Assessment of Air Taxi Passenger Acceptance – Implementation and Initial Evaluation of a Mixed Reality Simulator

Tim Laudien*, Anne Papenfuss*, Johannes Maria Ernst*, Maria Stolz*, Bianca Isabella Schuchardt* and Albert End†

German Aerospace Center (DLR)
* Institute of Flight Guidance, † Institute of Aerospace Medicine
Lilienthalplatz 7, 38108 Braunschweig, Germany

Urban air mobility paves new ways for public transport modalities like air taxis. To shape the operational concepts and the design of these air taxis, the acceptance and requirements of future passengers should be considered even in early stages of the development process. Within the HorizonUAM project, it is of interest to understand the effects of social presence, e.g. through on-board service personnel, on perceived comfort. These results help to develop concepts, how fully or mainly autonomous operations can be achieved that are accepted by users.

As part of HorizonUAM, an air taxi simulator was implemented to assess the aforementioned passenger acceptance with regard to defined key criteria like presence of on-board personnel or amount of presented information. To create an experience that is as close to a real air taxi flight as possible, recent advancements in head-mounted display technology facilitated the creation of a mixed reality simulation. Mixed reality combines advantages of full-flight simulators like human collaboration and use of analog instruments with those of virtual reality simulators that are cost-effective, highly immersive devices for rapid prototyping.

This paper reports on the work conducted to define and design such a mixed reality simulation to investigate factors of passenger acceptance. First, functional requirements that were defined for a first study of passenger interaction and comfort are presented, as well as the technical requirements that were derived. Additionally, mixed reality technology should be used for the novel simulator to enable high flexibility. Second, as numerable different setups of mixed reality were possible with state-of-the-art technology, four different setups were compared in a pre-study against each other. The empirical results with regards to experienced immersion are presented. Finally, the conclusion from this study regarding the final setup for the mixed reality simulation are presented.

Keywords: Acceptance, Air Taxi, Mixed Reality, Human-in-the-Loop Simulation

Speaker Bio:
Tim Laudien studied mechanical engineering at Dresden University of Technology (Germany) and specialized in the fields of aeronautical engineering. He received an engineering master's diploma in 2020. Currently, he works as a research scientist in the department of pilot assistance at the Institute of Flight Guidance of the German Aerospace Center (DLR) in Braunschweig and conducts research in the fields of virtual, augmented and mixed reality used for pilot assistance.