

First Meeting!

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What is IARC 7?

- International Aerial Robotics Competition
- Requires teams to solve “challenges that are currently impossible for any flying robots owned by government or industry”
- Began with Mission 1 in 1991
- When a mission is completed, a new one begins
- 7th mission began in 2014



What is Mission 7?

- Affectionately named “herding roombas,” the goal of this competition is to design a flying robot that:
 - Is fully autonomous
 - Can interact with robots on the ground to direct them toward a destination
 - Can navigate without reference points like gps or nearby walls

What is Mission 7?



What are the key rules?

- Full rules <http://www.aerialroboticscompetition.org/rules.php>
- No gps or slam.
- Roombas change direction between -20 and 20 degrees every 5 seconds.
- Roombas reverse completely every 20 seconds.
- UAV must be completely autonomous for the duration of the competition.
- UAV may fly for 10 minutes
- You get three tries.
- Write a white paper on the project.

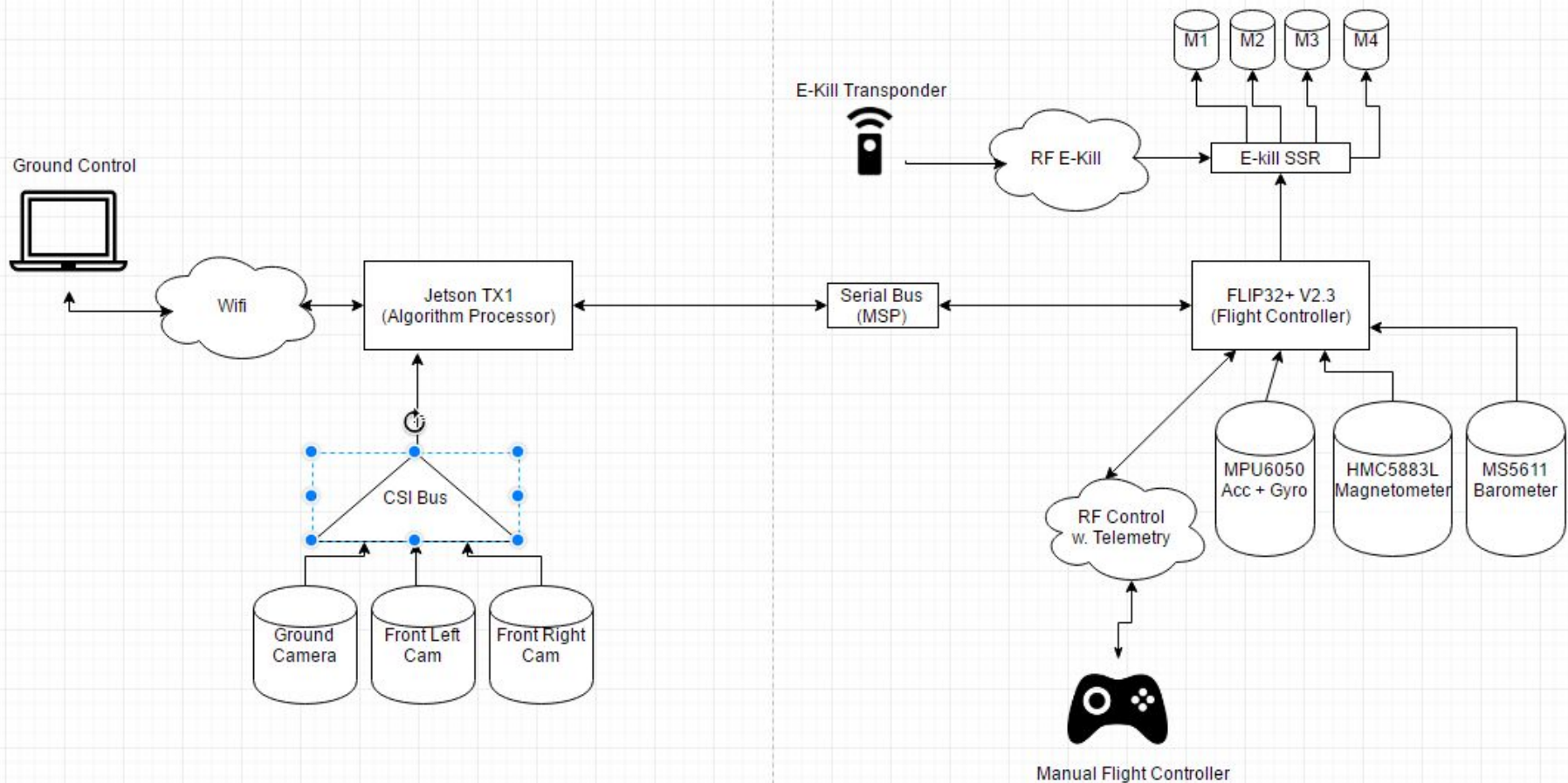
Key implications.

- We will rely on computer vision to locate roombas.
- Computer vision, using the white grid of lines, will also provide current location.
- We have to coordinate landing on roombas while they move, thus blocking our camera.
- The problem of autonomous flight must be overcome.
 - How to take off
 - How to land
 - How to move accurately

The Plan

- Simulator - Built using MORSE, allows us to test higher-level algorithms (e.g. for vision or path planning) before the physical robot is complete
- V0.1 - Based on the club's current quadcopter using low-cost hardware
- V1.0 - Final design using better hardware (dependent on funds)





V0.1 Underlying Software



- Flight controller - Runs a Cleanflight, an open source flight control software
- Jetson TX1 - Runs Ubuntu 14.04
 - Powerful quad core ARM processor
 - 256 core CUDA gpu
- ROS (Robot Operating System)
 - Runs on top of Ubuntu
 - Provides an easy way to distribute applications into components
 - Provides extensive data logging, debugging, and control capabilities out of the box
- Morse - simulator
 - Python based simulator that utilizes Blender for rendering and physics



Project Organization

- Key technologies to help
 - Trello! Demonstrate Trello: <https://trello.com/b/YMlUbYBm/iarc-mission-7>
 - Github
 - Slack
 - Google drive
- Buddy System
 - Pairing of newer members with more experienced members.
 - Will help new members be brought up to speed very quickly.
 - Gives you somebody to bat ideas off of.
 - We encourage getting together mid-week to work on tasks.

How to get involved.

- Software
 - Setup development environment: <https://github.com/Pitt-RAS/iarc7-common>
- Hardware
 - We will be jumping right into some CAD projects.
 - Jetson Protective cover
 - Landing gear
 - Camera mounting
- Business
 - If anyone's interested we need to start reaching out to sponsors ASAP. This means a sponsorship package, planning, and communication. We also need to design t-shirts.

Conclusion

- Stick around if you have time.
- We will send out these slides in a email.
- There will be a google form so we can get a feel of where everyone's at.
- Join the slack! (pittras.slack.com)
- We will add you to the drive/trello so you can begin exploring the different tasks and asking questions to get a grip on the project.