CIS-463-01

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02/21/2024

Dr. Park

Assignment 4

Robotics Project Proposal Document

Team “First-Class Flights”

Introduction

This project will focus on building an aerial robot system utilizing the F450 drone frame kits. The main goal is programming the drone with associated sensors and cameras to detect and track objects. During the programming process, we might take advantage of trained machine learning models to achieve our goal. Ideally, the system will run on microcomputers or microcontrollers to work with sensors and other components of the drone. In order to operate the drone remotely and perform the task automatically, we might need to acquire knowledge on 3D design and printing, remote control system, python programming, etc.

Problem Statement

CIS-463 Programming for Robotics is a course that is practical and research-oriented, requiring teams of students to collaborate on a 16-17 week robotics project in which they research, construct, program, and operate a micro-UAV (Unmanned Aerial Vehicle). The “First Class Flights” team has chosen to develop a drone with the capabilities of autonomous flight along pre-planned routes as well as detection and tracking of objects, allowing for respective deviations from flight plans in addition to airspace awareness and collision avoidance. Such a project is important with the proliferation of UAVs both commercially and recreationally. We have to look at the potential for and implications of fleets of such vehicles to be controlled by a single operator, something that is not possible with the current control-scheme of a single drone controlled by a single operator with a single controller.

Objective

Create an autonomous Arial Vehicle that can receive movement commands via TCP and execute them independently with the support of relevant sensors.

Projected Timetable

Week 1-2	Drone aerodynamics, UAS regulations, 3D printing.
Week 3-6	Practice program on microcomputer and microcontroller.
Week 7-9	Aerial drone (F450) assembly and development.
Week 10	First operation tests for aerial drone.
Week 11-12	Import and train machine learning models and computer vision test.
Week 13-14	Practice and apply data streaming server and client programming.
Week 15	Practice and apply remote control programming for the drone.
Week 16-17	Final drone operation test and presentation.