

Future of Unmanned Air Vehicles

Abstract: Unmanned Air Vehicles (UAVs) have rapidly evolved over the past decades with applications ranging from surveillance, and reconnaissance to environmental monitoring having potential usage in both civilian and military applications. Advancements in electric propulsion systems, batteries, lightweight materials, and artificial intelligence algorithms have significantly improved all types of UAVs' flight stability and autonomous capabilities.

The future of UAV technology will be discussed with a particular focus on solar-powered UAVs, vertical takeoff and landing (VTOL) UAVs, and Micro Air Vehicles (MAVs)/Nano Air Vehicles (NAVs).

With increasing emphasis on sustainability and renewable energy sources, the integration of solar power in UAVs has garnered significant attention. Solar-powered UAVs harness the sun's energy to extend flight endurance and reduce dependence on traditional fuel sources. Advancements in photovoltaic technology, energy storage systems, and energy-efficient designs are paving the way for solar UAVs to revolutionize long-endurance surveillance, environmental monitoring, and remote sensing applications. Vertical takeoff and landing (VTOL) UAVs have garnered significant attention due to their ability to maneuver in confined spaces and access challenging environments. Micro Air Vehicles (MAVs) and Nano Air Vehicles (NAVs) are at the forefront of miniaturization and swarm intelligence. Researchers are exploring new materials, propulsion mechanisms, and swarm intelligence algorithms to unlock the full potential of these tiny aerial systems. Flapping wing propulsion, inspired by nature's efficient flyers, offers a promising alternative to conventional propulsion systems. The importance of flapping wing propulsion and unsteady aerodynamics in the design of MAVs and NAVs will be discussed by underlining their potential to revolutionize the field of UAVs.