CS491/691: Introduction to Aerial Robotics

Hardware-in-the-Loop Fixed-Wing Control

TEAM 6
Motivation and Problem Description

- Explore the behavior of fixed-wing flight by studying the effects of L1 and TECS controllers
- L1: Finding the optimal path to pass by or through way points
- TECS: Manage energy to maintain a constant speed or constant altitude
- Trade-offs:
  - Agility
  - Energy Conservation
Proposed Approach

- Research the control schemes of L1 and TECS and figure out how they work
- Get flight control hardware for hardware-in-the-loop (HIL) simulation
- Compile and flash firmware to flight controller
- Use HIL simulation to verify the L1 and TECS control schemes for fixed wing flight.
System Description

- Telemetry from the flight simulator to the flight controller
- Control from the flight controller back to the flight simulator
- Pixhawk: flight controller
- QGroundControl: interface between Pixhawk and X-Plane
- X-Plane: flight simulator
Results

- L1 control behaves as we were expecting
Results

- TECS displays the priority of potential energy and kinetic energy given a specific weight.