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Rotorcraft Unmanned Aerial Vehicle with Horizontally Mounted Propeller for Environmental Interactions

A redesigned, simple-to-control VTOL rotorcraft with integrated sensors enhances aerial manipulation and environmental interaction capabilities by adding an independent control degree of freedom.

For environmental interactions, it is desired to have small UAV with vertical take-off and landing (VTOL) and hovering capabilities. However, current VTOL platforms are generally underactuated, i.e. equipped with fewer actuators than degrees-of-freedom. Existing UAVs are very agile, but the inherent coupling between their translational and rotational dynamics causes them to be unable to independently control forces and torque in all directions. While there are several omnidirectional UAVs, most are overly complicated and difficult for users to control. There is need of a UAV with omnidirectional capabilities that can be controlled easily.

Researchers at Purdue University have developed a rotorcraft UAV designed specifically for environmental interactions, the Interacting-BoomCopter (IBC). It is a redesigned version of the BoomCopter platform found in the hobby community specifically for interacting with the environment and is capable of both VTOL and hovering. In addition, a horizontally mounted propeller added to the UAV adds an extra independent control degree of freedom, allowing for simple control schemes to be employed to execute aerial interaction tasks. Sensors are also integrated into the vehicle for use in pulling or pushing in environmental interaction tasks..

Advantages:

-Simple control scheme

-Integrated sensors

-VTOL and hovering

Potential Applications:

Technology ID
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Category
Aerospace & Defense/Autonomous Systems (UAVs & AVs)
Robotics & Automation/Perception & Sensing
Robotics & Automation/Automation & Control

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-Aerial manipulation

-Environmental interaction

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