Module 1

Basic Aerodynamics of Quadrotor UAVs

Unmanned Aerial Vehicles (UAVs)

- A **UAV**, or simply a drone, is a flying apparatus without a pilot on board.
- The UAV you will be working with is a small, lightweight **quadcopter** (a helicopter propelled by four **rotors**). These rotors allow vertical takeoff and landing.

Features

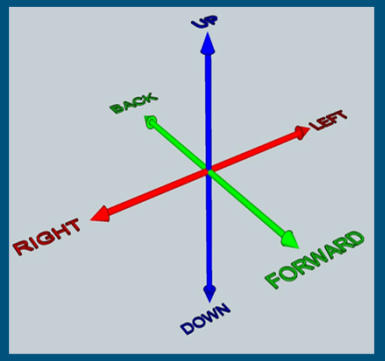
- The UAV has its own power supply. The UAV you will be working with is equipped with a **removable**, **rechargeable** battery.
- Also, it is equipped with a front-mounted camera, which provides a **live video feed**.

Flexible Movement

- Drones can move in various directions.
- Vertical movement : **Up**, **Down**
- Lateral movement : **Forward**, **Back**, **Left**, **Right**
- Rotational movement : **Yaw**, **Roll**, **Pitch**

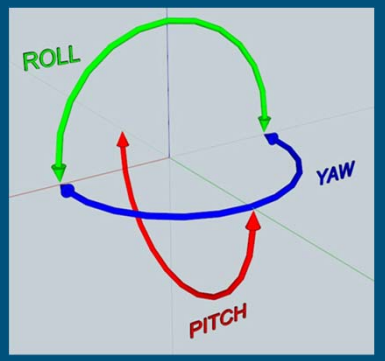
Types of Motion

- **Up**, **Down**, **Forward**, **Back**, **Left**, **Right** : straight-line motion without any rotation.
- The drone can move in a combination of these directions as well, i.e., in diagonal directions.



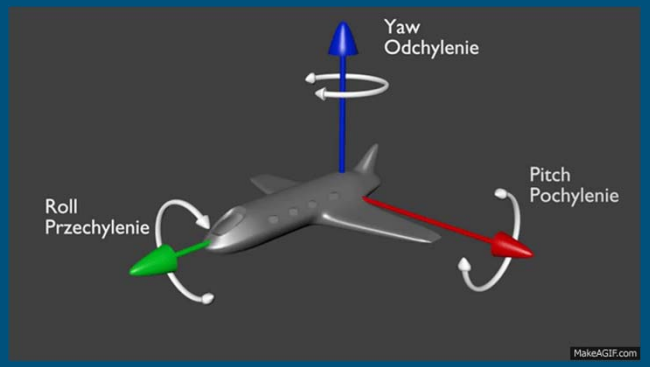
Types of Motion

- **Yaw**, **Roll**, **Pitch**
  : rotations around different axes.



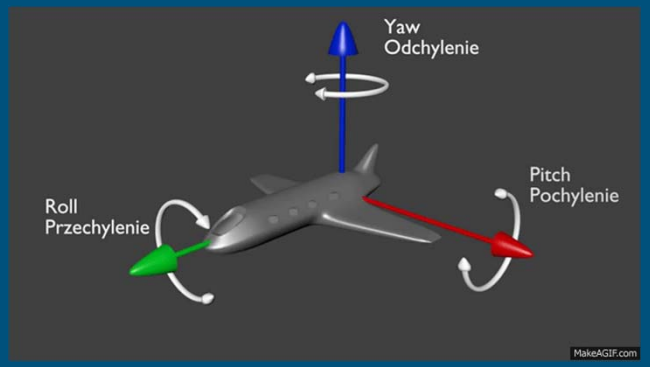
Pitch

- **Pitch** is rotation around the *left-right* axis, so left and right direction remain the same.
- This motion is how you would rotate on a rocking chair.



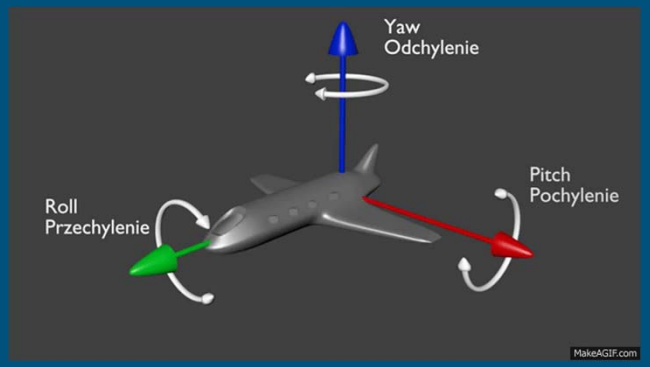
Roll

- **Roll** indicates a rotation around the *forward-back* axis, so forward direction remains the same even after rolling.
- This motion can describe how a dog would “roll” over the ground.



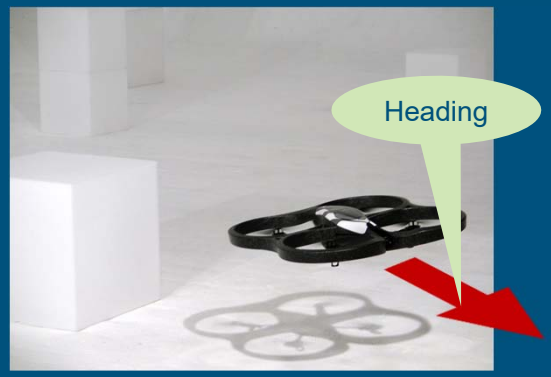
Yaw

- **Yaw** is a rotation around the *up-down* axis, so up stays the same.
- This motion is how your car makes turns.



Heading and Altitude

- **Heading** is the direction that you are facing. It is simply where you are headed.
- **Altitude** is how high you are above the ground.



Congratulations !

End of Module 1