

Optimal Control and Reinforcement Learning

16-745



Spring 2025

Course Team



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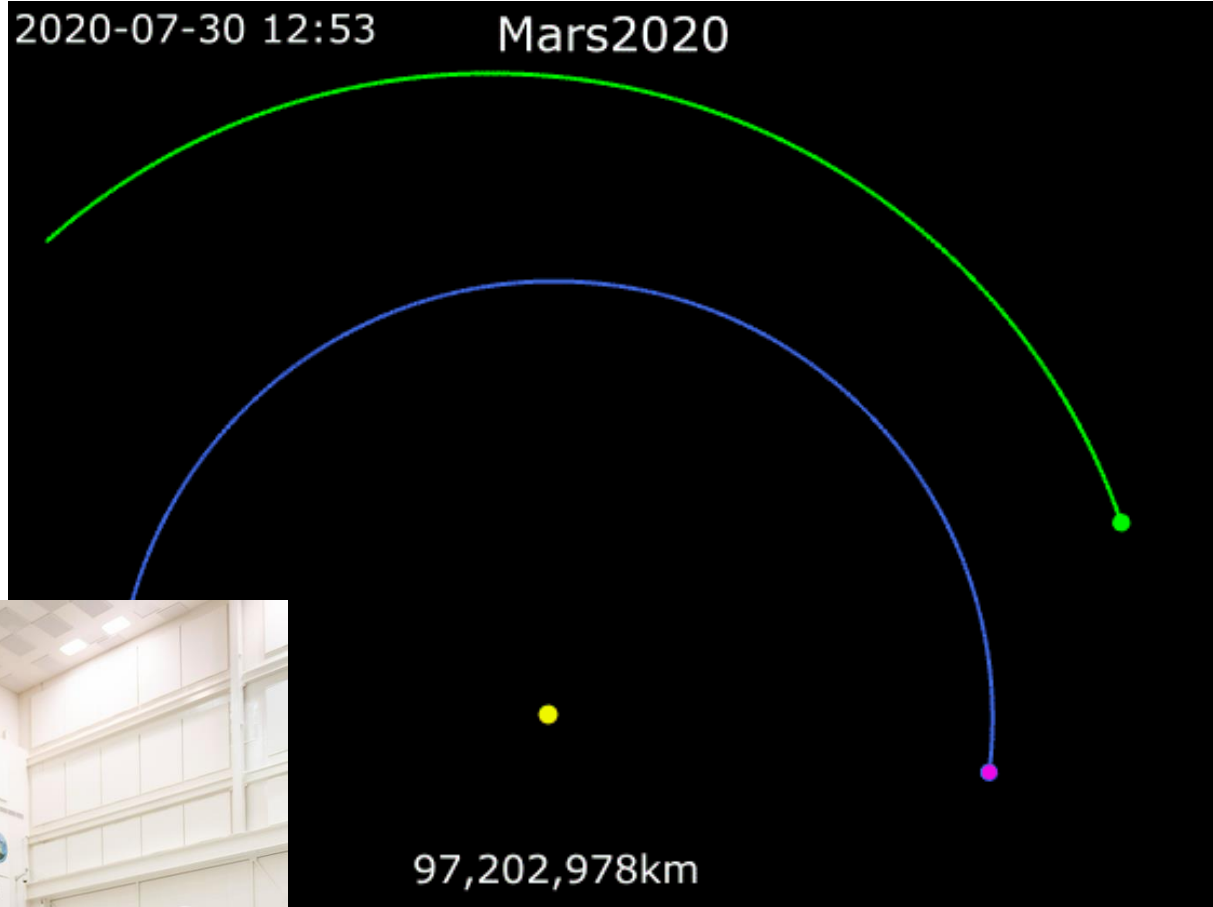


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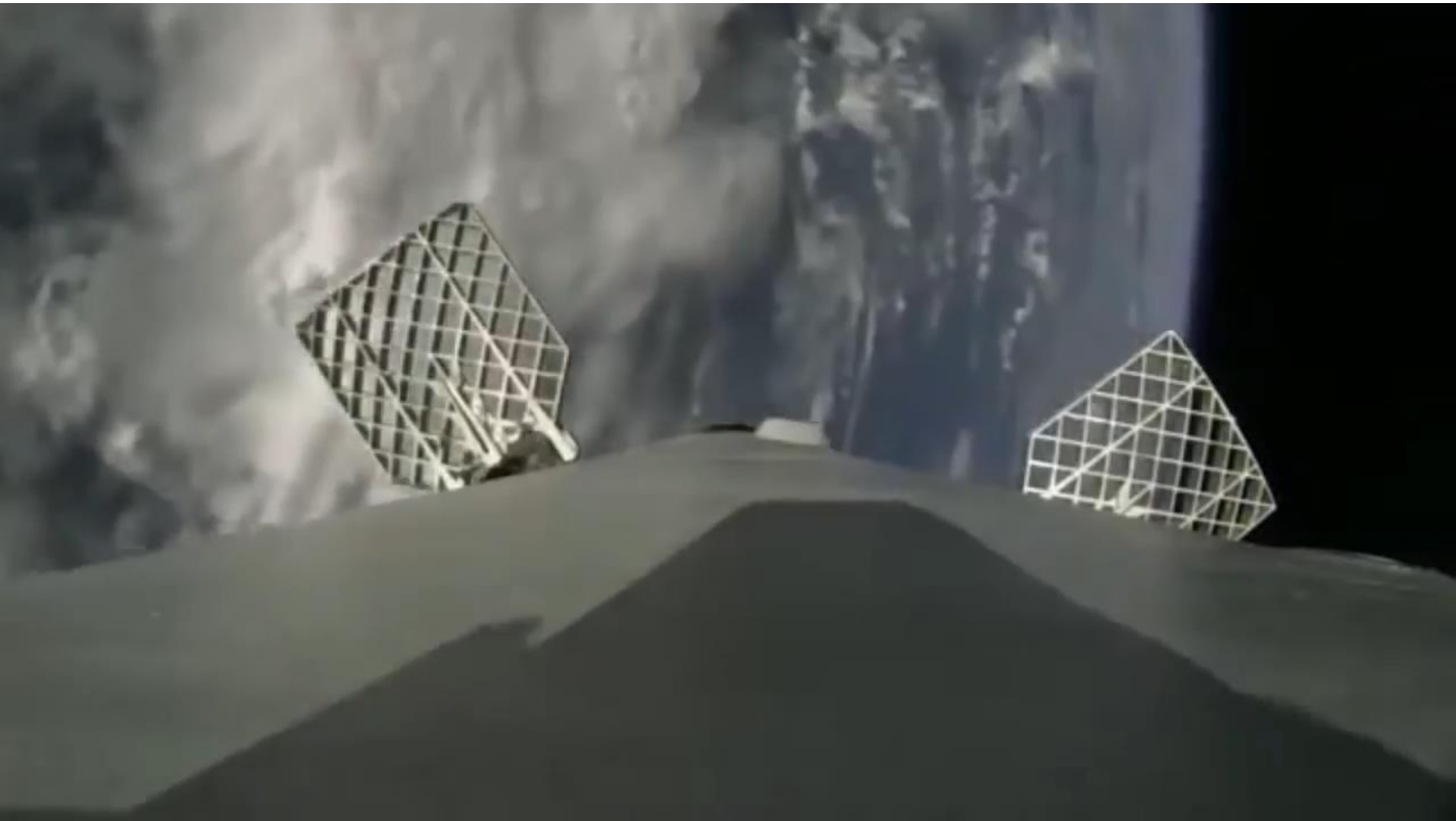


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What Is Optimal Control For?



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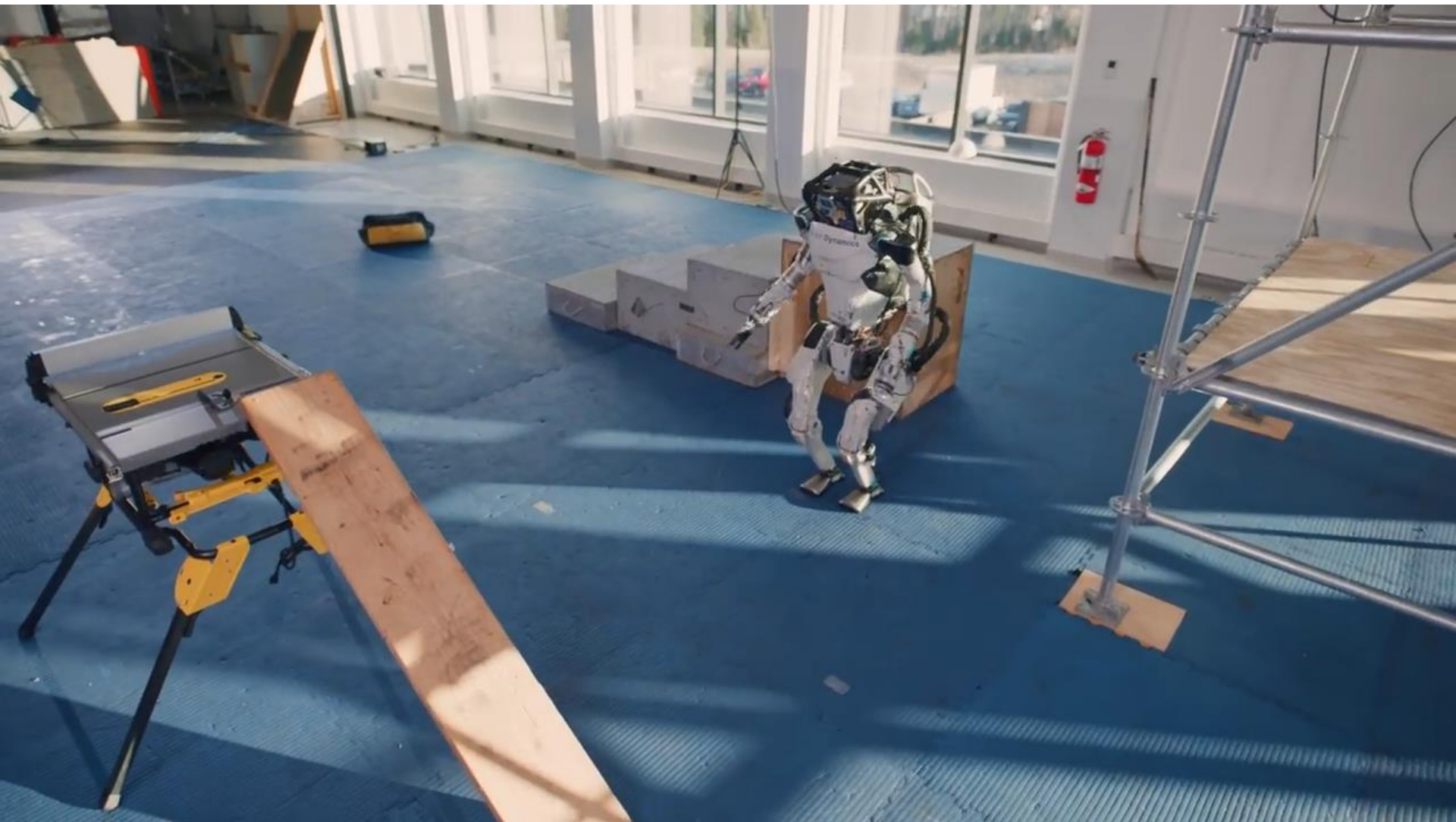


What Is Optimal Control For?

MIT Mini Cheetah
MIT Biomimetic Robotics Laboratory



What Is Optimal Control For?



Current Research Challenges

- Dealing with contact (legged locomotion, manipulation, etc.)
- Dealing with high-dimensional systems (e.g. deformable objects)
- Bridging the gap between model-based control and RL
- Safety guarantees for uncertain nonlinear systems
- Dealing with other (possibly adversarial) agents



What Are We Doing Here?

- Optimization-based control techniques
- Focus on robotics applications over theory
- Homeworks (~4) focused on algorithm implementation
- Course project in groups of 1-5 (do something cool!)



Logistics

- Lectures in person + zoom – will be recorded and posted
- Notes from lectures will be posted
- Piazza for course communication
- Homework will be distributed on GitHub and turned in through Gradescope
- Office hours TBD



Getting Started:

Fill out course survey:

<https://forms.gle/6Pxi3mdZPfZWagxWA>

Join course Piazza:

<https://piazza.com/cmu/spring2025/16745>