Controls, Robotics, and Automation With Respect for Human Interaction

Dr. Joshua Vaughan

Rougeou 225

joshua.vaughan@louisiana.edu

@Doc_Vaughan

http://www.ucs.louisiana.edu/~jev9637/

C.R.A.W.LAB

Dr. Joshua Vaughan

Rougeou 225

joshua.vaughan@louisiana.edu

@Doc_Vaughan

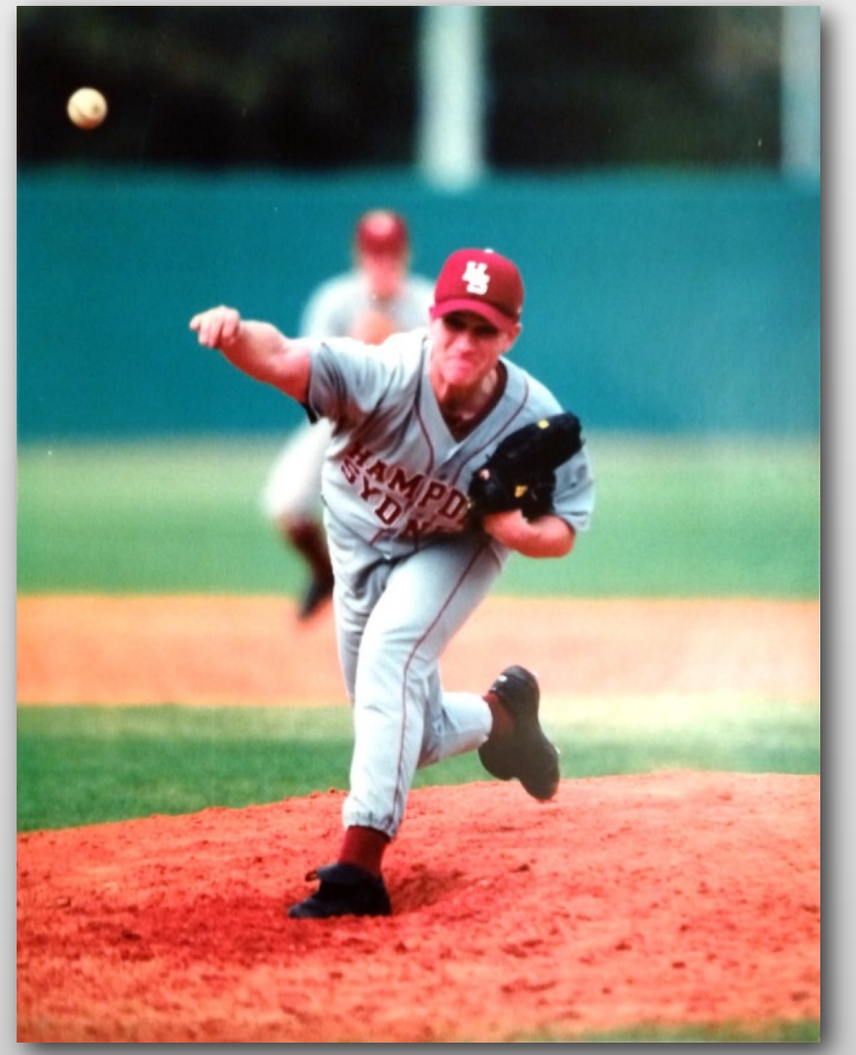
http://www.ucs.louisiana.edu/~jev9637/

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

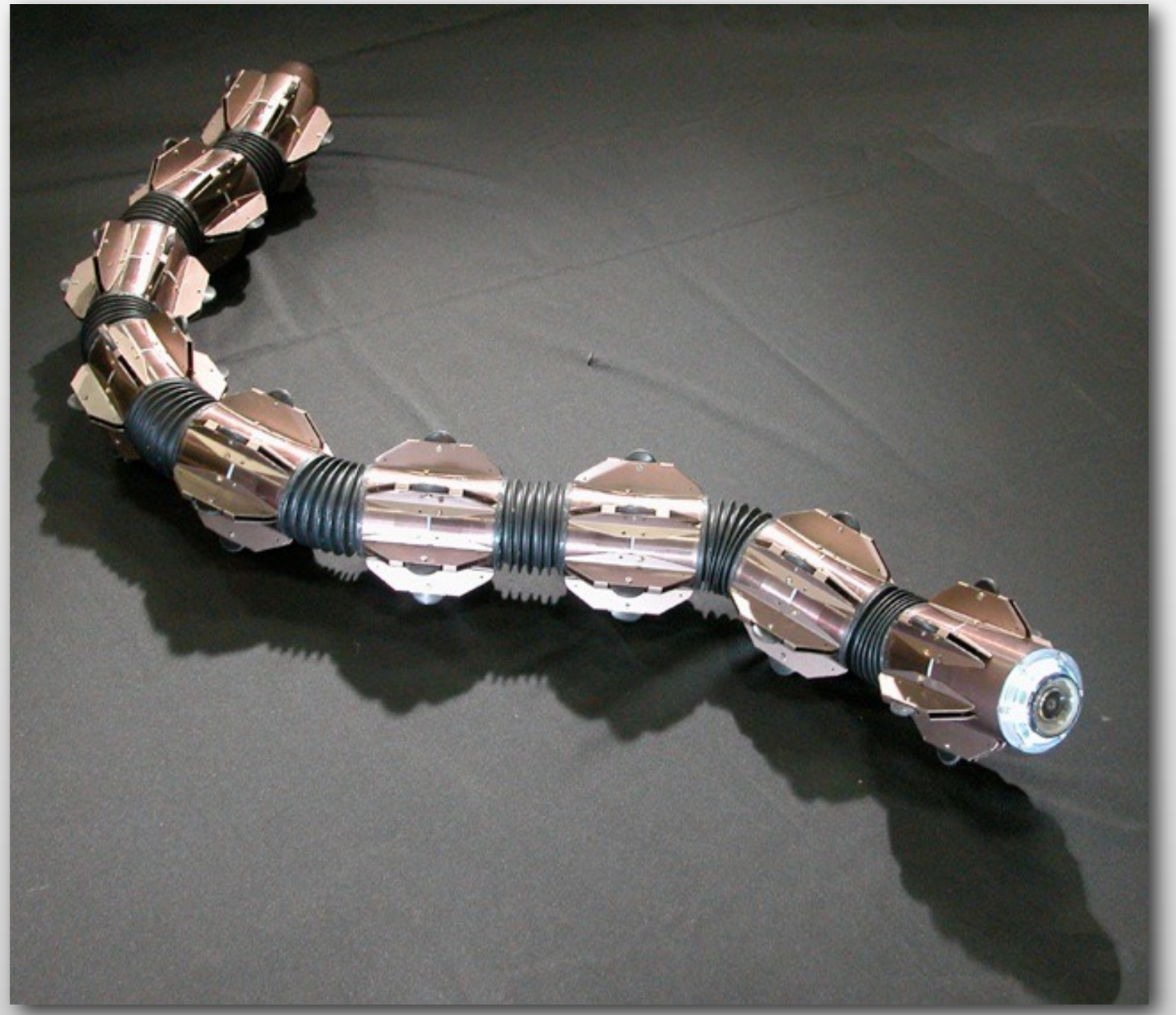
- Graduate School at Georgia Tech
  - Advisor: Dr. William Singhose
  - M.S. in May 2004
    - ✦ Thesis: *Active and Semi-Active Control to Counter Vehicle Payload Variation*
  - Ph.D. in August 2008
    - ✦ Thesis: *Dynamics and Control of Mobile Cranes*

Postdoc

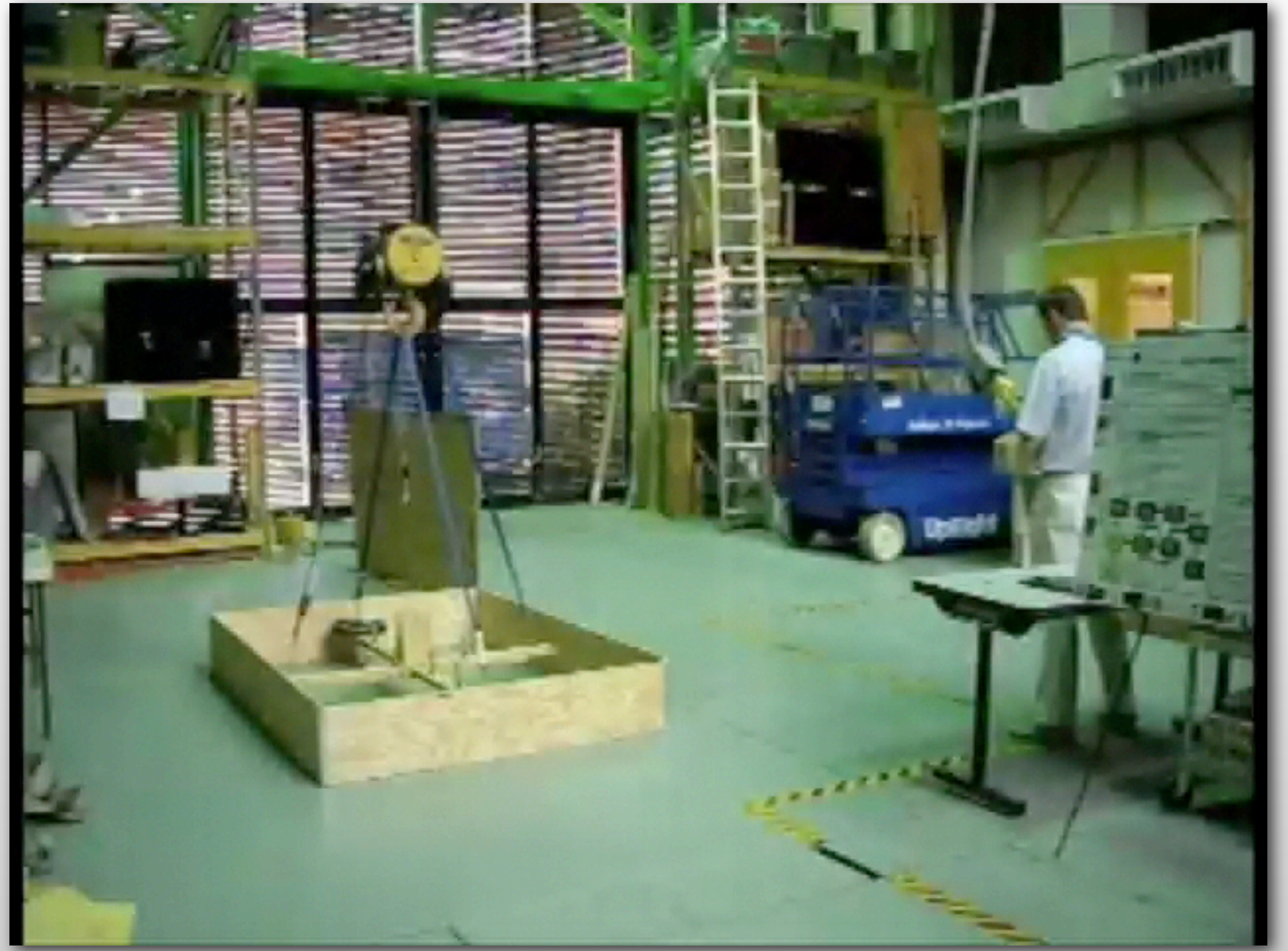
- Tokyo Institute of Technology with Dr. Shigeo Hirose

Postdoc

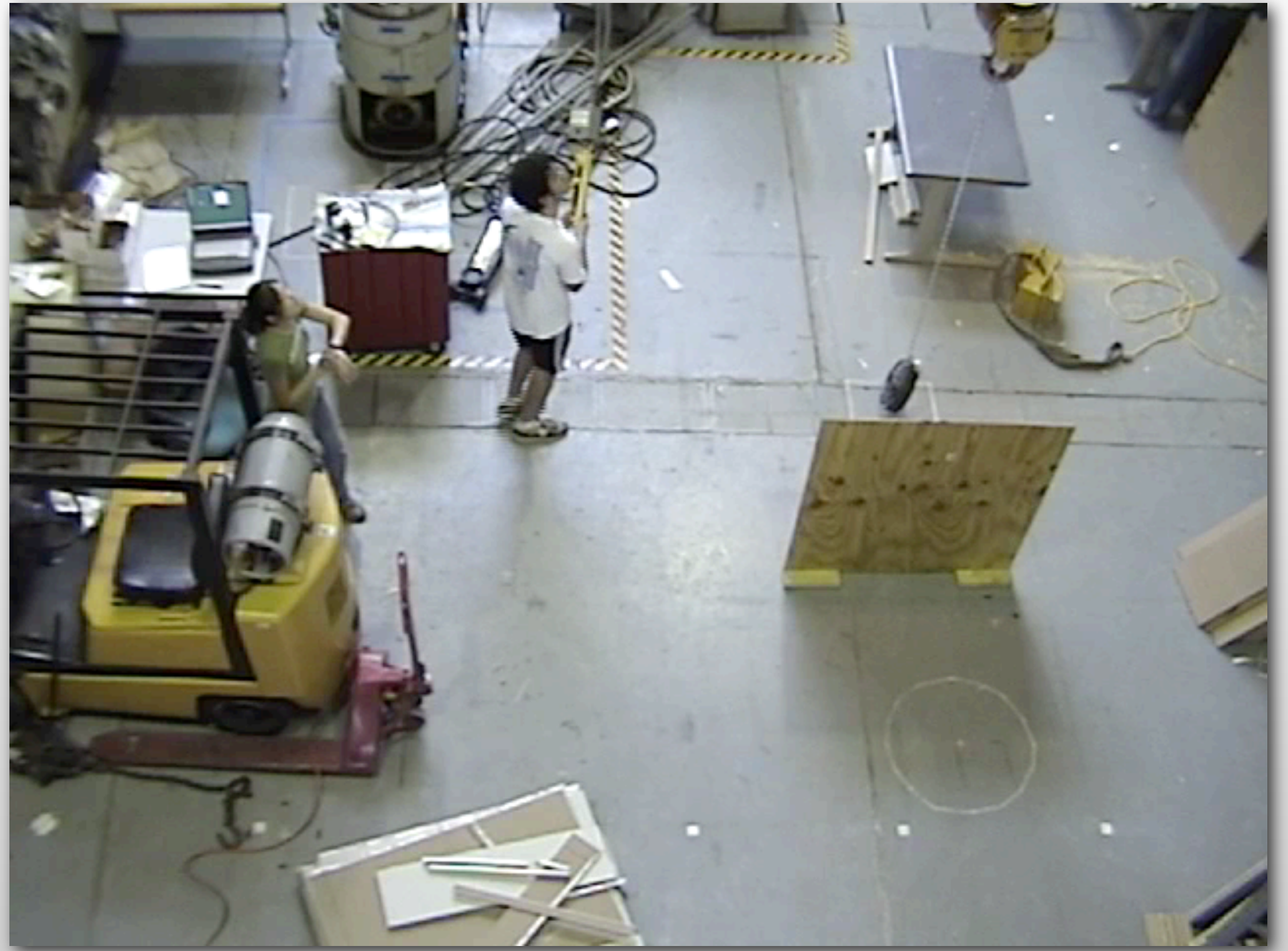
- Tokyo Institute of Technology with Dr. Shigeo Hirose



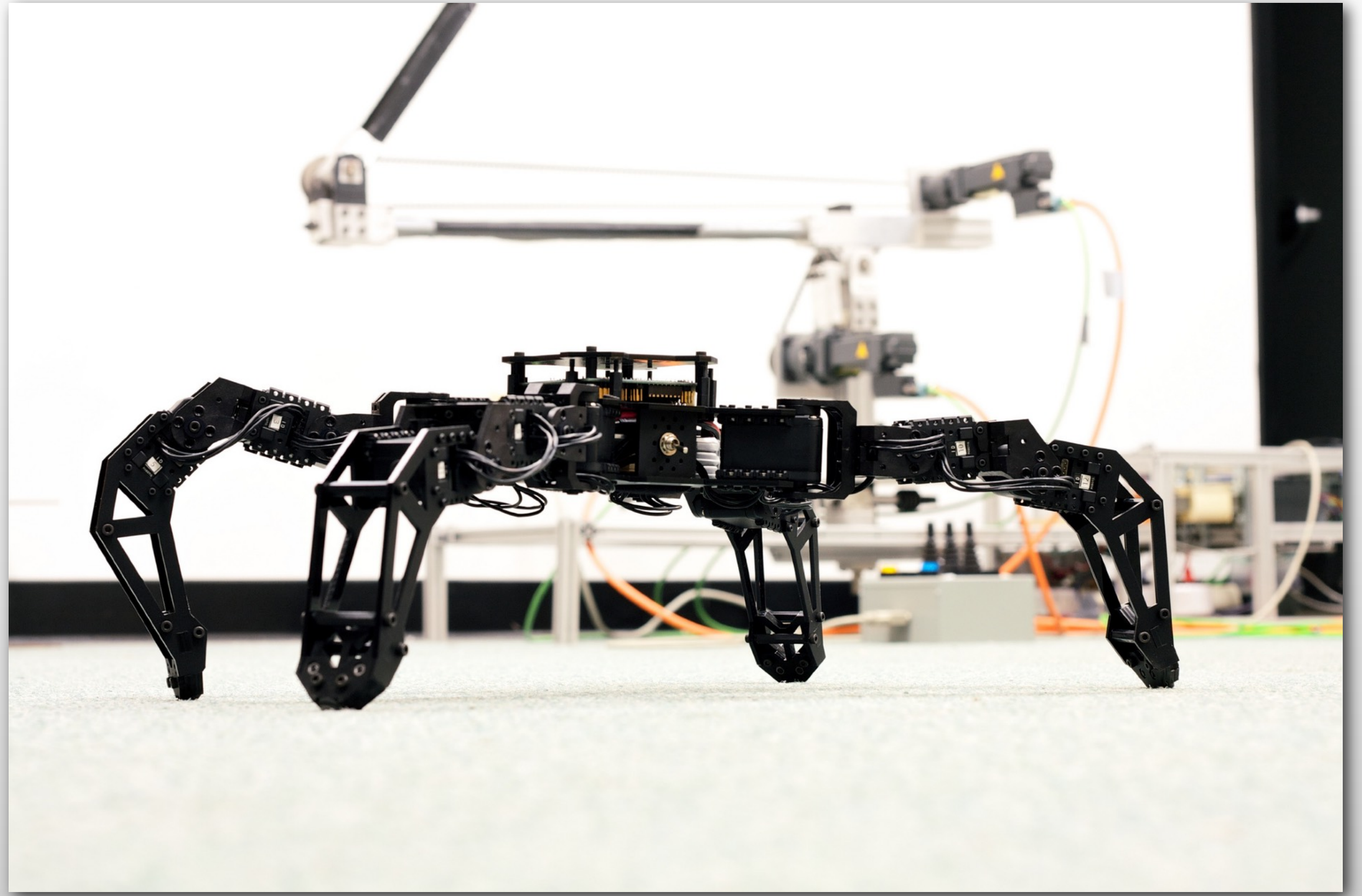
10-ton Bridge Crane



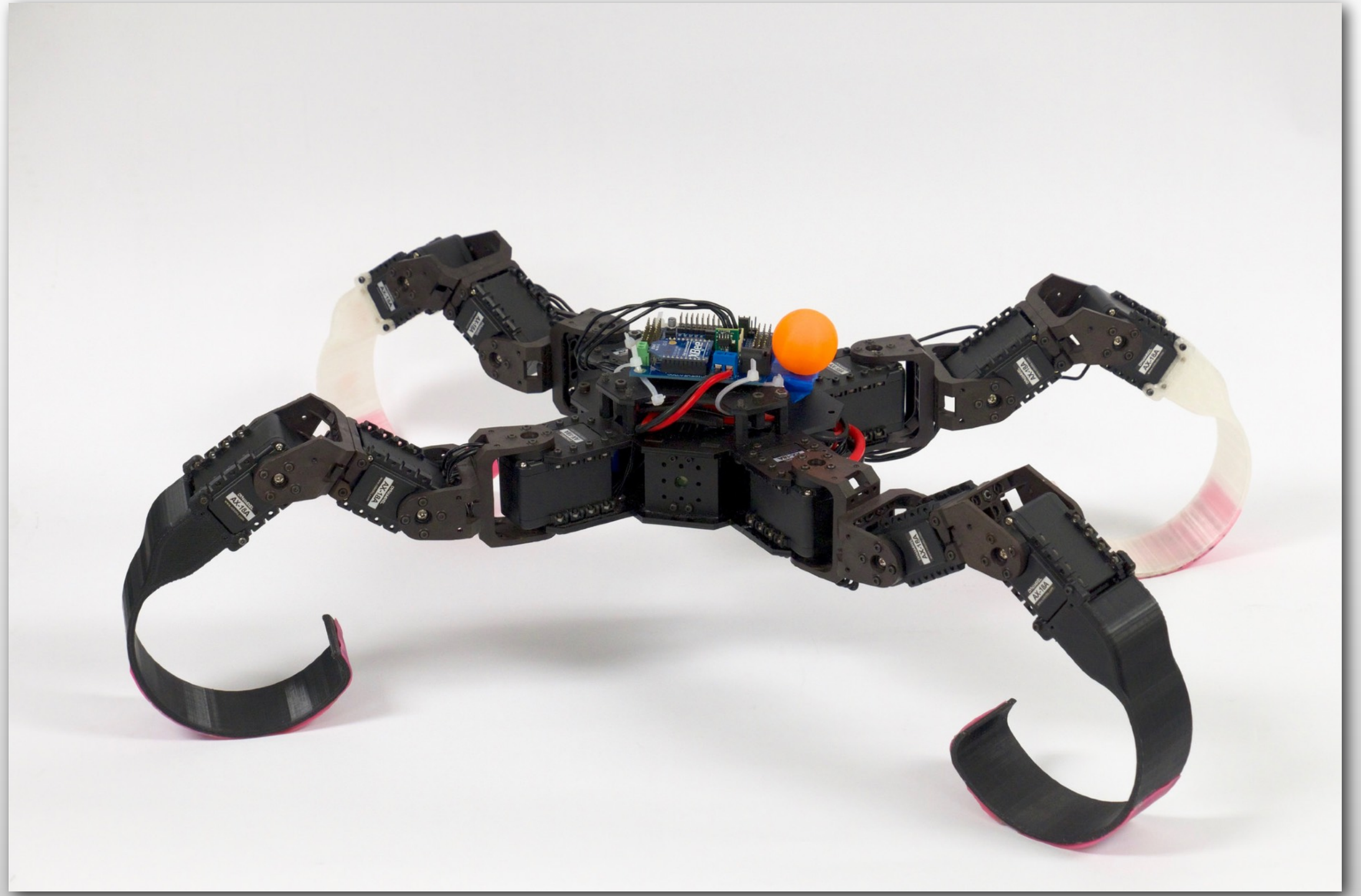
Example Multi-mode Crane Oscillation



Walking Robots



Walking Robots



Autonomous Surface Vehicles

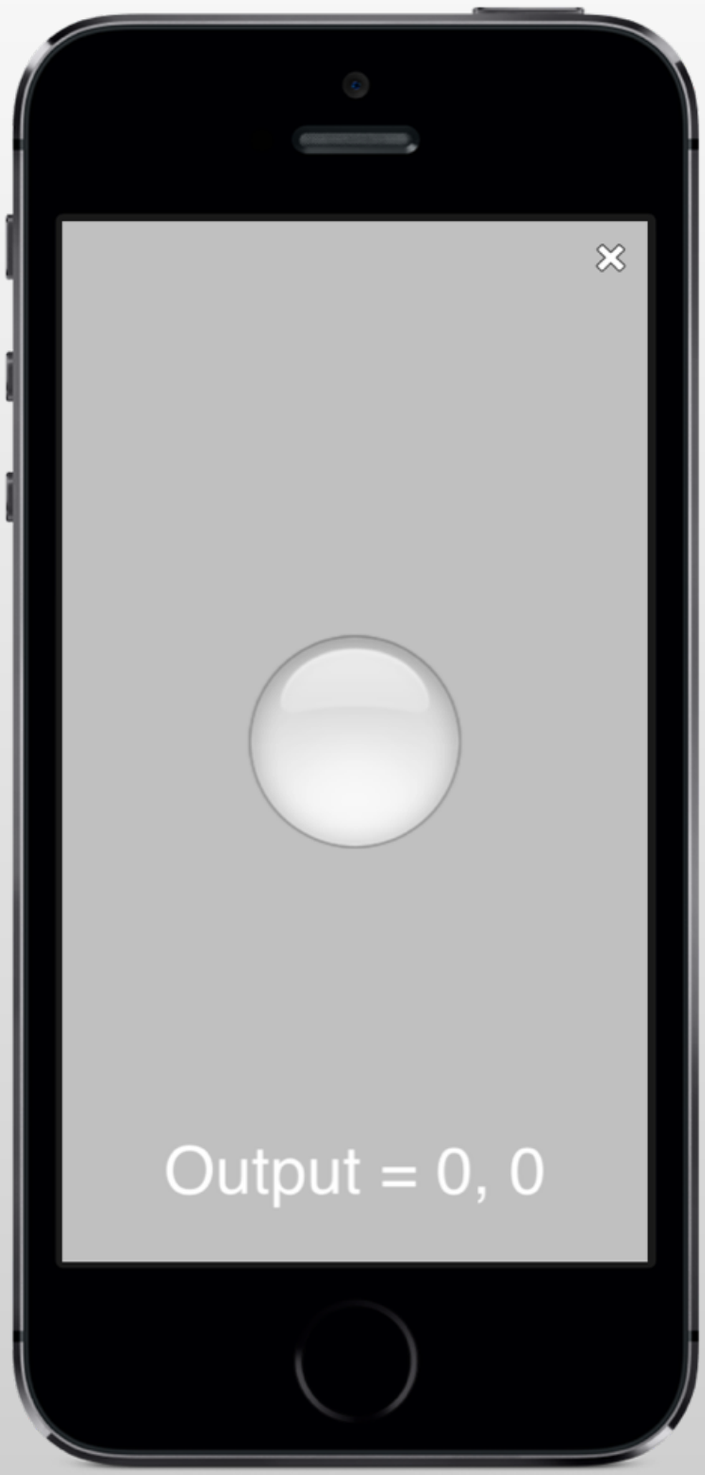
- Worked with Swiftships Shipbuilders, LLC
- Special Forces Boat – The Anaconda

Remote Control

- Gamepad

- iOS-based remote
  - Joystick
  - Tilt-based

- LEAP Motion Controller



LEAP Motion Control

Just a little while later…

2016 Maritime RobotX Challenge

Custom Kit from SparkFun

- Core is pyboard, a ARM-based microcontroller
- Write code in MicroPython
- ~$120
- http://sfe.io/w135021

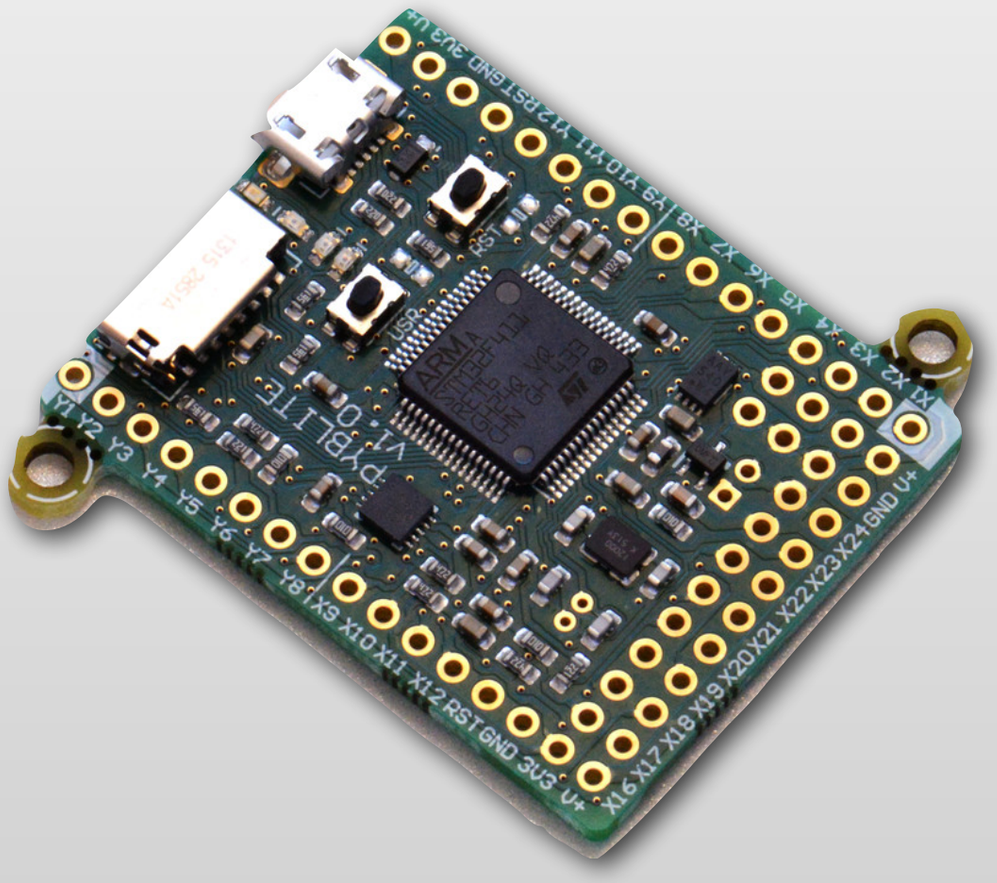


Photo from micropython.org

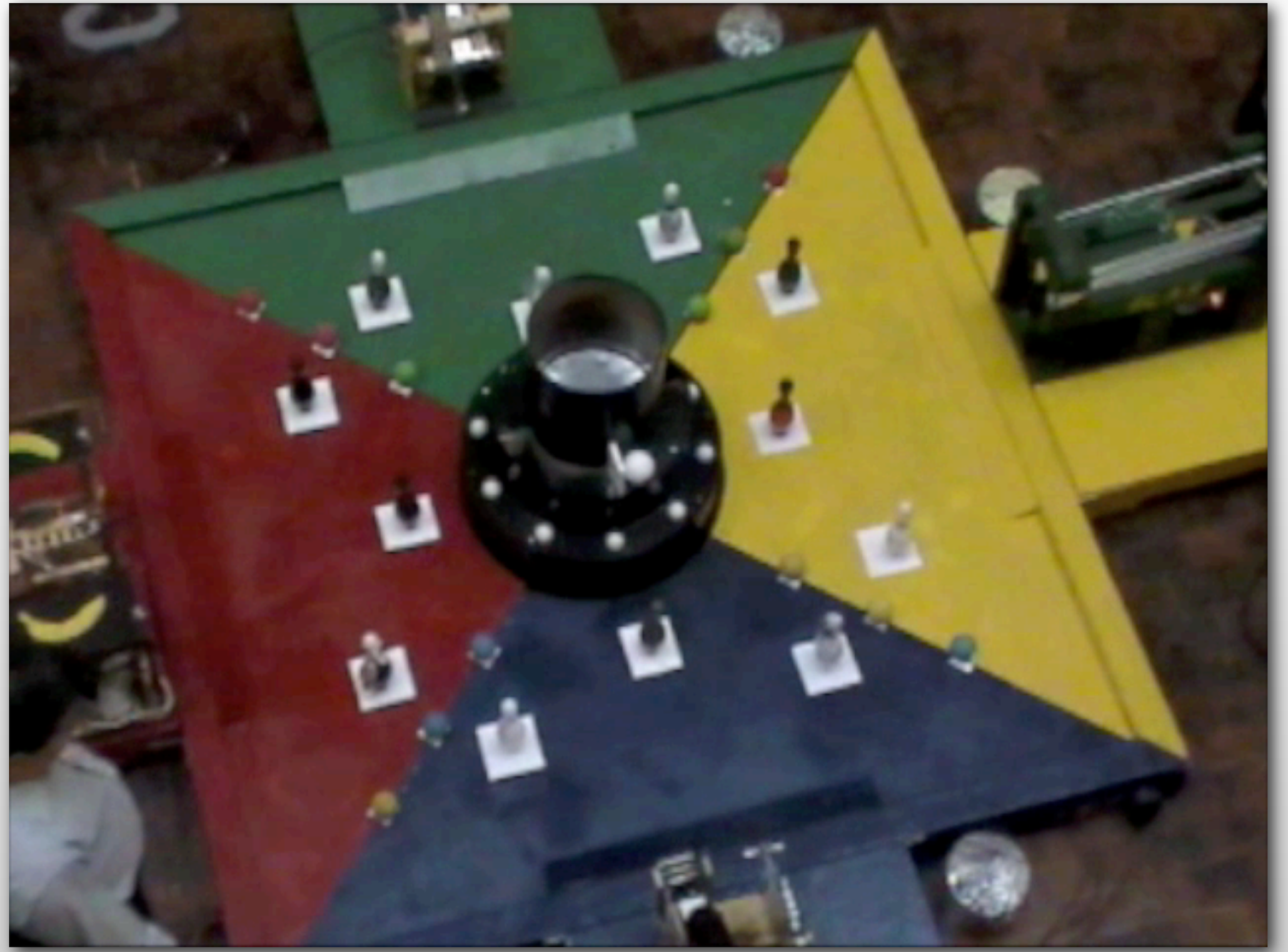
Final Project Kit

- Supported by UL Lafayette Educational Grant and STEP Grants
  - Better motors and driver
  - Solenoid
  - Distance sensor
  - Power Supply
  - Connectors for MCHE201 Track
- More this term!

Course Tools/Resources

- GitHub Repository – `https://github.com/DocVaughan/MCHE201---Intro-to-Eng-Design`
  - Example code
  - Report template
- Tons of info on class page
  - Links to pictures from past semesters
  - Video lectures on several topics (with more to come!)
  - Links to external sources of more information

ME2110 at Georgia TEch



MCHE201 – Spring 2015

An Invitation

What: MCHE201 Final Robotics Contest

When: Thursday, April 19th, 5pm – ~8:30pm

Where: Blackham Coliseum

Then, come win the contest this fall!!!

CanSat/ARLISS

- **A R**ocket **L**aunch for **I**nternational **S**tudent **S**atellites
- Held in fall in Black Rock, NV
- Two classes of competition
- Many more Japanese than American teams

The Black Rock Desert

The Launch

CanSat Class

- Size and weight of 12oz. beverage can
- Launched to ≈12,000 ft.
- Options:
  - *Mission* – Do something cool with the payload
  - *Comeback* – Autonomously navigate to target location

Open Class Comeback

- Must fit in 146mm diameter, 240mm deep cylinder and be less than 1050g
- Autonomously navigate to target
- Launched to ≈12,000 ft.

Open Class Comeback

- Must fit in 146mm diameter, 240mm deep cylinder and be less than 1050g
- Autonomously navigate to target
- Launched to ≈12,000 ft.

Open Class Examples

Open Class Examples

Open Class Examples

UL Lafayette's *First-Ever* Team

UL Lafayette's 2015 Team

UL Lafayette's 2015 Team

For High School Teams

- CanSAT-sized Mission Class entry
- Same microcontroller as MCHE201 kit
- Possible/likely inclusions:
  - Accelerometers
  - Barometric Pressure/Altitude
  - GPS
  - Camera

2015 Launches

- Launch 1 – `https://vimeo.com/docvaughan/arliss2015launch1`

- Launch 2 – `https://vimeo.com/docvaughan/arliss2015launch2`

Testing on the desert

- Pre-launch – `https://vimeo.com/docvaughan/2015prelaunchtesting`

- Post-launch – `https://vimeo.com/docvaughan/postlaunchtest2015`

flickr Albums from Past Teams

- 2014 – https://flic.kr/s/aHsk2LRZYC
- 2015 – https://flic.kr/s/aHsk6Xt1hc
- 2016 – https://flic.kr/s/aHskC3FrAj
- 2017 – https://flic.kr/s/aHskQREGFS

Thank You.