ubc engineering physics

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Lab Director, UBC Engineering Physics Project Lab

For a copy of the talk:

Google "UBC Engphys Kwantlen"

Kwantlen Polytechnic Surrey, 2011 Oct 19

1. **What is Engphys?**
2. **What do Engphys students do in school?**
3. **What do you do after Engphys?**

1. **What is Engphys?**
2. **What do Engphys students do in school?**
3. **What do you do after Engphys?**

1. What is Engphys?

Departments and Schools:

- Chemical & Biological Engineering
- Civil Engineering
- Electrical & Computer Engineering
- Materials Engineering
- Mechanical Engineering
- Mining Engineering
- UBC Okanagan Engineering

Non-department Programs

- Biomedical Engineering
- Engineering Physics
- Environmental Engineering
- Geological Engineering
- Integrated Engineering

UBC Faculty of Applied Science | Engineering

Think of it as an Applied Physics degree:

Math + Physics + Elec/Mech

60 incoming students/year

5-year program with co-op integrated into the program.

1. What is Engphys?

PHYSICS and **MATH** = foundations.

ENGINEERING = real-world applications.

Hands-on Practical **PROJECTS** = design experience

Combined to form a unique **INTERDISCIPLINARY** degree

(and yes it's a lot of work)

1. What is Engphys?

The same core Math and Physics courses as students in Honours Physics (science)

MATH 217 Multivariable and Vector Calculus
MATH 255 Ordinary Differential Equations
MATH 257 Partial Differential Equations
MATH 305 Applied Complex Analysis
MATH 307 Applied Linear Algebra
MATH 318 Statistics
MATH 400 Applied Partial Differential Equations

PHYS 250 Introduction to Modern Physics
PHYS 301 Electricity and Magnetism
PHYS 304 Introduction to Quantum Mechanics
PHYS 350 Applications of Classical Mechanics
PHYS 401 Electromagnetic Theory
PHYS 403 Statistical Mechanics
PHYS 408 Optics

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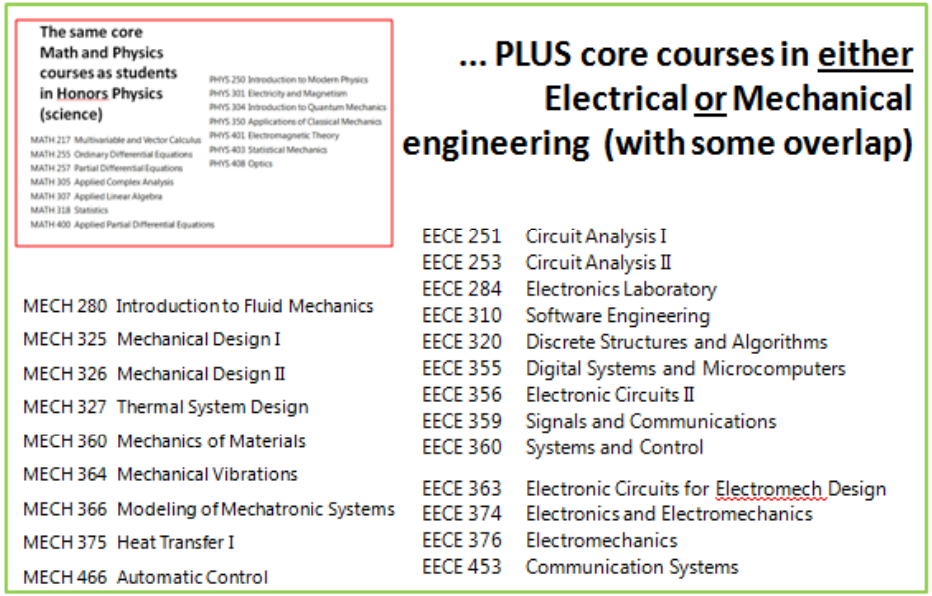
PHYS 401 Electromagnetic Theory
PHYS 403 Statistical Mechanics
PHYS 408 Optics

… PLUS core courses in either Electrical or Mechanical engineering (with some overlap)

MECH 280 Introduction to Fluid Mechanics
MECH 325 Mechanical Design I
MECH 326 Mechanical Design II
MECH 327 Thermal System Design
MECH 360 Mechanics of Materials
MECH 364 Mechanical Vibrations
MECH 366 Modeling of Mechatronic Systems
MECH 375 Heat Transfer I
MECH 466 Automatic Control

EECE 251 Circuit Analysis I
EECE 253 Circuit Analysis II
EECE 284 Electronics Laboratory
EECE 310 Software Engineering
EECE 320 Discrete Structures and Algorithms
EECE 355 Digital Systems and Microcomputers
EECE 356 Electronic Circuits II
EECE 359 Signals and Communications
EECE 360 Systems and Control
EECE 453 Communication Systems

1. What is Engphys?



... PLUS the flexibility in selecting your 3 to 4 tech elective courses from a broad range of topics:

- Astronomy
- Applied Physics
- Biophysics
- Bioengineering
- Sustainability
- Commerce
- Earth and Ocean Sciences
- Materials
- Automation
- Math

1. What is Engphys?

2. What do Engphys students do in school?

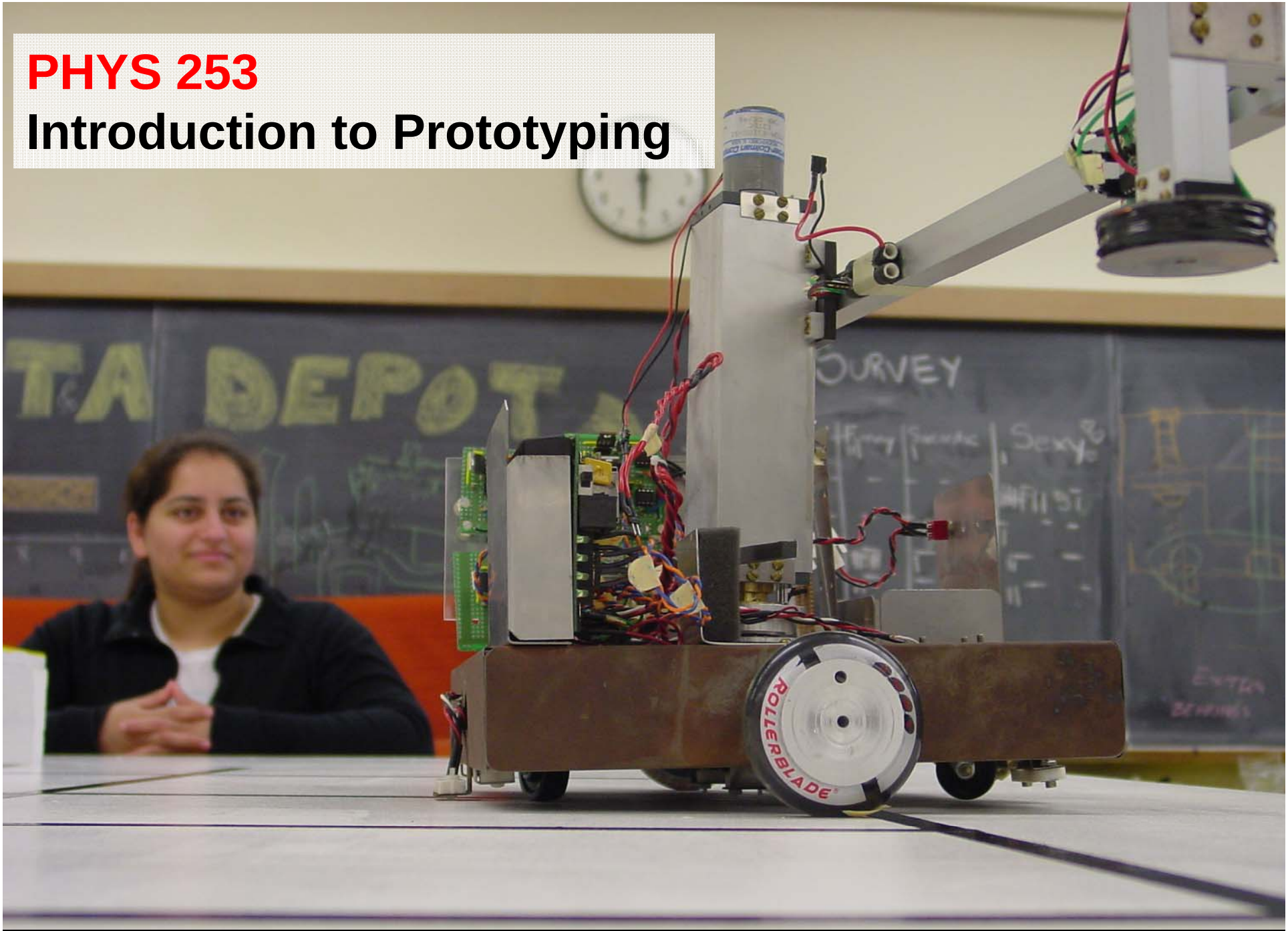
3. What do you do after Engphys?

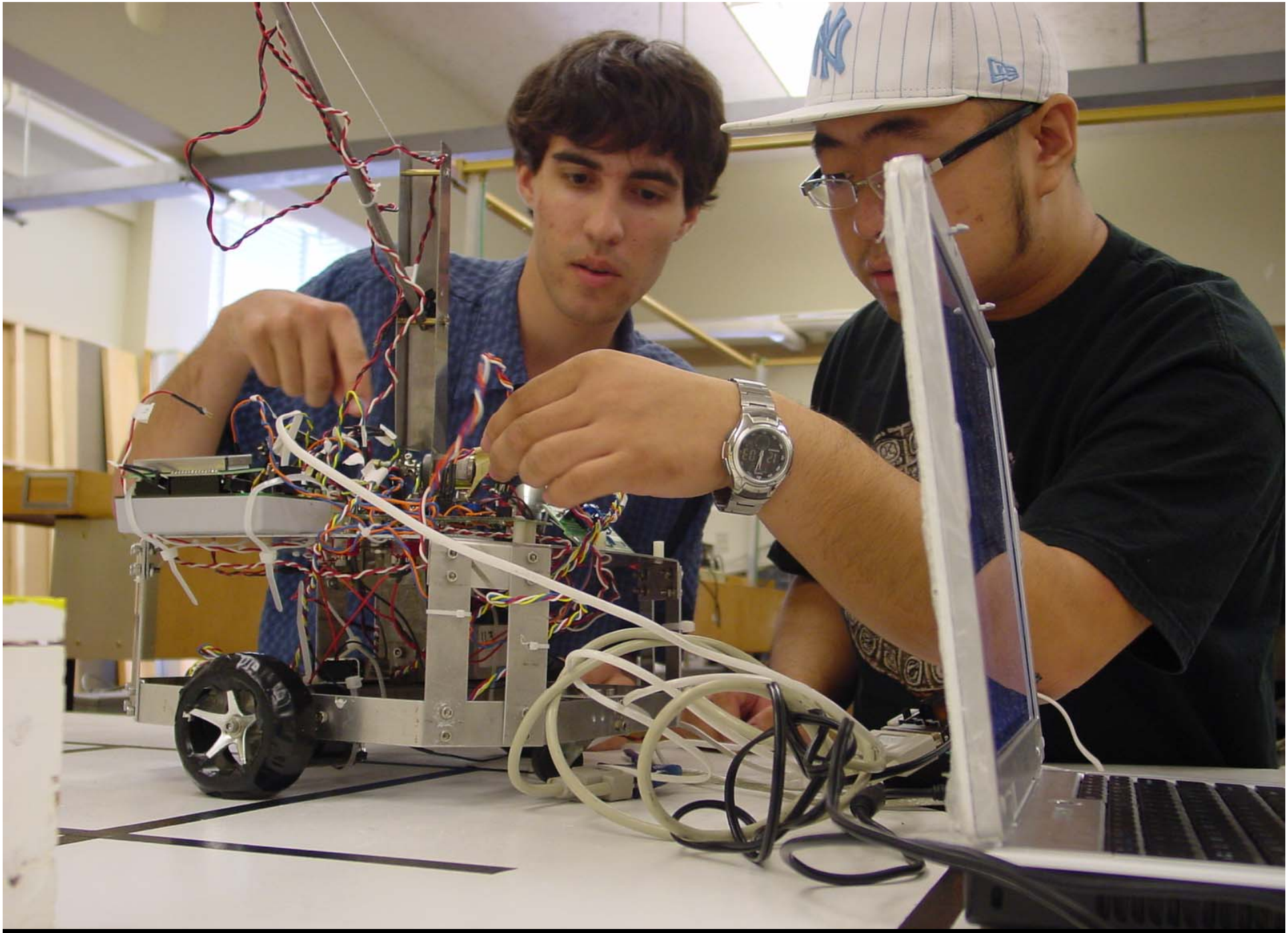
2. What do Engphys students do in school?

A strong **hands-on design component** used to build up your practical experience:

- "Intro to Prototyping" in 2nd year
- Open-Ended Project Work in 4th/5th years
- Co-Op throughout the program (four 4-month sessions)

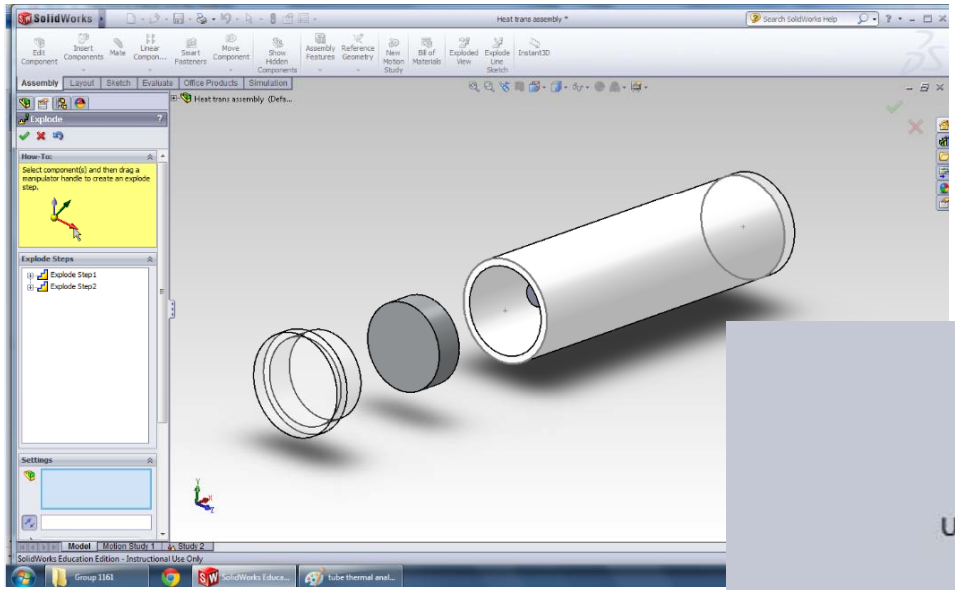
PHYS 253
Introduction to Prototyping

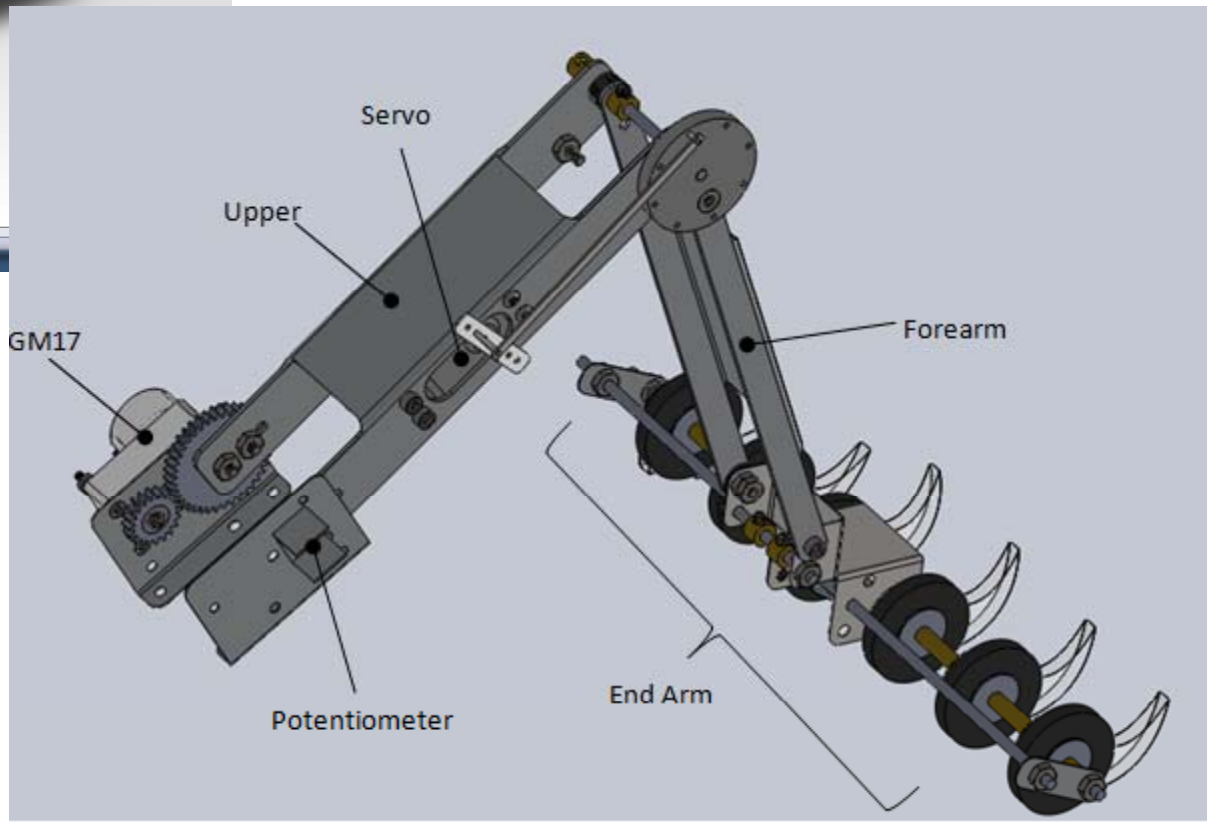




UBC Engineering Physics

Solidworks (500-seat license at UBC)





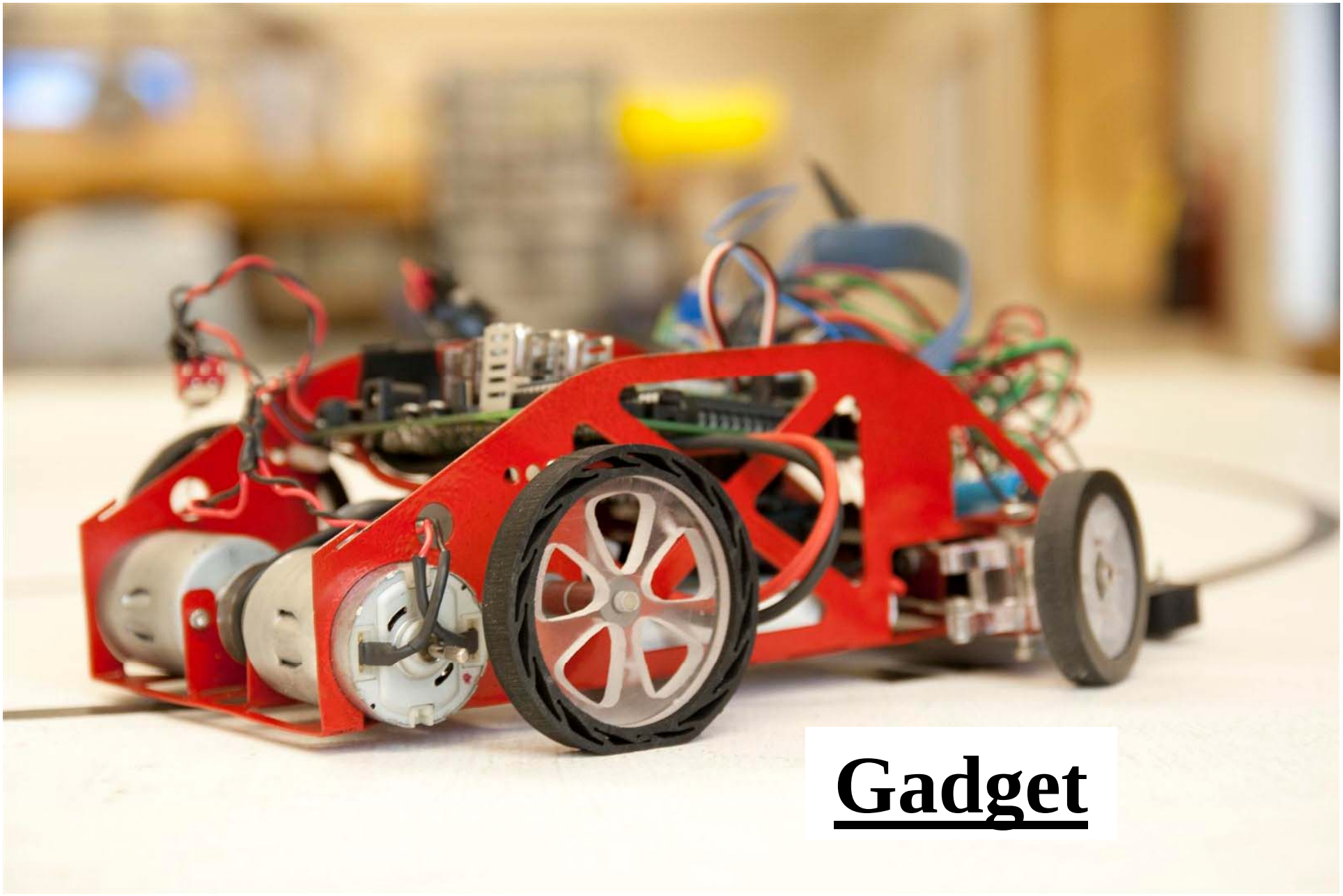
WaterJet cutter

60W laser cutter

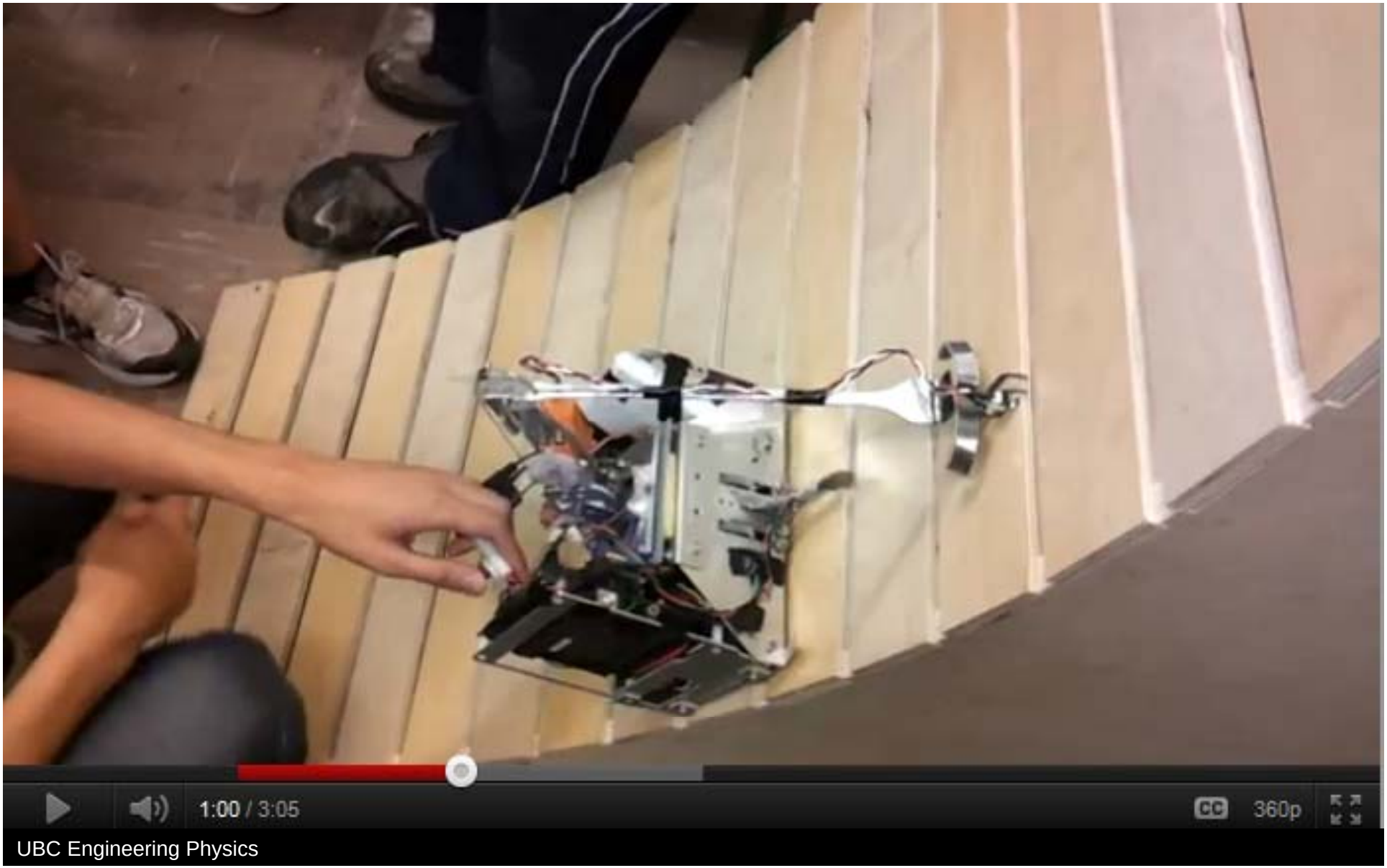
+ Student Machine Shop (lathe, milling machine, bandsaw, etc)

+ sheet-metal tools + spot welder + powder coating

Adiabatmobile


Gadget

Summer 2011 – Climber-Bots



For senior students:

Engineering Physics Project Lab

Open-ended project work in 4th and 5th year

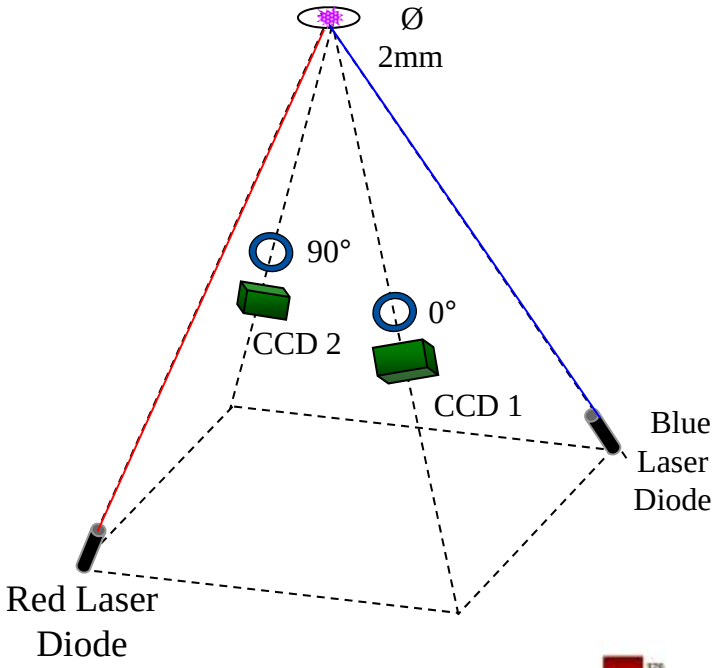
Projects with faculty members, industry, or self-sponsored.

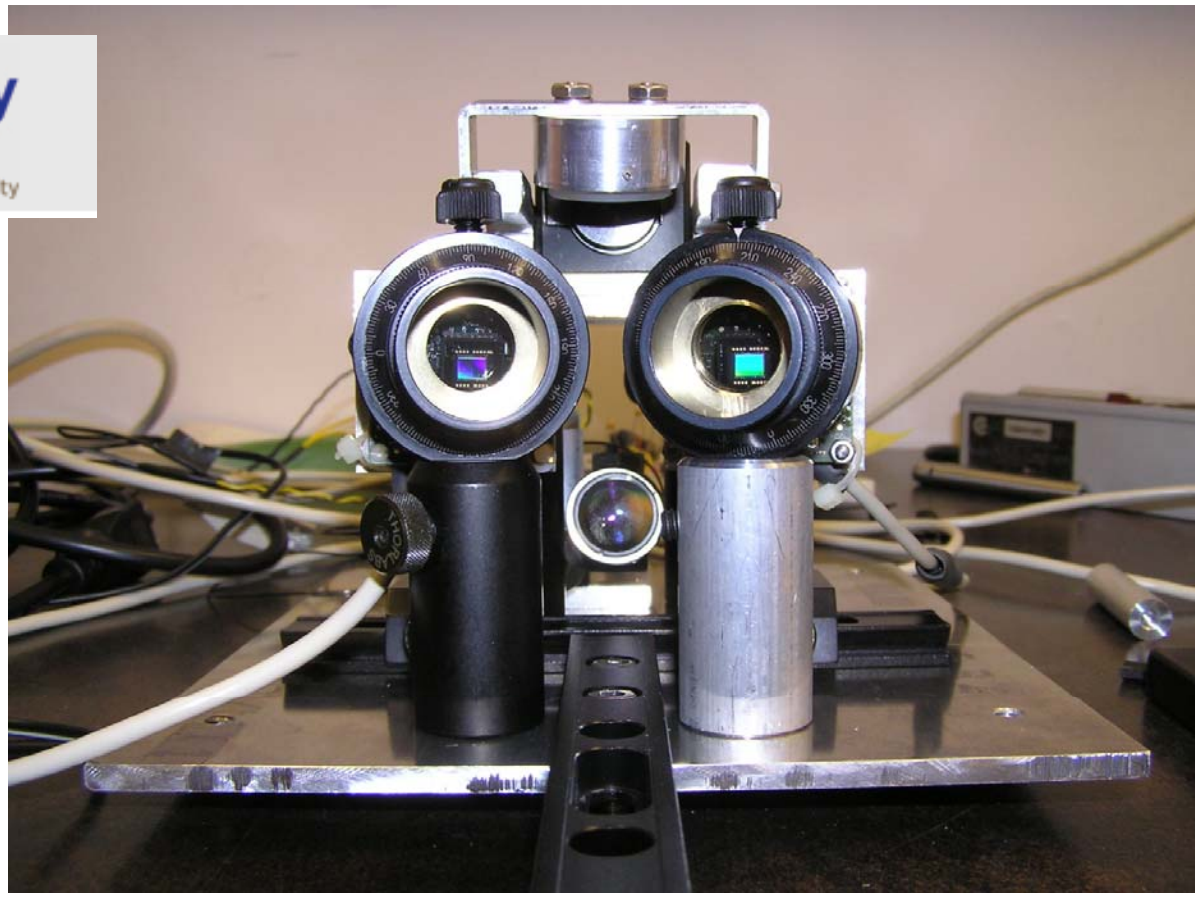
3 / 4 / 5-credit courses.

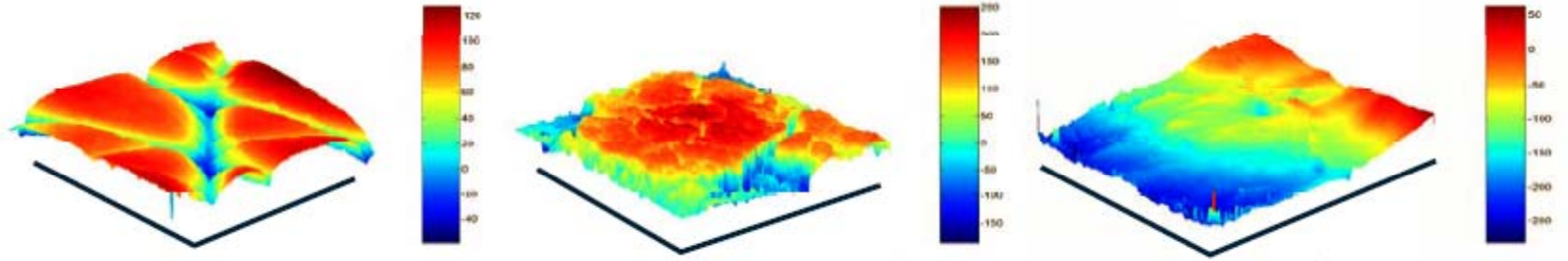
Small groups (2 or 3 students)

laser speckle imaging system for measuring surface roughness

BC Cancer Agency
CARE & RESEARCH
An agency of the Provincial Health Services Authority



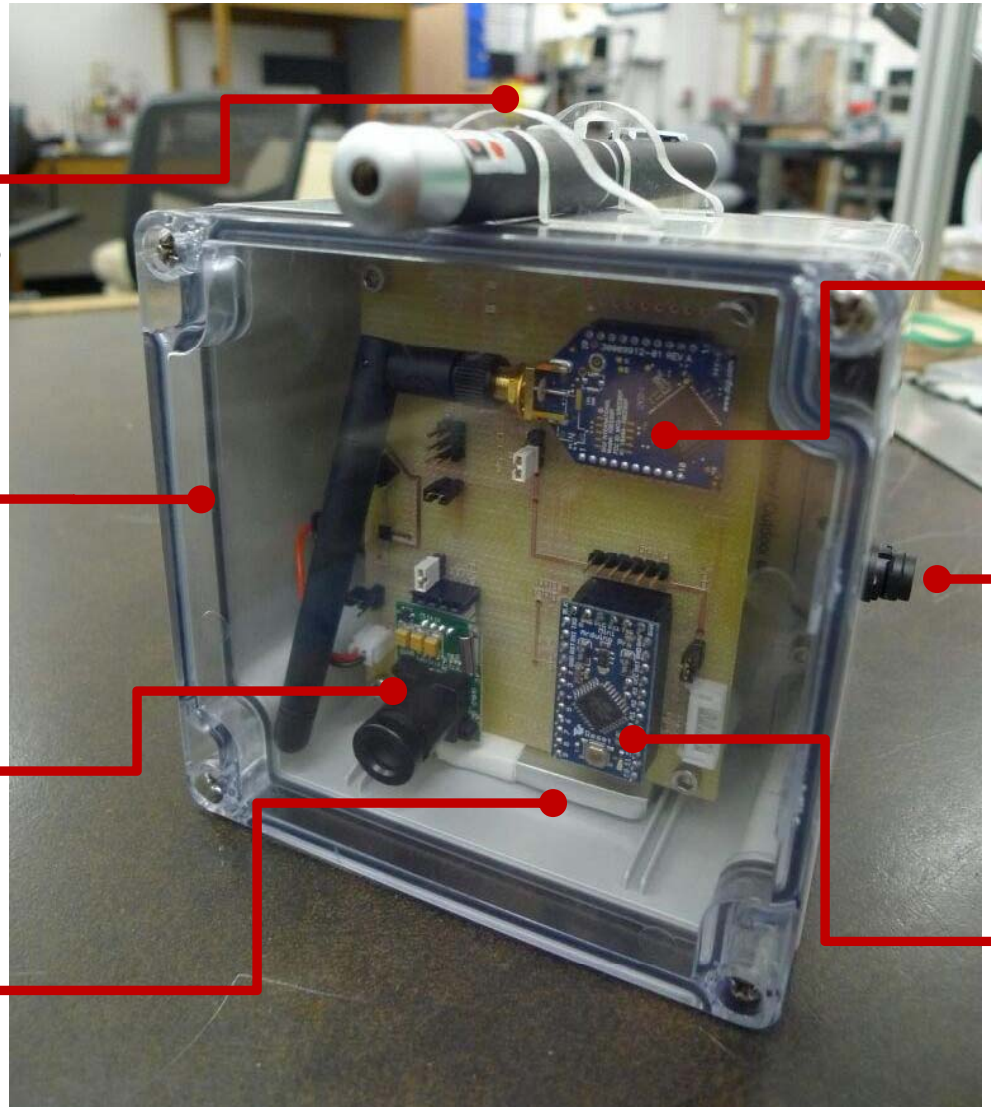




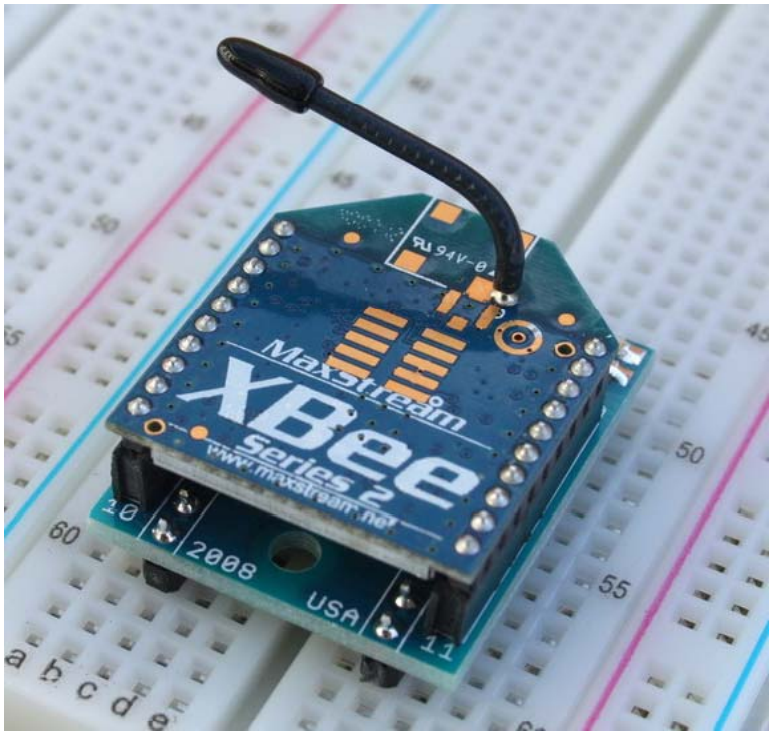
(a) normal skin (b) seborrheic keratosis (c) malignant melanoma.

CamNet

Total cost: ~$250

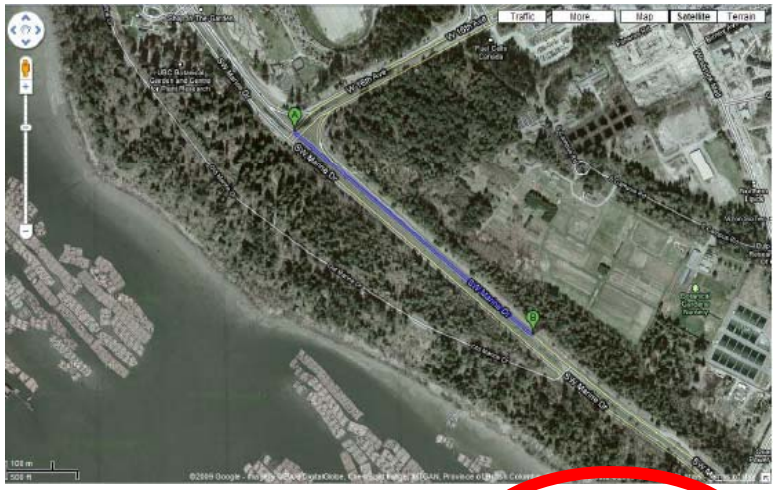


Wireless communication



$26 Xbee module from Robotshop.ca

Test Results



Line of Sight Range Test: ~1km

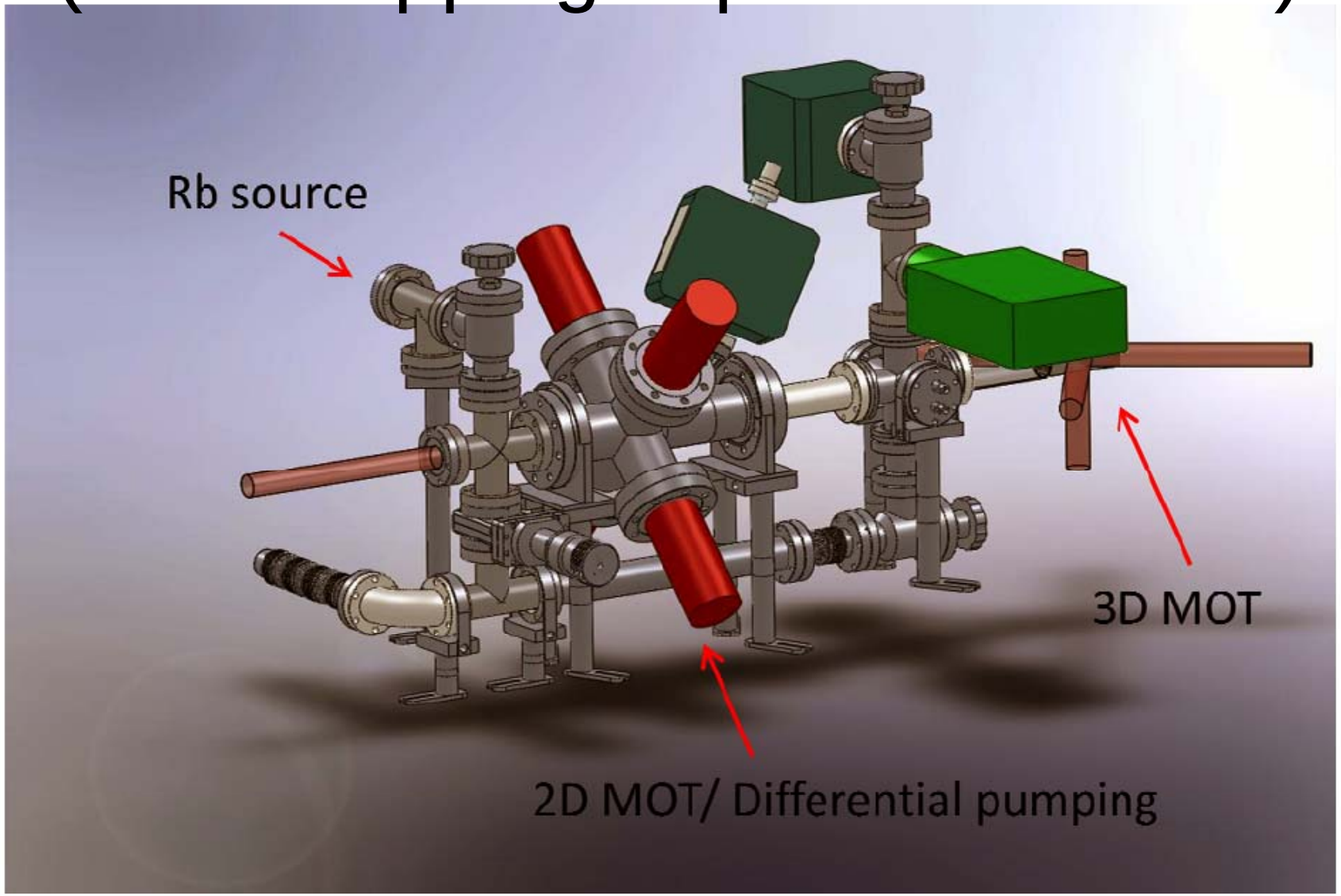
Urban Range Test: ~100m

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

2D Magneto-Optical Trap (laser-trapping super-cold atoms)



2. What do Engphys students do in school?

Recent Jobs through the Co-Op Program:

Intel – Embedded Systems Engineer, Design Engineer
Ballard Power Systems – R&D, Fuel Cell Testing
PMC Sierra – Semiconductors and circuit board design
BC Cancer Research Centre – Research Assistants
TRIUMF – Particle and Nuclear Physics research
BC Hydro – various positions
MDA – R&D, Aviation projects
Electronic Arts – Software Developers / QA Tester / Programming
D-Wave – Development of Quantum Computers, simulations and problem solving
Laser Zentrum Hannover (Germany) – Laser and optics research
Robert Bosch (Germany) – R&D of various mechanical components and engines
Microsoft – Software Design Engineer, Program Manager

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3. What do you do after Engphys?

Grad placements in last few years

Harvard (Biomedical Engineering)
MIT (3 students in applied physics)
UC Berkeley (AMO)
International Space University (France)
U of Toronto (biomedical, astrophysics)
Stanford (Elec, Biomedical Eng)
Queen's (systems engineering, MBA)
McGill (quantum computing)
Northwestern University (Math)
Oxford (fMRI research)

massachusetts institute of technology

CALTECH

3. What do you do after Engphys?

But it isn't all research:

"As the world moves toward commercial applications of quantum computing and nano-technology, 21st century business will be lead by physicists..."

Haig Farris, Entrepreneur, Co-founder of Ventures West (largest VC pool in Western Canada), currently on the board of 8 Vancouver-based high-tech companies.

From his recent talk "Business is Physics"

3. What do you do after Engphys?

“The best molecular biologists are physicists..”

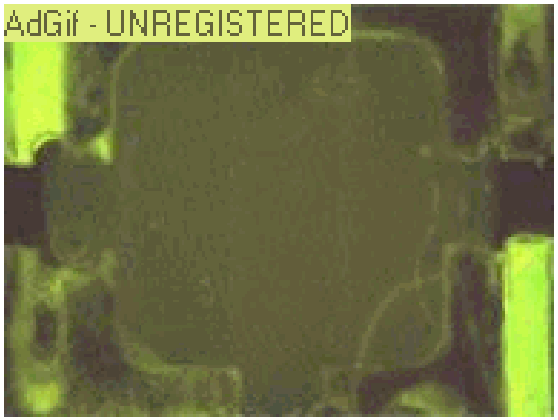
San Francisco Bay Area Biotech Executive.

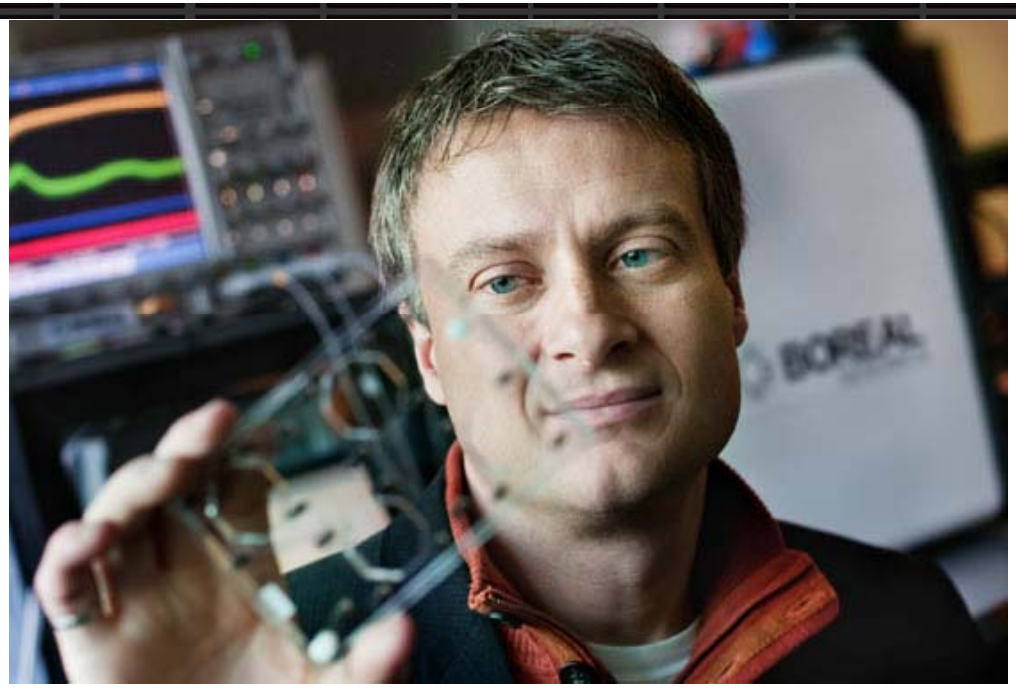
“The best engineers at CREO were from Engineering Physics”

CREO founder

3. What do you do after Engphys?

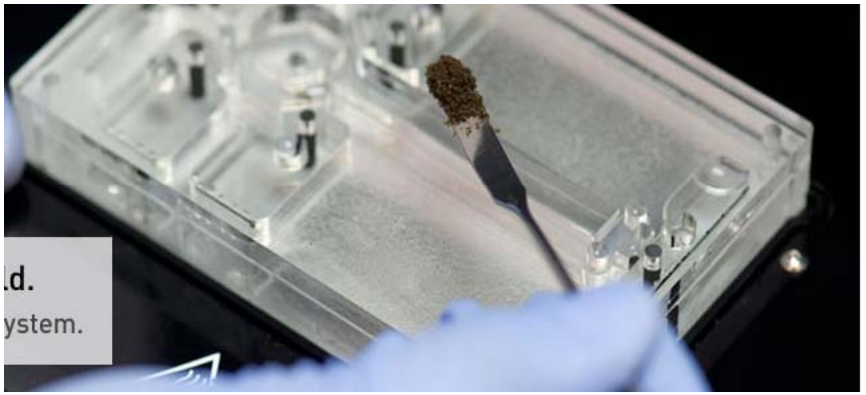
BOREAL GENOMICS



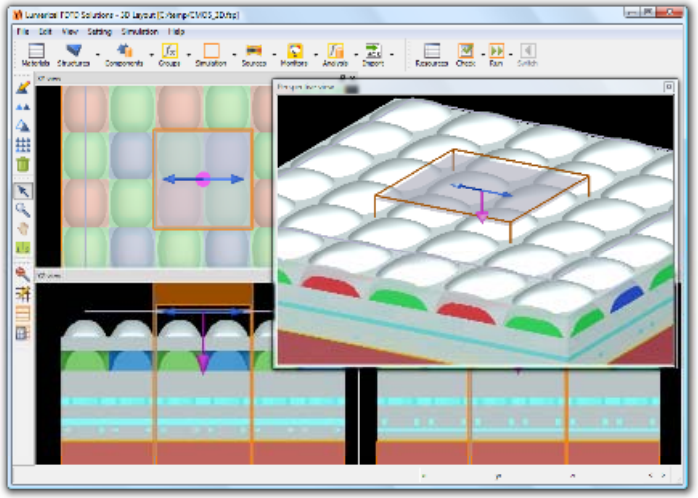


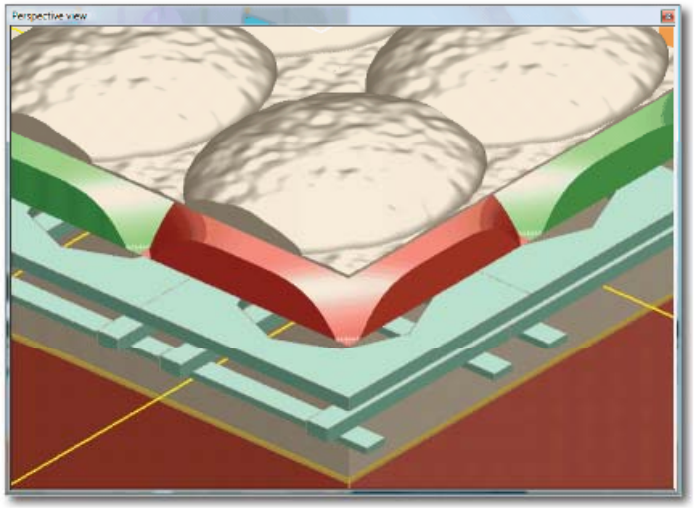
Name: Andre Marziali
Job Title: President and CSO, Boreal Genomics (and current UBC Engphys Program Director)

Technique for concentrating highly dilute quantities of DNA



3. What do you do after Engphys?



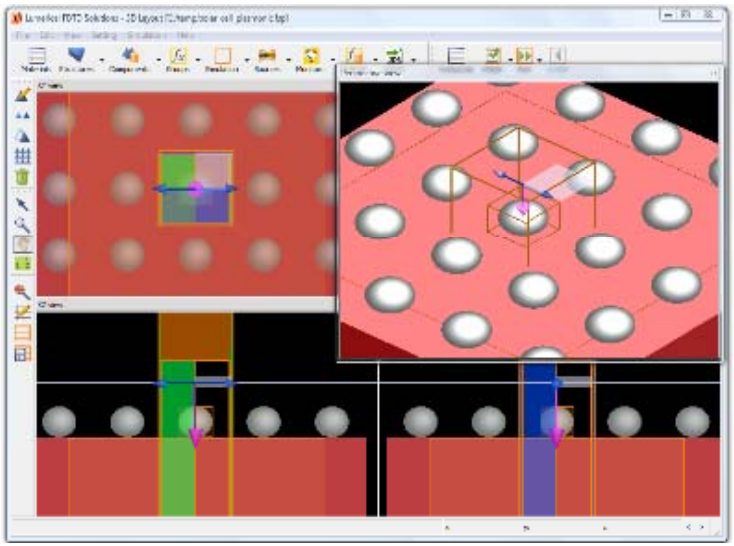


Computer model of CMOS image sensor

Simulation software for how light interacts with computer chip

Started in 2003 from a spinoff company from a UBC Physics / Engphys professor

Based in Yaletown, employs several recent Engphys grads.



3D FDTD Solutions model of solar cell device consisting of a periodic array of silver nanoparticles located on the upper surface of the silicon solar cell.

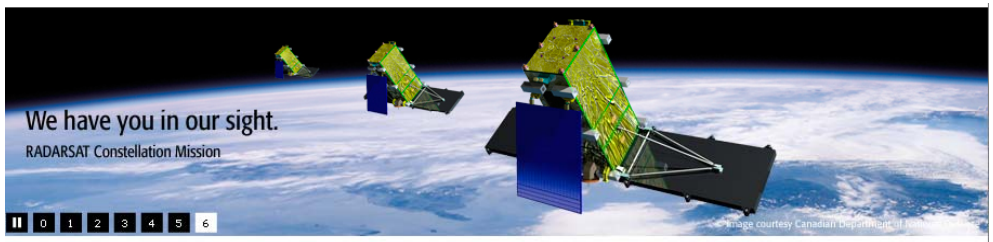
3. What do you do after Engphys?

- Evan Hohert - Engphys grad from Kwantlen
  - Worked in CARIS robotics lab at UBC (non-verbal control of robot-assisted lifting)
  - Now at Williams and White doing automation systems:

3. What do you do after Engphys?

MDA Essential Information Solutions

Canadian aerospace, information services and products company. Made the Canadarm I and II $1.7B company.



Name: Dan Friedmann
Job Title: CEO, MDA since 1995.

Name: Bjarni Trygvasson
Job Title: Payload Specialist on Space Shuttle mission STS-85 in 1997. One of 11 Canadian astronauts.

3. What do you do after Engphys?

Ausenco

T+ T-

English | 中文版 (Chinese)

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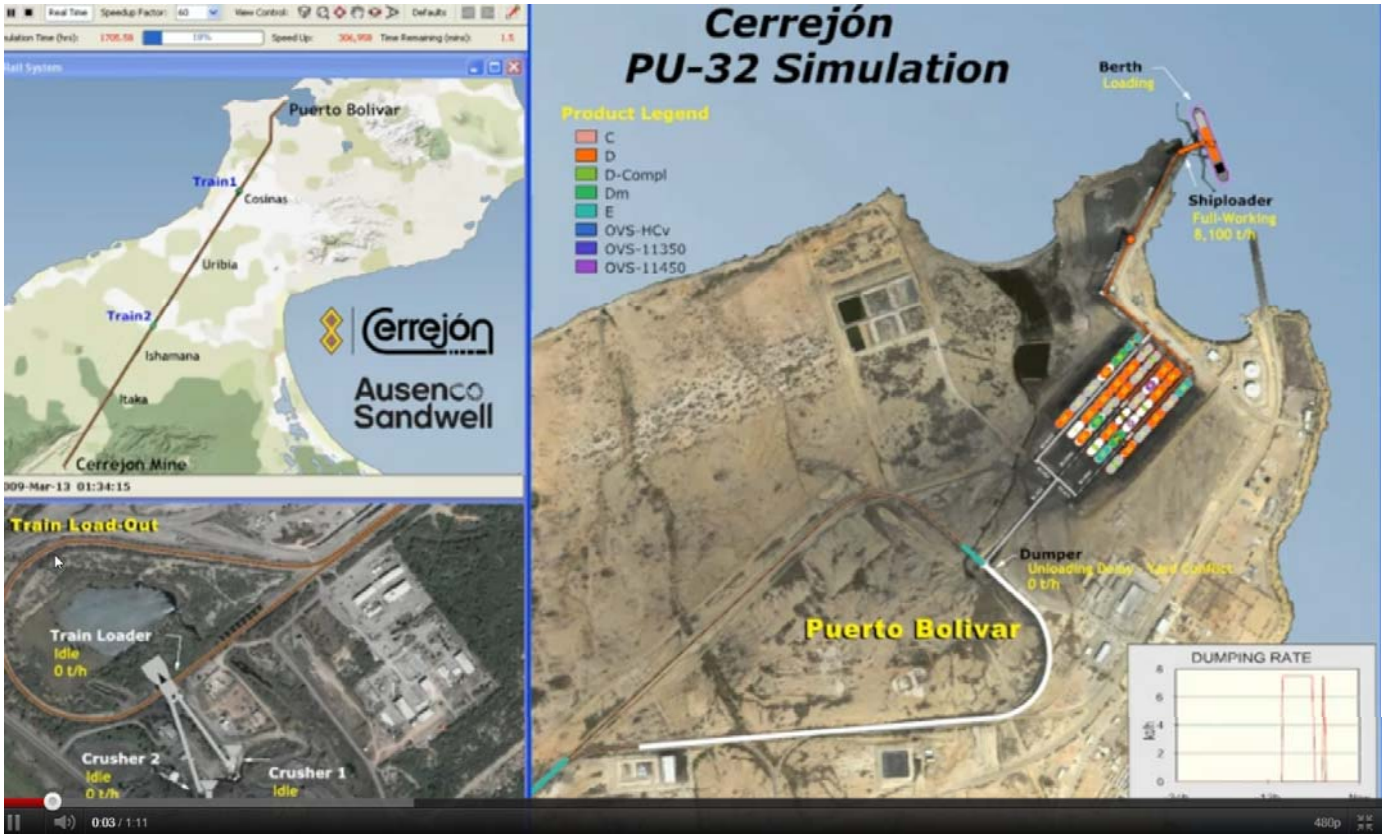
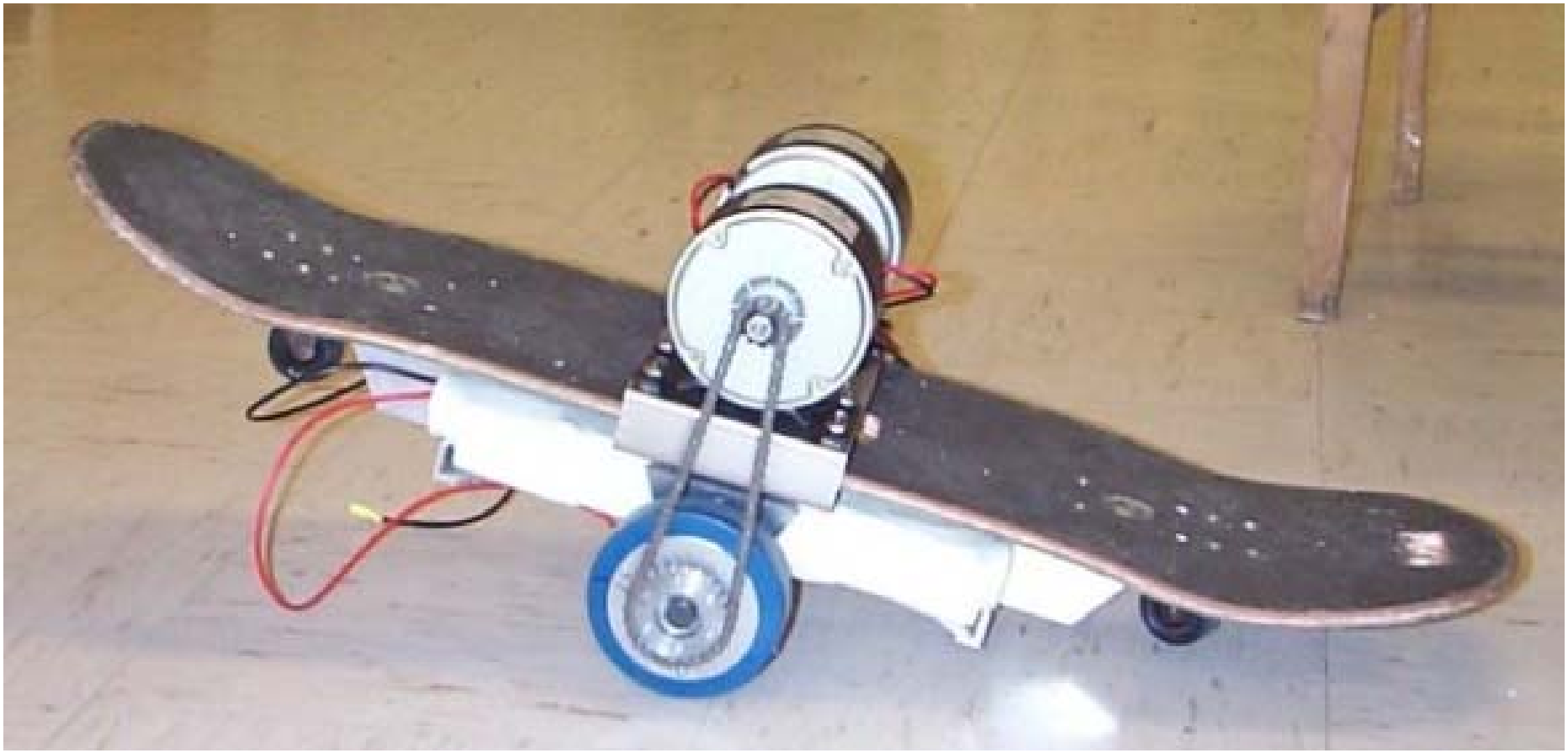
Logistics & Supply Chain Simulation

We are a world leader in the use of computer simulation modelling to optimise pit-to-port and port-to-port supply chains for the mining, oil and LNG industries.



Energy

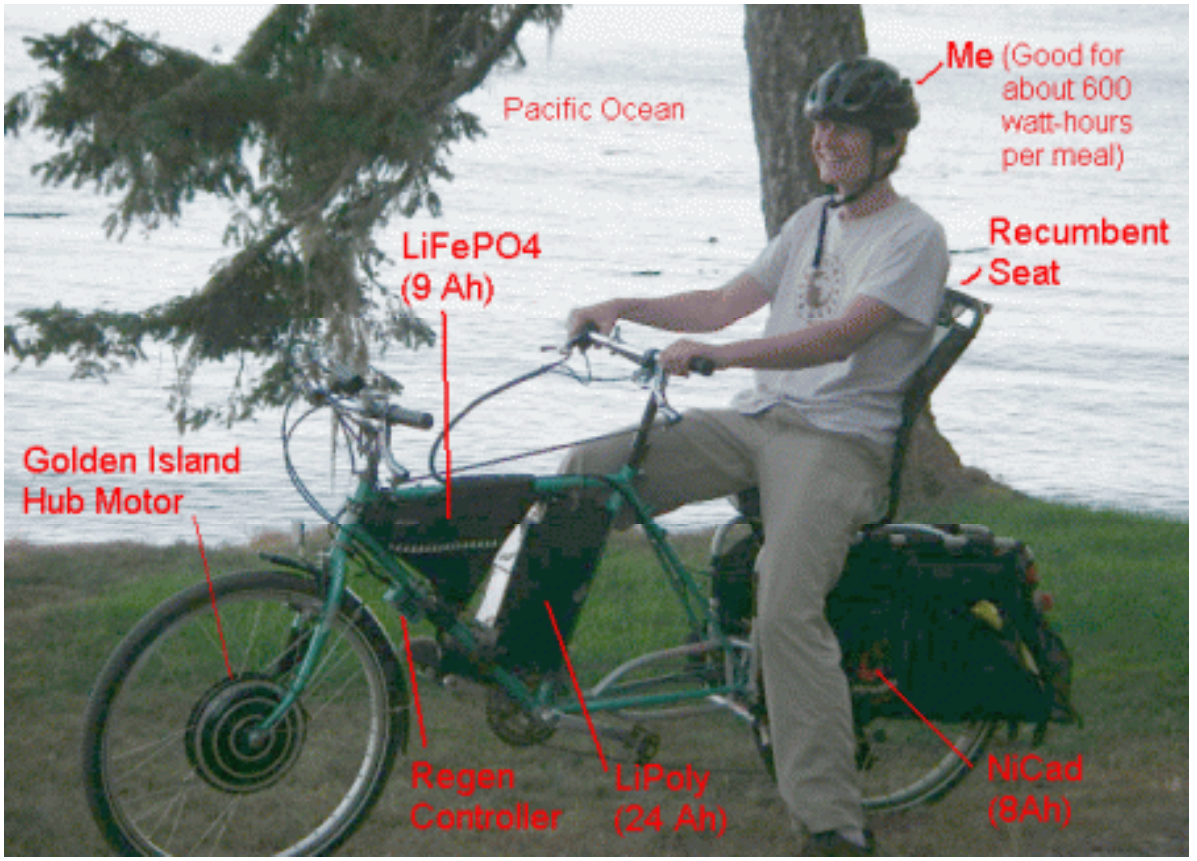
2005 – Emanual, the two-wheeled skateboard



Energy

Name: Justin Lemire-Elmore
Company: Founder, GRIN Technology

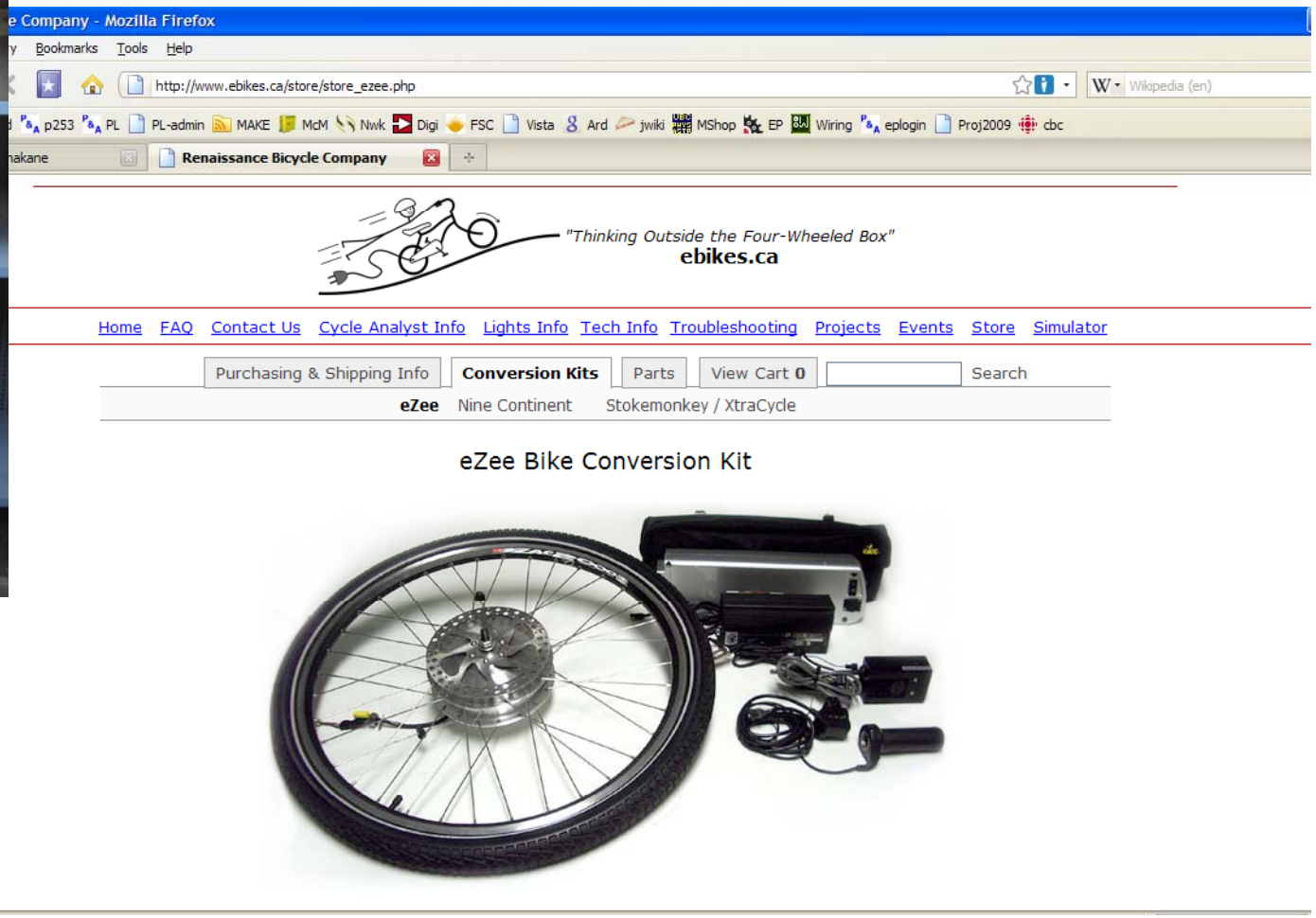
In 2008, rode his electric bike across Canada.
Took 30 days.
Used less than $10 in electricity. In total. That's it.



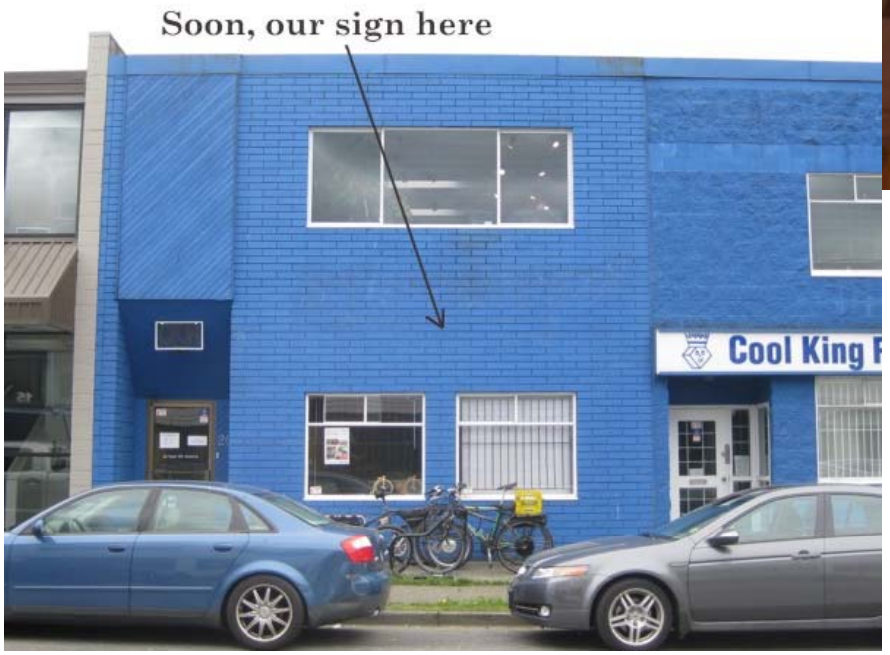
Energy

Name: Justin Lemire-Elmore
Company: Founder, GRIN Technology

Started own electric bike company.



Energy



Started own electric bike company.
Store at Main and 4th Ave.

Why Choose Engphys?

You like math and physics **.

You like working with people that work hard.

You like something you saw in this presentation.

You don’t know what you want to do when you grow up.

**** you don’t have to love it, just like it enough to work hard at it.**

How to get in…

- **You can enter Eng Phys from (in order of preference):**
  - UBC 1st Year Applied Science (Engineering)
  - UBC 1st Year Science, or Science 1
  - One of five local colleges offering Engineering Exchange programs: Capilano, Kwantlen, Langara, Douglas, UCFV.
  - You can transfer from another college or university.
- **Entry to UBC 1st Year Applied Science (Engineering)**
  - About 800 students are accepted each year.
  - Your marks in Physics, Math, Chemistry, and English count.
  - Your average should be well above 80% (cutoff is in the low ’80s)
- **Entry to Engineering Physics**
  - After 1st Year Applied Science or Science, you select Eng Phys for 2nd year.
  - We select the top 60 applicants, using a mixture of 1st year marks and a broad-based admissions process.
  - Minimum mark (in 1st year) is around 70% (may vary based on demand)

Other Information...

- **Tuition Cost:**
  - $5000 - $6000 per year
- **Typical time to finish degree:**
  - 5 years (including first year Engineering) is the default
  - Some students choose to take 6 years to lighten their course load, pursue terms abroad, or pursue other activities.
  - Drop-out / transfer rate is 10% - 20%
- **Guaranteed Acceptance to Engineering Physics:**
  - Students who have received a guarantee of their first choice of programs as part of the $2,000 and $4,000 levels of the President's Entrance Scholarship (PES) award will be placed into the program of their choice
- **Deadlines:**
  - The deadline for applying for UBC Applied Science is February 28, and the documentation deadline is June 30.
  - Deadline for selecting Eng Phys is June 15 after First Year Engineering.