Paper ID: 102765
student

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

Author: Mr. Farrdin Nowshad
BRAC University, Bangladesh

Mr. Maidul Islam
BRAC University, Bangladesh
Mr. Md. Shaeak Ibna Salim
BRAC University, Bangladesh
Mr. Akif Mohiuddin
BRAC University, Bangladesh
Mr. Abdulla Hil Kafi
Kyushu Institue of Technology, Japan

ENERGY-OPTIMIZED UAV PACKAGE DELIVERY SYSTEM: INTEGRATING BAROMETRIC SENSING AND GPS FOR REDUCED HOVERING TIME AND ENHANCED OPERATIONAL EFFICIENCY

Abstract

By enabling autonomous package delivery with greater efficiency and speed, unmanned aerial vehicles, or UAVs, are revolutionizing logistics. Unmanned aerial vehicles (UAVs) transform logistics by enabling faster and more efficient autonomous package delivery. Our VTOL (Vertical Take-Off and Landing) drone RaptorX increases efficiency through its cruise mode capability, supporting a 10kg payload with a 35-minute runtime. The operational viability of RaptorX is still significantly hampered by its high takeoff and landing energy consumption. In this research, we suggest a power-efficient package delivery system that combines a fuzzy logic-based motor control system, GPS, and a BME280 barometric sensor to minimize the hovering time and deliver a package from a safe altitude to the designated location with zero package damage. Continuous UAV position and height tracking offer precise altitude-based release and only release packages when both parameters meet predetermined thresholds. By enabling packages to descend at a regulated rate, the controlled delivery system lowers the overall hovering time and, consequently, energy consumption. Using a distance measurement algorithm, the delivery system determines the necessary drop distance before lowering the package using nylon wire. The payload release happens when the 0.9 mm (19 AWG) nichrome coil melts due to requirement fulfillment. Using fuzzy logic in motor control optimization techniques improves system responsiveness and power efficiency.LiDAR continuously scans the landing area using laser pulses to find objects and ground elevation levels. The system calculates the package delivery safety at the surface level after thoroughly examining the data gathered. By maximizing flight time while conserving energy and enhancing system reliability, the method increases the efficacy of UAV delivery.