AE 282 Jan 3:0

Unmanned Aerial Vehicles

Instructor

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Email:

Department: Aerospace Engineering

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

This graduate level course uses the background of flight performance and classical control design to a systematic model development for small unmanned aerial vehicles. Guidance, path planning, estimation and control subsections are discussed and integrated sequentially.

Prerequisites

Flight Mechanics, Classical Control Theory

Syllabus

History of unmanned air vehicle (UAV) development. Unmanned aircraft systems: coordinate frames, kinematics and dynamics, forces and moments, lateral and longitudinal autopilots. UAV navigation: accelerometers, gyros, GPS. Path planning algorithms: Dubin's curves, way-points, Voronoi partitions. Path following and guidance: Straight line and curve following, vision based guidance. Future directions and the road ahead.

Course outcomes

The course outcomes include

1. A thorough understanding of aircraft flight dynamics

2. A rigorous training in MATLAB based high fidelity modelling and simulation

3. An understanding of the synergy between various aircraft subsystems.

Grading policy

Mid Term 25%

Assignments 25%

Term Project 25%

Final Exam 25%

Assignments

Assignments include step by step development of MATLAB Simulink based models for aircraft 6 DOF equations.

Resources

Randal W. Beard and Timothy W. McLain: Small Unmanned Aircraft:
Theory and Practice, Princeton University Press, 2012
Kimon P. Valavanis: Advances in Unmanned Aerial Vehicles: State of the
Art and the Road to Autonomy, Springer, 2007
Current Literature