PLUTO DRONE SWARM CHALLENGE

DRONA AVIATION

TEAM ID 43

Components

1. The Python wrapper for controlling the drone
2. The code to detect ArUco markers stuck on the drone using OpenCV
3. The controller to control the drone using proportional–integral–derivative
4. The swarm communication framework using Wireless Local Area Network

COMPLETED TASK 1, 2 & 3

THE WRAPPER

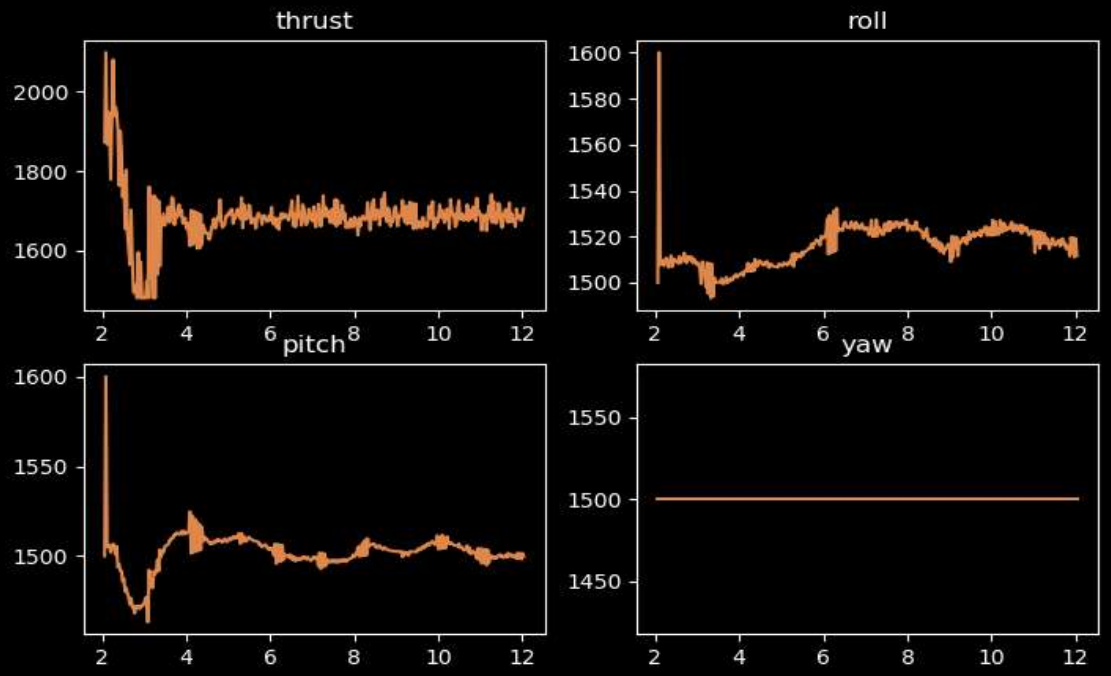
```
MPC_SET_RAW_RC

MSP_SET_COMMAND

MSP_ATTITUDE
```

MAJOR FUNCTIONS

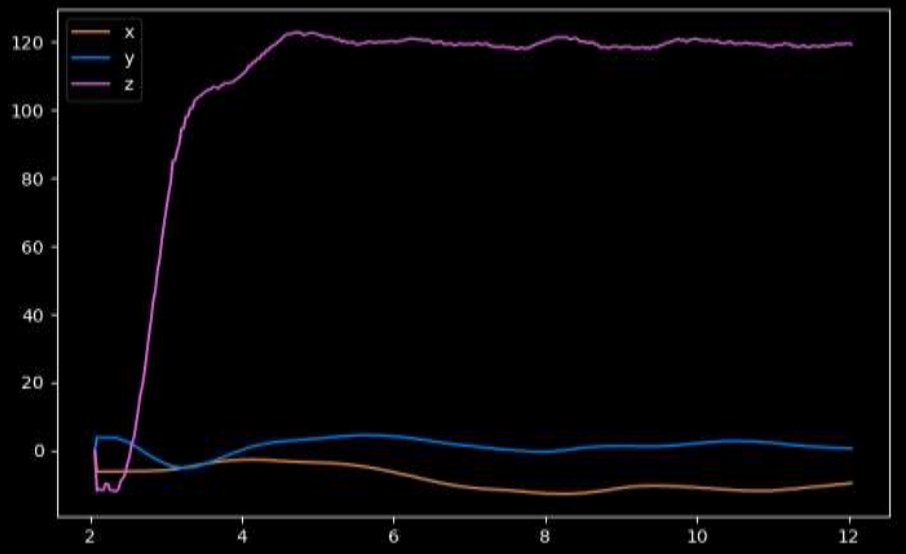
- Arm
- Takeoff
- Setting roll, pitch, yaw and thrust
- Land
- Disarm

Controller

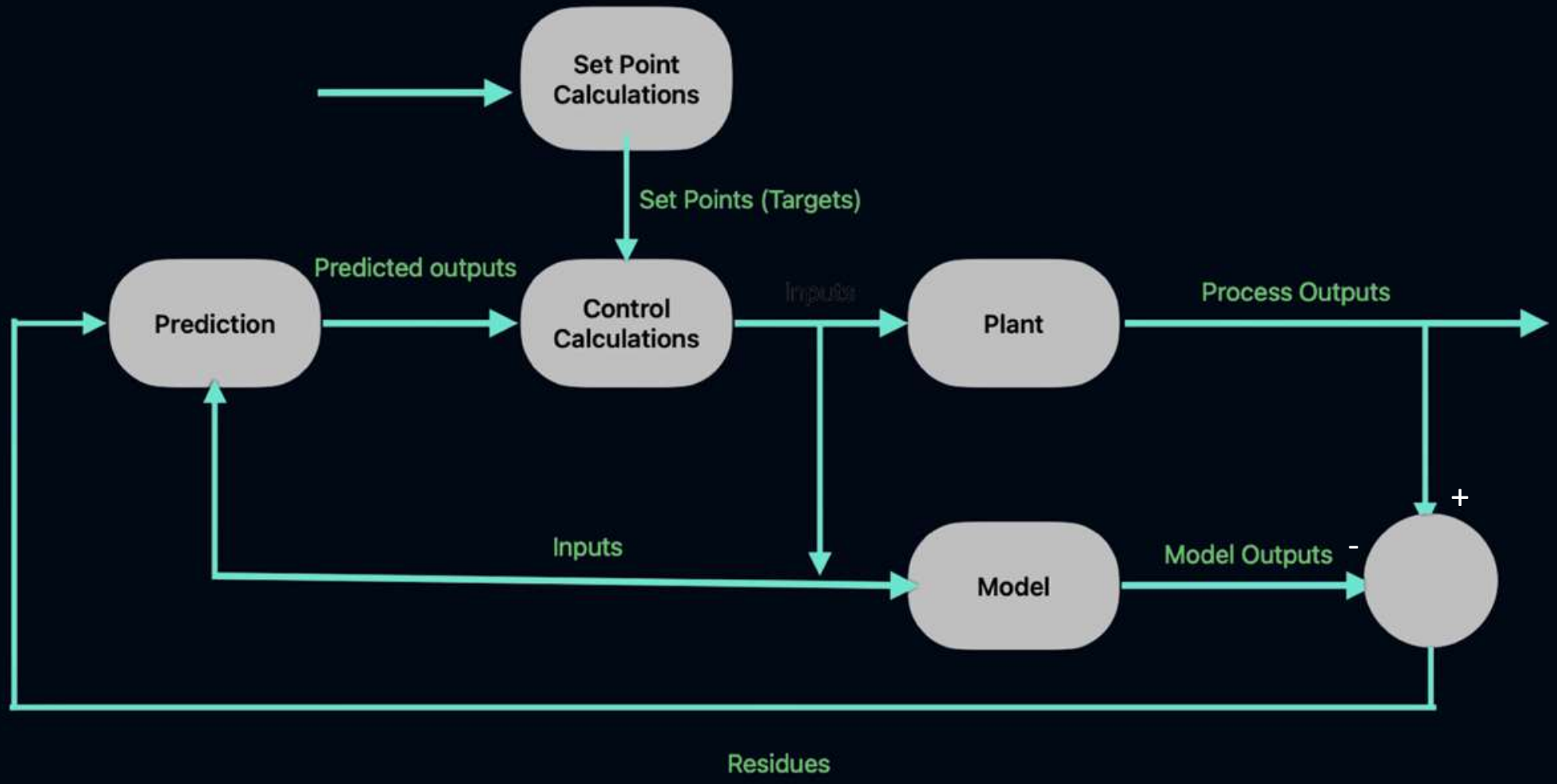
"COMPUTE A SERIES OF INPUTS THAT WILL MINIMIZE THE ERROR AT TIME T, THEN SUPPLY THE FIRST INPUT IN THIS SERIES AT EACH SAMPLING INSTANT"

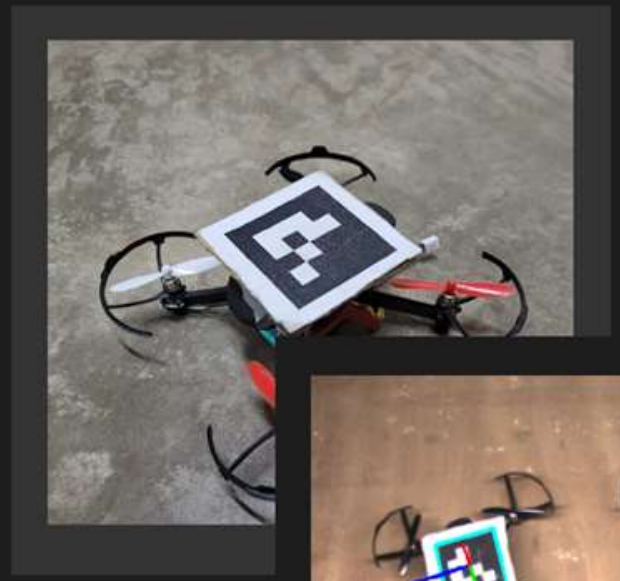


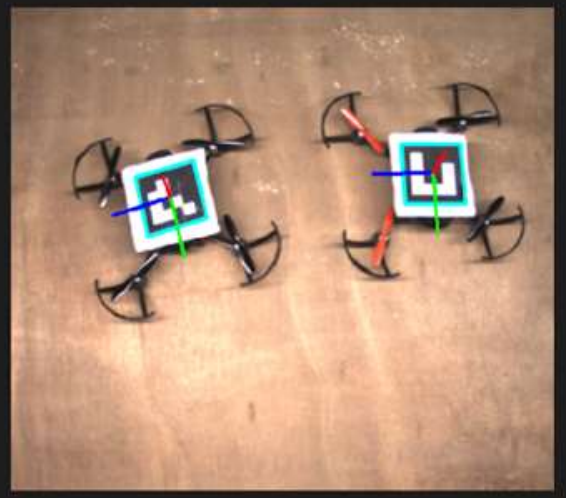
- USING THE PID AND MPC CONTROLLER APPROACH
- COMPUTING THE ROLL, THRUST AND PITCH
- COMPUTING THE ACCELERATION



MPC Control Block



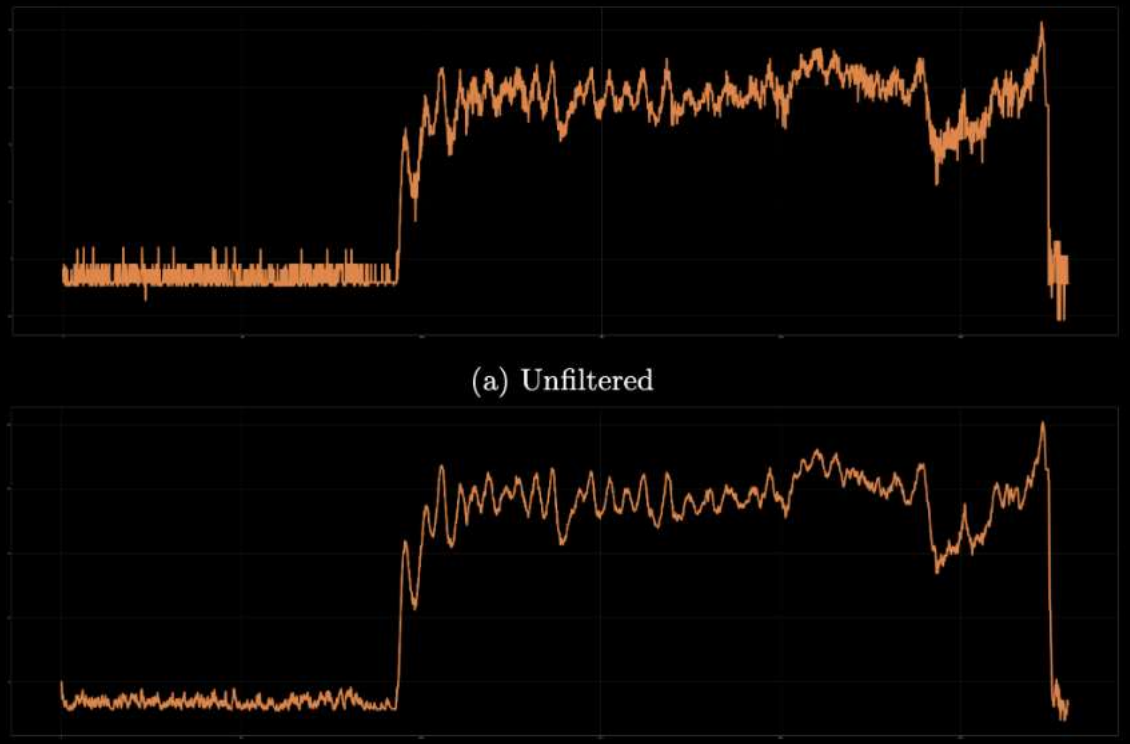




ArUco detection and pose estimation

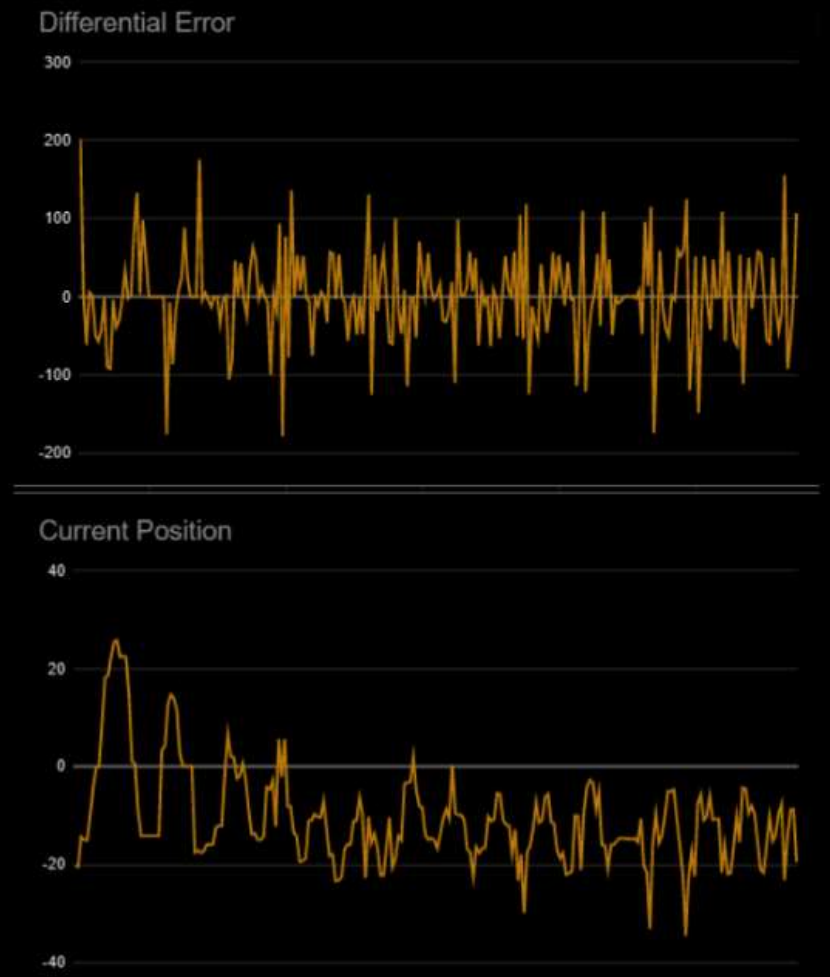
- Monocular Fish-eyed Camera
- Identification of real world position
- Using this as feedback for controller

Noise Filtering



(a) Unfiltered

The unfiltered vs the filtered altitude

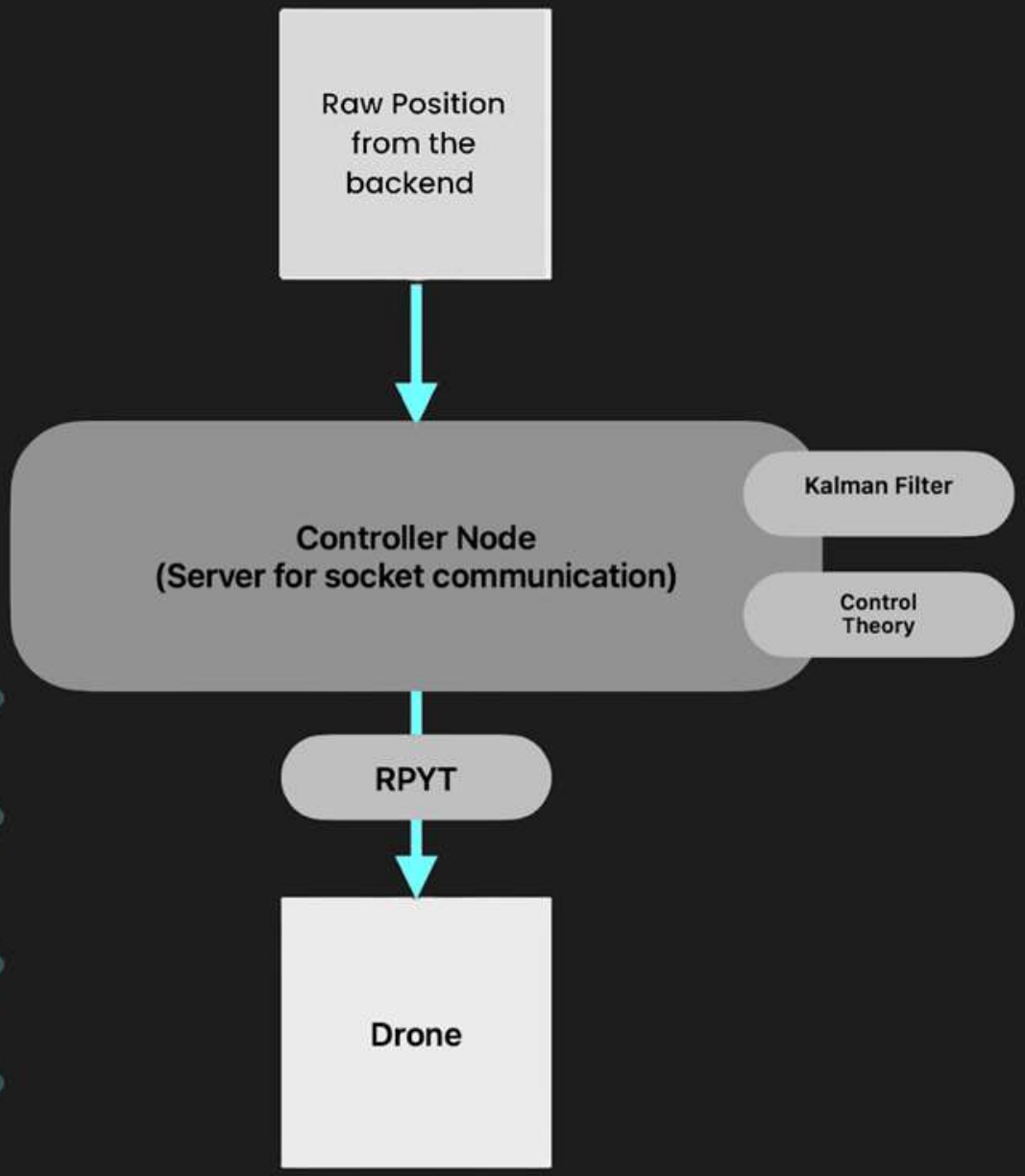


Differential error

Networking

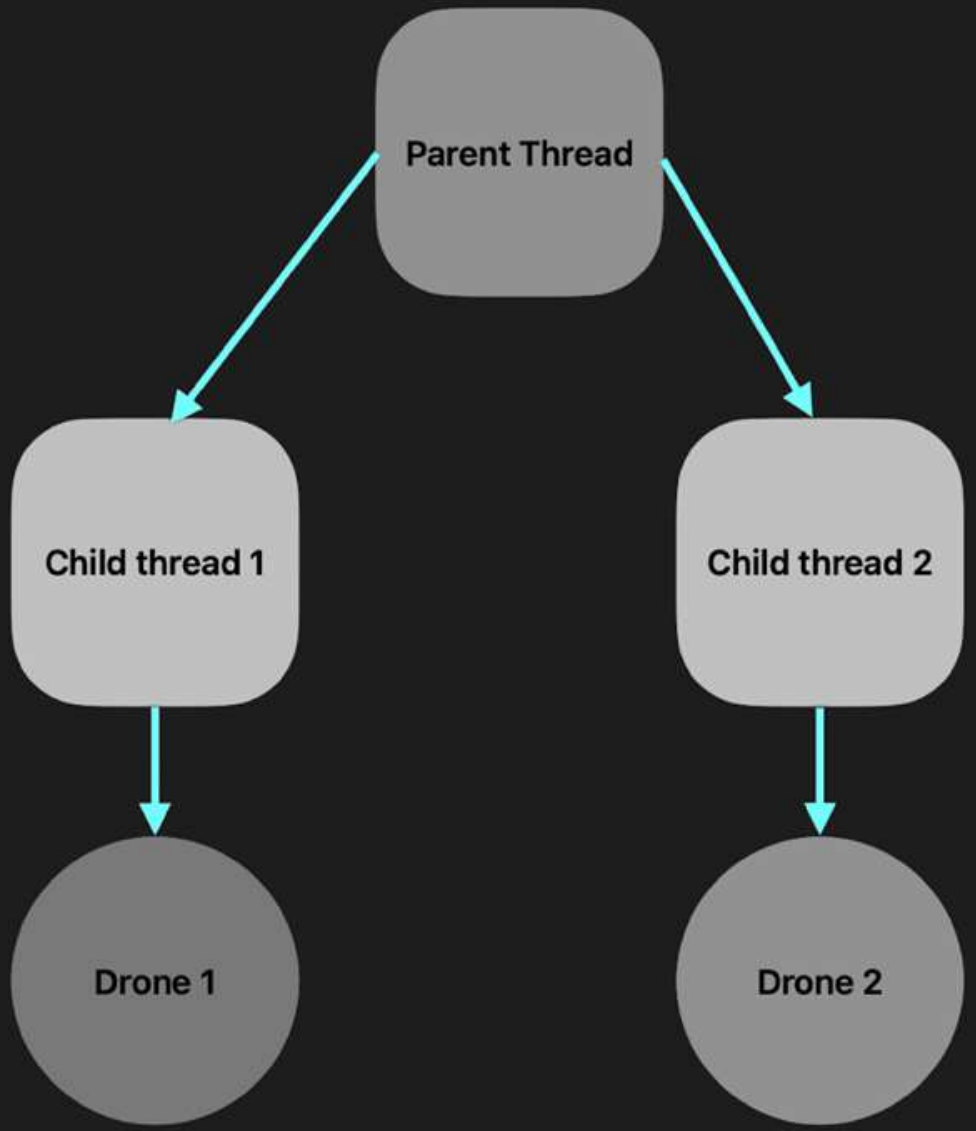
```
$ telnet 192.168.4.1 23
$ +++AT MODE 3
$ +++AT STA <SSID> <PASSWORD>
$ +++AT SETIP <IP>
```

- Using the router as a bridge between the swarm and the ground station
- Telnet for Changing the IP
- Upto 256 drones



SOCKETS FOR COMMUNICATION

- Inter process communication
- Controller node
- Written in Python
- Acts as socket for communication



THREADING

- Two controller threads in parallel
- One parent thread
- Two separate children threads
- Latching