# ELEC 5660: Introduction to Aerial Robotics
# Project 3: Phase 3 (Group Work)

Assigned: Apr. 25, 2023 Due: 11:59 PM May 12, 2023

## 1 Project Work

In this lab assignment, you need to integrate the whole system onboard. Using the information from the IMU and camera, your visual estimator and the EKF computes the state of the quadrotor. The drone will use this state for feedback control, and execute trajectories computed by your path planner and your trajectory generator.

If you finish the Extended Kalman Filter well, there should not be theoretical difficulties in this project, the remaining work is all about system integration and test. There is one thing should be noticed, that is the frame. Please be care about the frame, especially how the world frame in your drone's view looks like exactly. Your EKF calculate the pose of quadrotor IMU in the tag world frame. The control node requires the pose of quadrotor IMU in the Opti-Track world frame. You need to convert between them(also include the velocity). You should compare your pose and velocity with Motion Capture system before flight.

Be careful about your drone. Before the autonomous flight, you'd better do some test with the drone on hand to see whether the filter and state estimator is good. Almost all the bugs can be found offline, so please think about what is the problem and how to deal with it, don't just make it crash and crash again. If you can't find the bug, you try 100 times and you crash 100 times. We will teach you how to convert frame and debug in the lab tutorial.

## 2 Submission

When you finish the assignment you may submit your code, documents and video on **canvas** before **May 12, 2023 23:59:00**. The project name for this assignment is titled "`GroupX-Proj3Phase3`", where "X" is the number of your group.

Your submission should be a zip file containing: (i) A **maximum 4-page** document including figures plooted by **rqt_plot** or **rviz**, descriptions about your implementation, and any other things we should be aware of; (ii) a video that recording your demonstration; And (iii) your code and all files you need to run your code.