

Augmented Reality in UAV Simulator for Advanced Training

With the development of UAV technology, drones have made their way into many industries – such as aerial photography, search and rescue and payload carrying. As the list of UAV applications keeps growing, so does the need for skilled pilots. Current training programs, however, are not efficient enough to satisfy the demand. They're usually composed of two parts – theoretical, taught through lectures, and practical – UAV flying exercises supervised by an instructor (1-on-1 lessons). Both during training and examination, pilot's performance is evaluated subjectively - based on instructor's expertise and visual cues. This format of training results in a relatively small rate of UAV pilot certification.

The goal of this study is to propose a new method of training that would improve efficiency, repeatability, and unambiguity of flight control quality evaluation. An augmented reality training platform was developed for the HoloLens 2 headset, that enables automated and objective grading of pilot's performance.

Within the training platform, any flying exercise can be defined. An ideal flight path and other desired flight parameters are input. For each exercise, an overlay of virtual obstacles is created. The visualization can symbolize the flight path, checkpoints, or obstacles to avoid. Additional visual aids in the form of HUD and HDD are displayed, that correspond to one of three difficulty levels (easy, medium, hard). They offer enough context to improve momentary flight accuracy. At the end of every run, an overall report is generated with numeric results calculated from predefined control evaluation criteria and sensor data gathered during flight.

The platform is a versatile tool with a big potential for development. With only three components necessary (drone, controller, and the headset), it can make UAV pilot training more accessible and reliable. Its modularity allows for improving functionality as desired.