СУЧАСНІ ТЕХНОЛОГІЇ У СТВОРЕННІ КОМП'ЮТЕРИЗОВАНИХ СИСТЕМ КЕРУВАННЯ

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COMPARISON OF THE RELIABILITY OF UAVS WITH MANUAL CONTROL AND COMPUTERIZED CONTROL

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In the rapidly evolving field of aviation technology, Unmanned Aerial Vehicles (UAVs), commonly known as drones, have emerged as a significant area of interest. These systems are increasingly being used in a variety of applications, ranging from surveillance and reconnaissance to delivery services and environmental monitoring. The reliability of UAVs, which refers to their ability to perform as expected with out failure, is a critical factor that determines their effectiveness and safety.

There are two primary modes of controlling UAVs: manualcontrol, where a human operator directly controls the UAV, and computerized control, where methods has its own advantages and disadvantages the UAV is guided by an onboardc omputer system. Each of these control, and their impact on the reliability of UAV sis a topic of ongoing research.

Material sand Methods

This study is based on a comprehensive review of existing literature and research papers on the reliability of UAVs under manual and computerized control. The materials used include scholarly articles, technical reports, and case studies. The methods involve analyzing these resources to understand the design, implementation, and maintenance of UAV controlsystems, and their impact on reliability. Both quantitative and qualitative data from these sources are used tocompare the reliability of manual and computerized control systems.

Results

Manual Control

Manual control of UAVs has been found to be reliable [1], with the skil land experience of the operator playing a significant role. The operator's ability to react to unexpected situations and make quick decisions can often mean the difference between success and failure. However, the failure rate for drones in commercial aviation is higher than tha tfor airplanes. This suggests that while manual control can be effective, it also introduces a level of unpredictability and potential for human error.

Computerized Control

Computerized control of UAVs, on the other hand, has seen significant advancements [2-3]. The development of high-speed communication links allows for real-time contro land monitoring of UAVs. Flexible control strategies en able UAVs to adapt to changing conditions and perform complex maneuvers. Efficient collaborative decision-making algorithms allow multiple UAVs to work together, increasing overall efficiency and reliability.

These advancements have the potential toi ncrease the reliability of UAVs. However, challenges remain in ensuring the robustness of the sesystems. Adverse environmental conditions, such as high winds or low visibility, can disrupt communication links or cause control algorithms tof ail. Situations requiring complex maneuvers, such as navigating through dense urban environments, can push the limits of current control strategies

Conclusions:

The comparison of the reliability of UAVs under manual and computerized control reveals that both systems have their unique strengths and challenges. Manual control, while reliable, is heavily dependent on the operator's skill and experience, and is subjectt o human error. On the other hand, computerized control, with its advanced algorithms and real-time communication, offers potential for greater reliability and efficiency.

However, the robustness of computerized systems under adverse conditions and complex maneuvers remains a challenge. As technology advances, it is expected that these challenges will b eaddressed, leading to more reliable and efficient UAV operations.

In conclusion, while manual control of UAVs continuestobe a viableoption, the trend is moving towards more sophisticated, computerized control systems. These systems, despite their challenges, hold the promise of transforming the future of UAV operations, making them more reliable, efficient, andsafe.

References

1. Fahlstrom, P. G., Gleason, T. J., &Sadraey, M. H. (2022). Introductionto UAV Systems (5th ed.). John Wiley& Sons.

2. Fahlstrom, P. G., &Gleason, T. J. (2012). Introductionto UAV Systems (4th ed.). John Wiley& Sons.

3. Marqués, P., &DaRonch, A. (2017). Advanced UAV Aerodynamics, FlightStabilityand Control: NovelConcepts, Theoryand Applications. John Wiley& Sons.