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The impact of Augmented Reality and 3D Visualisation in ATS Airspaces' Learning Process

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Abstract

Air Traffic Services airspaces classified as Class A to G refer to volumes, within which specific types of flights may operate and for which specific air traffic services and rules of operation are specified. Within these airspaces, predetermined trajectories such as SID (Standard Instrument Departures) and STAR (Standard Arrival Routes) are used by instrument flight rules (IFR) flights from the take-off phase to the approach phase. Learning how airspaces and trajectories are designed is essential before starting the practical training. To reach this objective, air traffic control students currently learn through 2D tools as paper documents and Computer-Based Training data exercises. It aims at understanding these volumes' layout to build 3D representations so that air traffic controllers will better apply the corresponding rules and strategic separations between aircraft in vertical evolution (mostly departures and arrivals) inside these volumes. The objective of this study is to characterise the effects of augmented reality and 3D visualisation on airspaces learning. An educational tool was designed for visualising and manipulating airspaces in 3D using a user-centered design approach with air traffic control students and instructors. To identify their needs in terms of constructing 3D representations during training, we conducted contextual interviews, observations and a quantitative questionnaire. We then iterated by involving users in the prototyping process. Evaluations of the final mock-ups and the functional application were carried out with end-users through questionnaires and interviews in order to assess intrinsic motivation and willingness to use.