

# ENPH 253

# Intro to Instrument Design

Google ENPH 253 kickoff 2014

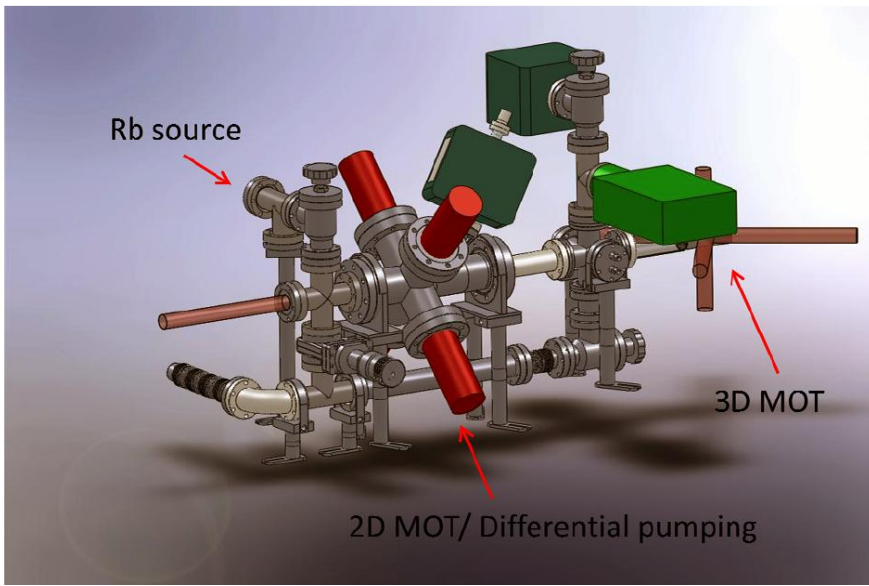
Jon Nakane / Bernhard Zender / Andre Marziali  
UBC Engineering Physics Project Lab  
2013 Nov 12

1. Example Senior Projects

2. ENPH 253

3. How you can get ready  
for summer

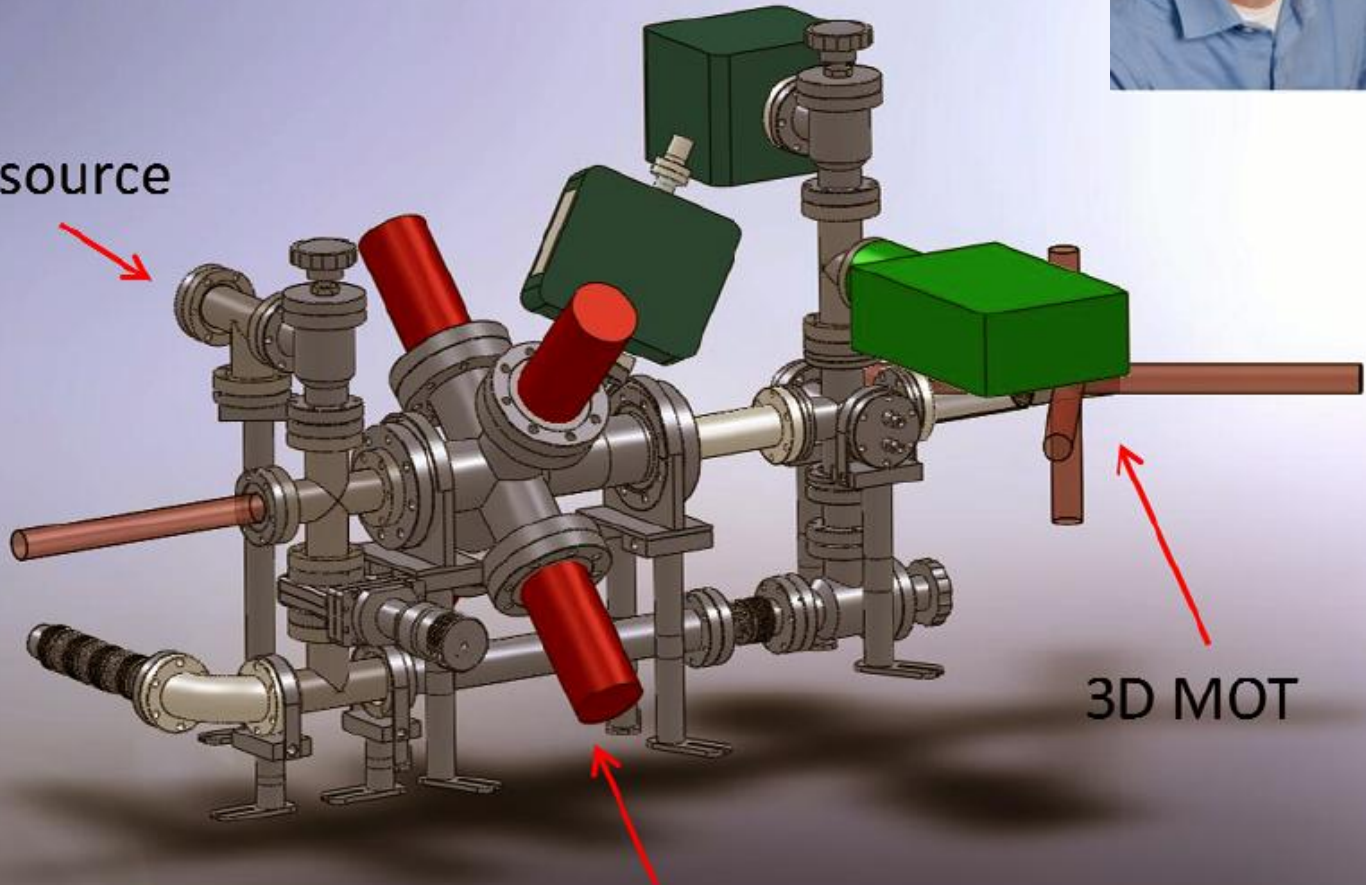
# 1. Examples of Senior Projects (enph 459 and 479)



# 2D Magneto-Optical Trap (Kirk Madison)



Rb source



3D MOT

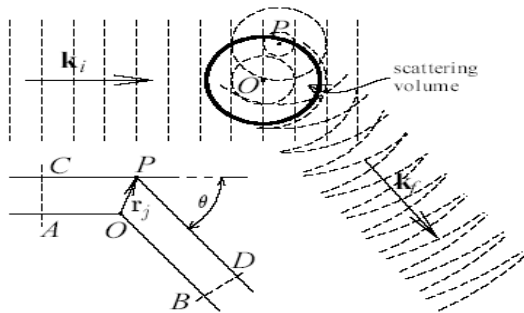
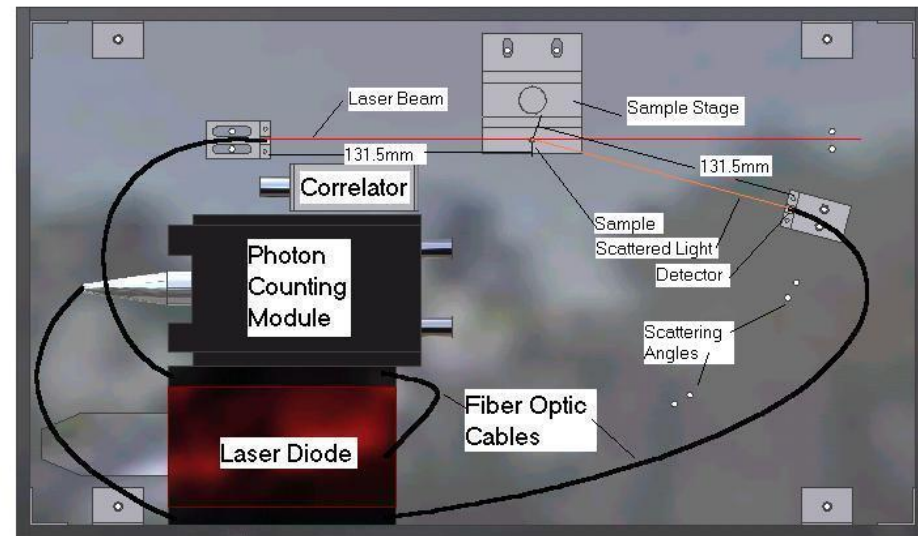
2D MOT/ Differential pumping



# Dynamic Light Scattering Prototype for Measuring Platelet Quality (Elisabeth Maurer)



Canadian Blood Services  
Société canadienne du sang





LightIntegra  
TECHNOLOGY

Company started based  
using 479 prototype

[Home](#) [About](#) [Technology](#) [Publications](#) [Contact](#)



## Platelets save lives. **We save platelets.**

**ThromboLUX™** is a quick and simple diagnostic test for platelet quality and function that will make it easy to screen platelets prior to transfusion.

Traditional methods of platelet quality testing are unreliable, time consuming, expensive and not used routinely. LightIntegra intends to make platelet quality testing a regular practice in blood banks around the world by making it accessible, affordable, reliable and fast.



# Electric conversion of mini cooper (there's a mini cooper in Hennings!)





# Titanoboa vs. the Mondo Spider



c. List of Projects

1. [ % ] Optical fiber polishing station with real-time microscopic inspection capability (Jones)
2. Solar Blind Extreme Ultraviolet (XUV) Detectors (Jones)
3. [ & ] Magnetic Resonance Imaging Field Stabilizer (Michal)
4. Circular Saw Vibration Frequency and Mode Shape Indicator (Schajer)
5. Accurate drug dosing in children (AnserminoDumontLarson)
6. Five projects from Zaber (Zaber Technologies)
7. [ & ] Pan & Tilt Drop Camera (Dennison/HarveyClark)
8. Bidirectional Single Cable Power and Signal to ROV (Dennison/HarveyClark)
9. ROV (Dennison/HarveyClark)
10. Inkjet micropatterning process for nanostructured field emission displays (Wang/Walus)
11. Acoustic Imaging (Waltham)
12. [ & ] Field Test and Modify Plumbing Endoscope for Seawater Deployment (MarliaveVanAqua)
13. Development of an electric bike mapping, performance analysis, and visualization program (Hodgson)
14. Building acoustical-environment monitoring system (Hodgson)
15. [ & ] Robotic Origami (Olson)
16. Design and construction of an instrument for 2D conductivity mapping of nanocomposite film

# c. List of Projects

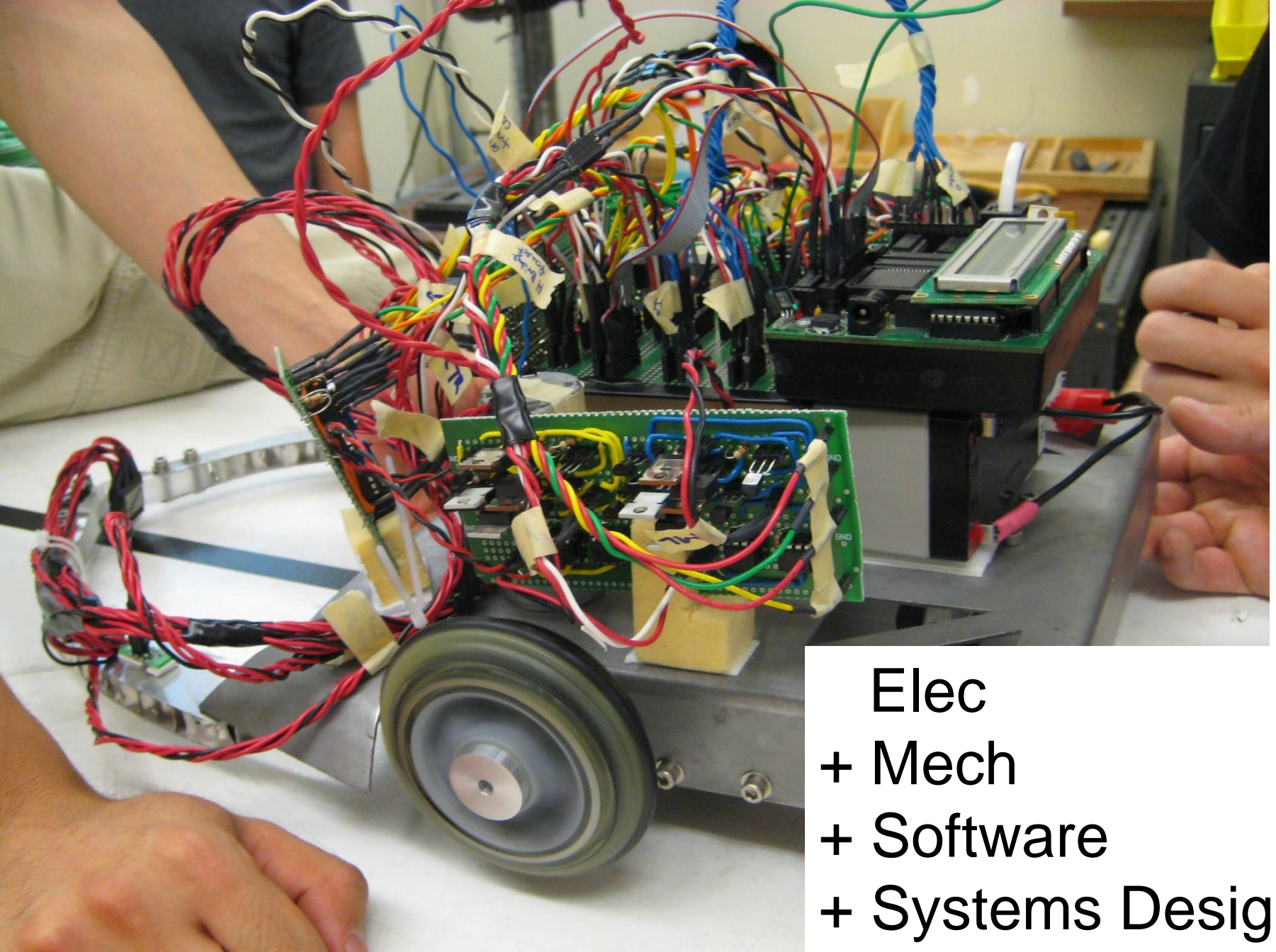
1. [ % ] Optical fiber polishing station with real-time microscopic inspection capability (Jones)
2. Solar Blind Extreme Ultraviolet (XUV) Detectors (Jones)
3. [ & ] Magnetic Resonance Imaging Field Stabilizer (Michal)
4. Circular Saw Vibration Frequency and Mode Shape Indicator (Schajer)
5. Accurate drug dosing in children (AnserminoDumontLarson)
6. Five projects from Zaber (Zaber Technologies)
7. [ & ] Pan & Tilt Drop Camera (Dennison/HarveyClark)
8. Bidirectional Single Cable Power and Signal to ROV (Dennison/HarveyClark)
9. ROV (Dennison/HarveyClark)
10. Inkjet micropatterning process for nanostructured field emission displays (Wang/Walus)
11. Acoustic Imaging (Waltham)
12. [ & ] Field Test and Modify Plumbing Endoscope for Seawater Deployment (MarliaveVanAqua)
13. Development of an electric bike mapping, performance analysis, and visualization program (Hodgson)
14. Building acoustical-environment monitoring system (Hodgson)
15. [ & ] Robotic Origami (Olson)
16. Design and construction of an instrument for 2D conductivity mapping of nanocomposite film

- 75+ available projects from Faculty & Industry Sponsors
- Self-sponsored projects can be done for credit, funding (e.g. \$10,000 Bycast Award for ENPH students)

**2.**

**ENPH 253**

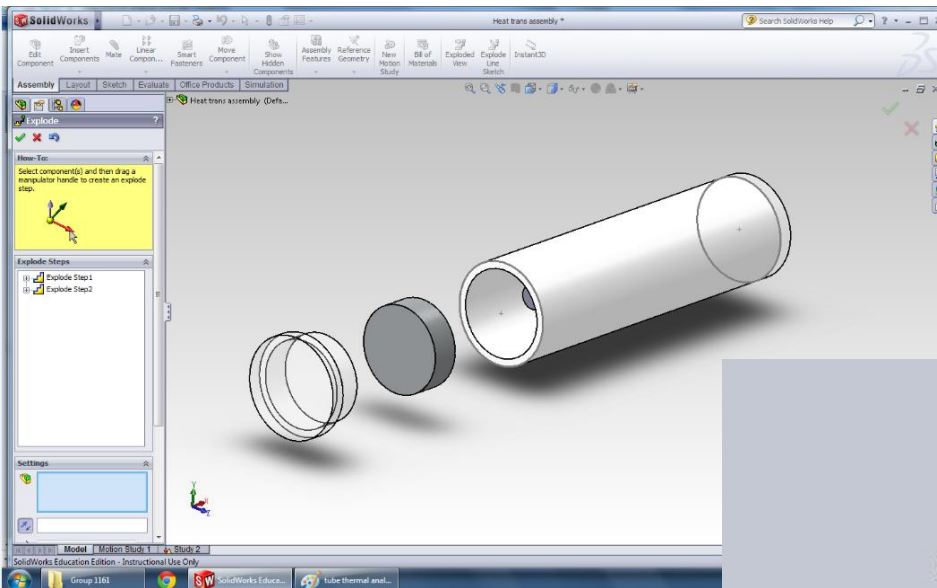




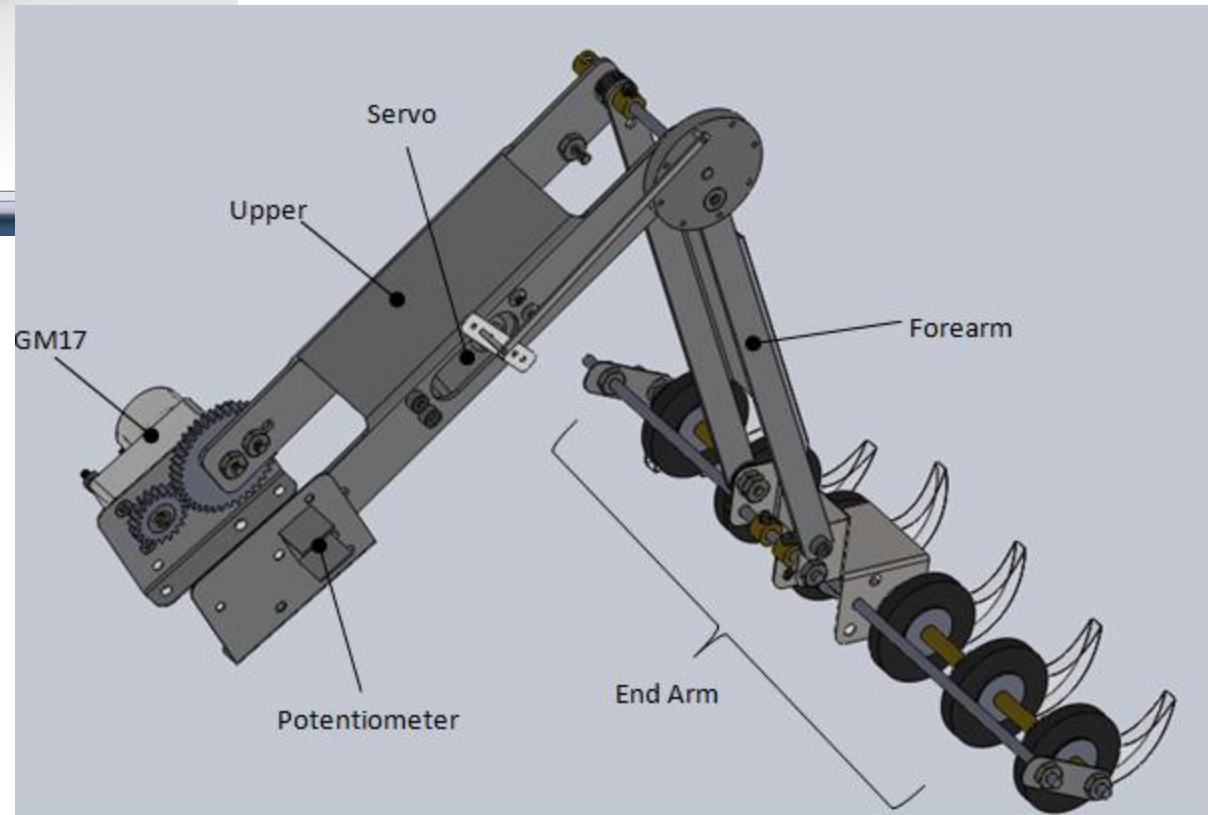
Elec  
+ Mech  
+ Software  
+ Systems Design



# Solidworks

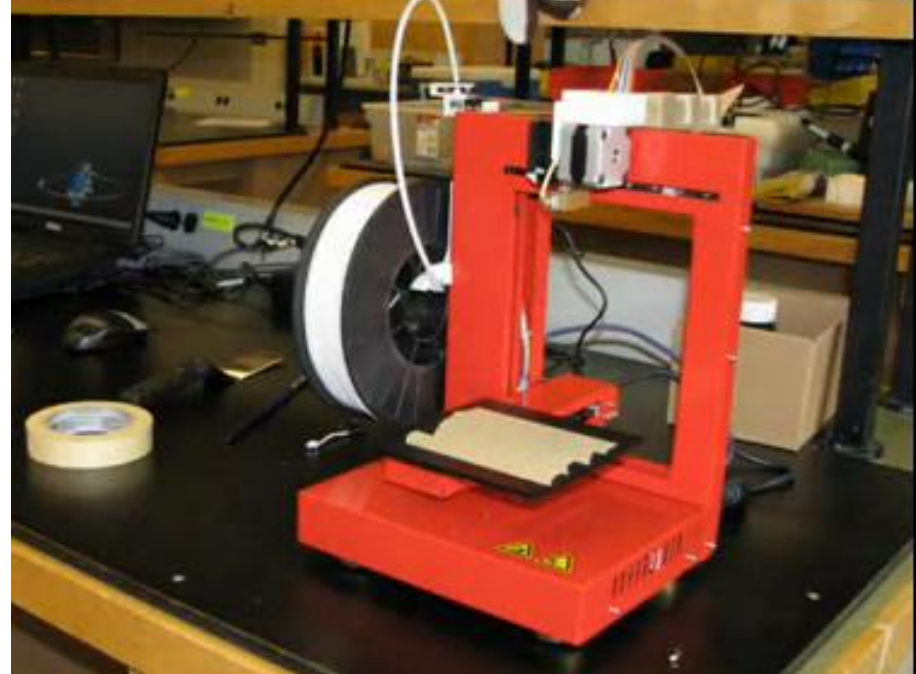


You can pick up the software and UBC educational license info from the Project Lab.





**WaterJet cutter**



**3D printers**

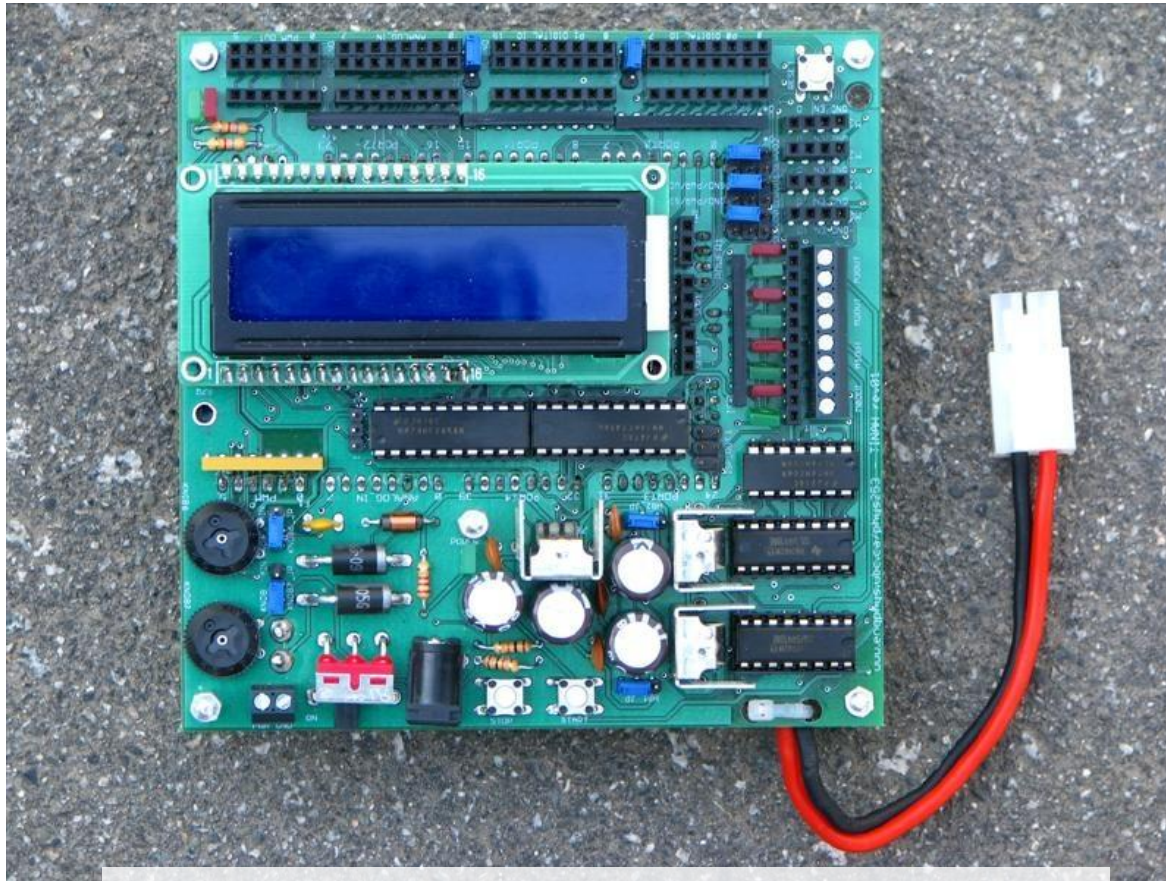


**50w Laser Cutter**

+ 10hr introduction to Student Machine Shop + sheet-metal tools + spot welder + powder coating + hand tools ....

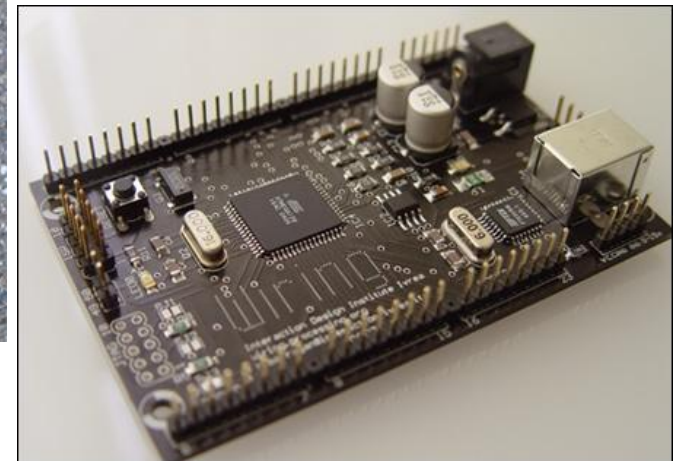


# Programming / Control



Based on Wiring  
Board Environment  
([www.wiring.org.co](http://www.wiring.org.co))

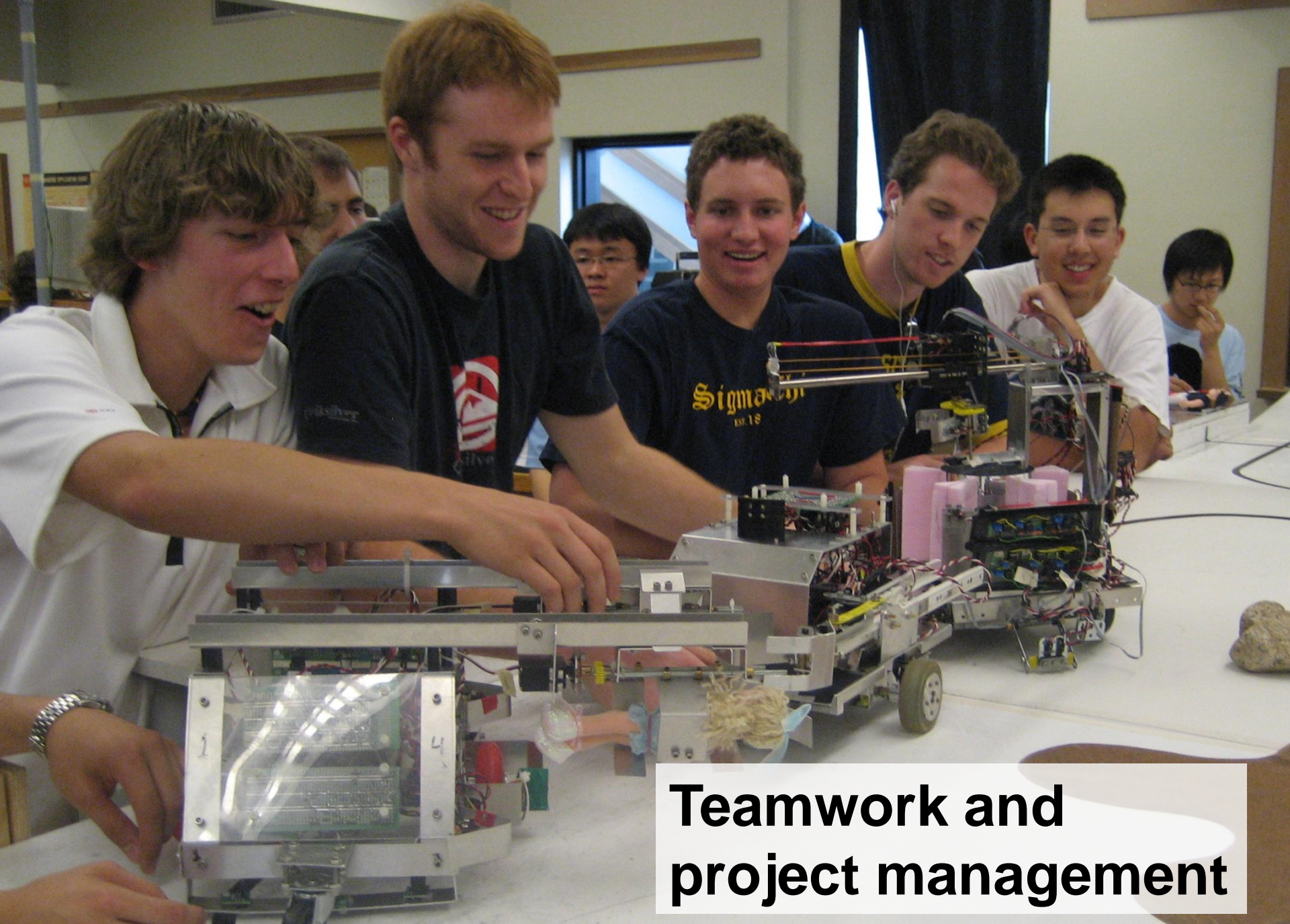
Similar development  
to Arduino  
([www.arduino.cc](http://www.arduino.cc))



TINAH interface board

(Funding from Skylight, Teaching Learning Enhancement Fund)





**Teamwork and  
project management**



# We monitor team interactions (e.g. class survey).

6. For the next section of questions, please indicate your own (and your perception of your team members) competency in each of the following areas.

Use this as a scoring rubric:

Excellent (> 85)

Typical student in Phys 253 (middle 2/3 of class) ( 75-85 )

Issues but OK ( 65-75 )

Major Issues (< 65)

	Yourself	TeamMember1	TeamMember2	TeamMember3
Awareness of Personality Preferences - Recognize a variety of working and learning preferences; appreciate the value of diversity on a team	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Team Communication - Communicate effectively with other team members	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Responsibility - Assume responsibility for own work and participate equitably	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Initiative - Exercise initiative and contribute to team goal-setting	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Leadership - Demonstrate capacity for initiative and technical or team leadership while respecting others' roles	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Professional Behaviour - Demonstrate punctuality, responsibility and appropriate communication etiquette	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>
Meeting Participation - Participate actively in meetings, helps to generate ideas	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>	<input type="text" value="80"/>

# FYI, your summer schedule is packed. (first 6 weeks of summer)

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:30	250-941	270-941	250-941	270-941	250-T91
9:00					
9:30					
10:00					270-T91
10:30	Math 307	257-941	Math 307	257-941	
11:00					
11:30		257-T91		257-T91	
12:00					APSC 203
12:30		Math 307		Math 307	
1:00	257-L01 /		257-L01 /		257-L01 /
1:30	253-L01		253-L01		253-L01
2:00		253-941		253-L01	
2:30					
3:00					
3:30					
4:00					
4:30					
5:00					
5:30					

# 253 schedule in July....

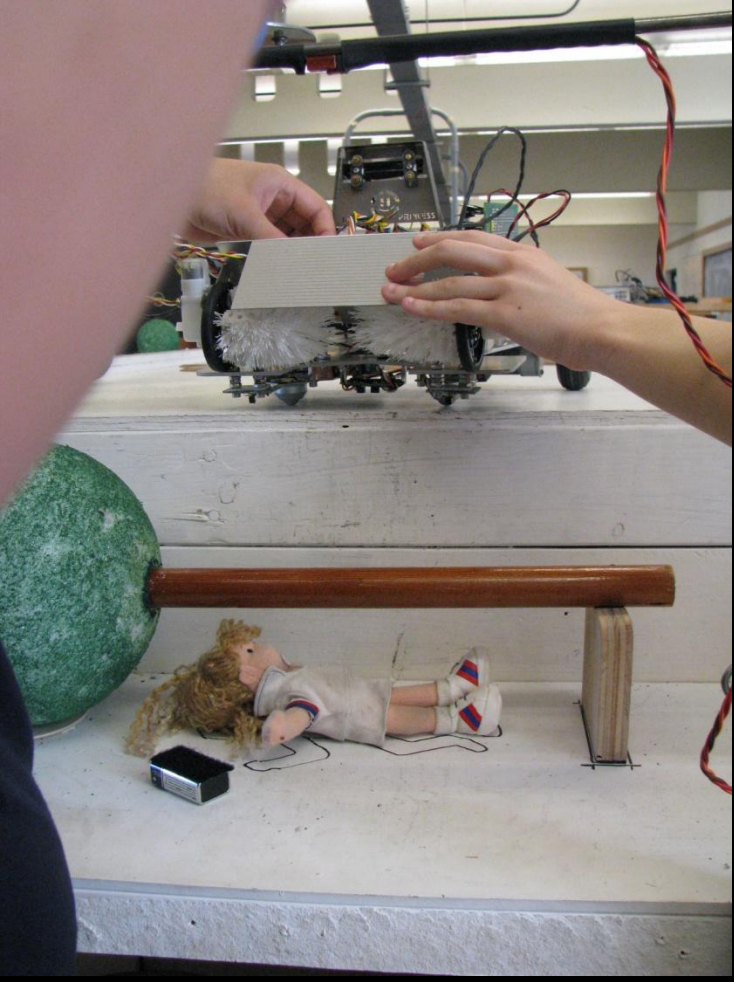
July											
9	1	2	3	4	5	6	7	8	9	10	11
	CDay	<b>Canada Day</b>									
			start: RS	start: ML	start: YR	start: JN, BZ					
			close: YR, BZ	close JN	close: RS, AM	close: JN, BZ					
			2 - 8pm	12:30 - 8pm	2 - 8pm	12:30 - 6pm					
10	8	9	10	11	12	13	14	15	16	17	18
			9am-noon								
		start: JN	start: RS	start: ML, BZ	start: YR	start: JN, BZ					
		close ML	close: YR, BZ	close JN	close: RS, AM	close: JN, BZ					
		12:30 - 8 pm	9-noon, 2-8pm	12:30 - 8 pm	9-noon, 2-8pm	12:30 - 6 pm					
11	15	16	17	18	19	20	21	22	23	24	25
			closed in morning			<b>Class meeting</b>	<b>phys 250 final</b>				
			due to phys250 review			<b>2:30pm. Everyone please attend.</b>					
		start: JN	start: RS	start: ML, BZ	start: YR	start: JN, BZ					
		close ML	close: YR, BZ	close JN	close: RS, AM	close: JN, BZ					
		9am - 11 pm	2pm - 11pm	9am - 11pm	9-noon, 2 - ??pm	12:30 - 6 pm					
12	22	23	24	25	26	27	28	29	30	31	1
			<b>Time Trials</b>		<b>math 307 final</b>						
		start: JN, RS		start: ML, BZ	2pm: YR	9am: YR					
		close ML, YR		close JN	close: RS, AM	close: JN, BZ					
		9am - 11pm	Lab Closed	9am - 11pm	2pm- 11pm	9am-9pm					

## Other details:

- 13-week summer term (May 12 – Aug 7<sup>th</sup>).
  - 6 weeks labs and training, 6 weeks build time.
  - Groups of 4 students (very rarely 3 or 5)
- Ties to other courses:
  - APSC 203 – assignments tied to robot proposal document
  - PHYS 257 (thermodynamics) – solidworks used to generate thermal models
  - PHYS 270 – possible interactions with Mechanics II



# Previous Competitions



Summer 2009 :

# Rescue Bots

UBC Engineering Physics



Summer 2010 challenge:

# Robo-Racers



# Summer 2011 – Climber-Bots



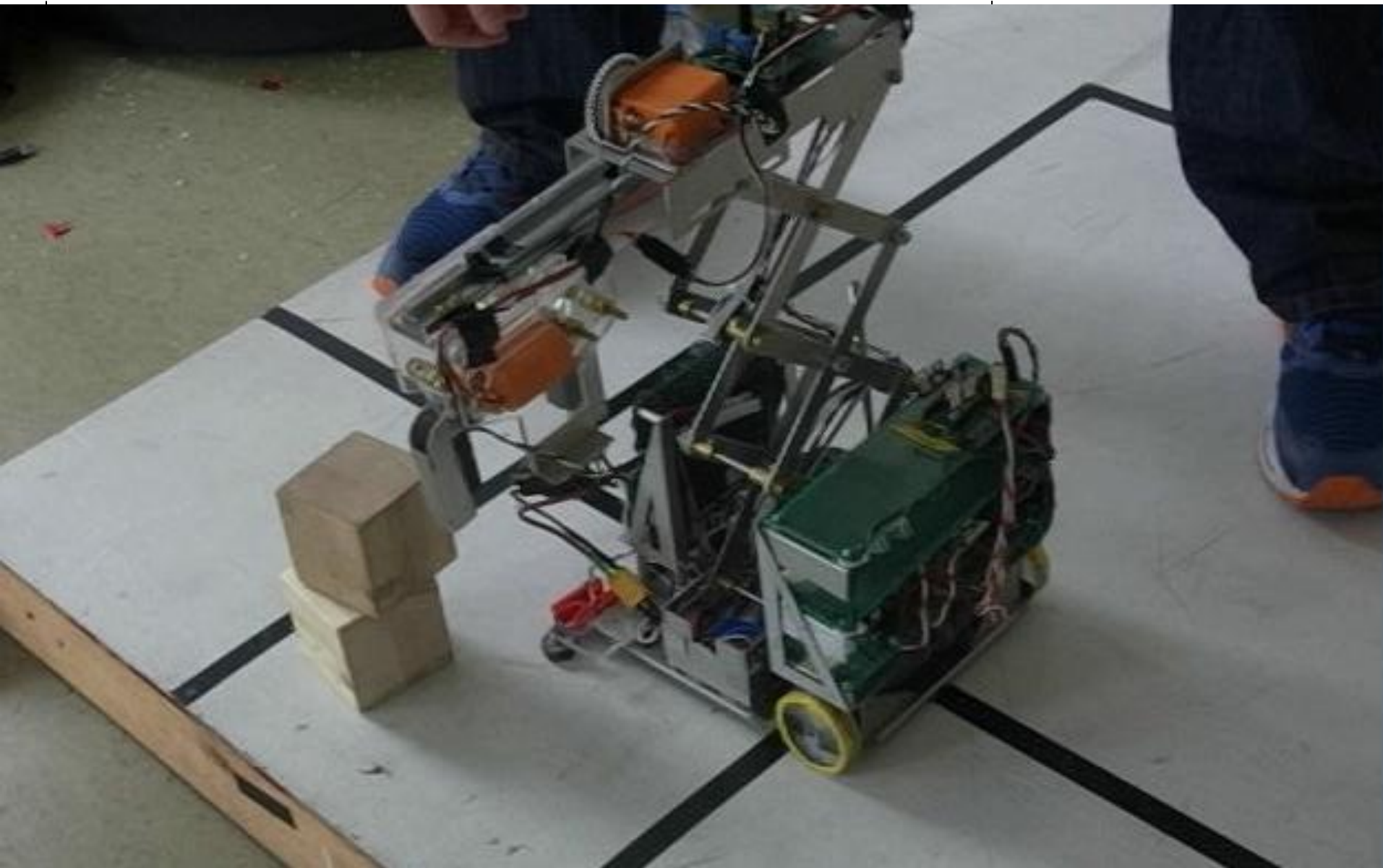
1:00 / 3:05

CC 360p





# Summer 2012 – Build-Bots





3.

Ways to get  
ready for next  
summer

1. Plan your summer accordingly (additional courses, jobs, commitments, etc)
2. Check out Phys 253 website, and last year's course website:

[projectlab.engphys.ubc.ca/enph253](http://projectlab.engphys.ubc.ca/enph253)

3. Get your Solidworks license now

[projectlab.engphys.ubc.ca/solidworks/](http://projectlab.engphys.ubc.ca/solidworks/)

4. Arduino kits for sign-out in Woodward Library



4. On campus in the spring? Contact the Project Lab for additional training (parts recovery, simple electronics debugging, etc).
5. Look at the online list of projects and think about what you want to do:

[projectlab.engphys.ubc.ca/available-projects/](http://projectlab.engphys.ubc.ca/available-projects/)

End.