Area of Study

The purpose of my thesis is to instrument a small-scale UAV for analysis of unsteady flight performance. For full-scale vehicles, flight test is conducted to experimentally determine aerodynamic coefficients and control derivatives. These tests generally rely on a steady and level flight assumption, such as when the vehicle is in a trimmed condition at cruise. This assumption is generally not valid for small-scale UAV’s for a variety of reasons, including wind gusts, pilot induced movements, and line-of-sight limitations.

This thesis will develop a method to determine aerodynamic coefficients even with these perturbations. This method will be used on a small UAV aircraft to determine the aerodynamic coefficients of the UAV, and these results will be validated. Once validated, various effects will be investigated, possibly including changes in parasite drag coefficient, changes in induced drag, and lift distributions, amongst others.