

Fly Sense



Team C – ILR10

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Work done these past 2 weeks

Over the past two weeks we have

- a) Deployed 3D occupancy grid to cluster the points retrieved from the Velodyne (to ensure code performance real time)
- b) Deployed part of the “art-work” in line with the feedback from NEA pilots
- c) Integrated the sound warnings code in the Jetson
- d) Integrated the obstacle avoidance code in the simulation
- e) Integrated the Gazebo obstacles in the flight simulation

Upgrades in Bird’s Eye view

- Include white blinking at the most likely collision spot
- Finalize size of the window shown to the pilot (dynamic?)
- Confirm cut-off timings (red, yellow and green)
- Include opacity factor on the vertical axis (to make more transparent points away from the quadcopter plane)

Sound warnings

- Test the resilience of the deployment made in ROS (to ensure no overflow in the Epson)

Obstacle avoidance

- Integrate with the output from the sound warnings (most dangerous point)
- Solve the wobbling seen in simulation (different aerodynamics assumed, we are doing a regression on the simulator data in the same fashion we have done with the real quad)
- Inform pilot of the dimension being constraint

Individual achievements for the past 2 weeks

In the past two weeks, my work as been mostly team based and not individual. Whereas in the spring break I had focused on the developing isolated software packages for implementing the algorithm, the past weeks have been focused on porting/integration/debugging.

Team achievements for the past 2 weeks

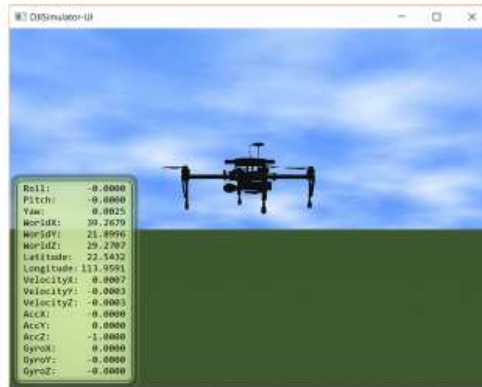
- With Shivang and Nick: Integration of obstacle avoidance algorithm in the simulator
- With Shivang: Improving performance of the Bird’s Eye view to real time
- With Nihar: Processing sound warnings at the Epson
- With Hari: Processing sound warnings at the Jetson

Obstacle avoidance with Shivang and Nick

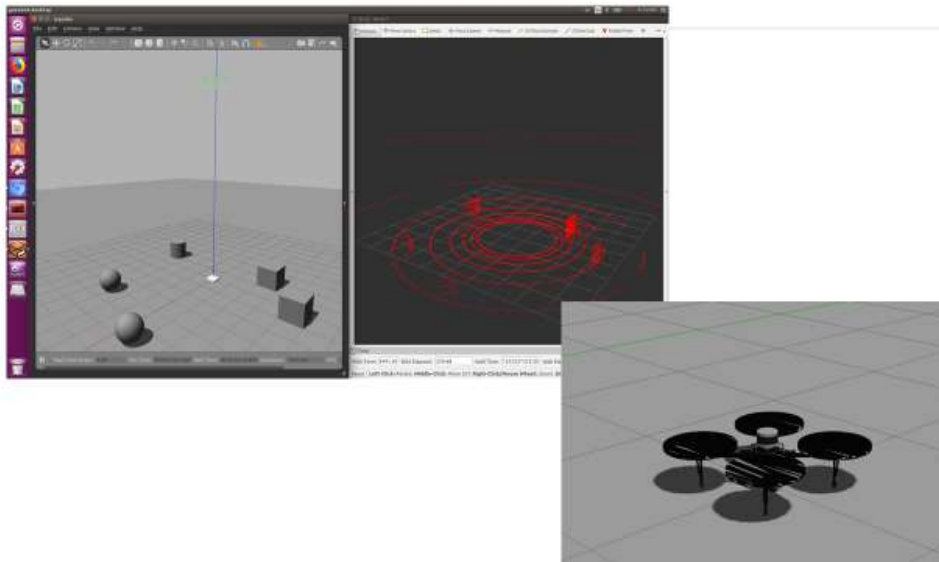
OBSTACLE AVOIDANCE

Flight Software

- Pilot stick override code has been implemented and tested in DJI flight simulation
- Emergency braking code has been implemented. Tuning and testing in progress.

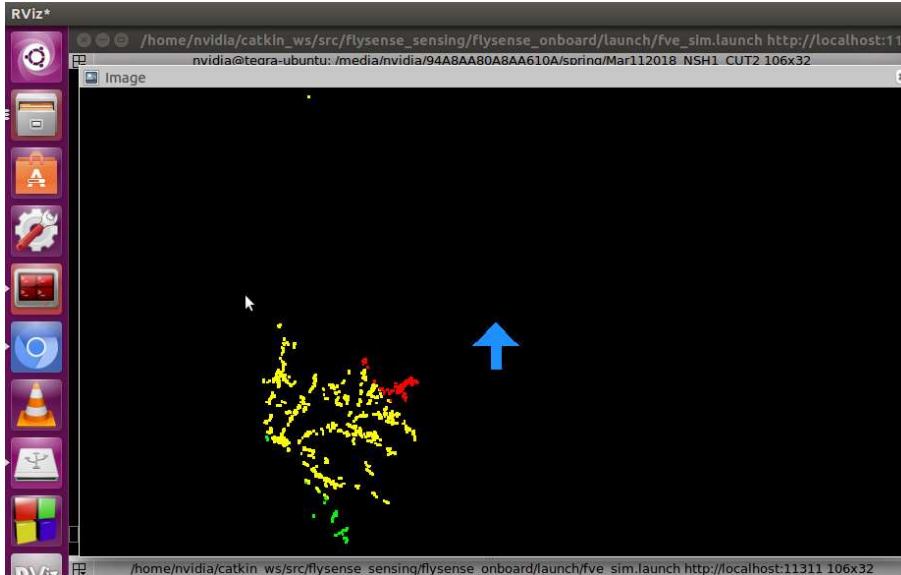


GAZEBO SIMULATOR



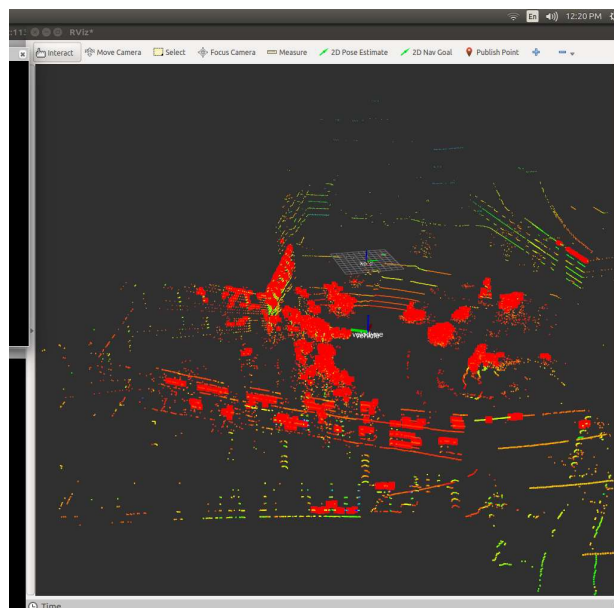
Real Time Coloring with Shivang

The coloring code is dependent solely on what the pilot can do, with different sections of the same obstacle colored differently in line with the feedback from NEA pilots.



Sound warnings with Hari

The “big read clusters” are the aggregated clusters ($0.2 \times 0.2 \times 0.2$ m grid) that are being passed to the sound warnings. The sound warnings forward integrates the motion equation (from current state) and detects when the current input will generate a collision in the environment by contrasting the projected path with the aggregated clusters. The aggregation into clusters ensures the algorithm can work real time by lowering the number of points being processed.



Milestones for next two weeks:

Our next big milestone is the flight at NEA's Nardo field this coming Friday.

We will expose NEA pilots to the fully integrated software suit (so far, we have only shown them videos and mock-ups).

Problems Faced these past weeks:

The biggest problem is, as always, a substantial load from all the different courses... made worst by the fact that this semester there is not only one group to interact with across three different courses, but rather a different group for each course.

Key risks:

Navigating through the heavy load coming from multiple assignments across all courses. I am beginning to regret the day I convinced professor Dolan to have 5 technical courses in a single semester (I had an MBA which made the business classes kind of redundant).