a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

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MECH 493 project: Using Unmanned Aerial Vehicles to Measure Wind Speed and Direction

Background and research goal

The use of Unmanned Aerial Vehicles (UAV's, or drones) is growing dramatically as UAV's become more powerful and sensors (the payload) becomes lighter and cheaper. In many applications (air pollution flux measurements, wind farm site characterization) it is important to measure wind speed. For the largest class of UAV's, which used multiple rotors (ie., quad- and hexa- copters), the air flow near the UAV is strongly influenced by the vehicle, and it is not possible to use any of the wind speed instrumentation normally used at fixed sites. The approach our group is taking is to use the UAV dynamic sensor data (accelerations, tilt, power) to infer the wind field. The basic concept is not new, and at least for quasi-static data (UAV tilt and motor power), it has been proven to give reasonable wind estimations, but with low spatial and temporal resolution. Our attempt to improve this approach will be based on a new calibration procedure, a better aerodynamic model of the UAV, and use of dynamic sensor data.

Tasks to be performed by the student

Use existing UAV aerodynamic models and propose 1 new model to infer wind speed from real UAV sensor data.
Fly the UAV in the vicinity of a research-grade wind speed instrument to validate the method.
Publish the results as a research paper and an open-source Python script.

Facilities and team:

The student will work in a team with professors, a senior PhD student, and post-doctoral fellow. The research platform is an IndroRobotics Scout MkIIIb quadcoptor, which is based on a DJI Matrice airframe.