EC4.402: Introduction to UAV Design: Assignment II (Spring 2025)

- *Total 10 marks.*

- *Due date: April 10, 2025.*

- *Assume any data if found missing and mention your assumption in the answer.*

- *MATLAB, PYTHON programming can be used (no need to submit the codes).*

Q.1) Find the acceleration input (a_{xd}, a_{yd}, a_{zd}) required for a quadrotor to navigate from $(0, 0, 0)$ to
a) $(120, 140, -5)$
b) $(130, -50, -5)$
c) $(-30, -160, 5)$
d) $(-70, 30, -5)$
All the units are in metres.
Plot the acceleration (a_x, a_y, a_z) as a function of time and also the desired roll angle (ϕ_d), pitch angle (θ_d) and thrust (T_d). The mass of the UAV, $m = 2$ Kg and the yaw angle, $\psi = 0^o$. Assume that inner loop attitude control can perfectly track θ_d and ϕ_d (i.e. $\theta = \theta_d$ and $\phi = \phi_d$). Also, plot the respective velocity and position along 3-axis as a function of time?
(6 marks)

Q.2) Perform simulation in ROS for reaching the 4 waypoints as given in **Q.1)**. Provide the necessary plots similar to **Q.1)**.
(4 marks)