



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 camera pointing forward, which provides live video feed.



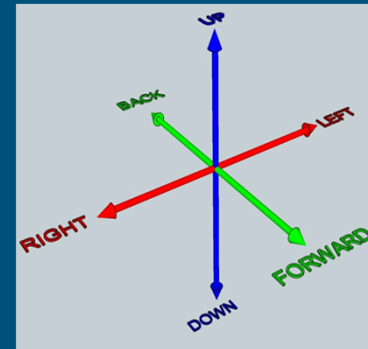
Flexible Movement

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



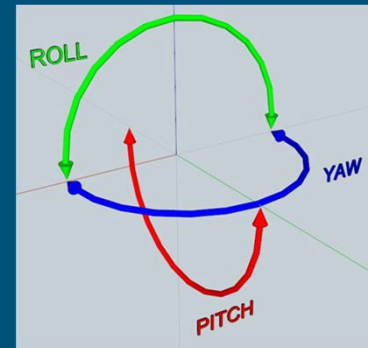
Types of Motion

- 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.



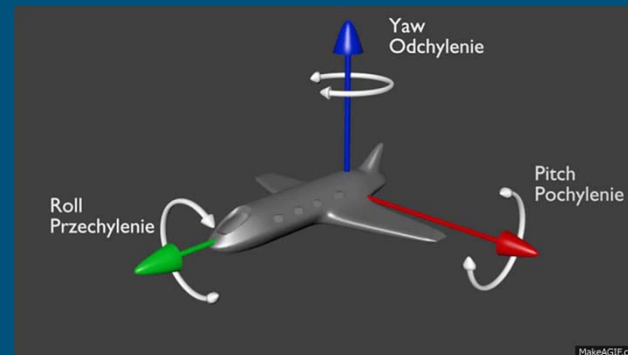
Types of Motion

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



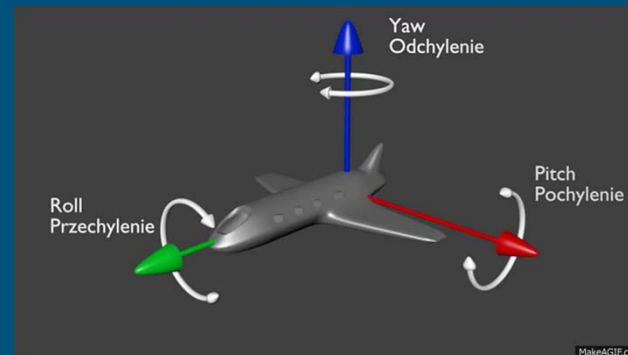
Pitch

- **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.



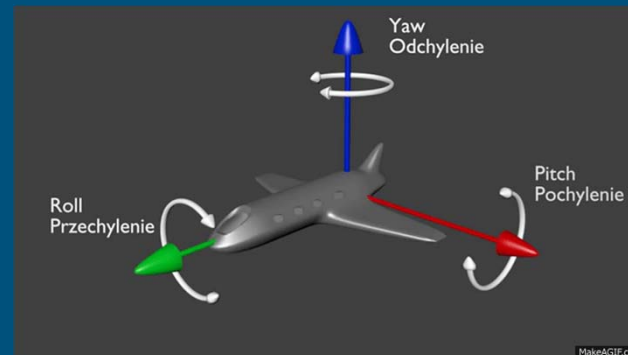
Roll

- Roll indicates 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 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