

# Zero to Root in 12 Months

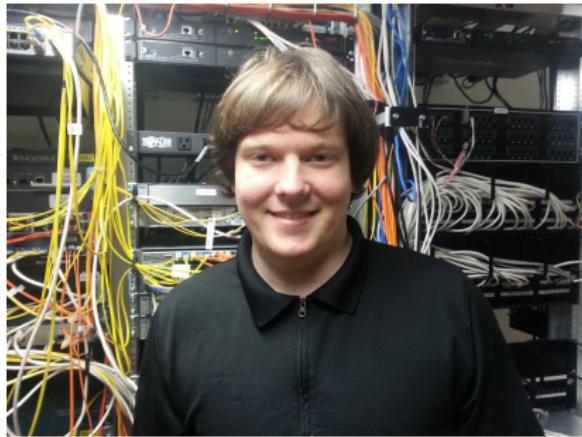
## Training and Utilizing Junior Sysadmins in Higher Education

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# Presenters

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# ROV 2009 and 2010

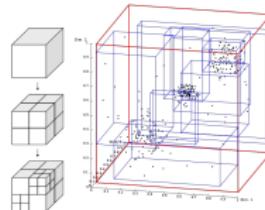
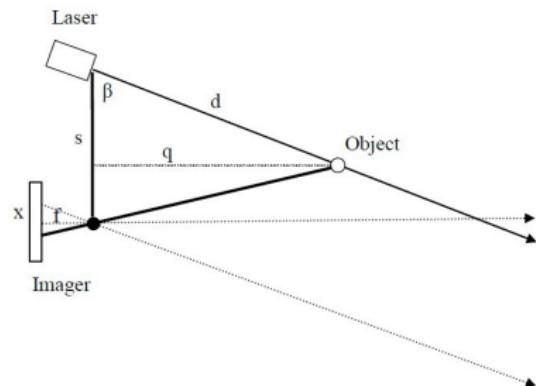
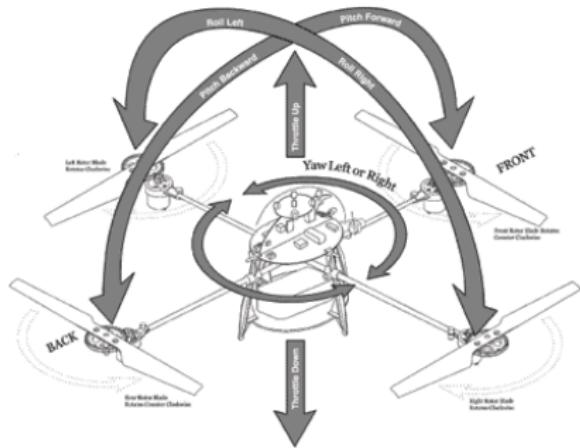
- ▶ 2009 and 2010
- ▶ Underwater Remote Operated Vehicle
- ▶ Marine Advancement for Technology Education (MATE) Center
- ▶ 2009 - Boston, Mass. - 28th
- ▶ 2010 - Hilo, Hawaii - 18th
- ▶ No members of the 2009 team remain, the torch has been passed
- ▶ Switched away from MATE in 2011, seeking new challenges

# International Aerial Robotics Competition

- ▶ Mission
  - ▶ Covertly infiltrate a secret installation
  - ▶ Recover and replace USB stick without being detected
- ▶ Rules
  - ▶ 10 Minutes
  - ▶ Cannot Land
  - ▶ Completely Autonomous
- ▶ IARC
  - ▶ 6th IARC Misson in about 20 years
  - ▶ 1k entry fee(hopefully get waived), 20k grand prize
  - ▶ Mission went uncompleted last year
  - ▶ Designed so that “No currently existing craft can complete the mission”
  - ▶ AUVSI, Association for Unmanned Vehicle Systems International

# The very basics of the plan

- ▶ Quadrotor
- ▶ Mapping and Octrees
- ▶ Perform SLAM
- ▶ AI



# Using school and internet resources to increase efficiency

The collage includes the following screenshots:

- IARC Portfolios State (IARC Robot)**: A screenshot of a web-based portfolio system showing a list of projects and tasks.
- Google Groups (PSU ROV)**: A screenshot of a Google Group inbox with several messages from members like Greg, Spencer, and William.
- github.com (PSU-ROV)**: A screenshot of a GitHub repository for PSU-ROV, showing branches like 'master' and 'TweetyCentral' with recent commits.
- Google Groups (IARC)**: A screenshot of another Google Group inbox with messages from members like Greg, Spencer, and William.
- Issues (IARC)**: A screenshot of a JIRA-like issue tracking system showing a list of issues categorized by priority.
- Google Sheets (PDX-ROV 2011 Budget)**: A screenshot of a Google Sheet containing a budget table with columns for Part Name, Quantity, Price Per Unit, Order #, and Total Price.
- Code Editor (Screenshot)**: A screenshot of a terminal or code editor window showing a list of files and a partially visible code snippet.

# Close, but not there yet

- ▶ Quadrotor mechanical done
- ▶ Capable of brief flights
- ▶ Closed loop stabilization in 'tweaking' phase
- ▶ Craft takes off, hovers for a few seconds, 'lands'
- ▶ Need floating point unit
  - ▶ Complexity bump
- ▶ 3 PCBs are in the works
  - ▶ Sensor/control board has been prototyped and built once already
  - ▶ Power board has been prototyped
  - ▶ ESC board has been whiteboarded

# Pieces have moved forward, much remains to be done

- ▶ Hokuyo conversation demonstrated
- ▶ Pandaboard/Beagleboard flashed, configured
- ▶ Messaging code(0mq) has been written, but needs to be fleshed out
- ▶ SLAM(Tinyslam) has been investigated, but needs to be worked on a lot
- ▶ AI(A\*?) Hasn't been touched, needs a ton of work

# Things that have tripped us up

- ▶ Noise
- ▶ Sensor drift
- ▶ The accelerometer conspiracy
- ▶ The super-tool problem
- ▶ The leaf problem
- ▶ Cosine function

# Really cool things that happened

- ▶ Greg wrote an RTOS
- ▶ Bribed mechanical engineers
- ▶ Kept the number of 'black boxes' to an absolute minimum
- ▶ Set up foodbot

Flight Components:

<i>Carbon Fiber Frame</i>	\$100.00
<i>2 Motors</i>	\$89.98
<i>PCB ESCs</i>	\$100.00
<i>Battery Charger</i>	\$119.99
	<b>\$410.97</b>

Navigation Components:

<i>PandaBoard Minicomputer</i>	\$174.00
<i>Printed PCB and components (control)</i>	\$200.00
<i>Printed PCB and components (power)</i>	\$100.00
<i>Digital inertial measurement unit</i>	\$64.95
<i>Protoboard and components</i>	\$100.00
	<b>\$638.95</b>

Miscellaneous:

<i>Testing Equipment</i>	\$100.00
<i>Unplanned Expenditures(S&amp;H)</i>	\$200.00
	<b>\$300.00</b>

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Total: **\$1316.84**

# Thank You very much

- ▶ Once again, we're the PSU Remote Operated Vehicle Team
- ▶ I, and my teammates as well, strongly support this pilot program because our experience last year with getting involved in student engineering was the highlight of my college experience to date.
- ▶ Thanks Again!

# We want you

- ▶ Google Group - psu-rov@googlegroups.com
- ▶ Redmine - rov.cs.pdx.edu
- ▶ Weekly Meetings - FABC 86-04 - 1:00pm Saturdays
- ▶ IRC #rov, irc.cat.pdx.edu