Software Development for Unmanned Aerial Systems

Goals for Today's Class

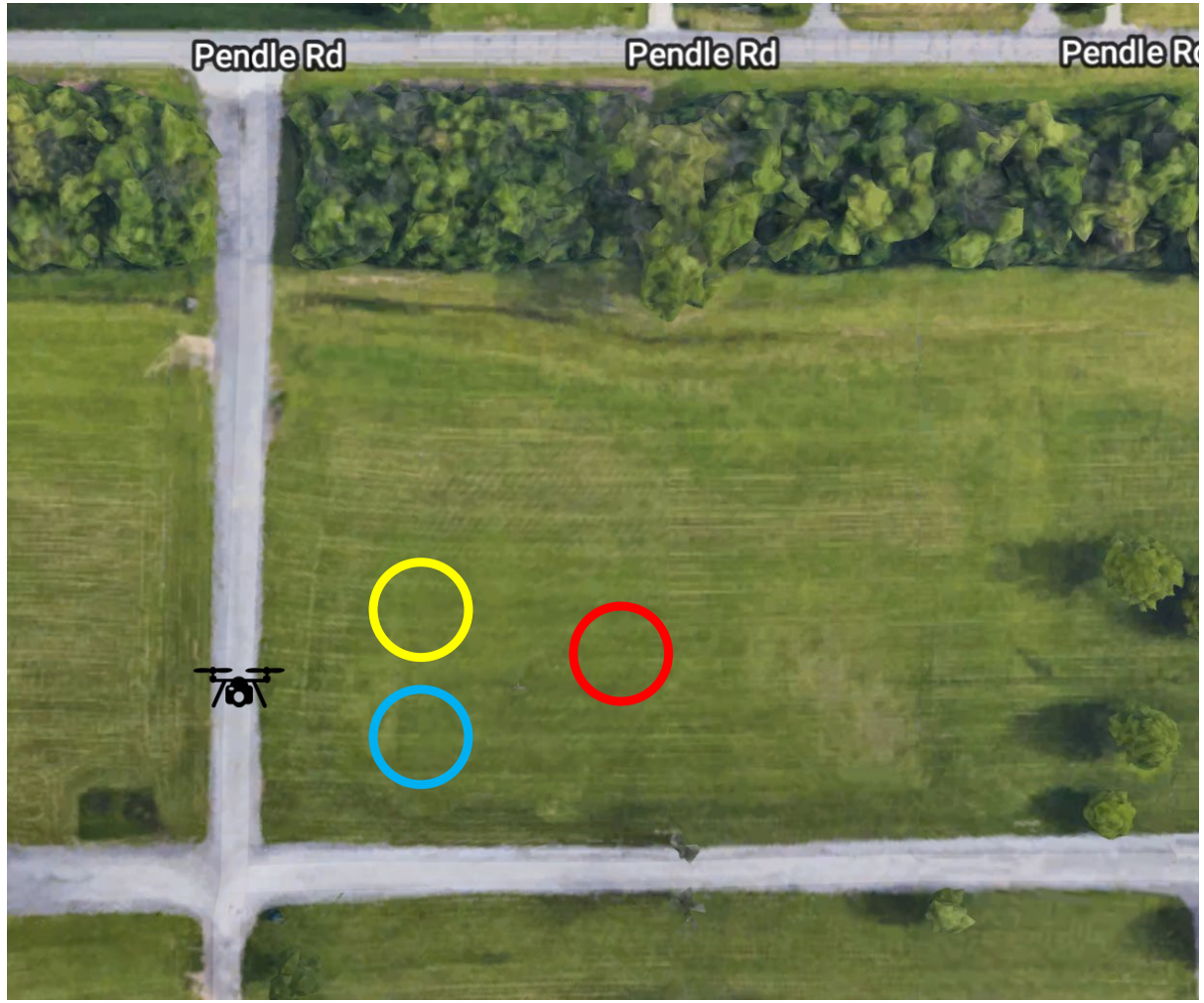
- Getting ready for flying
- Testing your code
- UAV configuration & calibration
- Flying field safety
- Projects
- Group time + Safety Analysis Discussion

Flying: Getting Started

1. **Flying training**
   (for those who haven't flown before).

2. **Flying test**
   (everyone) Includes flying from one hula-hoop to another.

3. **Simple python program**
   flying from your laptop.



Wednesday, Feb 27th 3.30pm-5.30pm or Wednesday, March 6th , 3.30pm-5.30pm

Safety Issues

Identify hazards

Identify contributing faults

Specify mitigating requirements

Build a safety case

Testing before flying!

- **Run in the simulator before flying in the real world!**

- Eyeballing – sanity checks!
  Check the input data, expected results, expected outputs
- Plot coordinates / Connect to the Dronology map
- Monitor data / log data & Analyze
  Compare timestamps & distances, check log entries
- UAV internal safety features – Use them, but don’t rely on them!

Class UAVs

3DR Iris

- Radio Telemetry (USB Dongle)
- Pixhawk Flightcontroller
- optional: Raspberry Pi
- optional: GoPro + Gimbal

Intel Aero

- WiFi
- Intel Flightcontroller
- Built in companion computer (Ubuntu)
- Multiple cameras (Infrared, down/forward facing)

Class UAVs

Hexcopter

- Radio Telemetry (USB Dongle)
- Pixhawk Flightcontroller
- optional: Raspberry Pi
- can carry heavy stuff…

Calibrate and configure your UAV

MissionPlanner

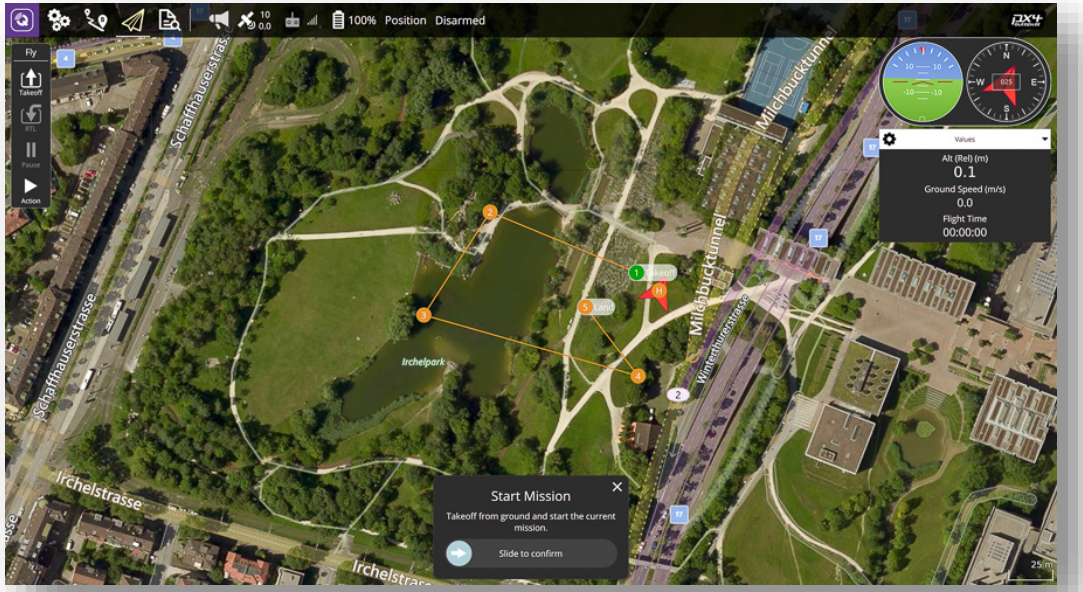
http://ardupilot.org/planner

Windows

QGroundControl

http://qgroundcontrol.com

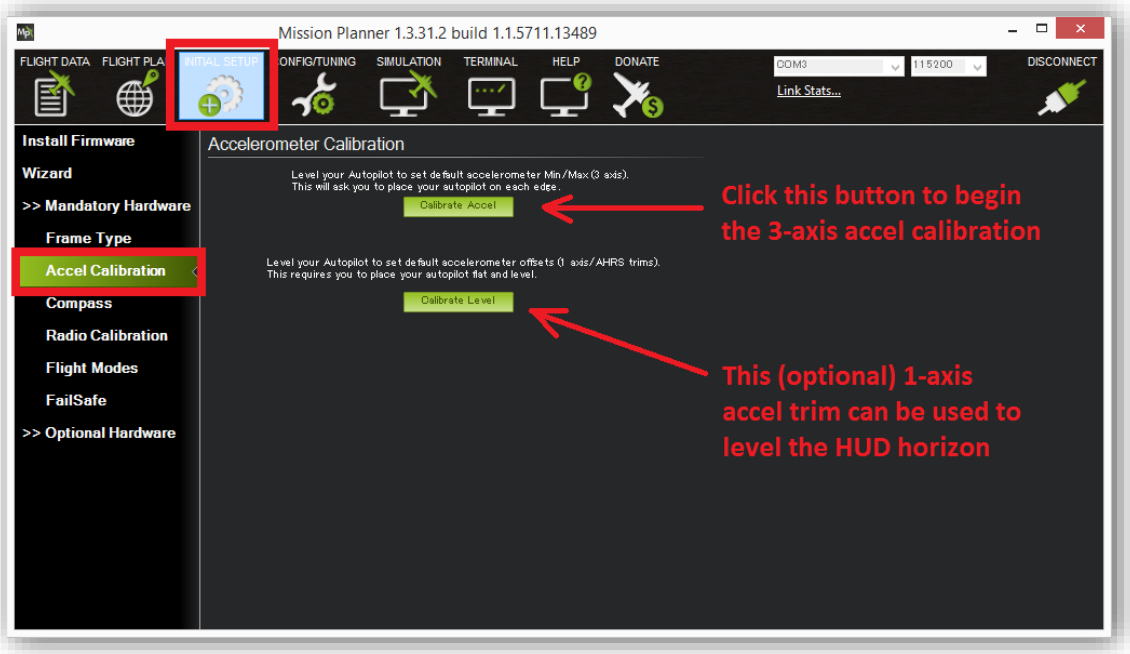
(Windows), Linux, Mac



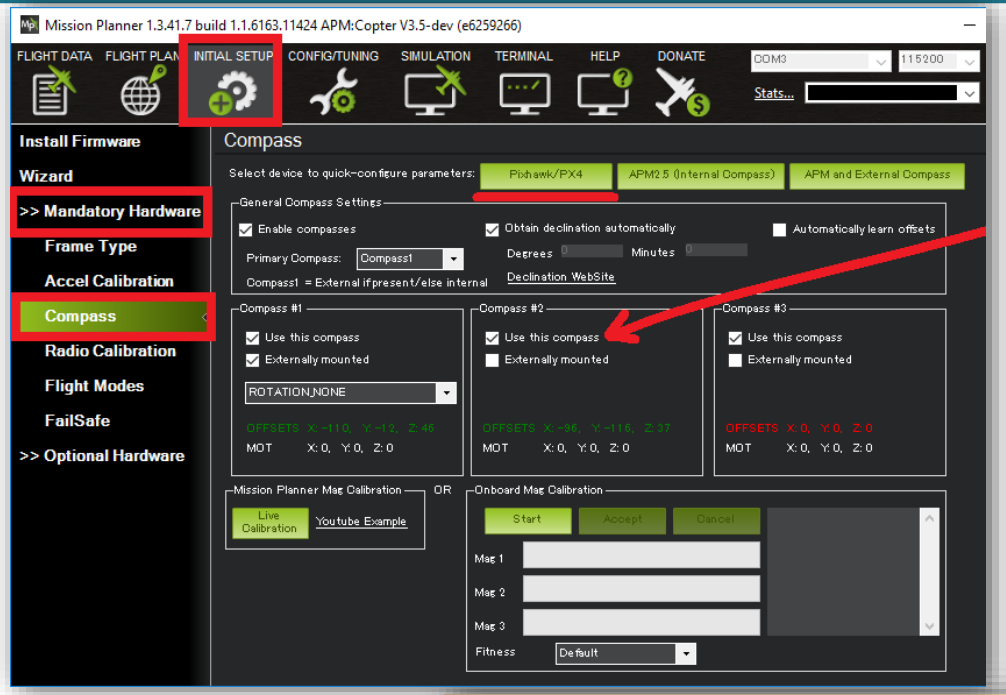
Calibrate and configure your UAV

MissionPlanner

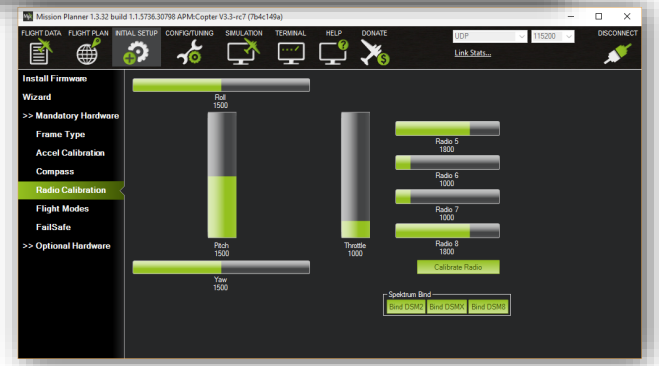
1. Accelerometer Calibration



2. Compass Calibration



3. Radio Control Calibration

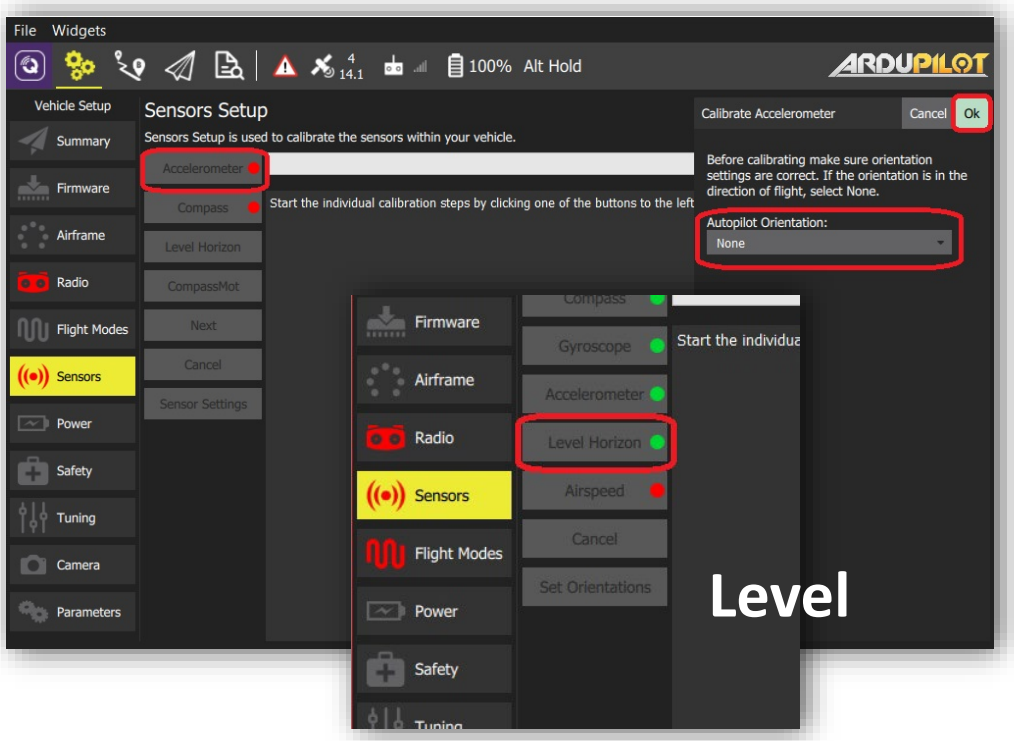


User Guide: http://ardupilot.org/planner/docs/mission-planner-overview.html

Calibrate and configure your UAV

QGroundControl

1. Accelerometer Calibration



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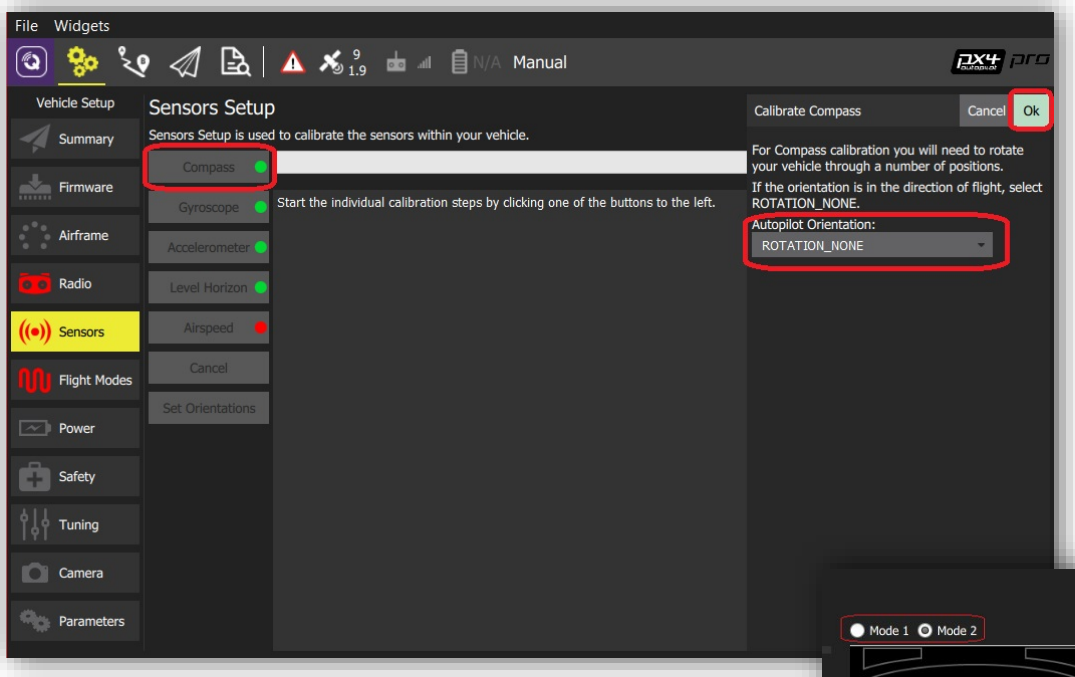

3. Radio Control Calibration

User Guide: https://docs.qgroundcontrol.com/en/

Flying Field

Never fly over people!

1 Backup Pilot per UAV!

Test before fly!

Check UAV, batteries, handheld before you fly!

Don’t panic! A broken (drone) arm is not the end of the world

Group Projects

Topics!

- **Which UAVs?**
  - Do we need wifi, a pi, cameras, …?
- **Additional Hardware?**
  - Sensors, servos, parachute, …

Supply Deliveries

Sporting Events Videoing

Pi Projects

- **Safety Analysis**
- **Drone-to-drone Communication** (Homework Part1)