

Wireless Powered Flight: Charging Drones While in Operation

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FIGURE 1

University of Aveiro team in Dubai,
exhibiting the “Wireless Powered
Flight” project at Prototypes for
Humanity 2024.

FIGURE 2

Schematic of the wireless powered
drone system with the transmitting
antenna, dielectric lens, receiving
antenna, rectifier and drone.

Wireless power transfer (WPT) can revolutionize energy distribution by eliminating the need for physical cables. This project advances WPT by developing a system to wirelessly power a drone while in operation, so that there is no need to interrupt missions for power charging, inspired by the pioneer work of William Brown^{1,2}. Here at the “Radio Systems – Av” group from Instituto de Telecomunicações – University of Aveiro, the research in WPT uses microwaves, where the energy propagates freely through space, enabling long-systems. By focusing the energy through quasi-optics³, the beam efficiency can be significantly increased⁴, which is achieved in this project through dielectric lenses⁵ and with an aerodynamic receiving antenna⁶. This innovation supports sustainable energy goals, offering potential for clean energy distribution, extending the range of aerial electric vehicles or even enabling uninterrupted operation, improving energy access in challenging environments, all of which are crucial in surveillance, delivery, and rescue missions, either in military or emergency scenarios.

A small-scale project was developed for focusing power at under 2 m, showing that a drone only turns on when the energy is focused directly on it. It was awarded the “Outstanding Student Design Demonstrator Award” at the IEEE Wireless Power Transfer Conference and Exhibition 2024 in Kyoto, Japan, and selected as one of

100 projects worldwide to be exhibited at Prototypes for Humanity 2024 in Dubai⁷.

Reference

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