



D.R.D.O SASE's UAV Fleet Challenge

Indian Institute of Technology, Kanpur

8th Inter IIT Tech Meet, IIT Roorkee

THE TEAM

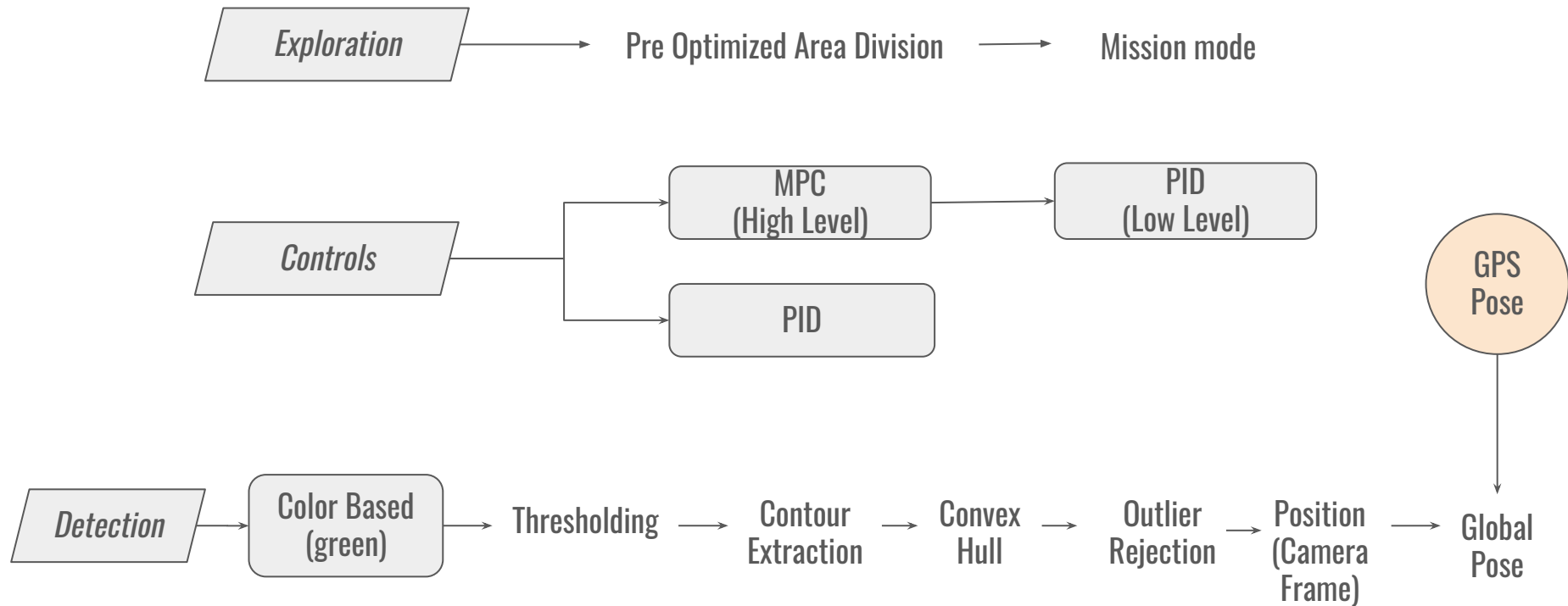
- Competitions
- MAV solutions for Real Life Problems
- Industrial Collaboration
- Open Source Robotics Community



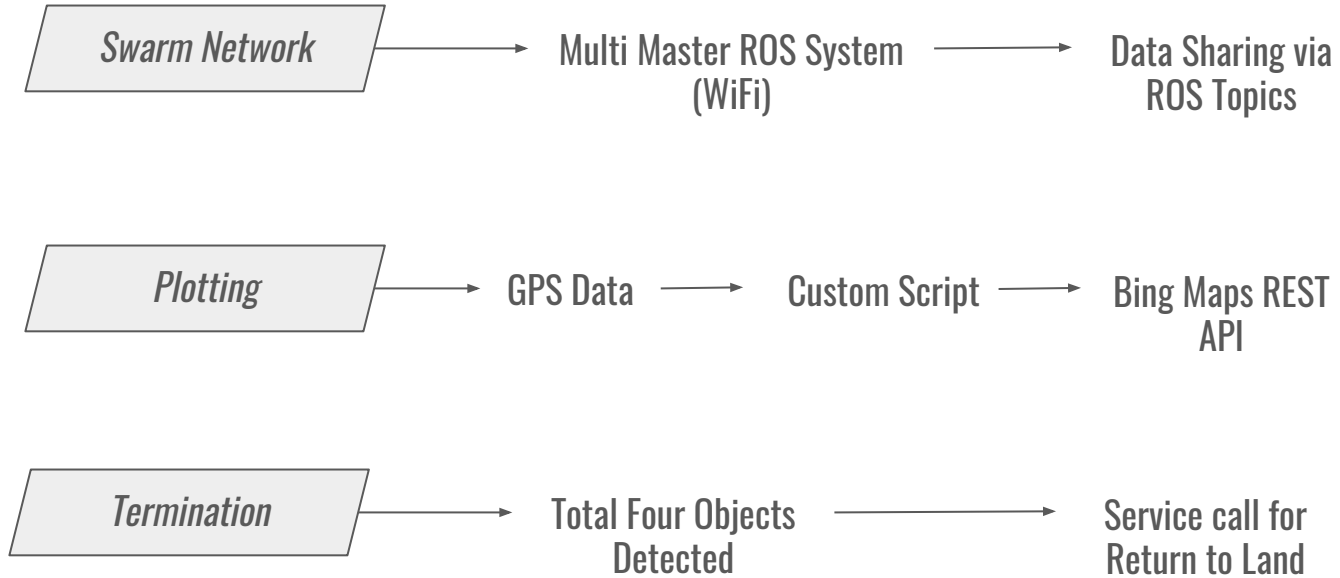
Past Endeavours

- Visual Inertial Odometry System with Nonlinear Optimal Controls
- ROS based Swarm network development
- 6th InterIIT: Indoor Inventory Management System
- 7th InterIIT: Hackathon based on Drona Aviation product
- IMAV 2019, Spain: Outdoor Collaborative Object Delivery

APPROACH

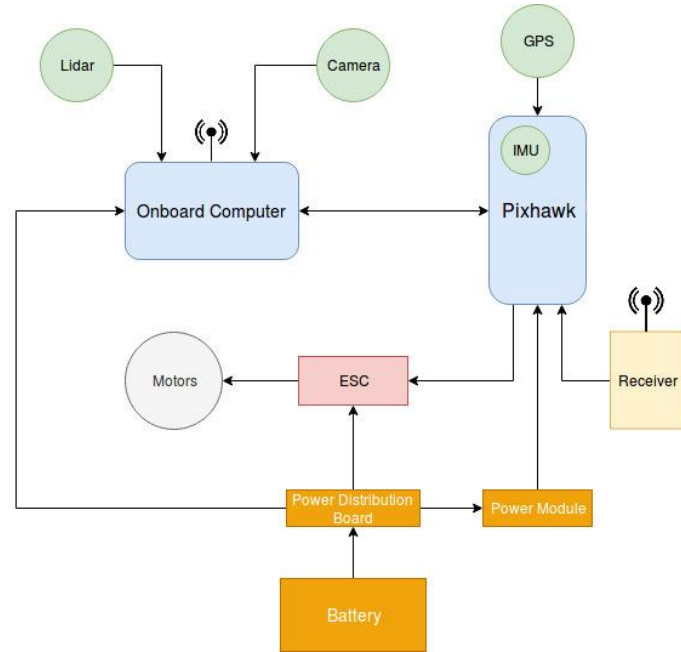


APPROACH(contd.)



SYSTEM ARCHITECTURE: HARDWARE

- Carbon Fiber composite frames - lighter weight
- Pixhawk Cube - Reliable Flight control
- Here 2 GPS - Accurate Positioning
- NVIDIA Jetson TX2 - Powerful Computation
- FrSky Transmission - Economic
- T-Motor Propulsion - Efficiency
- Rangefinder - accurate height estimation
- OCam 5MP - Global Shutter camera



SYSTEM ARCHITECTURE: SOFTWARE

Finite State Machine

- MSM Library - Boost C++
- Transition Guards and Action Functions

Computer Vision & Pose Estimation

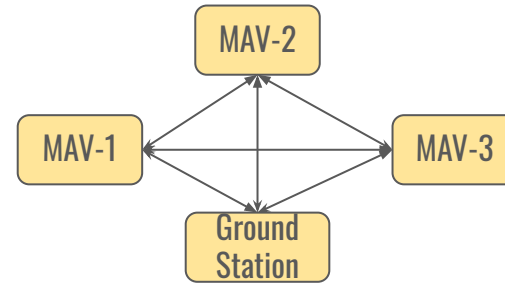
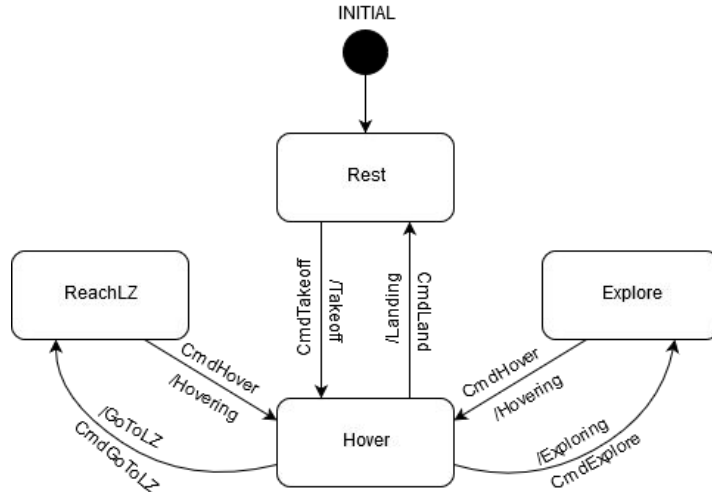
- OpenCV
- GeographicLib

Communication

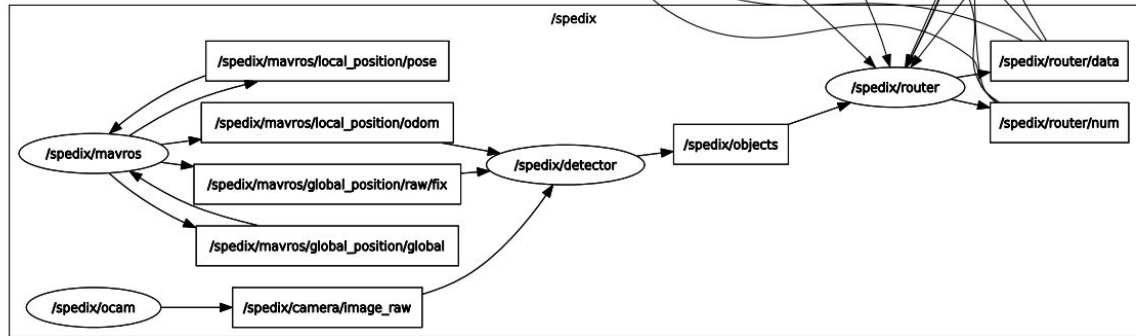
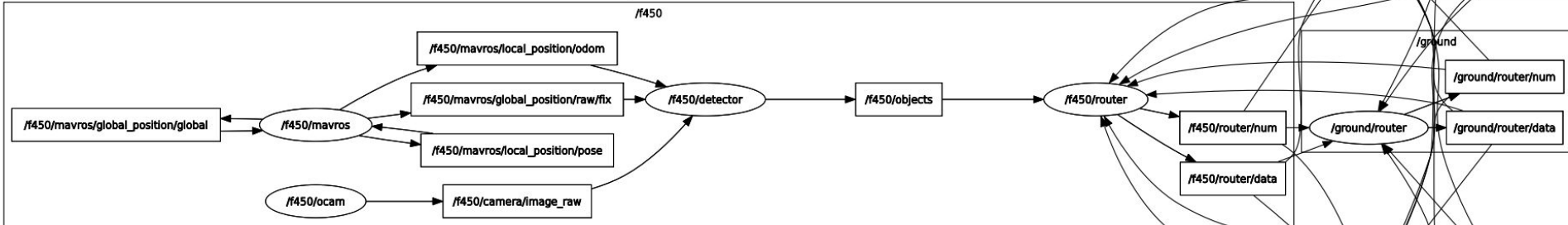
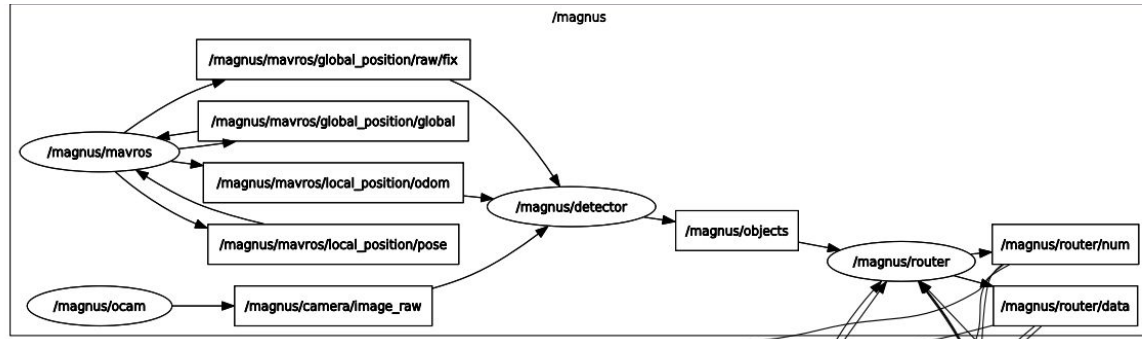
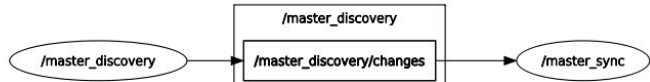
- Message reception checks and feedback
- Multimaster FKIE
- Peer to Peer Network

Map Generation

- Open Source Bing Maps REST API
- Offline, cached map for Real-time plotting



Target GPS
Data and
Number



SYSTEM ARCHITECTURE: NETWORK

KEY FEATURES

- Custom built minimal Carbon Fibre composite frames for an economic, lightweight design.
- Computationally scalable for detection algorithms involving more complex targets.
- High flight time with efficient propulsion system (~30 min)
- Upto 1.5kgs of additional payload capacities.
- Swarm based on ROS system.
- UTM Pose data sharing for obstacle avoidance



COST ANALYSIS

<u>Description</u>	<u>Cost(INR)</u>
Frame Manufacturing	2500/-
Propulsion System (Efficiency)	22,000/-
Flight Controller + Navigation (Reliability)	28,000/-
Computation (Scalable)	40,000/- (Patronage from NVIDIA)
Vision System	6000/-
Radio System	12,000/-

CONTACT US

Feel free to contact us anytime. We will be really happy to hear from you, be it about discussion of some new idea for a technology transform or about your support that can immensely help us.



<https://github.com/AerialRobotics-IITK/Wiki>



<https://aerial-robotics-iitk.gitbook.io/aerial-robotics-iitk/>



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