Introduction to Drone Technology (IDT)

Module 10 - Drone Configuration and Testing

Schedule

0900 - 0930	Introduction
0930 - 1545	Drone Configuration (+ Lunch Break)
1545 - 1600	Transport Back to SDU

- Course notes and guide on Confluence
  - https://sdu-dronecenter.atlassian.net/wiki/spaces/IDT/overview
- Extra Information needed for Airside Access
  - Announcement on Itslearning

Task overview

- *Step #1: Build a frame*
  - *Design considerations*
- *Step #2: Mount and connect hardware*
  - *Pixhawk 4 Mini Wiring Quick Start*
- **Step #3: System Configuration and Calibration**
  - Continues work from Module 06
- **Step #5: First flight and tuning (inside the drone cage)**
  - Multicopter PID Tuning Guide
- Step #6: Outdoor flights (both manual and mission)
- Step #7: Autonomous Outdoor Flights (using recorded flight plans)

Class Objectives

Primary

1. Finalise installation of components and electronics
2. Configure Flight Controller
3. Test fly drone within the drone cage.

Secondary

1. Prepare drone and support equipment for next week flying.
2. Prepare Mission Plan in QGroundControl
3. Verify recording of GPS coordinates using ROS2

Dynamic Control Allocation

- New feature in PX4 since v1.14.0
- Motor Output channels are flexible.
- Requires further Setup from user
  - Distance to motors from FCU
  - Channel Assignment Wizard

Back < Vehicle Setup

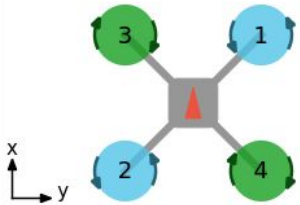
- Summary
- Firmware
- Airframe
- Sensors
- Radio
- Flight Modes
- Power
- Actuators
- Safety
- PID Tuning
- Flight Behavior
- Camera
- Parameters

Actuators Setup

Geometry

Motors 4

	Position X	Position Y	Direction CCW
Motor 1:	0.15	0.15	☑
Motor 2:	-0.15	-0.15	☑
Motor 3:	0.15	-0.15	☐
Motor 4:	-0.15	0.15	☐



Actuator Testing

Configure some outputs in order to test them.

Actuator Outputs

One or more actuator still needs to be assigned to an output.

PWM AUX | **PWM MAIN** | UAVCAN

Identify & Assign Motors

MAIN 1-2 PWM 400 Hz

	Function	Disarmed	Minimum	Maximum	Rev Range (for Servos)
MAIN 1:	Disabled	1000	1000	2000	☐
MAIN 2:	Disabled	1000	1000	2000	☐

MAIN 3-4 PWM 400 Hz

	Function	Disarmed	Minimum	Maximum	Rev Range (for Servos)
MAIN 3:	Disabled	1000	1000	2000	☐
MAIN 4:	Disabled	1000	1000	2000	☐

MAIN 5-8 PWM 400 Hz

	Function	Disarmed	Minimum	Maximum	Rev Range (for Servos)
MAIN 5:	Disabled	1000	1000	2000	☐
MAIN 6:	Disabled	1000	1000	2000	☐
MAIN 7:	Disabled	1000	1000	2000	☐
MAIN 8:	Disabled	1000	1000	2000	☐

Motor Order Identification and Assignment

This will automatically spin individual motors at 15% thrust.

Warning: Only proceed if you removed all propellers.

No motors are assigned yet. By saying yes, all motors will be assigned to the first 4 channels of the selected output (PWM MAIN) (you can also first assign all motors, then start the identification).

The procedure is as following:
- After confirming, the first motor starts to spin for 0.5 seconds.
- Then click on the motor that was spinning.
- The above steps are repeated for all motors.
- The motor output functions will automatically be reassigned by the selected order.

Do you wish to proceed?

No | Yes

Safety

Safety Recap

- Power Wiring: **Red ➡ Red**, **Black ➡ Black**
- Have a tutor check your wiring **before** applying connecting battery.
- ESC ➡ Motor Wiring: Unplug power **before** switching wires
- **No propellers attached** when drone is on the bench
- **Communication is Key**

Test Flying and Drone Cage

Drone Cage

- Tutor must be present when performing a test in the cage.
- No person permitted in the cage when the drone is “hot”
- Safety net must be **fully closed** before drone is armed.
- One Drone at a time

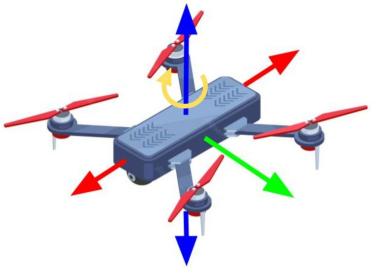
Test flying

- Pilot = solely focused on flying the drone.
- Stabilised mode only. **Position Mode will not work indoors**
- Have laptop with QGroundcontrol connected.
- Verify drone can arm (spin motors) **before** attaching propellers

Pilot

Piloting

- Nominate one person to act as pilot for a team
- Pilot practice can be undertaken using miniDrones
- Read through the Manual Flights Guide on Confluence



Batteries

Batteries

- Each Team will be allocated 2 batteries
- 4-Cell 5000mAh battery
- Choose one person from the team to be shown how to use the chargers
- Your Responsibility to ensure batteries are charged before flight

Preparations

- Drone, Laptop and Transmitter are charged.
- Make a checklist for going airside
  - Responsibilities (pilot, GCS operator, photos/video)
- Verify QGroundControl Mission Plan

Questions?