TECHNICAL ANALYSIS OF DRONE-BASED CARGO LOGISTICS

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Annotation: The application of unmanned aerial vehicles (UAVs), or drones, in logistics is transforming the future of delivery systems. This study provides a technical analysis of drone-based cargo transportation, highlighting aerodynamics, energy consumption, navigation algorithms, and regulatory constraints.

Keywords: Drone logistics, UAV technology, delivery systems, energy efficiency, navigation algorithms

Main Text

Drone logistics offers an efficient alternative for last-mile delivery, especially in congested urban areas or remote regions. Technically, drones are categorized by payload capacity, flight range, and propulsion systems. Multirotor designs provide high stability but limited endurance, whereas fixed-wing UAVs offer extended range and efficiency.

Energy management remains a major constraint. Battery density determines operational limits; hence, hybrid propulsion (electric + fuel cell) models are being tested to extend flight time.

Autonomous navigation relies on GPS, LiDAR, and visual-inertial odometry. Path planning algorithms such as A* and Dijkstra's algorithm are employed for obstacle avoidance and optimized routing. However, integration with air traffic management systems and compliance with aviation regulations remain ongoing challenges.

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