



MCHE 474: Control Systems

Fall 2017

Dr. Joshua Vaughan

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`@Doc_Vaughan`

First, Some Info on Me



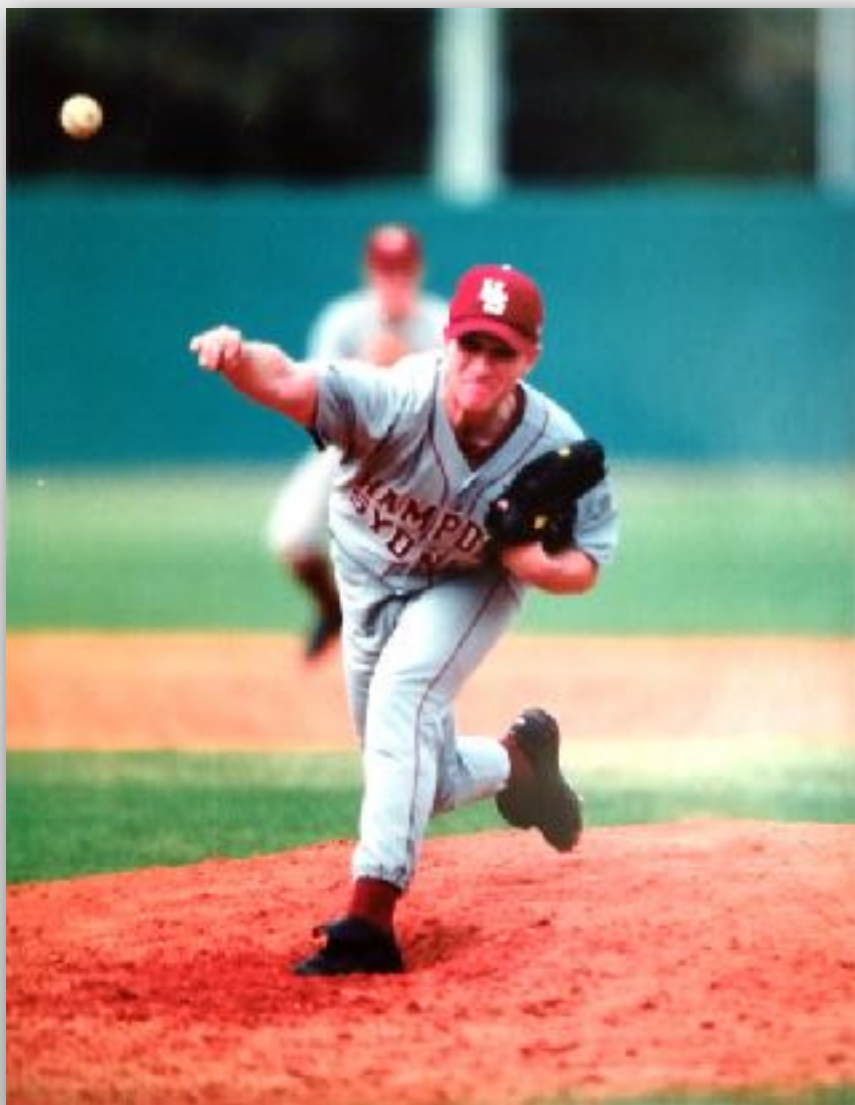
- Grew up in Southern Virginia
- Bachelor's from Hampden-Sydney College in May 2002
 - Double Major: Physics and Applied Math



First, Some Info on Me



- Grew up in Southern Virginia
- Bachelor's from Hampden-Sydney College in May 2002
 - Double Major: Physics and Applied Math
 - 4-year starting pitcher



Grad. School



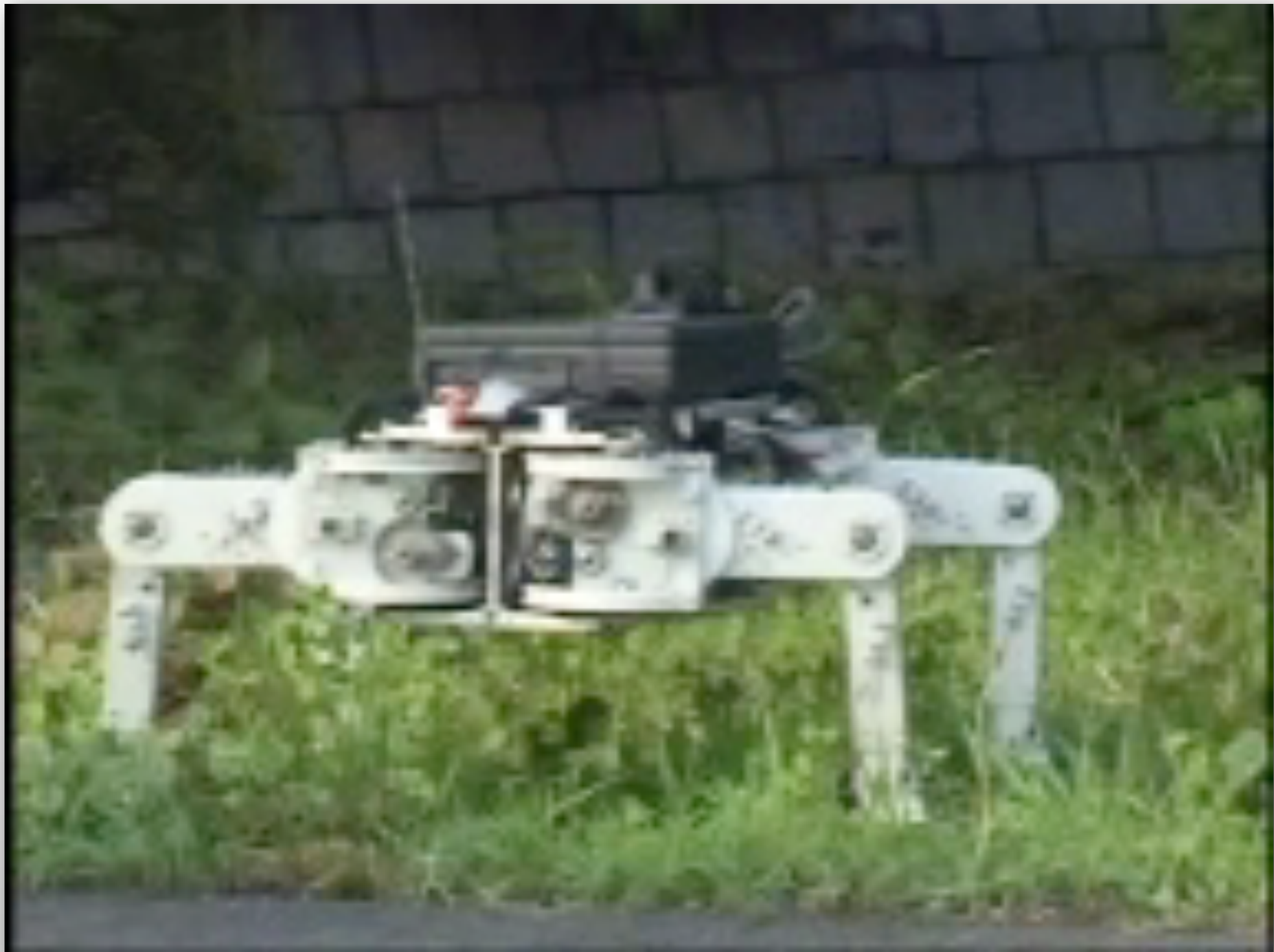
- Graduate School at Georgia Tech
 - Advisor: Dr. William Singhose
 - M.S. in May 2004
 - ♦ Thesis: *Active and Semi-Active Control to Counter Vehicle Payload Variation*
 - Ph.D. in August 2008
 - ♦ Thesis: *Dynamics and Control of Mobile Cranes*



Postdoc



- Tokyo Institute of Technology with Dr. Shigeo Hirose



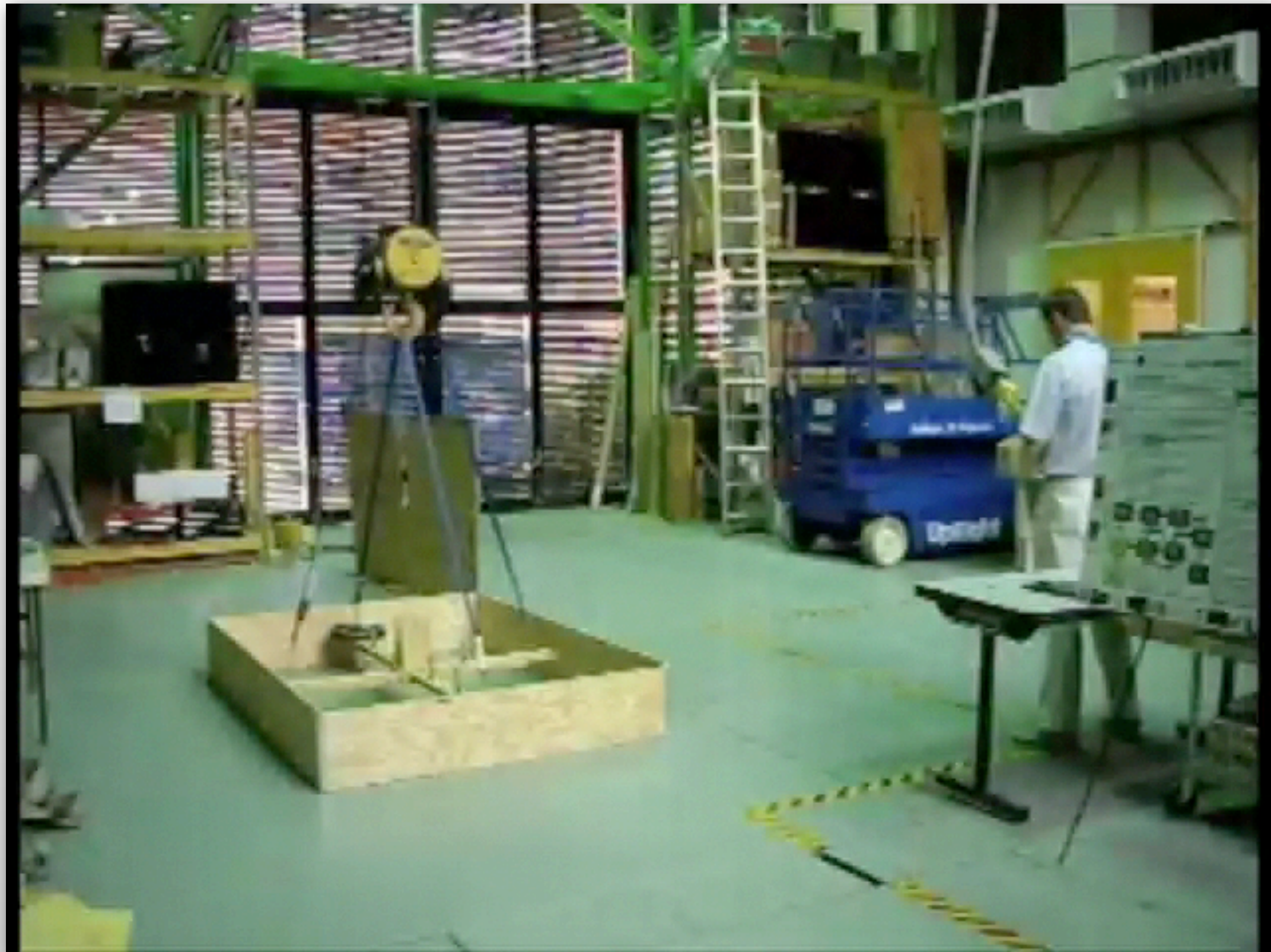
Postdoc



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10-ton Bridge Crane



Example Multi-mode Crane Oscillation



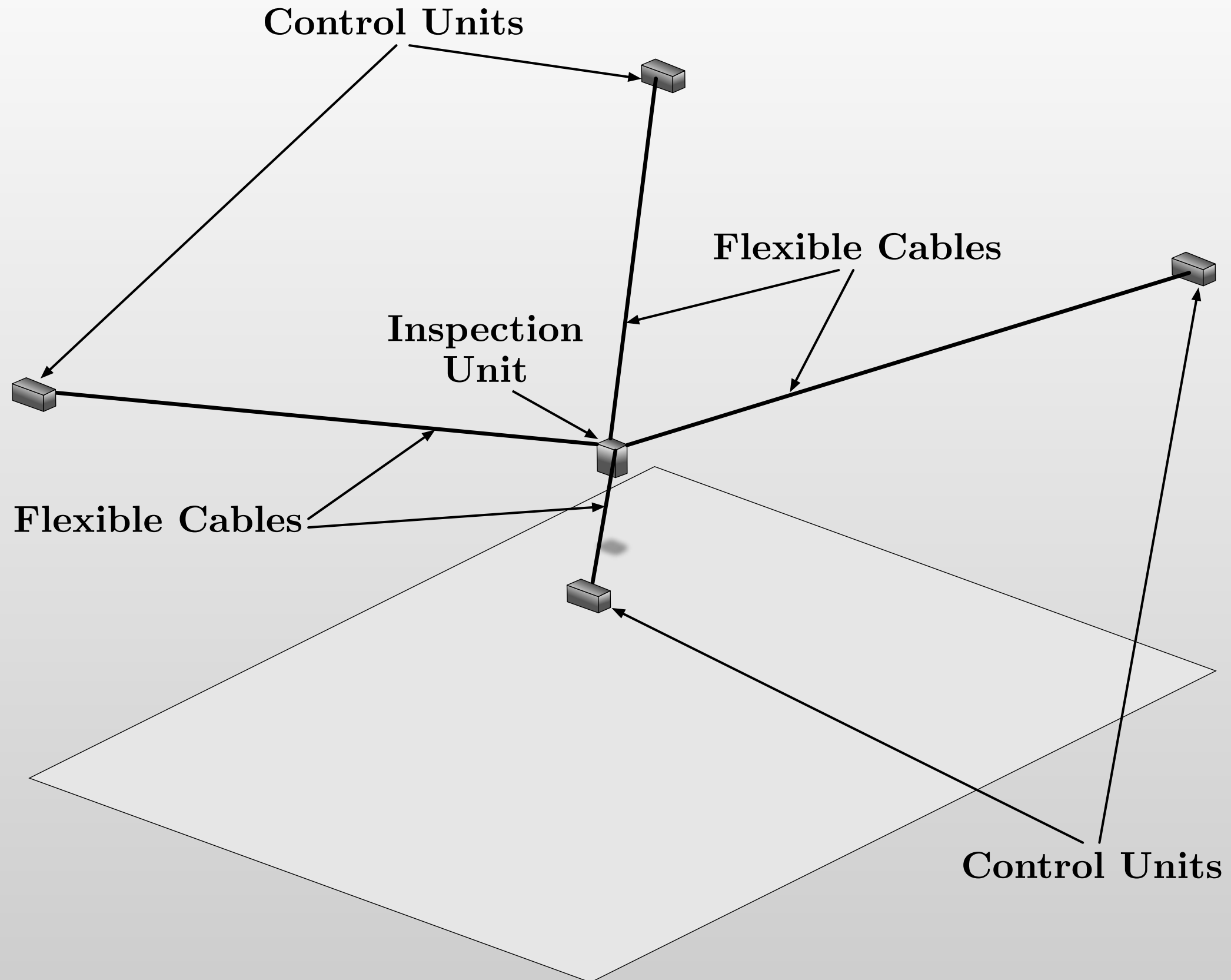
Cooperative Crane Control



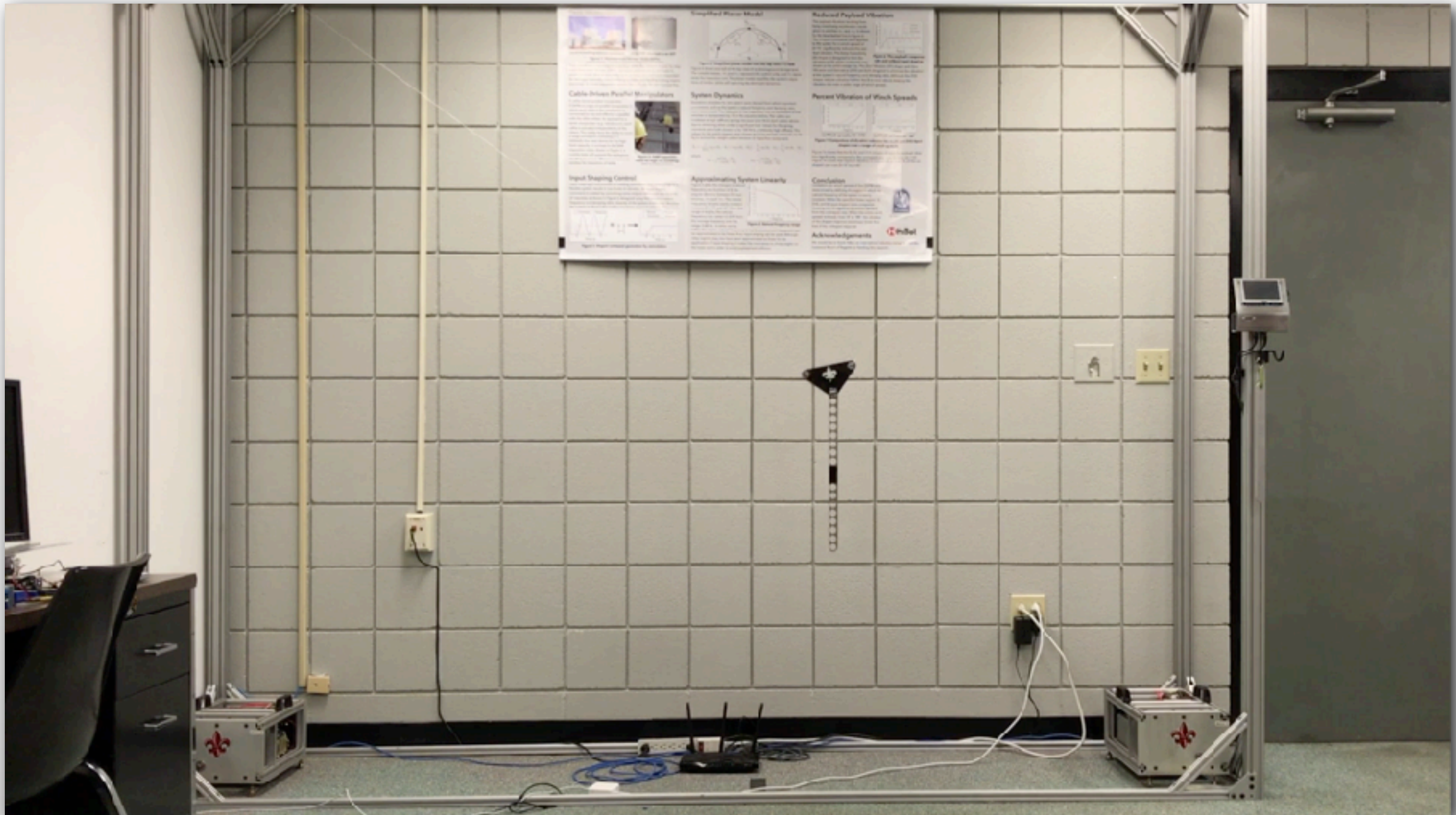
Aero. Manu. Lab at GT



Cable-driven-parallel-manipulators (CDPMs)



Cable-driven-parallel-manipulators (CDPMs)



Walking Robots



2016 Maritime RobotX Challenge



Course Info



- Official Description:
“Classical and modern control theory. Response of first and second-order systems, stability analysis and frequency response methods. Computer control of machines and processes.”
- Distill important dynamic characteristics of complex systems (like the ones you just saw) and learn to control them.

Course Info (cont)



- Lecture: TR 12:30 – 1:45pm, CLR 309
- Lab: Various Times, Various Rooms
- Modern Control Systems (13th Edition) by Richard Dorf and Robert Bishop
- <http://www.uclouisiaa.edu/~jev9637/MCHE474.html>
- No set office hours (for now)

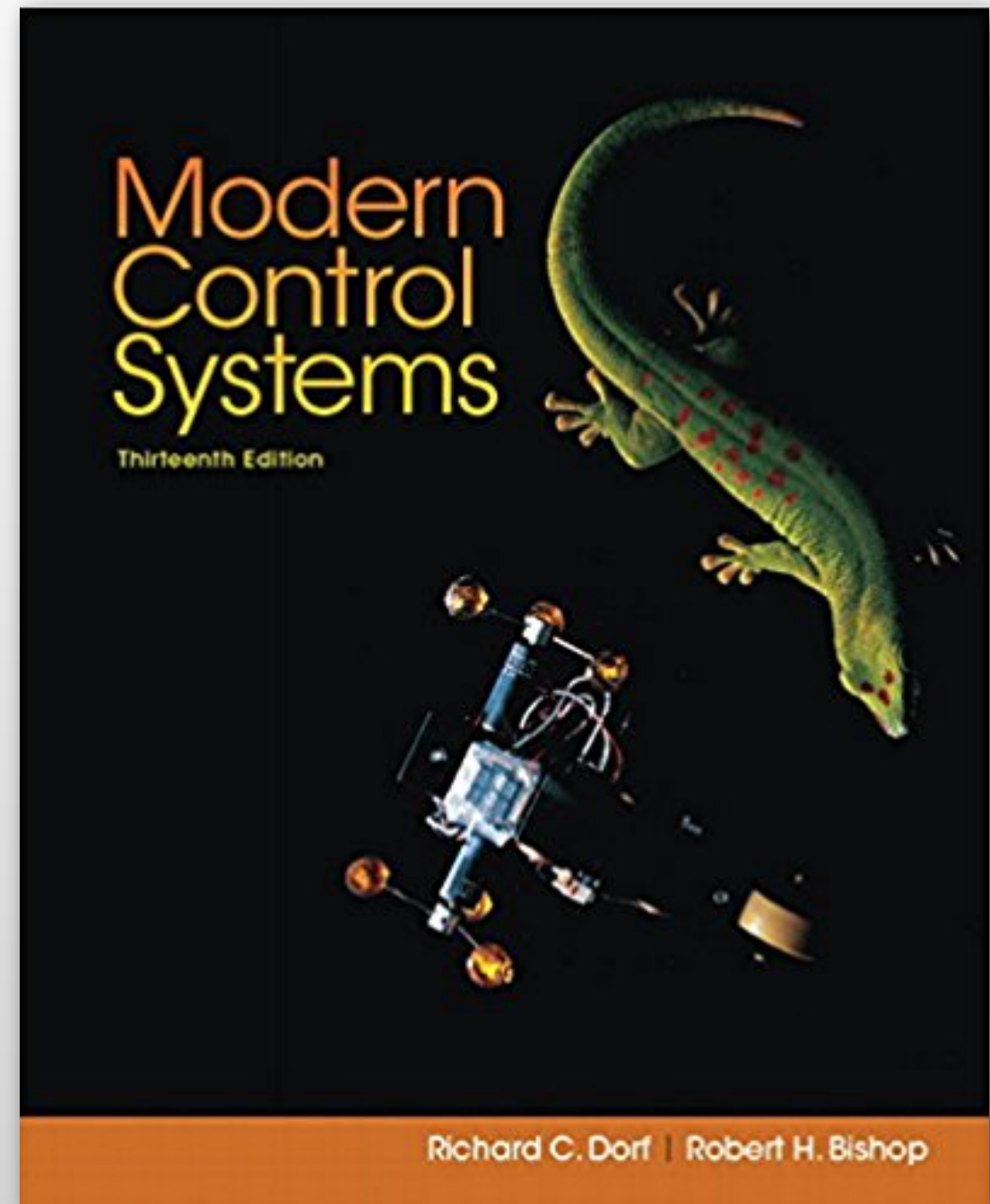


Image from: <http://amzn.com/0134407628>

Schedule



	Tuesday		Thursday	
August	21	Course Introduction	23	Chapter 2
	29	Chapter 2	31	Chapter 2
September				
	5	Chapter 3	7	Chapter 3
	12	Chapter 4	14	Chapter 4
	19	Chapter 5	21	Chapter 5
	26	Chapter 5	28	Mid-Term Exam 1

Note: PDF version on the course site also has tentative assignment due date information.

Schedule



	Tuesday		Thursday	
October	3	Chapter 6	5	Fall Break
	10	Chapter 7	12	Chapter 7
	17	Input Shaping	19	Input Shaping
	24	Chapter 8	26	Chapter 8
	31	Chapter 9		
November			2	Chapter 9
	7	Chapter 10	9	Mid-Term Exam 2
	14	Chapter 10	16	Chapter 10
	21	Chapter 11	23	Thanksgiving Break
	28	Advanced Control Design	30	Advanced Control Design
December	Final Exam – Monday, Dec. 4, 8:00 – 10:30am			

Note: PDF version on the course site also has tentative assignment due date information.

Course Tools/Resources



- Simulation and Analysis
 - Anaconda Python distribution - <http://continuum.io/>
 - ♦ NumPy, SciPy, & Sympy
 - ♦ Jupyter notebook - <https://jupyter.org>
 - ♦ *Note:* Make sure to get the Python 3 version.

Python 3



The screenshot shows the Anaconda website's download page for version 4.4.0, released on May 31, 2017. The page features a green header with the Anaconda logo and navigation links. Below the header, there's a large green banner with the text "DOWNLOAD ANACONDA DISTRIBUTION" and "Version: 4.4.0 | Release Date: May 31, 2017". Underneath, there are icons for Windows, macOS, and Linux. The page then lists three main features: "High-Performance Distribution", "Package Management", and "Portal to Data Science". Below these, there's a section titled "Download for Your Preferred Platform" with links for Windows, macOS, and Linux. The macOS section is selected, leading to the "Anaconda 4.4.0 For macOS Graphical Installer" page. This page offers two options: "Python 3.6 version" (Graphical installer (142 MB)) and "Python 2.7 version" (Graphical installer (138 MB)). The "Python 3.6 version" option is highlighted with a red box, and its "DOWNLOAD" button is also highlighted.

Python 3.6 version *
Graphical installer (142 MB) ⓘ

[↓](#) **DOWNLOAD**

Command Line Installer (380 MB) ⓘ

Python 2.7 version *
Graphical installer (138 MB) ⓘ

[↓](#) **DOWNLOAD**

Command Line Installer (375 MB) ⓘ

Course Tools/Resources



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 - ♦ NumPy, SciPy, & Sympy
 - ♦ Jupyter notebook - <https://jupyter.org>
 - ♦ *Note:* Make sure to get the Python 3 version.
 - Python Control Systems Library - <https://cl.ly/0Q2z091Y3s0J>
- GitHub repository – <https://github.com/DocVaughan/MCHE474---Control-Systems>
- **C.R.A.W.LAB** Equipment

Grading



- Homework - 10%
 - Due approximately bi-weekly
 - Electronic submission (pdf via email)
 - Will include some simulation/coding
 - *For you!*
- Mid-Term Exams - 36%
 - 2 exams, equally weighted
 - No calculators, no equations sheet, I provide paper
- Labs and Mini-Projects - 24%
- Final Exam - 30%

General Rules/Advice



- Be responsible for your own learning
 - If you have a question, ask
 - Try to understand, not memorize
- Be respectful of others. We have a course Code of Conduct that we will follow.



Questions?