INTEGRATION OF ARTIFICIAL INTELLIGENCE IN AVIONICS SYSTEMS FOR AUTONOMOUS FLIGHT CONTR

Бін Джах Х.М.С
Науковий керівник - к.т.н. проф. Хорошайло Ю.Є.
Харківський національний університет радіоелектроніки, каф ПЕЕА
М. Харків, Україна
email: dzhakh.bin@nure.ua

The integration of artificial intelligence (AI) into avionics systems has emerged as a transformative approach in the aviation industry, which promises to enhance efficiency, safety, and autonomy in flight control operations.

This thesis investigates the utilization of AI techniques, and it discusses the various applications of AI in avionics systems, ranging from autopilot systems and trajectory optimization to collision avoidance, predictive maintenance, and Communication systems etc...The integration of artificial intelligence in avionics systems represents a transformative shift in the aviation industry towards autonomous flight control. By leveraging AI technologies, aircraft can achieve higher levels of autonomy, safety, and efficiency, paving the way for the next generation of intelligent aviation system.

Enhancing Flight Safety and The Revolutionary Impact of Autonomous Systems

More than a century after the invention of the autopilot, aerospace engineers are still working to bring more automated processes into aircraft cockpits to enhance safety, increase efficiency, and reduce pilot workload. With the help of artificial intelligence (AI), autopilot technology has evolved from simple devices that maintain an aircraft's altitude and heading to fully autonomous flight control systems capable of performing gate-to-gate operations without any human input.

In recent years, the aviation industry has witnessed a significant paradigm shift with the advent of artificial intelligence (AI) technologies. Among the myriad applications of AI in aviation, one of the most groundbreaking areas is the integration of AI into avionics systems for autonomous flight control. This integration holds the promise of revolutionizing the way aircraft operate, paving the way for safer, more efficient, and more adaptive flight control mechanisms.

The integration of AI in avionics systems for autonomous flight control represents a transformative opportunity for the aviation industry. By harnessing the power of AI, aircraft can achieve unprecedented levels of intelligence,

adaptability, and safety, paving the way for a more efficient and sustainable future of aviation.

AI important in the Aviation industry. In the realm of flight operations and related sectors, the significance of intelligent systems cannot be understated. These technologies are integral to ensuring safety, enhancing efficiency, curtailing expenses, and elevating customer service. The use of AI in aviation has transformed operational processes. Automation is now commonplace and vital for maintaining competitive advantage in the airline industry.

AI in the airline industry has opened a wealth of possibilities, such as predictive maintenance, optimization of fuel consumption, autonomous drones for inspections, and baggage handling robots. These technological innovations have demonstrated that AI in aviation offers multifaceted benefits to airlines and passengers by improving punctuality rates and reducing flight cancellations.

Thus, AI and automation are revolutionizing the airline industry by creating safer skies while simultaneously boosting productivity and profitability.

The Role of Artificial Intelligence (AI) in Air Travel

AI-driven predictive maintenance systems analyze vast amounts of data from sensors and equipment on planes, enabling airlines to predict when components need servicing or replacement. This proactive approach reduces the risk of in-flight malfunctions, ensuring that aircraft are in optimal condition.

AI also assists pilots during flights by providing real-time data analysis and predictive analytics. Automated systems can identify and address potential safety concerns, such as weather changes or navigation adjustments, helping pilots make informed decisions and avoid dangerous situations.

AI-powered collision avoidance systems can detect nearby aircraft and obstacles, issuing timely alerts to prevent accidents. Additionally, AI contributes to air safety through improved air traffic management. AI algorithms help optimize air traffic flow, reducing congestion in the skies and minimizing the risk of mid-air collisions.

References:

1-https://attractgroup.com/blog/how-ai-and-automation-are-revolutionizing-the-aviation-industry/.

2-https://utilitiesone.com/the-quest-for-intelligent-aircraft-incorporating-autonomous-systems.

3- https://amprius.com/aircraft-safety/.

4-https://www.linkedin.com/advice/3/how-can-you-integrate-ai-aircraft-systems-skills-aviation-wcede

5-   https://www.aviationfile.com/artificial-intelligence-and-air-traffic-control/