Progress Review 3

Tasks

1. Matrice 100 setup
2. Waypoint generation v2.0 implementation
3. Mobile SDK: Navigation Simulation
4. Onboard SDK: Hardware and Software setup
5. Rudimentary RGB based signature detection
6. Thermal signature detection: Initial exploration

Matrice 100 Setup

- Assembly
  - Structural frame
  - GPS module
  - Battery compartment
  - Propeller & Propeller guard
- Firmware upgrade
  - Upgraded remote controller(through DJI Go)
  - Upgraded Matrice 100(through DJI Assistant2)
- Calibration
  - Tested rotation of motors(through DJI Assistant2)
  - Calibrated the compass(through DJI Go)
  - Calibrated the remote controller(through DJI Go)

Parts of Matrice 100

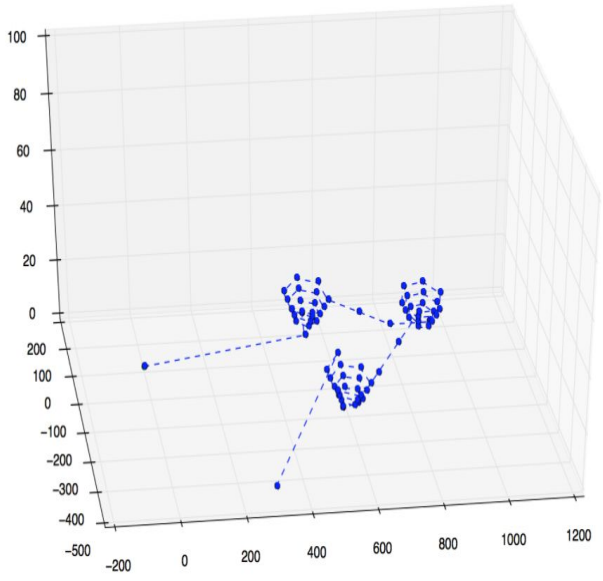
DJI GO App

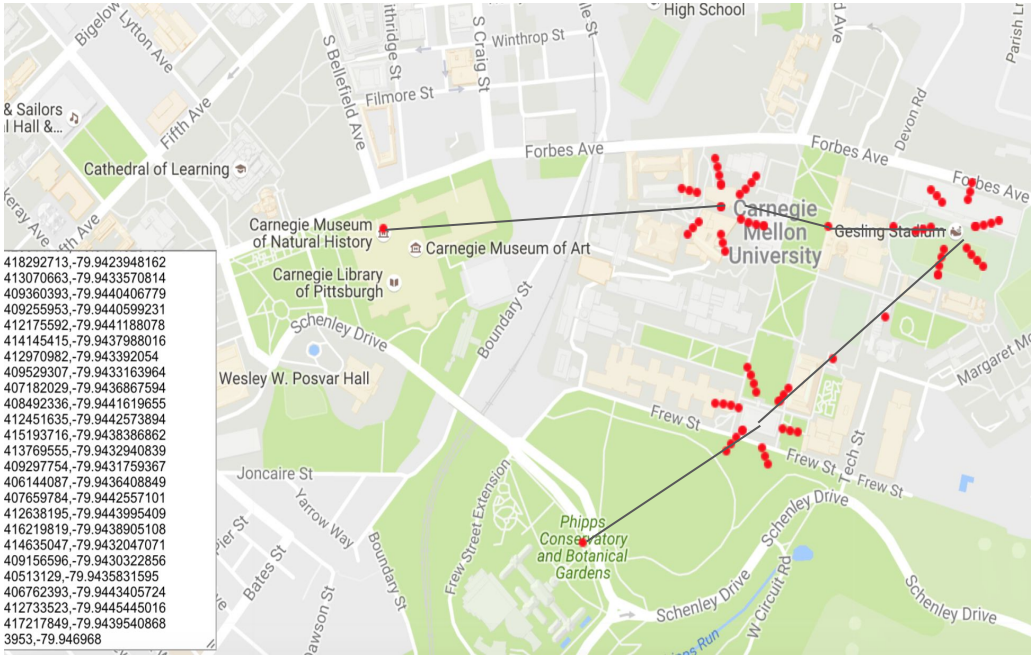
Matrice 100 Setup and teleoperated flight

Matrice 100 Setup and flight

Waypoint generation with localized pattern

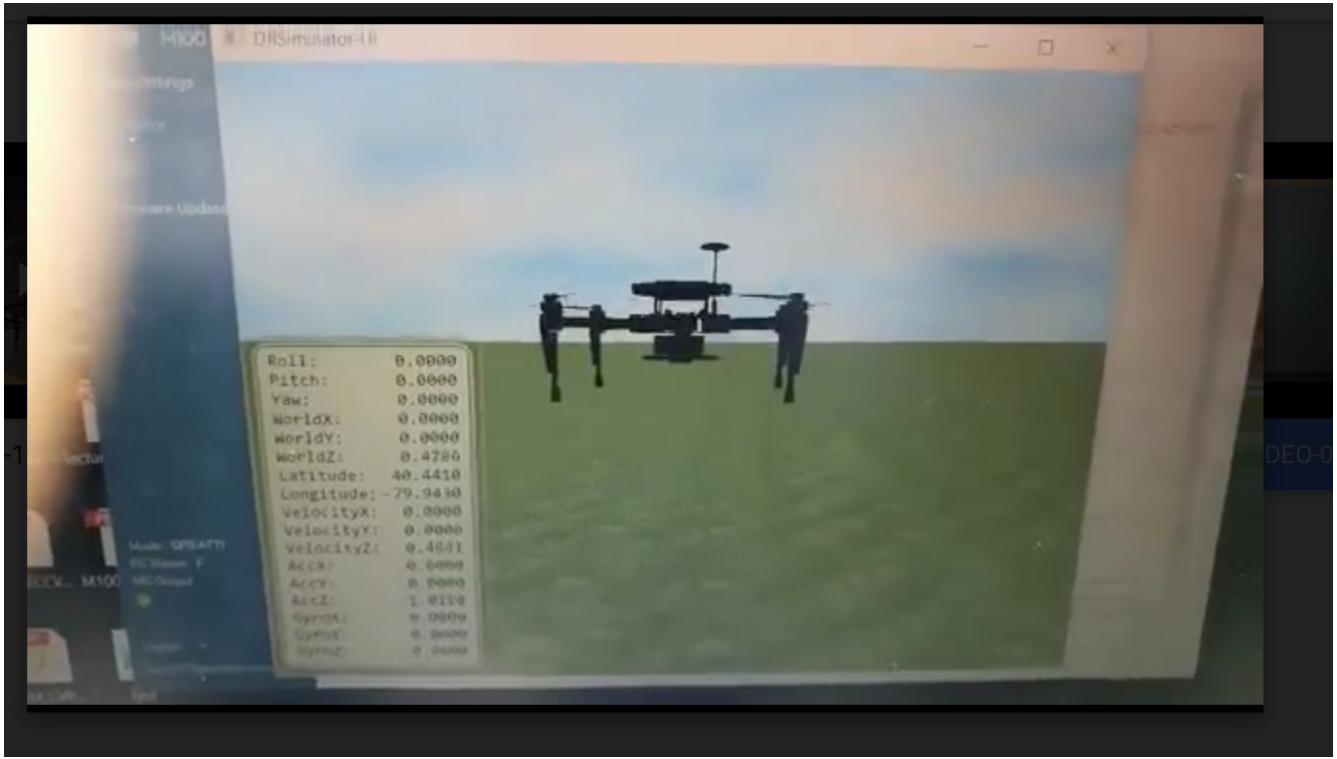
- Implemented waypoint generation V2 with localized pattern





Mobile SDK based navigation simulation

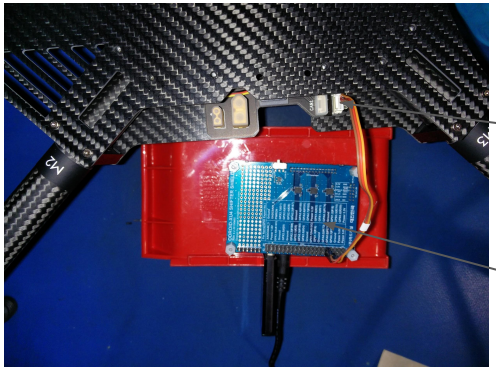
- Able to do waypoint navigation on DJI simulator using mobile sdk



Drone simulation through mobile sdk

Onboard SDK: Hardware and Software setup

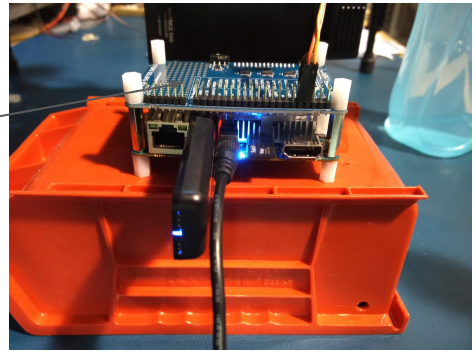
- Odroid XU4: Connection with Matrice 100
- Ubuntu ARM installation
- ROS Indigo installation on Odroid XU4



Matrice 100
UART Port

Odroid
XU4

XU4 Shifter
shield



RGB based Signature Detection—Rudimentary

HOG+SVM based Human detection(Horizontal Images)

- Training:INRIA dataset
- Test: Negative 453, Positive: 1126
- Results: 85% overall accuracy

```
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   404    49
   180   946
```
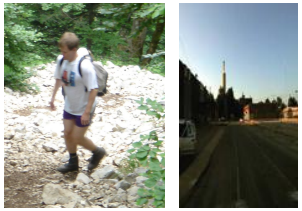
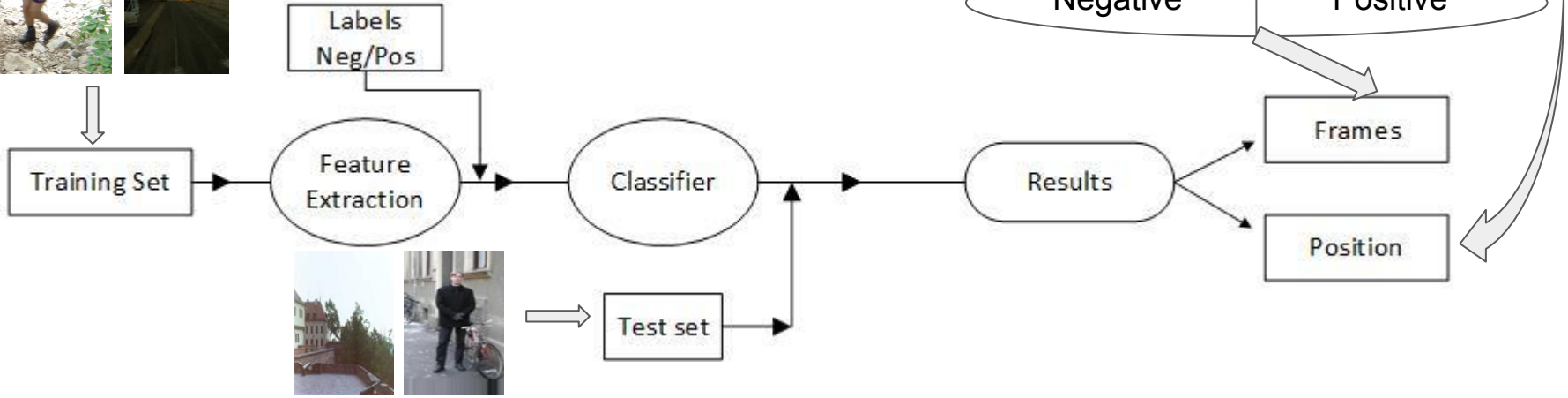





RGB based Signature Detection—Future work

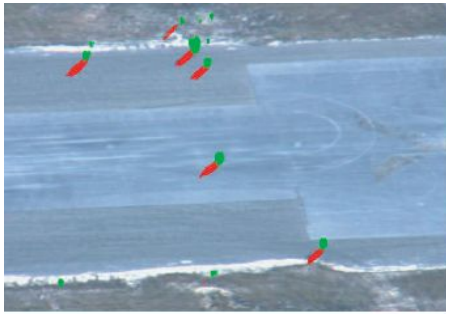
Implement algorithm for aerial Images

- Collect datasets from the Internet
- Create our own datasets

Constrain the search area in each image

- Background subtraction using ViBe method[1]
- Blob detection with geometric constraint[2]

Background Subtraction



Blob Detection

References:

[1] http://www.telecom.ulg.ac.be/research/vibe/doc2/index.html
[2] http://vision.eecs.ucf.edu/news/Reilly_ECCV_2010_Geometric.pdf

Thermal Signature Detection: Initial exploration

Challenges:

- Significantly low resolution images
- No color or texture information
- Little work exists in literature

Sample image from one of the datasets

"People Detection and Tracking from Aerial Thermal Views"
- useful paper[1]

Proposed approach (3-Fold):

- Background subtraction using ViBe method: to generate foreground candidate regions
- Try out different detectors: HOG /LatentSVM trained on INRIA dataset
- Tracker based on a particle filter approach

Evaluation datasets made publically available by the authors

[1] *by Jan Portmann, Simon Lynen, Margarita Chli and Roland Siegwart, Autonomous Systems Lab, ETH Zurich*

Thanks