Intro to Electronics

1. What's a microcontroller?
2. Projects we've done at UBC
3. Hands-on intro to electronics kits, boards.

4. Tours of our lab (~5pm?)

Shad Valley UBC 2011
Jon Nakane
UBC Engineering Physics
2011 July

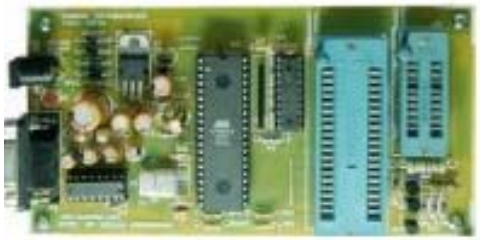
1. Microcontrollers for Projects

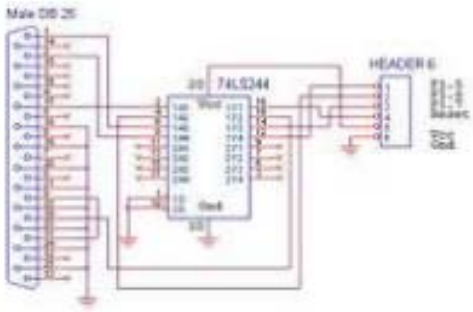
What is a Microcontroller?

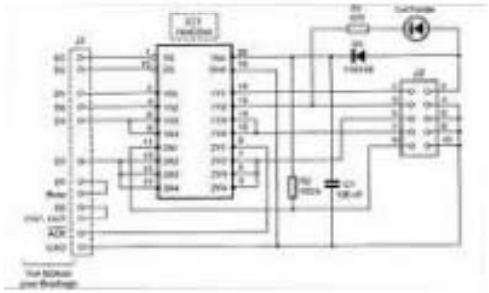
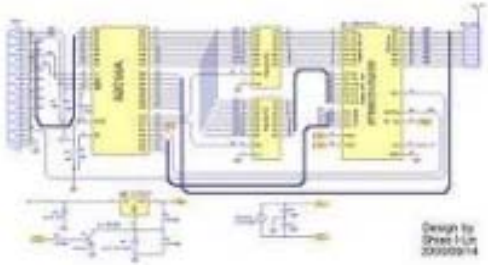
- **General-purpose** programmable chips used to have built-in functions:
  - Reading digital and analog signals
  - Have on-board memory
  - Connect to other devices easily

In the old days (~7 years ago)

- Hardware programmer requried
- Software was hard to get started.



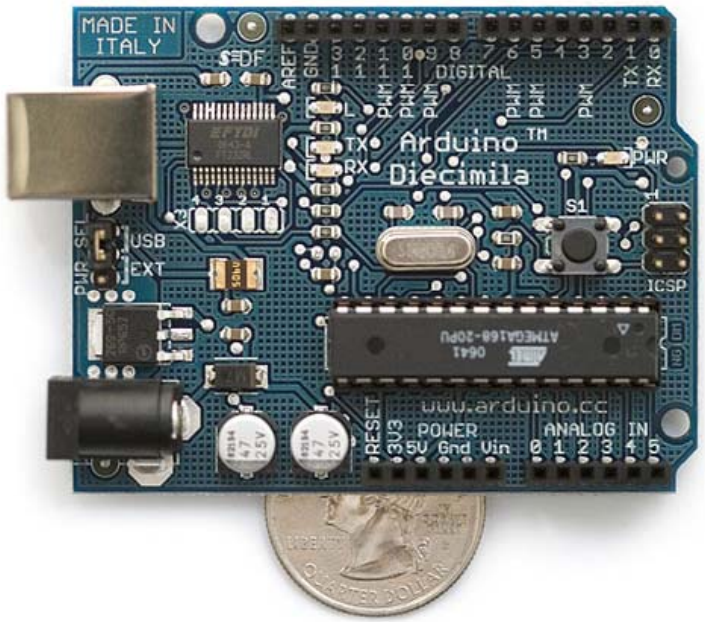


Nowadays

- Program it through a computer, but it runs on its own
- Now, programming and USB on-board. Cheap!
- Newer software “hides” much of the software inside.

e.g. $30 Arduino board



www.arduino.cc $30 for the board.

ARDUINO

search

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Photo by the Arduino Team

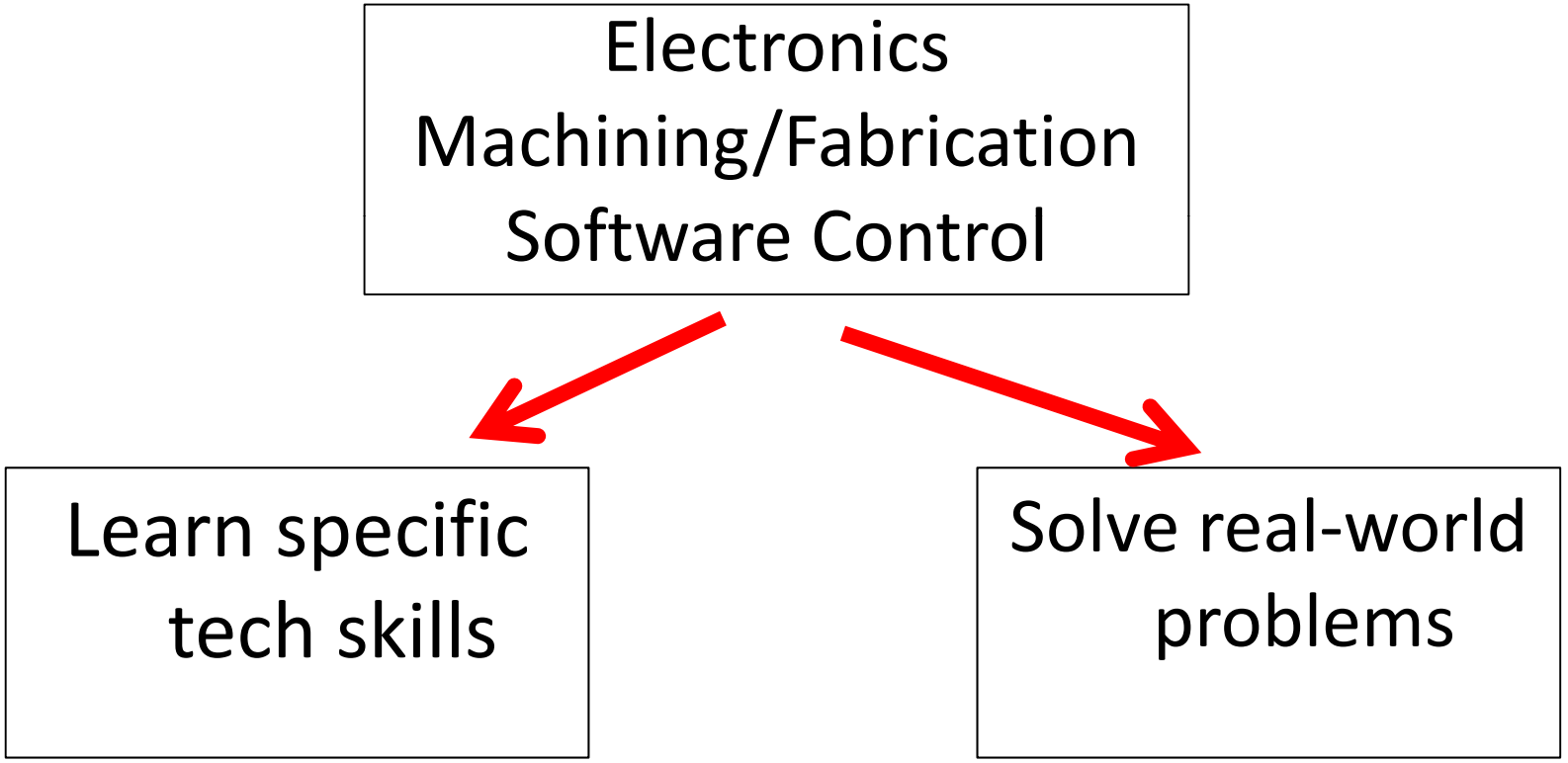
Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP).

http://hacknmod.com/hack/top-40-arduino-projects-of-the-web/

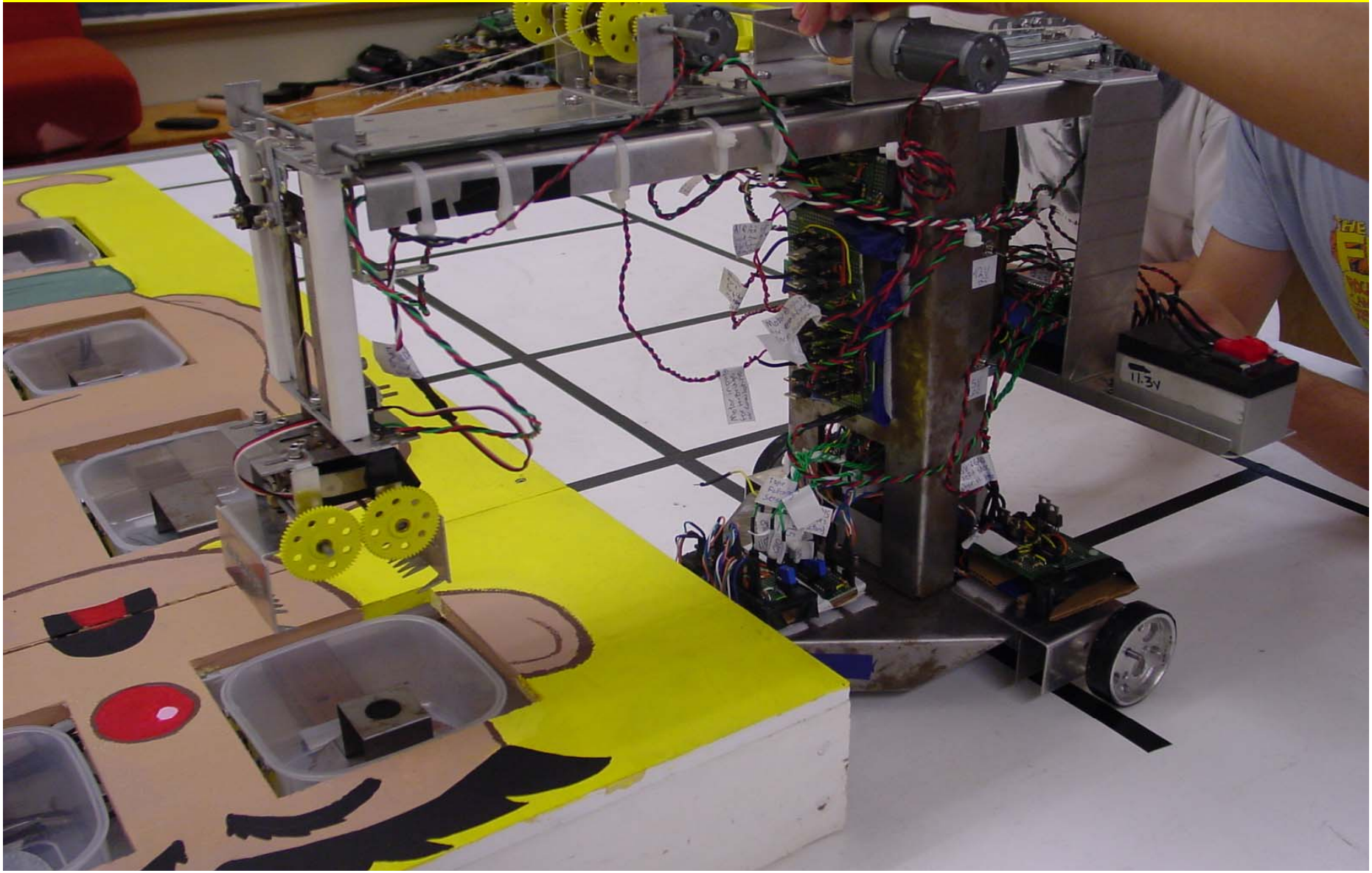
2. Projects we do here at UBC

Physical Prototyping for UBC Engineers



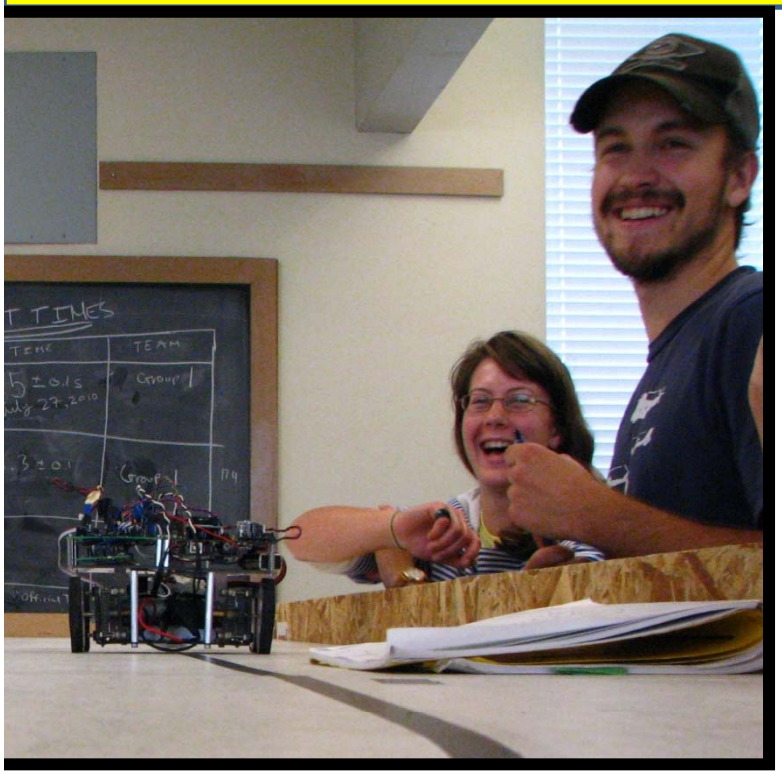
UBC Phys 253 – course for 2nd year students

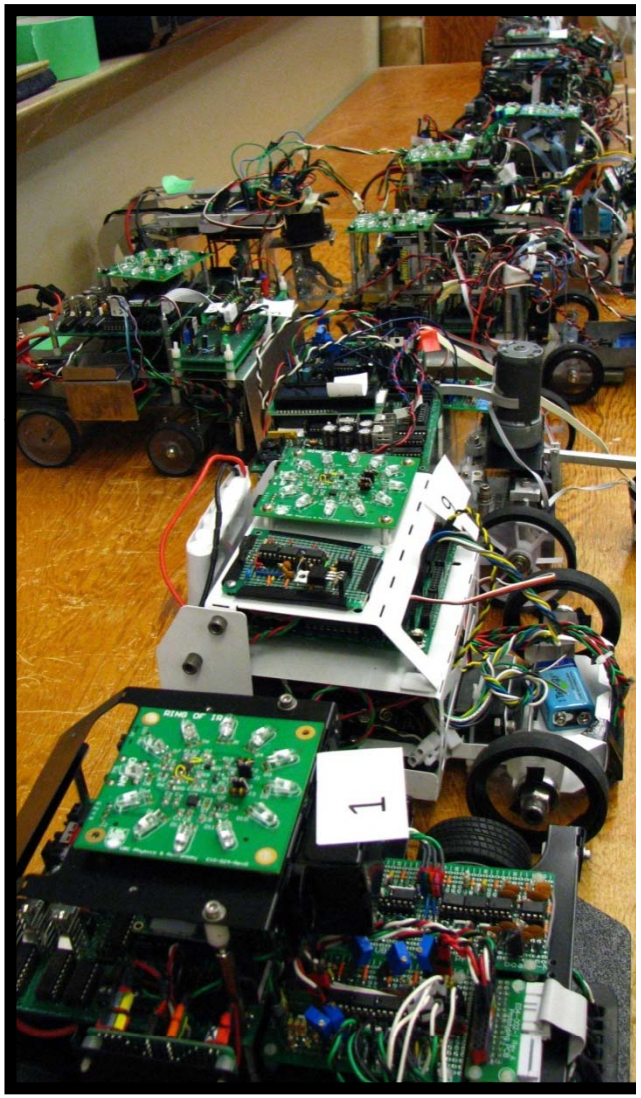
2008 Operation-Bots



10th annual
ubc engineering physics
robot competition

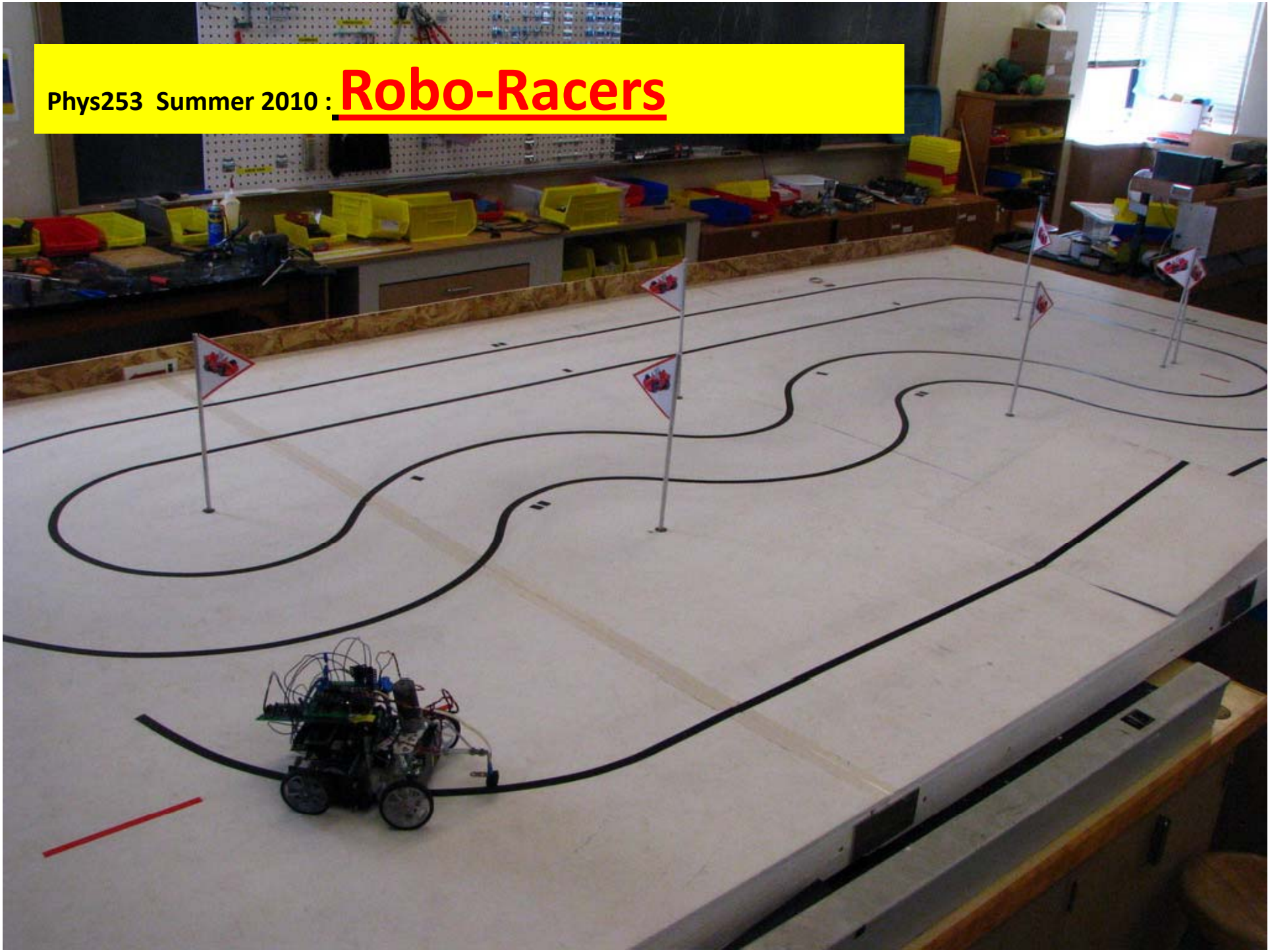
RoboRacers

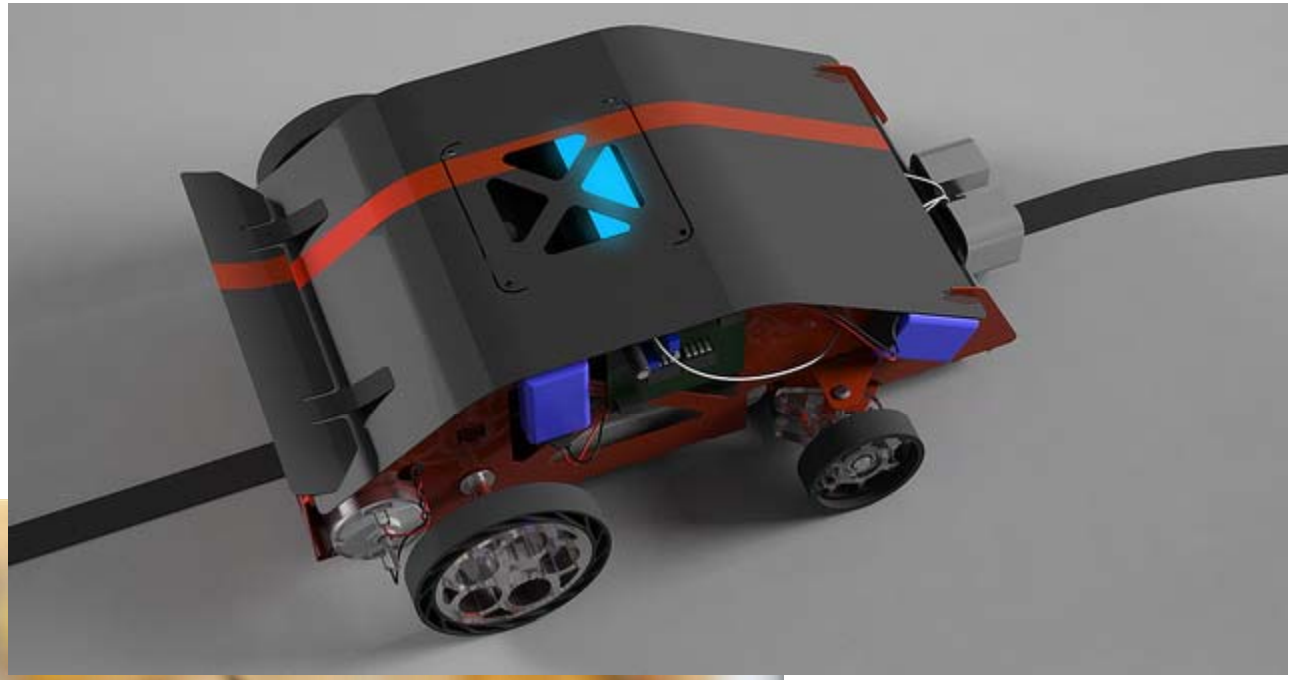


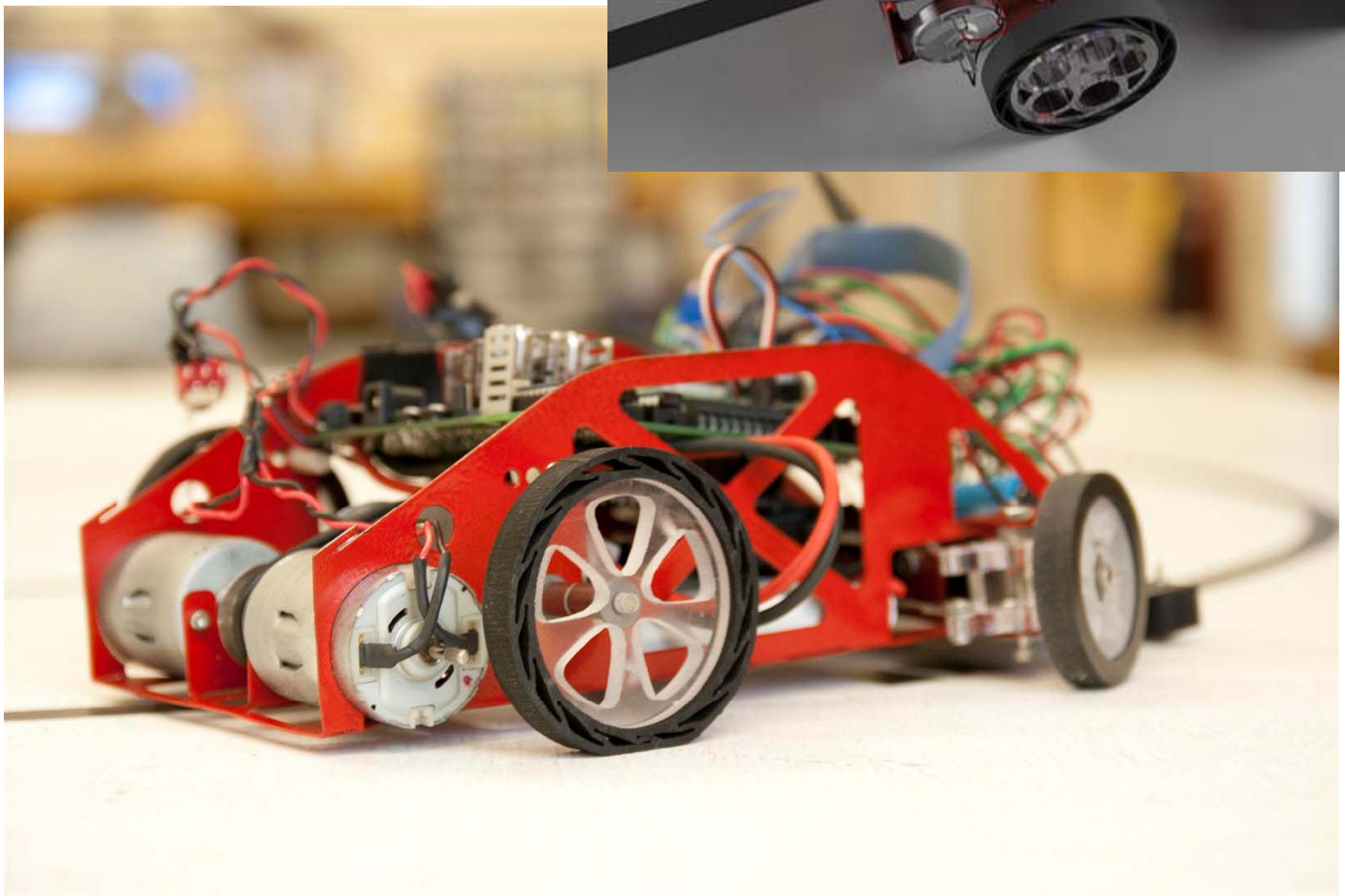


2010 august 5

Sponsored by: Newark FLUKE


Phys253 Summer 2010 : Robo-Racers

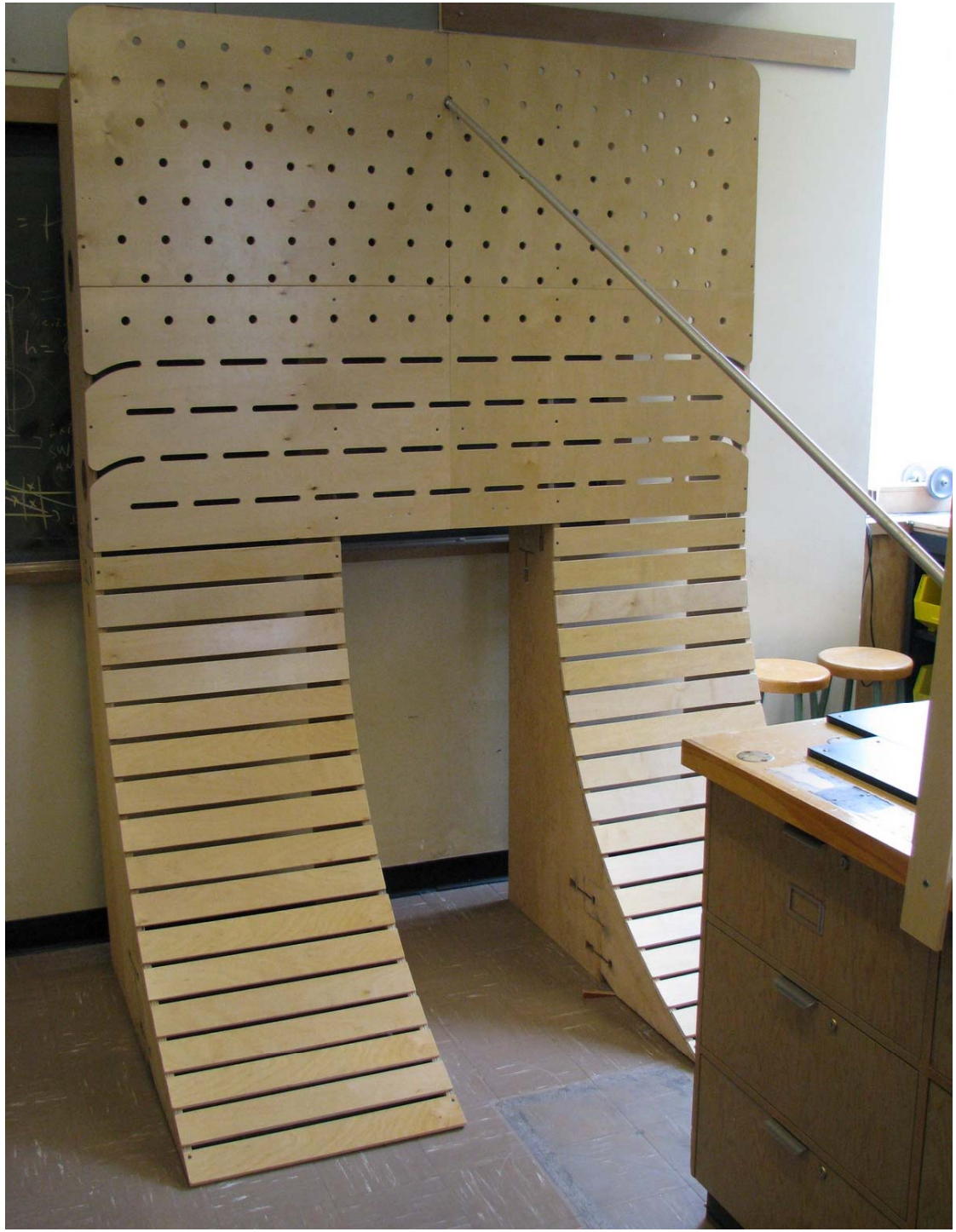




Phys253 Summer 2011 :

Climber-Bots

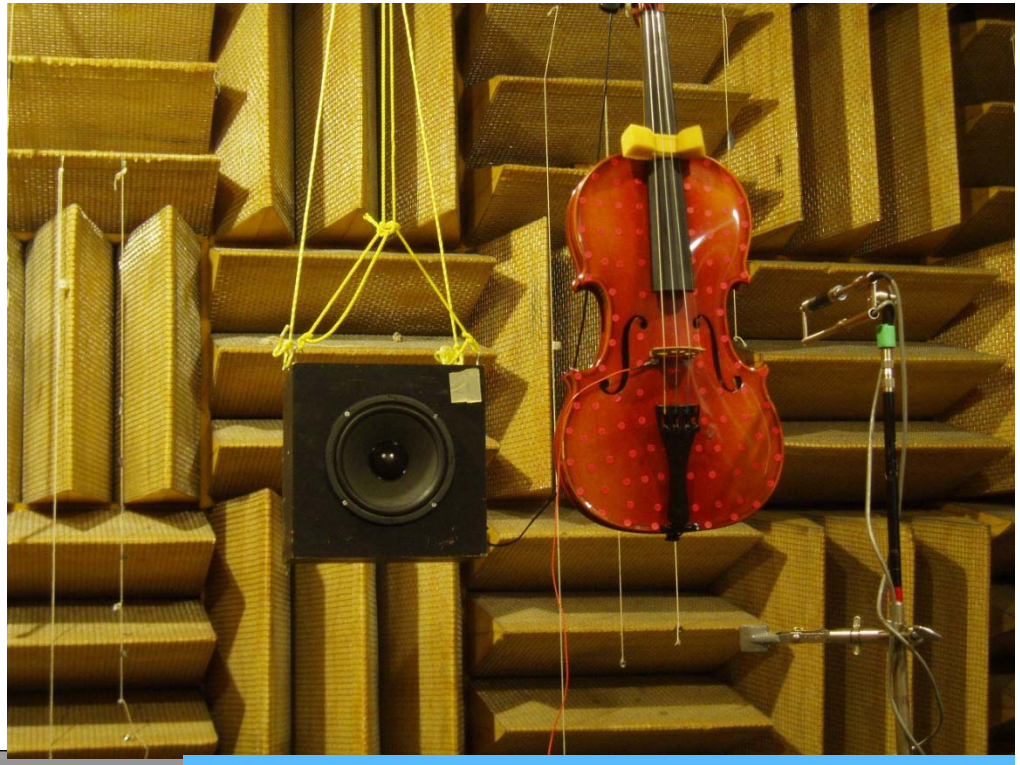
8 foot tall climbing wall

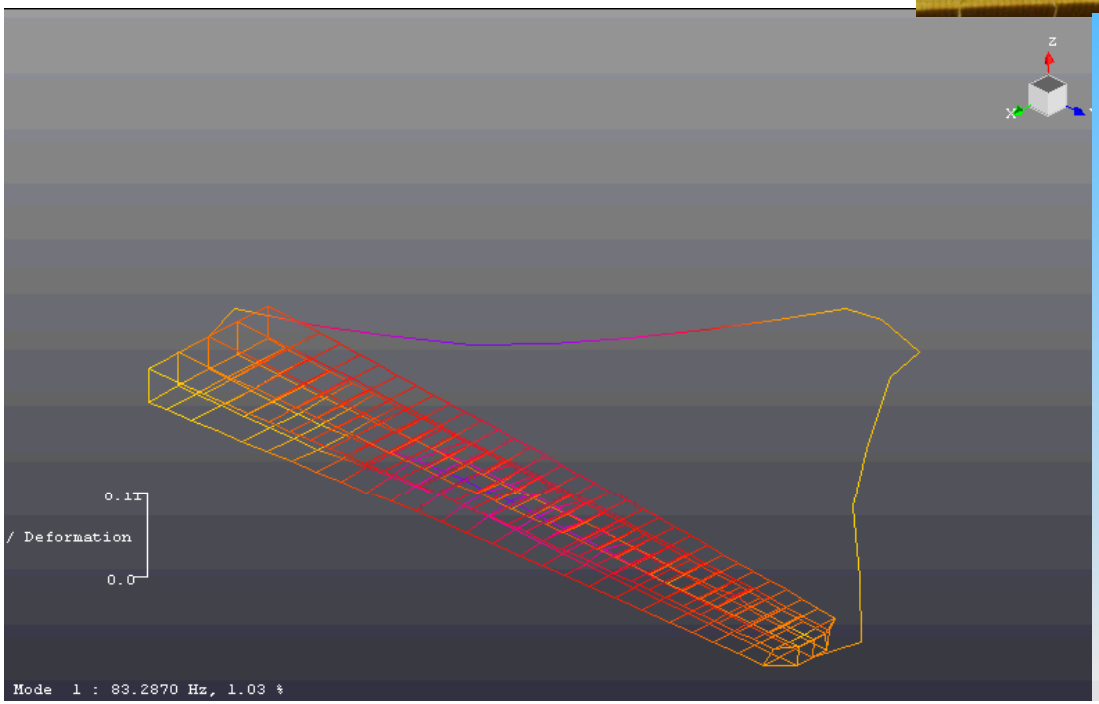


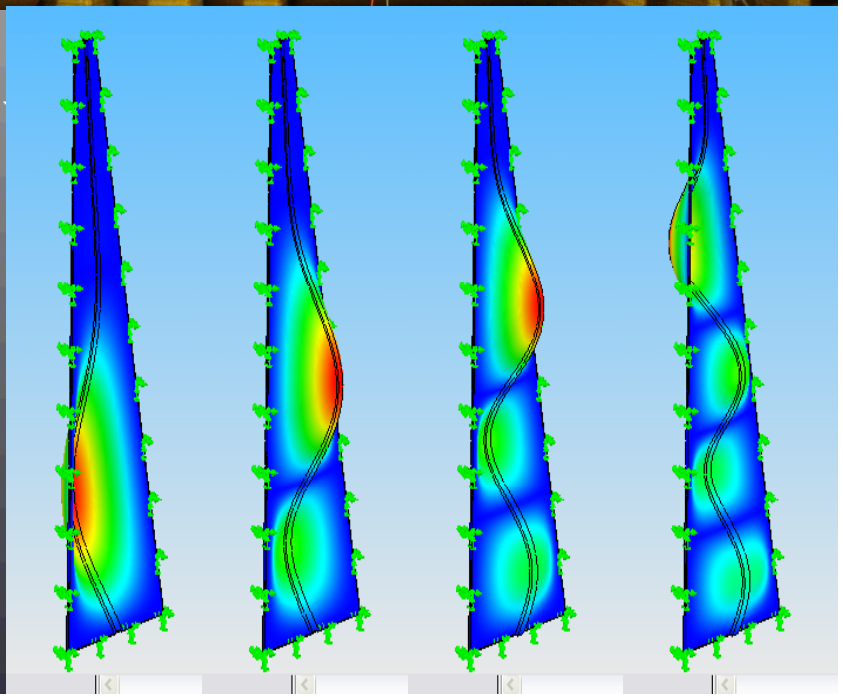
Projects done by Engphys students for course credit

Acoustics Project

- Modal analysis of structures (esp. musical instruments)

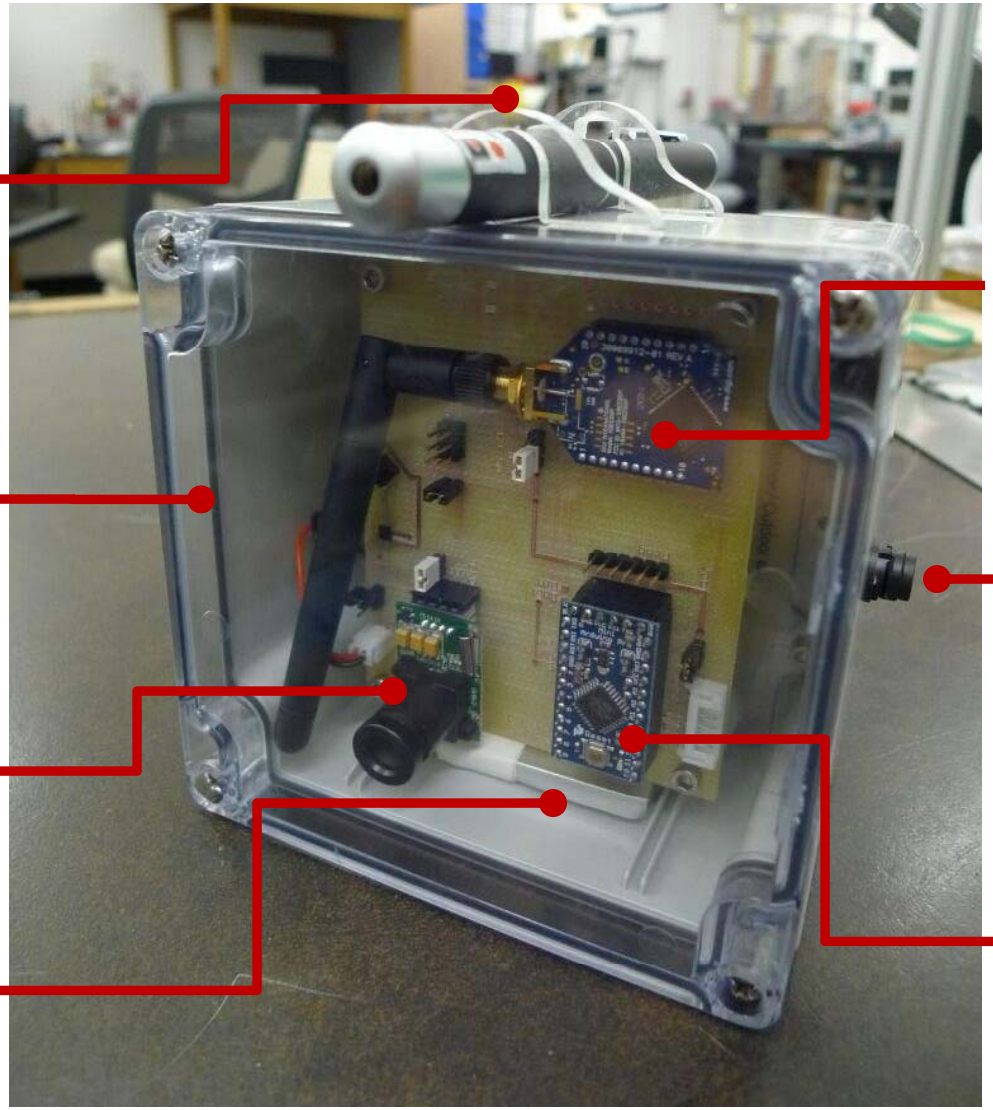




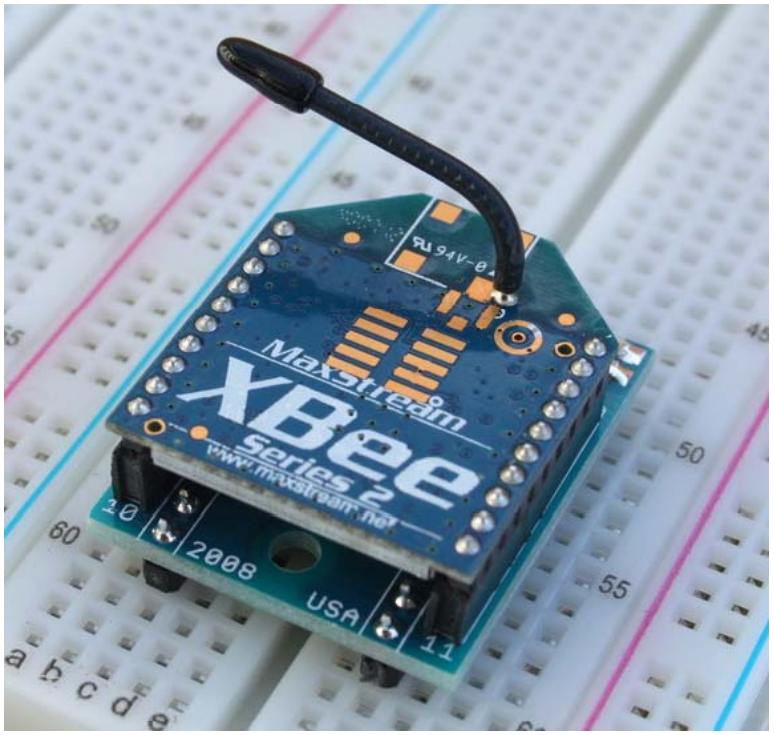


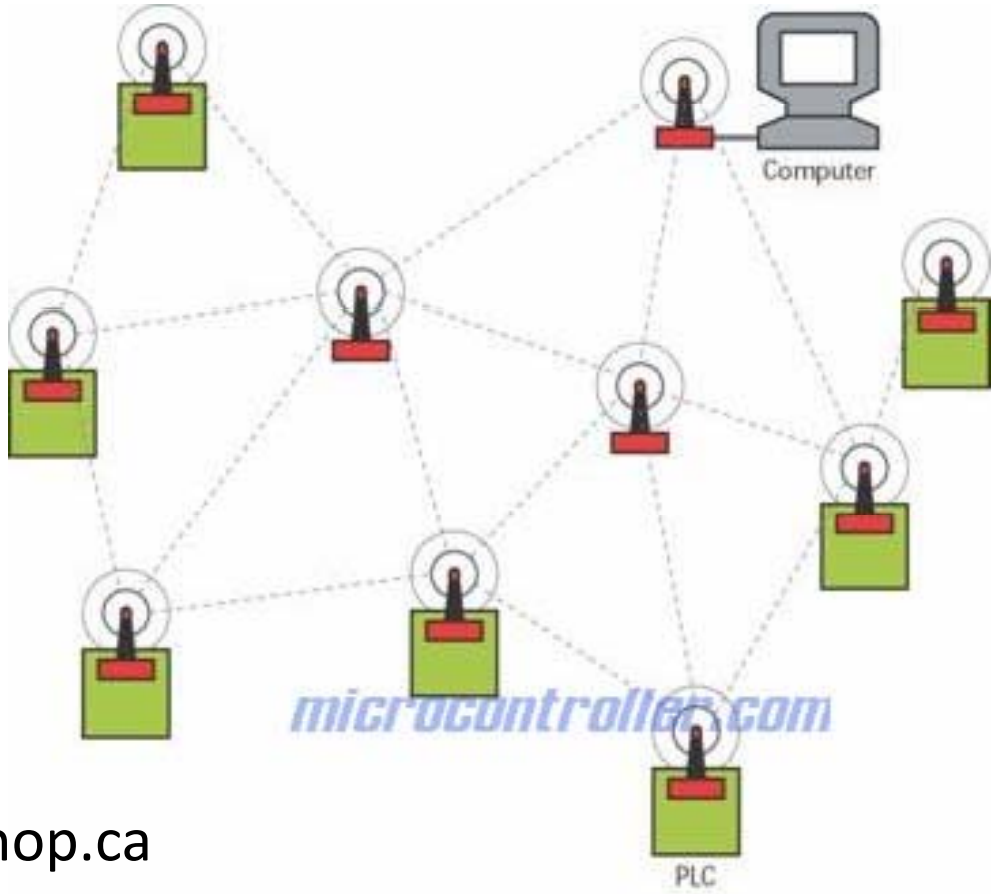
CamNet

Total cost: ~$250



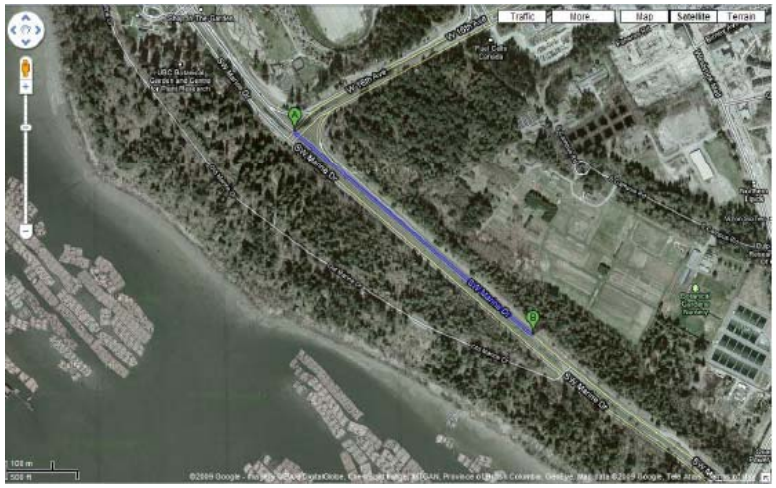
Wireless communication





$26 Xbee module from Robotshop.ca

Test Results



Line of Sight Range Test: ~1km

Urban Range Test: ~100m

Image Quality Test

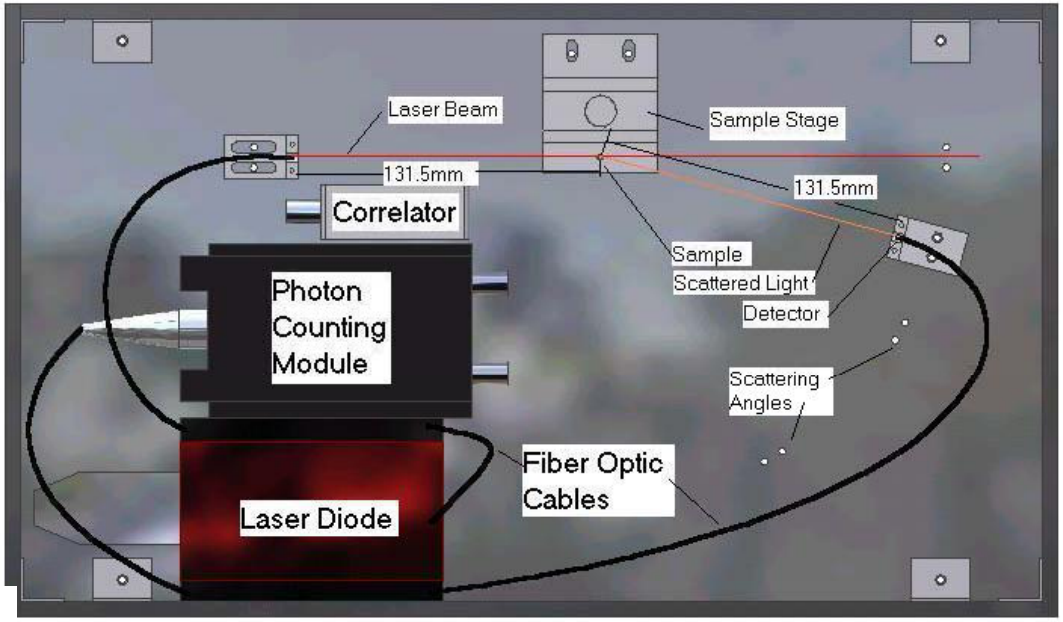
A letter sized “9” can be easily recognized over 92 ft away.

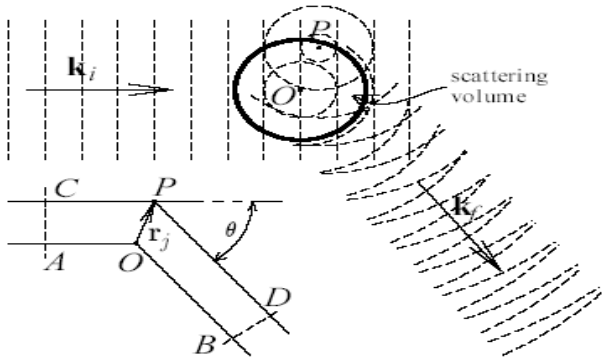
>> A camera node can acquire an image with enough clarity to read a standard gas station sign from over a block away

www.tangibleinteraction.com
at the 2010 Olympic Closing Ceremony

Dynamic Light Scattering Prototype for Measuring Platelets

Canadian Blood Services
Société canadienne du sang





LightIntegra
TECHNOLOGY

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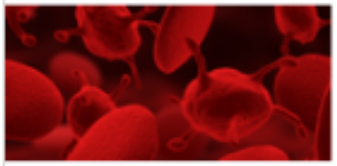
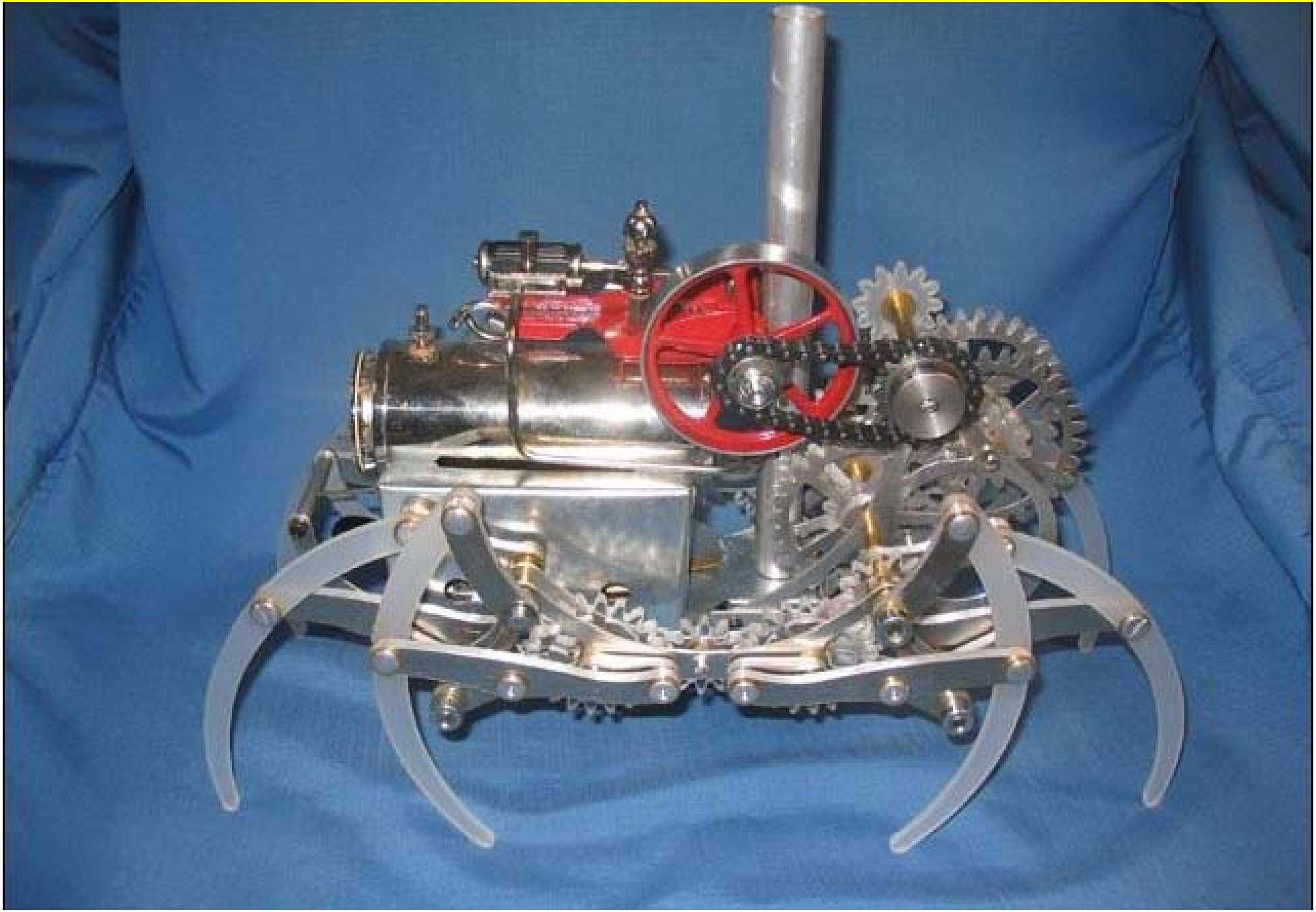


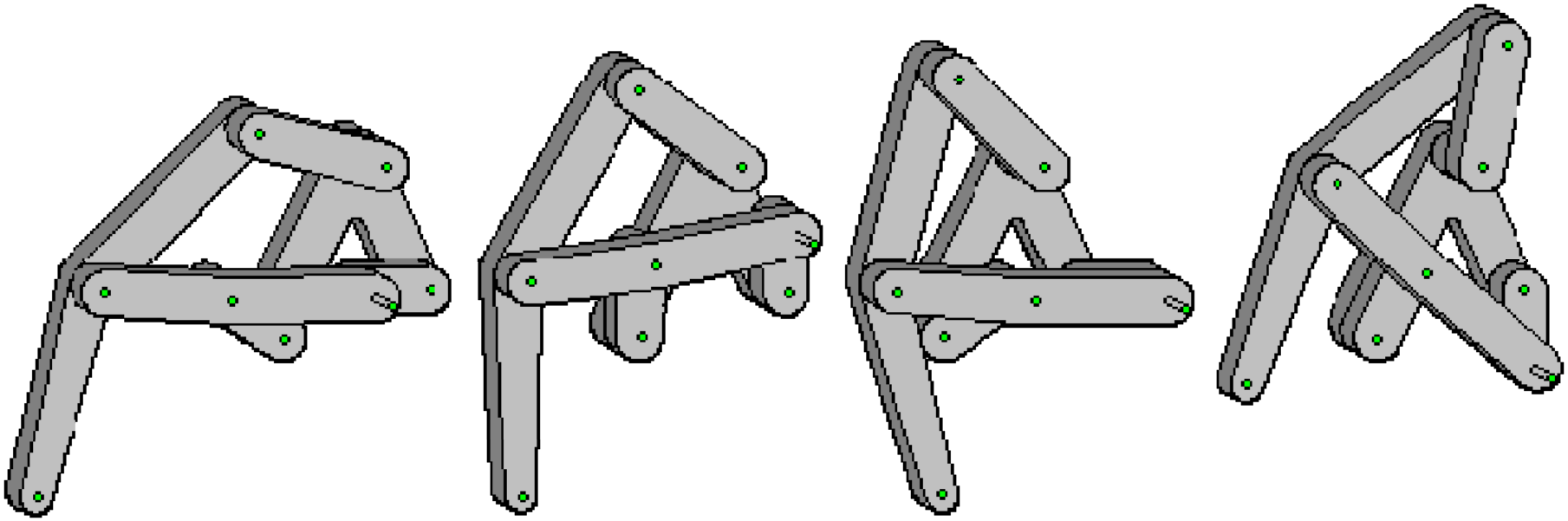
Platelets save lives.
We save platelets.

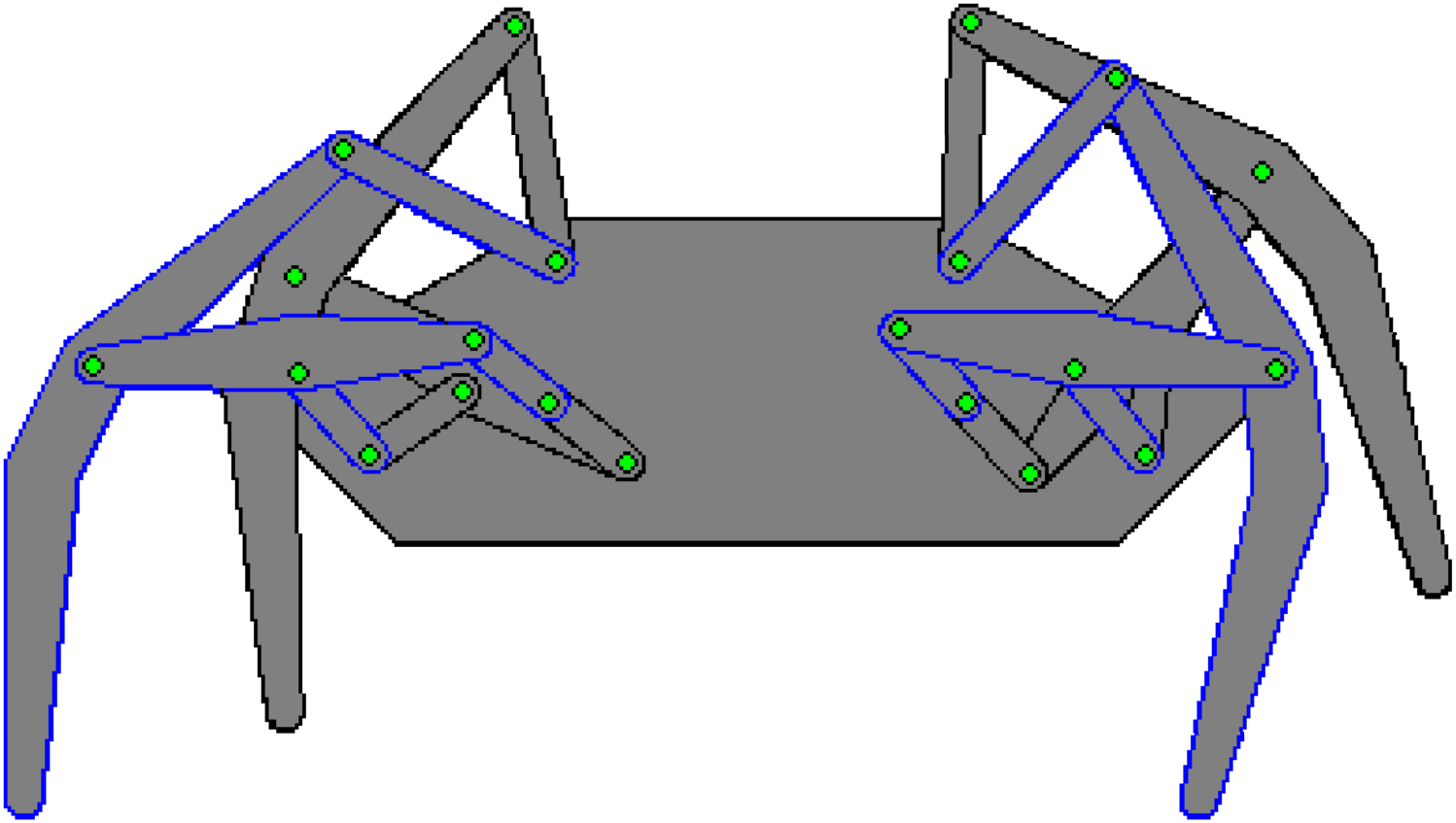
ThromboLUX™ is a quick and simple diagnostic test for platelet quality and function that will make it easy to screen platelets prior to transfusion.

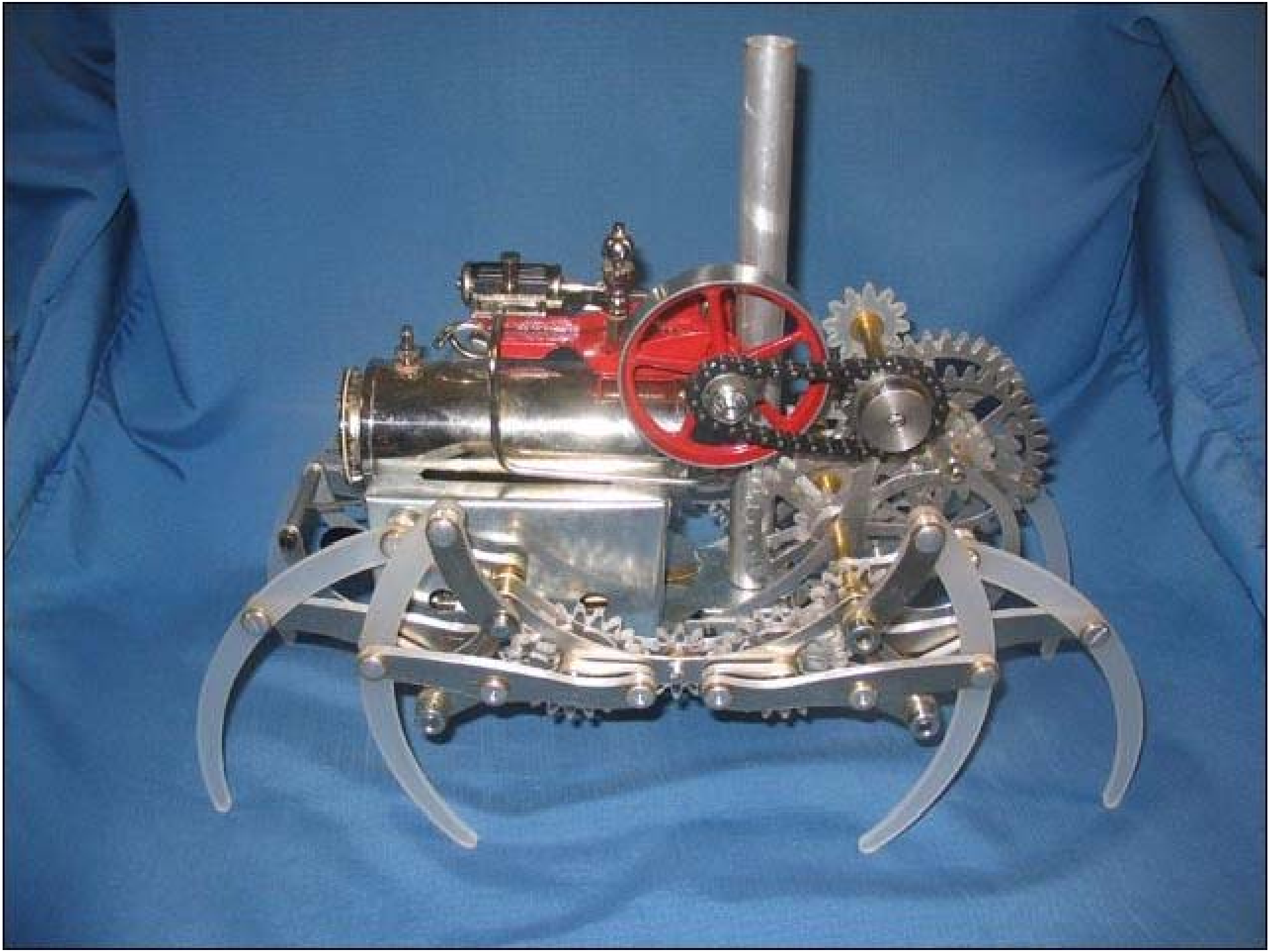
Traditional methods of platelet quality testing are unreliable, time consuming, expensive and not used routinely. LightIntegra intends to make platelet quality testing a regular practice in blood banks around the world by making it accessible, affordable, reliable and fast.

Vancouver Junkyard Wars! 2005 - Walking vehicle

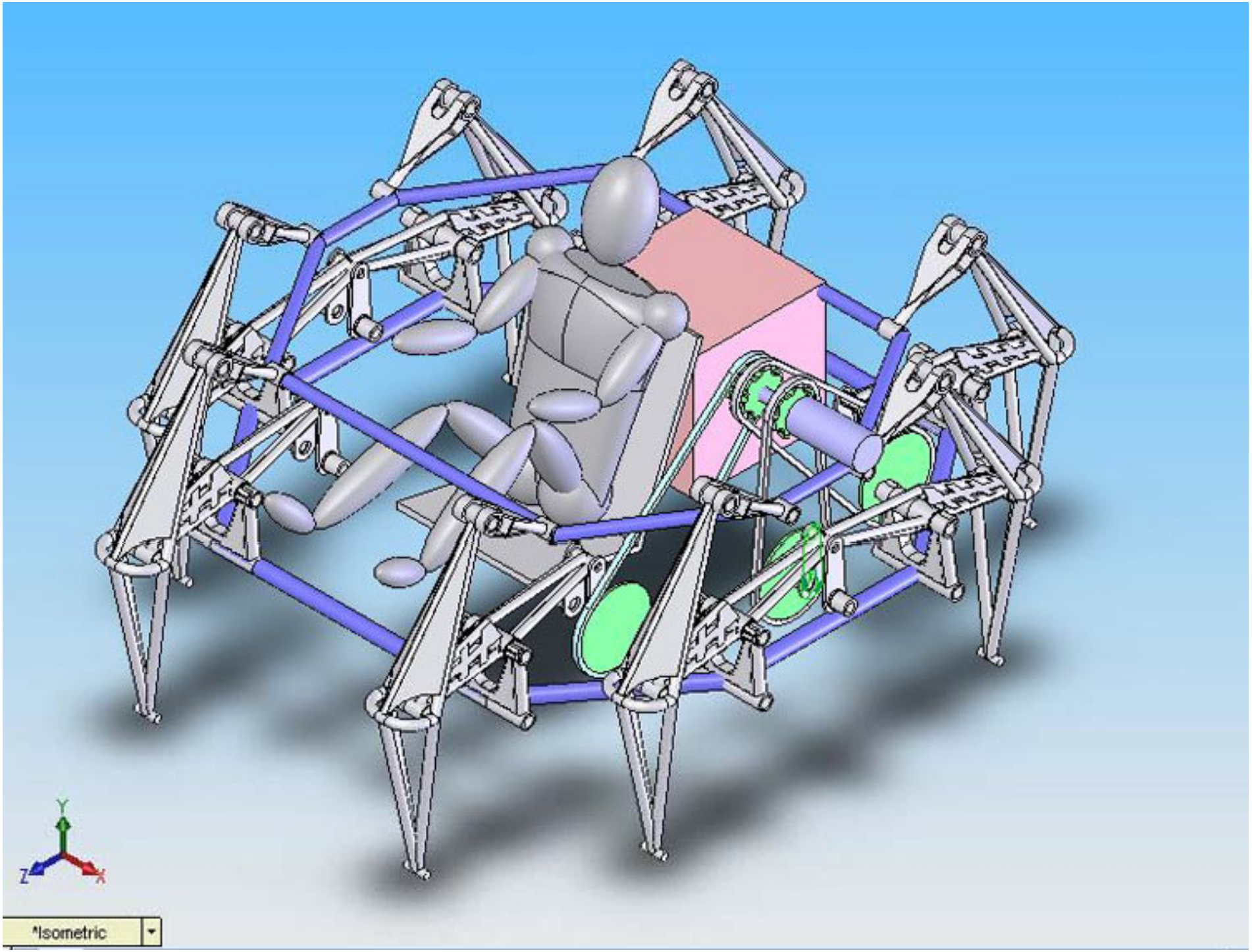






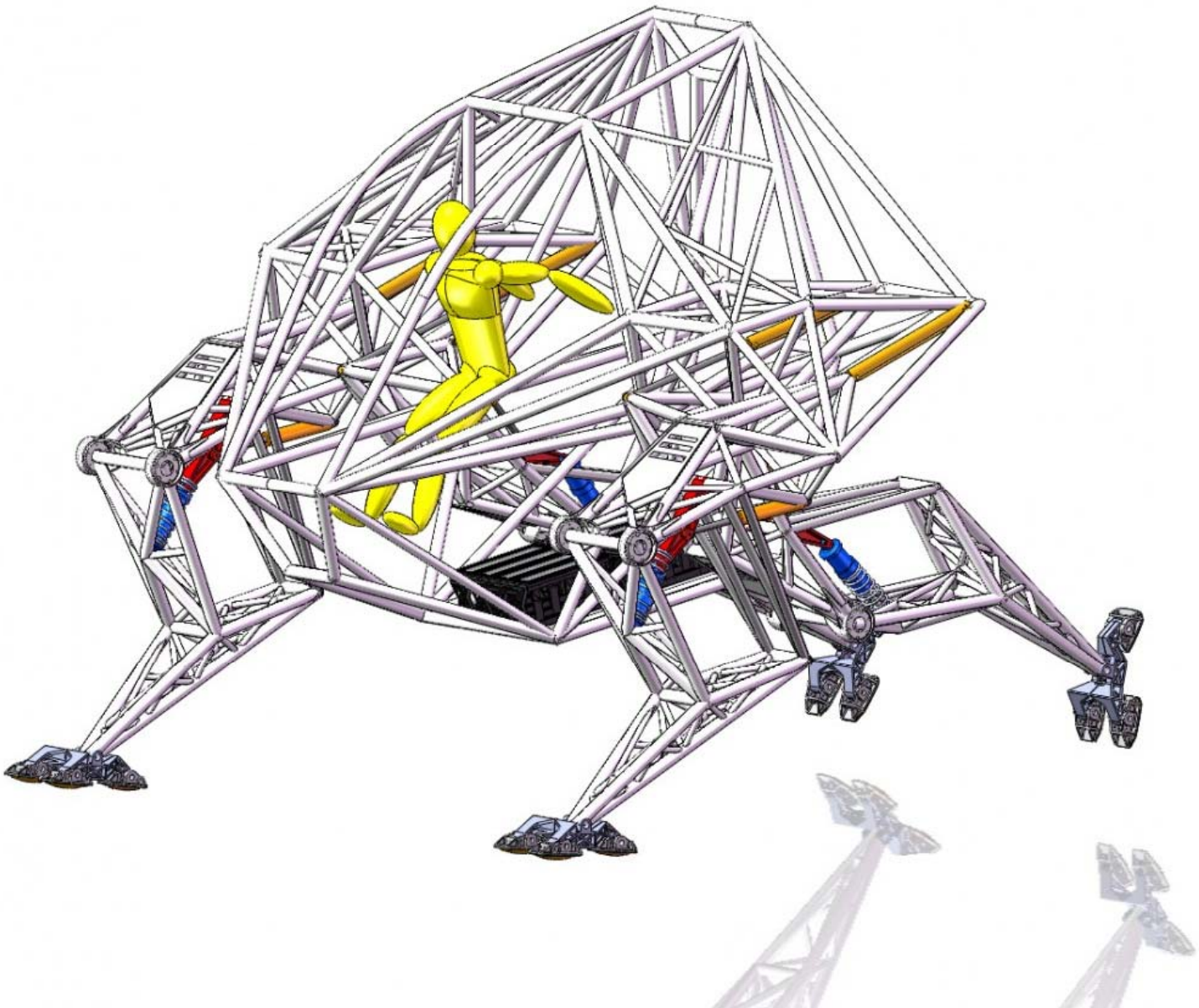


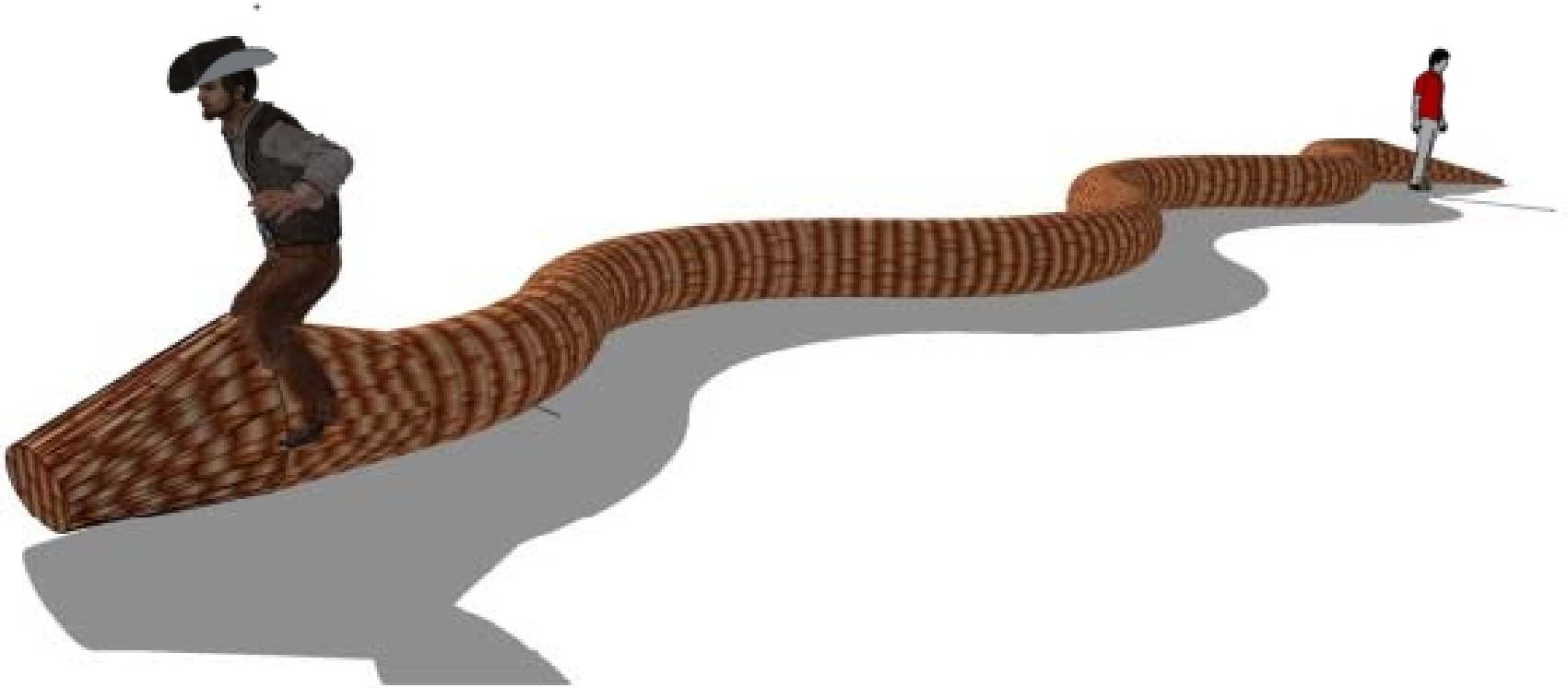
Competition Day! Built in 1 weekend.


Y
Z
X
*Isometric

www.mondospider.com

www.anti-robot.com



TITANOBOA

An amphibious electromechanical reincarnation of the ancient, 60ft serpent rendered extinct by climate change. Dare to ride the snake and look towards the uncertain future of our beloved planet.