MECH 539/EECE 589 Project Proposal: Bitcraze Drone

Team Members

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Project Description

Programming the Bitcraze drone to either avoid or intercept ping pong balls thrown in its direction implementing the concept of dynamic obstacle avoidance. The practical application of avoiding objects could be used for surveillance in unsafe areas like rescue missions and military. Stretch Goal: Automatically navigate to a wireless charging pad when low on battery.

Components Required

1. Crazyflie 2.1 Drone (x1)
2. Bitcraze Flow deck (x1)
3. Raspberry pi Zero (x1)
4. Raspberry pi Camera (x1)
5. Wireless charging pad (x1)
6. Python v3
7. OpenCV
8. Ping pong ba

Plan

- Setup the Bitcraze drone and develop test applications to navigate the drone
- Background research on various image recognition methods to identify the object of interest i.e., ping pong ball
- Develop script for Raspberry pi zero to capture live video feed and implement the image recognition algorithm to detect the moving object (ping pong ball)
- Implement code to control the movement of drone based on the results of image recognition algorithm and also considering avoid or intercept mode
- Program the drone to maintain a constant height from the ground and keep a minimum distance from ground while dodging balls using Flow deck
- Test and fine tune the image recognition and drone control parameters

Evaluation

- Successfully setup and control the basic navigation of the drone
- The image recognition algorithm achieves a high accuracy of tracking the ping pong ball trajectory
- Successfully control the movement of drone based on avoidance or intercept mode