THE UAS TRIBUNE

Opening New Frontiers - What Augmented Reality Brings to Drone Operations

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ANARKY LABS

What Is Anarky Labs & What Do We Do?

We are a Finnish start-up founded in March 2020 and our first product, AirHUD, is the first real Heads-Up Display for drones. We use augmented reality (AR) to give pilots unreached situational awareness. Our vision is to create a product that benefits drone remote pilots, but not only. We think the outside use of augmented reality is only starting, and that it holds potential for numerous purposes. Air taxis, air traffic management, building inspections…, the possibilities are endless!

Fig. 1 - The augmented reality view given to the drone pilot with AirHUD, showing the drone indicator always pinpointing drone's location, with map and video feeds beside it, and also mission waypoints in real world locations, and even building meshes that enable real-time distance indication between the drone and the nearest building.

Research-based Innovation

We have conducted long hours of research on how to achieve real-world scale- and location-based visualisation of data with augmented reality. These are crucial elements in our solution, that make it unique in the world, and now we do have US patents to prove it! We have also studied the algorithms for satellite-based drone localisation, one key element of AirHUD being its precision. In the field of user-friendliness, we conducted a thorough investigation on the visualisation of various digital twin data sources. As a concrete result, we now offer regulatory airspace volumes as a standard feature. We have also spent a lot of time doing research, in close coordination with regular remote pilots, on using augmented reality to aid in piloting drones.

Development & Test Programmes

To fully demonstrate the operational benefits of augmented reality, we conducted (and continue to do so!) a comprehensive testing and development programme with regular test flights. As a start-up, we need to understand where the industry is going and how the use of the drones is evolving. Therefore, we have thus a precious cooperation with research facilities such as VTT Technical Research Centre of Finland and Oulu University to apprehend the possible future needs of drones in professional operations. Our feedback channels from early customers using the system is essential to collect ideas and to improve AirHUD. We are also broadening the support of drone platforms and the targeted operations, according to client needs. For example, the support of aviation data, which will supply remote pilot teams with shared situational awareness.

Finally, we are now expanding AirHUD capabilities to drone training operations making it possible to fly a simulated drone in a real environment, but also a real drone in a simulated environment.

Example of Flight Missions Benefiting From AirHUD

We have identified various flight missions that can benefit from this technology:

- Inspections (buildings, roads, agriculture, forest, oil & gas, mining, industrial sites, etc…)
- Night flights
- EVLOS / BVLOS flights
- Observation and control of autonomous flights
- Search and rescue
- Security
- All missions where easily understanding the legal requirements helps in operational efficiency
- Training of demanding drone operations (simulated Specific Category flights for example)

Challenges

Of course, we are facing some challenges, but none of them are insurmountable. For example, we are aiming for AirHUD to become the reference platform for commercial EVLOS drone operations without observers. We know already that these discussions with the regulator may take some time! We are also aiming at getting AirHUD recognized as an official training tool, which is a long process.

Regarding the solution itself, we are naturally facing some resistance to change, as AirHUD disrupts the way that drone operations are currently conducted. While

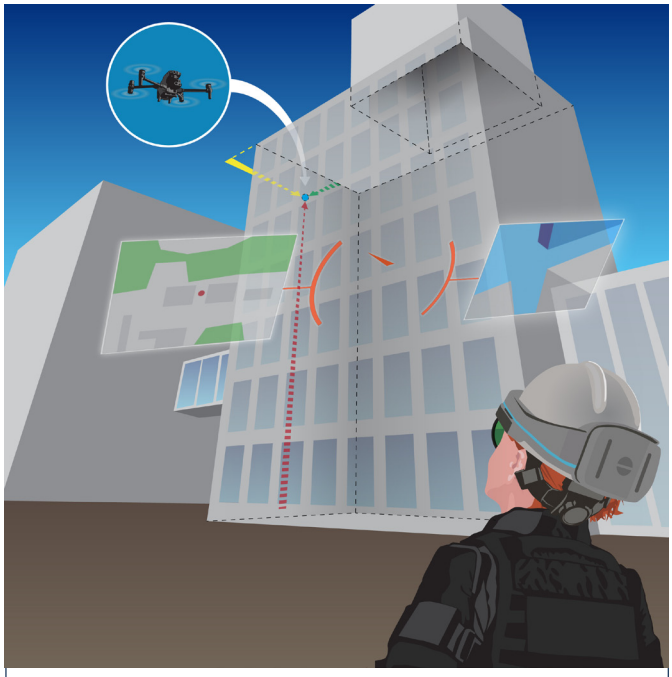

Fig. 2 - AirHUD enables the pilot to even fly the drone behind obstacles and still see their location and intuitively their relationship to their surroundings.

Fig. 4 - Height indicators, including ultrasound / camera-based short range detection, are always shown, even when flying partially or totally beyond visual line of sight

some are finding these changes frightening, others, such as law enforcement remote pilots, are embracing the new possibilities.

Our last challenge is, as with all innovations, to keep on top of the technologic curve!

Economic Benefits Of AR For Drones

The benefits of drones using augmented reality are almost endless and mostly financial:

- On average, less personnel is needed per mission
- EVLOS / BVLOS and night flights will be easier to conduct and thus become more common
- Augmented reality facilitates manual, resulting in a reduced need for the creation of precise and complex waypoint missions
- By visualizing the quality of data collected by the drone at the location of operation, augmented reality will help speed up and simplify operations
- Increased safety and operational efficiency result in flight cost savings

Fig. 3 - AirHUD makes it trivial to conduct night flights as the drone is always pinpointed in the air, no matter how far away.

The Finnish UAV Ecosystem (FUAVE)

We have been a member of FUAVE since March 2021. The goal of FUAVE, a multidisciplinary research consortium funded by the Academy of Finland, is to support the development of the Finnish unmanned aviation knowledge base and related business opportunities. The organisation has been a fantastic place to network and connect with experts in the field. We now have several cooperation projects that started thanks to meetings organised by FUAVE.

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