However, prototyping these support systems and testing them in operative control rooms can be a challenge. Therefore, we developed a virtual reality (VR) control room which can be used to investigate the effects of existing and future support systems on operators' performance and behaviour in a fully controlled environment. Important assets of this VR control room include the possibility to subject operators to different levels of cognitive load and to monitor their cognitive-affective states using not only subjective but also behavioural and physiological techniques.

Specifically we did testing towards guided and not-guided visual search tasks. Since these tests required multiple sensors (eye tracking and ECG) it was practical that the tests could be conducted in our own laboratories. Experience from other tests taught us that using sensors in field testing experiments can be very tricky compared to a virtual operator room where the experiment can be repeated in a controlled way.

ExperienceDNA framework

In our ExperienceDNA framework, a new technique is developed using virtual reality (VR) to improve the measurement of the participants' reactions during such a test. In this system, VR user tests can be monitored and controlled through a desktop interface (as seen in this video: https://www.youtube.com/watch?v=MDLq3xVeUxc). In addition, physiological trackers (eye tracking and heart rate monitoring)are used to measure what the participant is looking at and to gauge their preferences. Moreover, the use of VR allows for quick adaptation to the virtual environment the participant is confronted with. In this way, highly versatile tests can be conducted while minimising the initial setup effort. Some Important considerations are legibility and realism of the environment. Nonetheless, testing in VR can be a viable alternative when the target operator room is occupied or unavailable.