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# Lecture 2: Dynamics

## MAE 345/549

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Sept. 8, 2022



**Mechanical and  
Aerospace  
Engineering**

# Quadrotors



[https://www.youtube.com/watch?v=pF3AM89pC\\_c](https://www.youtube.com/watch?v=pF3AM89pC_c)

# Quadrotors

## Flight Statistics

Top Speed: 3.85 m/s

Max Drag: 1.25 m/s<sup>2</sup>

# Hovering

- Goal (for next ~4 lectures): Develop techniques for making quadrotor hover in place
- Approach:
  - **Dynamics:** Figure out how quadrotor will behave when you apply different propeller speeds [Today]
  - **Control:** Figure out some mechanism for taking corrective actions when the quadrotor moves away from the desired hover configuration [Next 3 lectures]

# Dynamics and Control

- **Note:** Entire courses can be (and are) devoted to **dynamics** (e.g., MAE 206 and 542) and **control** (e.g., MAE 433, 434, 544, etc.)
- We will only cover enough material to give you a good understanding of how control works for robotic systems
- Also allows us to develop **terminology** we will use extensively throughout the course

# Humanoid balancing



# Planar Quadrotor

