Aircraft Dynamics 833 May 2015

Introductory course to aircraft dynamics

Homework 5

Guidance and Waypoint Navigation

Implement a guidance system for the aircraft that uses the longitudinal and lateral controllers from the previous homework to navigate the aircraft through a path described by a waypoint list.

Implement the algorithm that calculates the cross track error and the in-track distance, given the coordinates of the source waypoint, the destination waypoint, and the aircraft position, in the NED axis system.

Design and implement the guidance controller that controls the aircraft to follow the ground track by controlling the cross track error to zero.

Implement a waypoint scheduler that detects when the current destination waypoint has been reached, and then schedules the next waypoint from a user supplied waypoint list.

Test the system by creating your own waypoint list that describes a closed path, e.g. a rectangular path or a figure-8 path, and then having the guidance system autonomously navigate the aircraft through the path.

Connect the nonlinear simulation to the QTGLEngine software to visualise the flight control with 3D computer graphics.