Open-Source DIY Unmanned Aerial System for Remote Sensing: Open Plane Project

Gurnak, Matej (School: High School of Jura Hronca)

Fixed-wing unmanned aerial systems are utilized in a wide range of applications such as mapping, monitoring, surveillance, etc. These systems are usually extremely expensive and almost exclusively used by large companies or the military. Fixed-wings have several advantages over the more popular multi-rotors, therefore my aim was to develop a cost-effective open-source DIY alternative that anyone can build and use. Development of the plane was based on reliability, availability, and price of widely used components to ensure anyone can replicate the build regardless of the location. Flight data were collected from the flight controller's blackbox and the camera, qualitatively analyzed to verify the efficiency of the design. Subsequently, four test models were built throughout the design process to investigate the effects of design choices on the plane's flight performance and user experience. In comparison to similarly priced multi-rotors, the final version of the Open Plane offers better endurance, greater coverage, and advanced autonomous capabilities by utilizing open-source control software. The model was designed in accordance with EU legislation, ensuring compliance with regulations and safe operation. The system was thoroughly tested and successfully used for mapping areas of up to 0.75 square miles and flights spanning more than 70 minutes. A combination of open-source and custom-developed code was utilized to process the recorded footage and create industry-standard high-resolution orthomosaics. The final model fulfilled the proposed objectives, was used in real-world applications, and the information gathered during the development was shared on popular social platforms.

Awards Won:
Third Award of $1,000