



PROJECT NUMBER: 2021-1-PT02-KA220-YOU-000029077

MODULE 4: TECHNICAL LABORATORY AND FLIGHT WORKSHOP

MECB



Co-funded by the
Erasmus+ Programme
of the European Union

This project has been funded with support from the European Commission. This communication reflects the views only of the author. The Commission cannot be held responsible for any use which may be made of the information contained therein.

UNIT 1 – DRONE TECHNOLOGY

- Which are the main components of a drone?
- Which type of drone is most common?
- What makes drones so stable?



UNIT 1 – DRONE TECHNOLOGY



TYPES OF DRONES

- Multi rotor drones
- Fixed wing drones
- Single rotor drones
- Fixed wing hybrid VTOL



Multi rotor drones



Fixed wing drones



Single rotor drones



Fixed wing hybrid VTOL



TYPES OF DRONES



- Which types of drones are most suitable for journalism?
- Discuss

UNIT 1 – DRONE TECHNOLOGY



Main components of a Drone

- Drone Motor (explain the different types)
- Drone propellers (materials used and why)
- Drone flight controller
- GPS Module
- Electronic Speed Controller (ESC)
- Power port module
- 3 Axis Gimbal (for drones with cameras)
- Drone camera
- Drone battery
- Drone antennas
- Downward ultrasonic obstacle avoidance sensor
- Flight LED
- Drone frame (which materials are used, pros and cons of using polymers and composites)





PROJECT NUMBER: 2021-1-PT02-KA220-YOU-000029077

MODULE 4: TECHNICAL LABORATORY AND FLIGHT WORKSHOP

MECB



Co-funded by the
Erasmus+ Programme
of the European Union

This project has been funded with support from the European Commission. This communication reflects the views only of the author. The Commission cannot be held responsible for any use which may be made of the information contained therein.

UNIT 2 – DRONE CONTROLLER



- Which flight terminologies are you familiar with?
- Can you name some standard buttons on the controller?

UNIT 2 – DRONE CONTROLLER



DRONE CONTROLLER



The drones work by sending signals from the controller to the receiver inside the drone and this allows for wireless communication. The three main components responsible for this are:

- Drone transmitters
- Drone receivers
- Flight controllers which are made up of:
 - Accelerometers
 - Magnetometers
 - Gyroscopes
- Electronic speed controller (ESC)

Drone communication

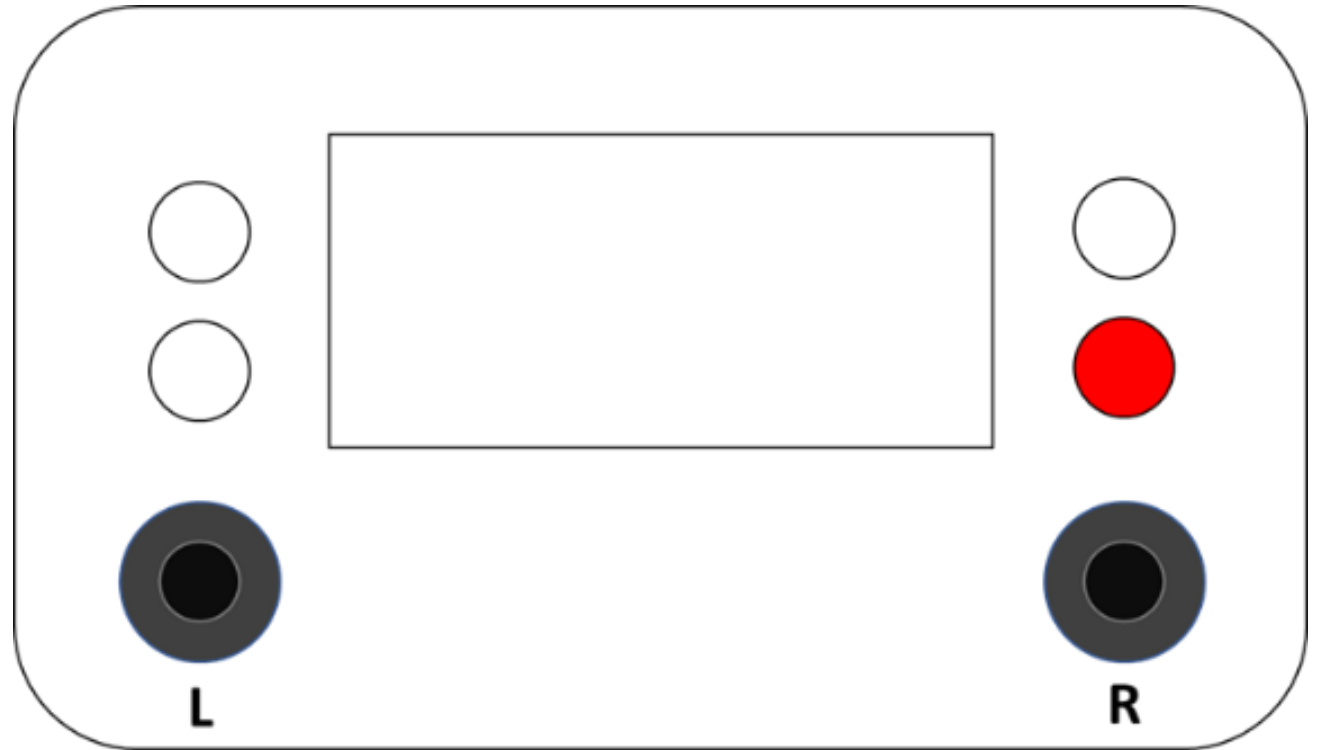
Technology used for drone communication:

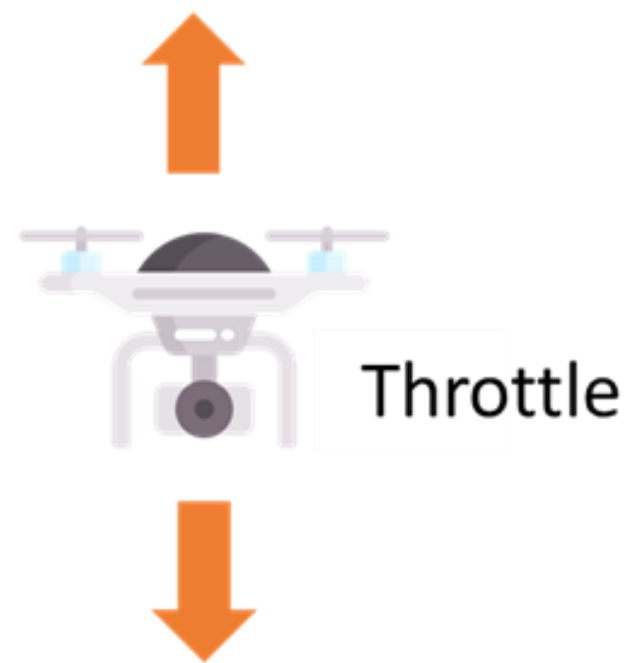
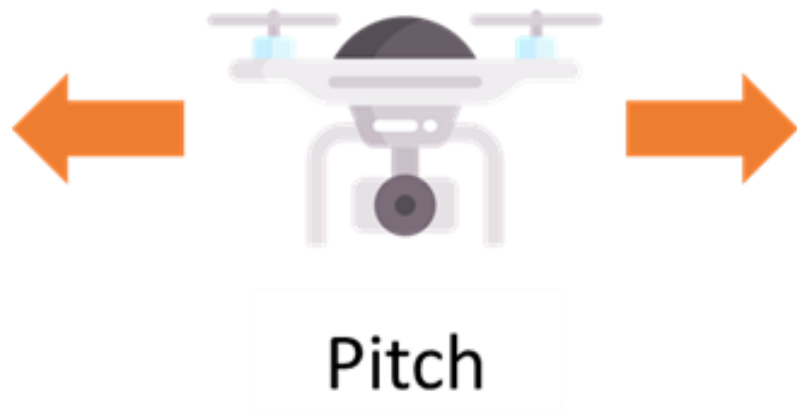
- Radio frequencies
- Wifi
- GPS
- Satellite link



Buttons in a drone controller

- Left is used for yaw/throttle
- Right is used for roll/pitch









PROJECT NUMBER: 2021-1-PT02-KA220-YOU-000029077

MODULE 4: TECHNICAL LABORATORY AND FLIGHT WORKSHOP

MECB



Co-funded by the
Erasmus+ Programme
of the European Union

This project has been funded with support from the European Commission. This communication reflects the views only of the author. The Commission cannot be held responsible for any use which may be made of the information contained therein.

UNIT 3 – Flying a drone



- What pre-flight checks can you think of?
- Why are pre-flight checks important?

UNIT 3 – Flying a drone



Pre-flight checks



Before each flight there are a number of checks that one has to do on the drone, to ensure that the flight is as safe as possible. These checks include:

- Physical check of the drone to make sure that the major components are secured and not damaged
 - Battery: fully charged and secured
 - Propellers: clean, turn smoothly and no sign of damage or vibration
 - Frame: clean, no visible damage
 - Motors: good working order and no debris. Check for any abnormal sound on startup

Pre-flight checks



- Make sure that all the controls on the drone controller are working
 - These have to be tested before flight and before gaining altitude
 - Check that the GPS and RF connection is good

Pre-flight checks



- Check that the camera and gimbal are secured and in good working order
 - Camera fixed, lenses clean and clear
 - Correct settings

Basic flight exercises



In this section different exercises will be suggested so that you will be able to gain confidence using your drone. For these exercises it is recommended that you use a set of cones or markers that can be placed on the ground and used as a reference. Before flight always make sure that a safe landing zone is set.

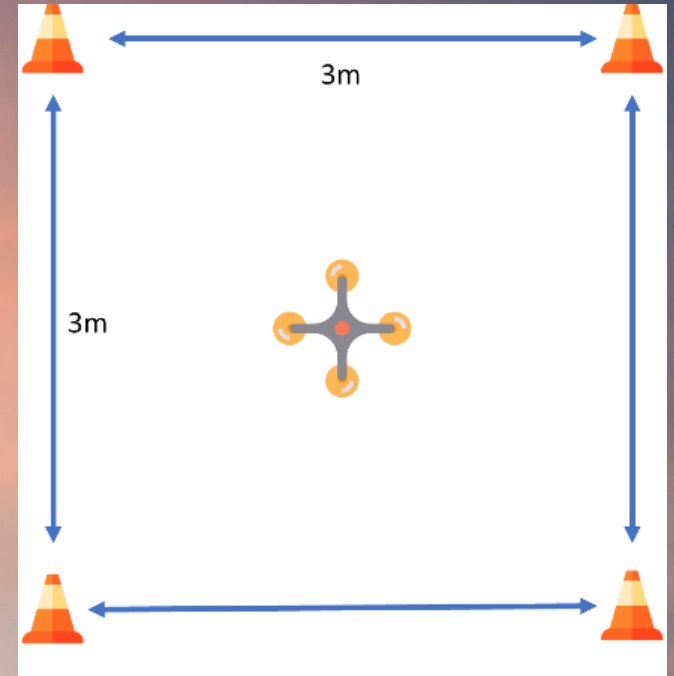
Basic flight exercises



Take-off and landing

These are the most basic exercises that the students should familiarise themselves with. Although most modern drones can perform these manoeuvres automatically it is always recommended that they are familiar with manual operation. To perform a manual take off manoeuvre increase the rotor speed and then when the rotors spool up increase the throttle by pushing the left joystick forward. To land the drone manually, reduce the throttle until the drone is close to the ground, then the drone can either land automatically or else the rotors can be switched off

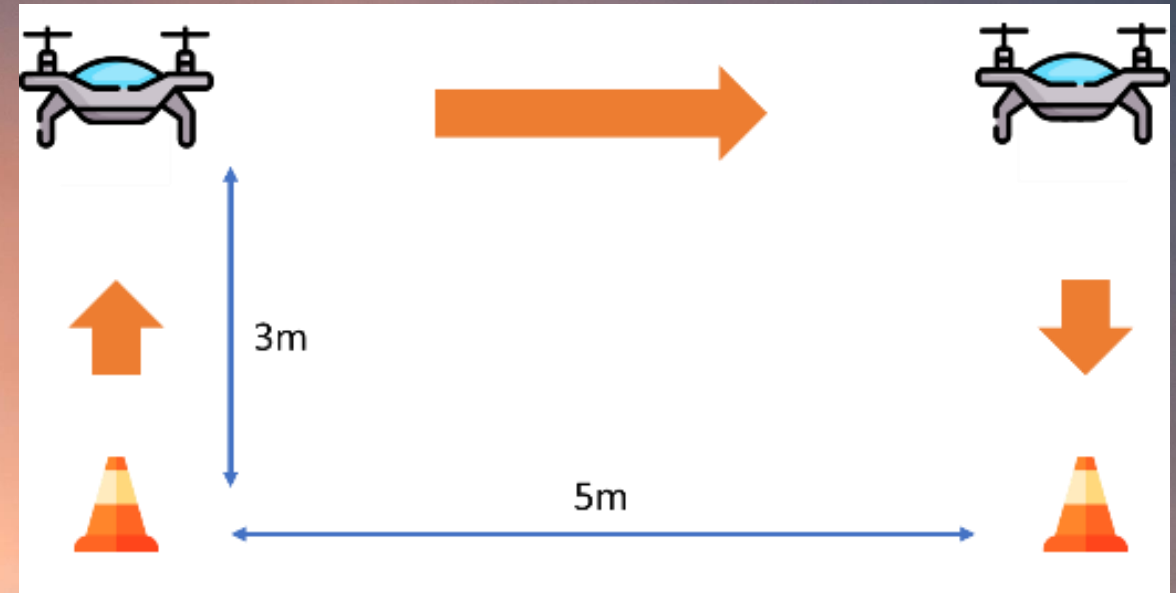
Basic flight exercises



Hovering

Place four markers approximately 3 metres apart in a square pattern and place the drone in the middle shown in the image below. After take-off try and keep the drone within this perimeter hovering at an altitude of 3 to five metres for about ten minutes. This task can be more challenging if there is a slight breeze.

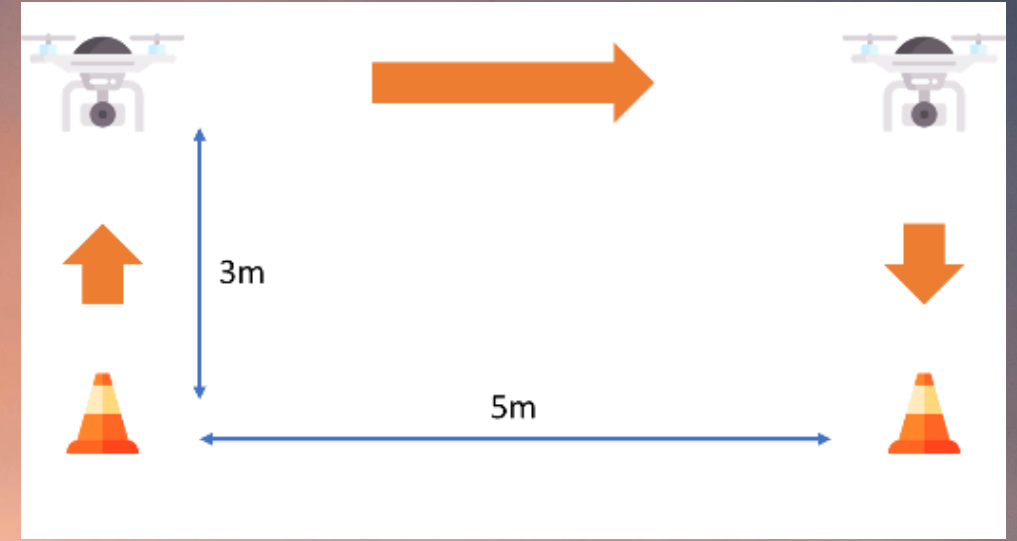
Basic flight exercises



Up, across, down

Place two markers 5 metres apart and put the drone next to one of them. Perform the take off manoeuvre and go up to an altitude of approximately 3 metres. Move sideways 5 metres over the next cone and then land the drone. During the flight the tail of the drone should be facing you as shown in the image.

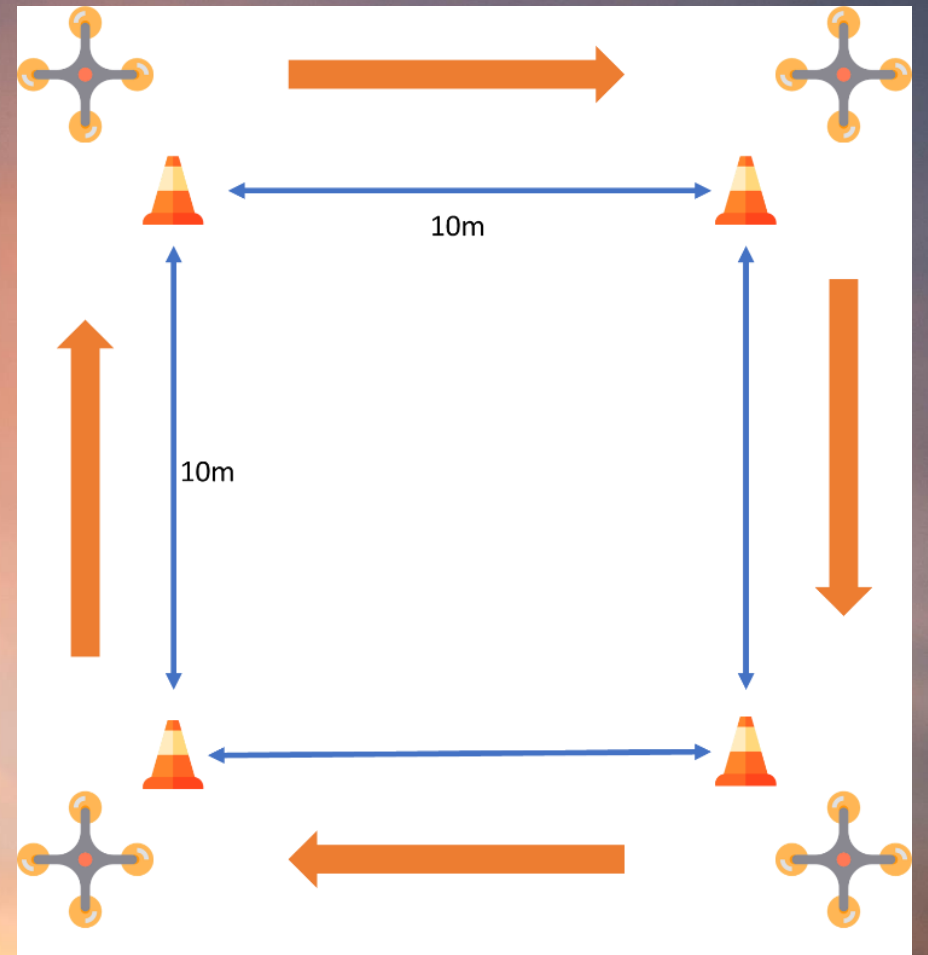
Basic flight exercises



Up, across, down - Sideways

Perform the previous exercise but this time the drone must be facing sideways. This is an off-axis movement as the perspective is different from the previous exercise. It is essential that you learn to master this technique as you will be using the controls in a different way.

Basic flight exercises



Flying in a square pattern

Position four cones 10 metres apart in a square pattern and place the drone next to one of them tail facing towards you. Take off at an altitude of around 5 metres and move off to the next cone. While hovering, turn the drone 90 degrees to face the next cone and fly towards it. Continue this until the drone is over the starting cone. This exercise will train your ability to fly the drone in different perspectives.