

Robotics Project 3

drones and cameras

Objective: To learn more advanced work in robotics with drones and video

Task: Create a drone that finds a face and then will follow that person (without running into the person!) then *use the gesture detection of openCV to “direct traffic” based on hand gestures* (see <https://gocv.io/writing-code/more-examples/>)

SAFETY: even though there are safety rails around the propellers, please wear some sort of eye protection while using the the drones for this project. If you don't wear glasses please wear some other eye protection. I have eye protection on a shelf near the sink in the lab. **Because of the Covid virus concerns, please do not share the eyewear.** There should be enough for each person who has been coming into the lab to have one. Please write your name on the plastic bags that they come in and keep the eye protection in those bags so you always wear the same eyewear and no one else wears the same as yours.

Background: Computer vision is hard, it takes a lot of processing and lots of work. Fortunately there is a very mature, 20 year-long project called openCV (short for open Computer Vision) which does most of the work for us. We might did a little of the “under the hood” discussion of computer vision but opencv is the way to go for most of what we need in a one semester course. We can use the openCV library that exists through the python wrapper around it as you did last time.

See: <https://www.section.io/engineering-education/creating-a-hand-tracking-module/>
https://developers.google.com/mediapipe/solutions/vision/gesture_recognizer/python
and
<https://realpython.com/face-recognition-with-python/>

Details:

- Your robot needs to
 - take off
 - look for the target person
 - follow the target person at a safe distance.
 - Moving left, right, forward and back as needed.
 - allow the robot to be additionally directed by hand gesture recognition. Your program needs to support at least 4 gesture directed behaviors.
 - One for stop/wait
 - One for come here
 - One for land
 - One more that you decide on.

Deliverables:

- a demo of the robot performing on the final exam period in class (May 8th)
- The code in a github repo in which you make me a collaborator.

- A short paper due (one per group) in class during the final (May 7th) Submit electronically through MS Teams

Paper format:

written in **professional** American English. (If you were interviewing for a job and the recruiter knew me you should be happy that this paper is used to show your communication skills. Aim it at the students taking this course next semester who don't know what they are doing (you last week)

Double spaced

Sections:

Introduction: What are you doing and why should I, the future robotics student, care

Robot hardware: include a short discussion of the tello robots and their capabilities.

Robot software: What was your solution to the problem? Did you try any intermediate steps? How did it work? Which feedback control mechanism did you use, include the tradeoffs of that choice. Include a link to your github repo with the code.

Conclusions: How well did your approach work? and What did you learn that you wish you knew going in? and finally if you had a little more time what would you change