UAV Workshop

Course Introduction

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Course Outcome

- The main goal of this course is to provide students with the broad knowledge needed to understand the current technology in Unmanned Aerial Vehicles (UAVs) and **hands-on skills** needed to develop an array of applications based on UAVs for various technology markets like Smart City, construction, image and video mapping, medical, search and rescue, parcel delivery, hidden area exploration, oil rigs and power line monitoring, precision farming, etc.

Topics

1. Introduction to the program and instructor
2. Introduction to UAVs
    - Classification of UAV, Airspaces, etc.
3. Components of UAVs (Mechanical and Electronics)
    - Working of the components
4. Mathematical Modeling of Quads/Fixed-Wings
5. Introduction to Python
    - Setup of Python and Jupyter
    - Maintaining out worksheet and submissions
6. Python Programming - Basics, data structures, algorithms, and visualization
7. Basics and modeling of Quads using Python
8. Simulation of Quads using Python
9. Introduction to Tello
    - Understanding, driver install, and connection of Tello
10. Programming of Tello
    - Basics of operations and maneuvers
11. Introduction to OpenCV
    - OpenCV with Python
    - Image and video manipulation of OpenCV
12. Tello and OpenCV
13. Projects and demonstrations using Tello/OpenCV for navigation

Grading

- Practicals / Homeworks / Classworks – 50%
  - Homeworks/Github Wiki's
  - Quizzes
- Independent Studies – 25%
  - Small project/literature review based on the Homeworks /Classworks
- Final Project – 25%
  - Project based on the Homeworks/Classworks
- Total – 100%

Tools & Instructions

- Programming Language
  - Scratch/Blocky (for demo purpose only)
  - Python 3 & Dji Tello Libraries
  - OpenCV library
  - Arduino for ESP32

- Github
  - Materials for this course
  - Documentation for this course
  - Submission for this course

- Other Tools
  - Anaconda – Ipython, Spyder
  - Google Colab (optional – for demo only)
  - Binder.org (optional – for demo only)

Our Drone/UAV/Quadrotor

Improvement to our previous ver

	Tello Edu	Robomaster Tello Talent
Camera	5 MP	5 MP HD
Wifi	2.4GHz only	2.4/5.8 GHz
Swarm		Multiple devices connect to the same router
Offline Programming	No	Yes
External sensor support	No	Yes
Competitions	Programming Race	AI Competition, Air-Ground Operation, Maze Race
LED Light Show	No. Can purchase Robomaster TT expansion kit	RGB 256 All Color LED light to create a light show
Microcontroller	No. Can purchase Robomaster TT expansion kit	ESP32

To pass this course

Attendance (100%) &

Need to get 50% of the grading scheme

to pass this course.

No exceptions!!!