# Goal

We seek to have DJI Tello carry out 1-2+ commands autonomously. By the end of this project, DJI Tello should be able to recognize a command, find the target, and fly to the target. DJI Tello should be able to distinguish two tasks/objects from one another.

# Tasks

* Classifiers
  + We need Tello to recognize:
    - Shapes (ball, block, etc..)
    - Color (red, blue, etc..)
    - People
    - Hand Signs/Commands
  + We need to devise a way to utilize ML to detect these. We can utilize a classifier to learn these objects. We may not need one to recognize all of these. For example, we may be able to utilize python’s open-cv to detect red input from the camera (i.e. rgb(255, 0, 0). Rather than recognize humans, Matt suggested we can have it recognize a high-viz vest, so just color again. The camera does not have a zoom function, so if we use commands, we will need it to be able to recognize the hand sign within the frame. **Open to other solutions to resolve these problems in a simpler fashion.**
  + Sub-Tasks/Requirements
    - Apply ML methods to recognize all objects/targets within the environment.
    - ML methods should be compatible with camera input data and should be able to distinguish/classify objects from within a frame (i.e. the method should be able to be utilized with the camera sensor to single out/focus on specific objects within the frame).
* Flight Environment/Simulation
  + We need a simulation environment for DJI Tello to fly in
    - We need to create an environment that allows for a drone to receive sensor input and commands. The environment should mimic real flight conditions (real life physics) and have some option of rgb, electro optical (camera) sensor input. Output optional.
    - Sub-Tasks/Requirements
      * Create sim environment
      * Integrate/program Tello commands (see tello\_commands.pdf)
* Reinforcement Learning Method (e.g. Deep-Q Learning)
  + We need a ML method that allows for autonomous flight. The ML method should be model-free. The algorithm we use should integrate tello flight commands to perform discrete actions to interact with the environment.
  + We need the model to be able to avoid obstacles. We may want to integrate some human detection as a priority obstacle to avoid, possibly shutting down and landing immediately if a human not wearing a high-viz vest is detected.
  + When Tello gets within x distance of the target, we can have it perform the ‘flip x’ command to signal it has completed the task.