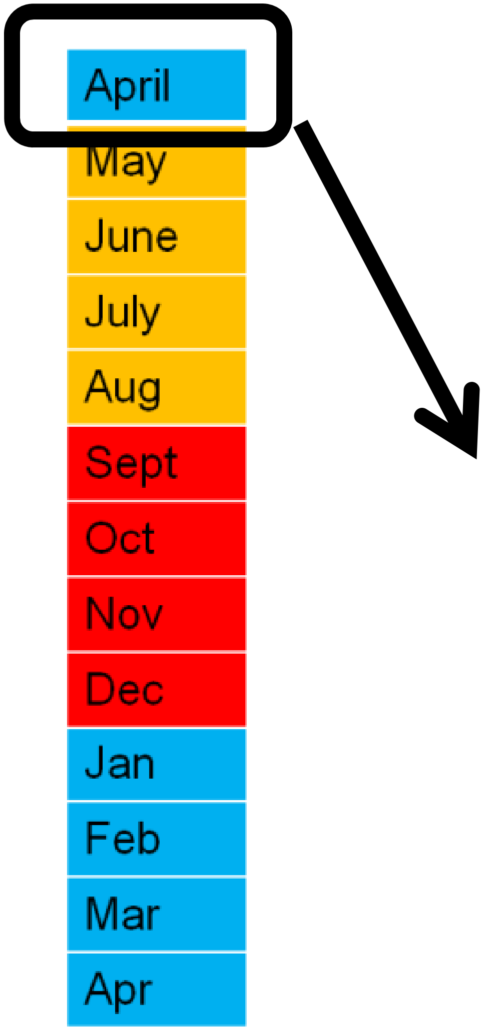


ENPH 459
Engineering Project I

Info session for 2012/2013
Talks and links are online.

Google: ENPH 459 Kickoff 2012

Jon Nakane, Chris Waltham, Bernhard Zender
2012 March 29

Today

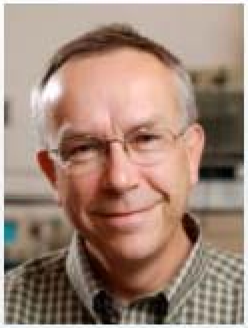
- Meet Chris Waltham
- History and Timeline
- Recent 459 and 479 projects
- Summer + 1st Term

Firefox | Chris Waltham | UBC Physics & Astrono... | +

ubc.ca https://www.phas.ubc.ca/users/chris-waltham | Google

Bookmarks

Profile | Publications



First Name: Chris
Last Name: Waltham
Position: Professor
Office Room: Hennings 260
Office Phone:
(604)822-5712
Lab Room: Hebb 1H
Email:
c...@physics.ubc.ca

Research Group(s):
Applied Physics

Students Wanted:
actively recruiting

Links:
Research Website
Publications
C21 Project: Physics Teaching for the 21st Century
PHYS 318 (Acoustics)
PHYS 333 (Energy and Climate) DE section starts 2012.09
ENPH 459/479 (Engineering Physics Project Laboratory)
Course Archive
BP site
Faculty Service Centre

Awards:
Faculty of Science Award, 2010; Alumni Association Distinguished Faculty Award, 2008; John C. Polanyi Medal (NSERC) 2006; Faculty of Science Award, 2003; Killam Award, May 1998

Research Area: Musical Acoustics

Researchers & Instructors
Departmental Contacts
Academic Program Contacts

For Dept Members
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Website Feedback

Feedback Form: Have suggestions or comments for the new website? Let us know!

Latest News & Events

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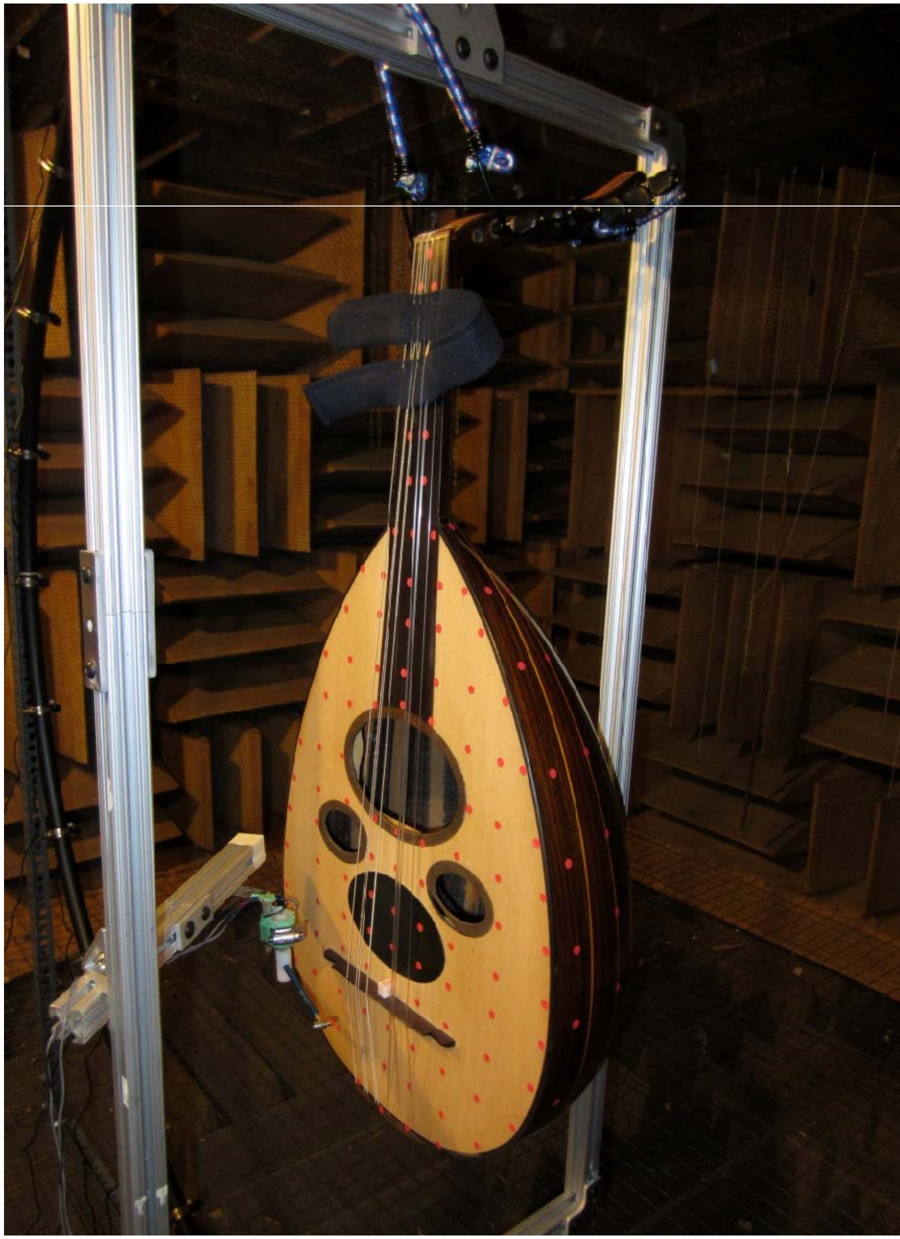
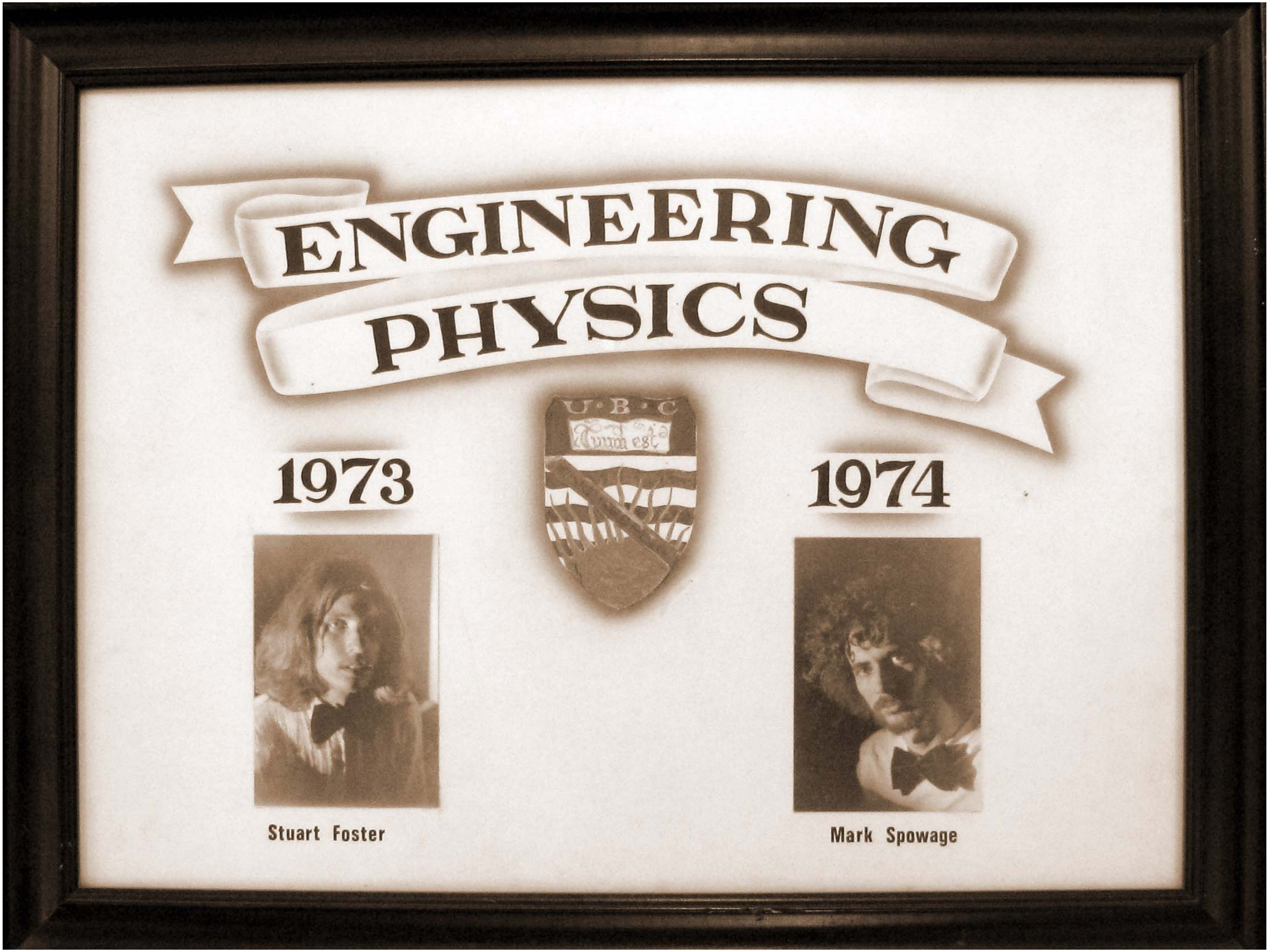


History

1st Engphys Grad Classes 1948, 1949


ENGINEERING
PHYSICS
U·B·C
Tuum est
1973
1974
Stuart Foster
Mark Spowage

Engphys Project Lab started in 1988/89 to give students a full project experience:

Tech Experience

- Design experience
- Technical skills

Project Management

- Planning
- Management
- Resource Allocation (equipment + time)
- Professional Communication

Professionalism

Timeline for the next 12 months

ENPH 459 is a 2-term course.
Treat it like a 1year experience

(don't believe SSC when it lists it as only a Term2 course)

April	
May	**Summer** ID potential team members (2-3 members per group) Discuss self-guided projects, possible topics
June	
July	
Aug	
Sept	**Term 1** (4-6 hrs/week) Confirm team members / Project by mid-September Research and Proposals (3-4 drafts submitted) Most students on co-op this term
Oct	
Nov	
Dec	
Jan	**Term 2** (8-12hrs/week) Project work officially begins Final Reports submitted
Feb	
Mar	
Apr	

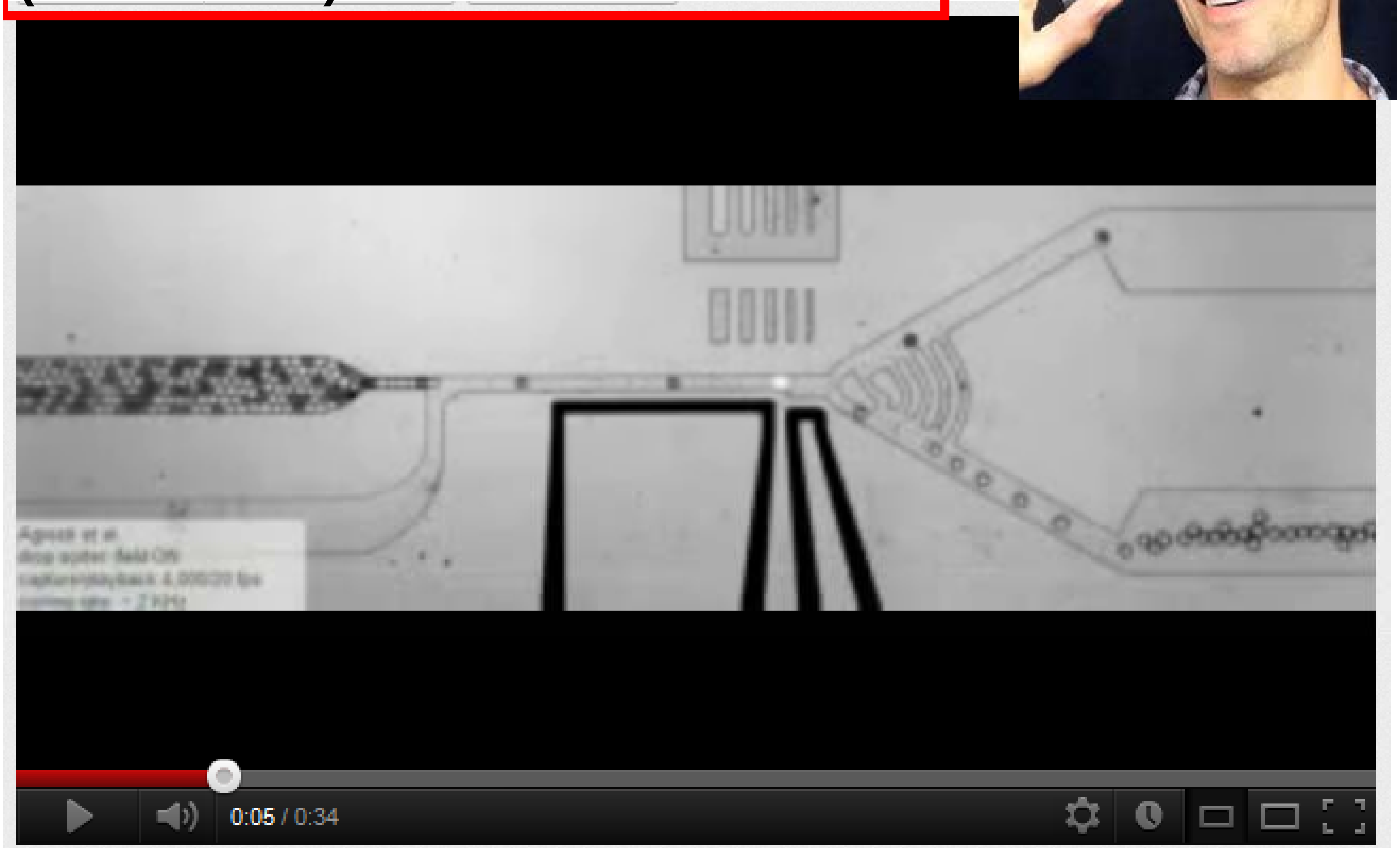
Recent Projects in ENPH 459 (and 479)

1. Project Sponsors from PHAS and across campus.

2. Off-Campus and Self-Sponsored Projects

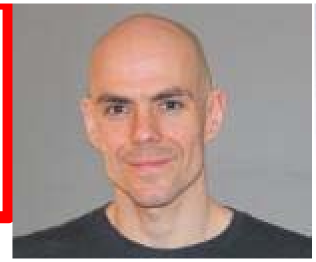
Microfluidics Drop Sorter

(Carl Hansen)



http://www.youtube.com/watch?v=S1fEHLarRZk

Microfluidics + NMR
(Carl Hansen, Carl Michal)



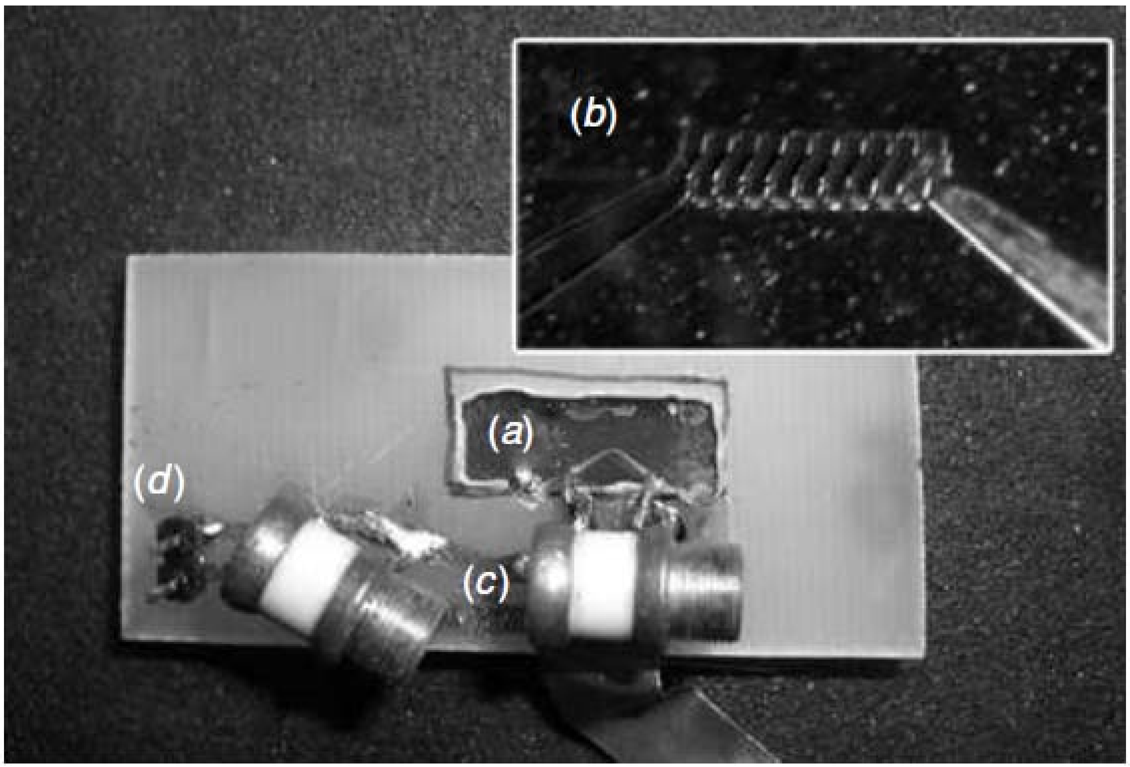


Figure 2. Photograph of the microcoil and tuning circuit, showing (*a*) a microfluidic chip with the coil beneath the printed circuit board, (*b*) inset with a close-up photograph of the microcoil (*c*) tuning and match capacitors, (*d*) electrical connection to coax cable.

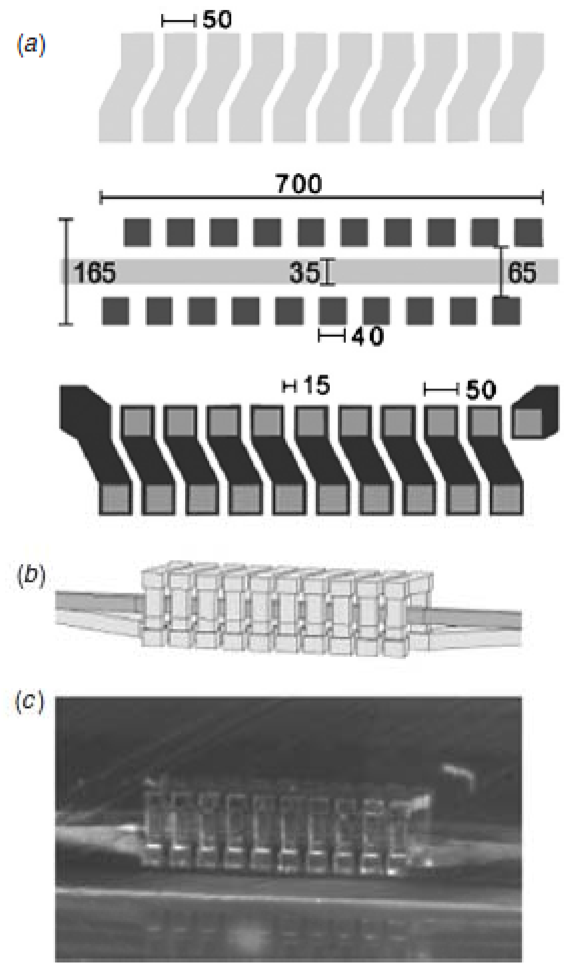


Figure 1. (*a*) CAD drawing of three individual layers used in constructing the coils. Dimensions listed are in μm. (*b*) CAD drawing of a finished coil assembly. (*c*) Optical microscope image of a completed coil.

Microfluidics + NMR
(w/ carl hansen, carl michal)

Publication with students as lead authors

IOP Publishing — Journal of Micromechanics and Microengineering
J. Micromech. Microeng. 19 (2009) 095001 (6pp) doi:10.1088/0960-1317/19/9/095001

Sub-nanoliter nuclear magnetic resonance coils fabricated with multilayer soft lithography

Matthew H C Lam[1,3], Mark A Homenuke[1,3], Carl A Michal[1] and Carl L Hansen[1,2]

[1] Department of Physics and Astronomy, The University of British Columbia, 6224 Agricultural Rd, Vancouver, BCV6T 1Z1, Canada
[2] Center for High-Throughput Biology, The University of British Columbia, 2185 East Mall, Vancouver, BCV6T 1Z4, Canada

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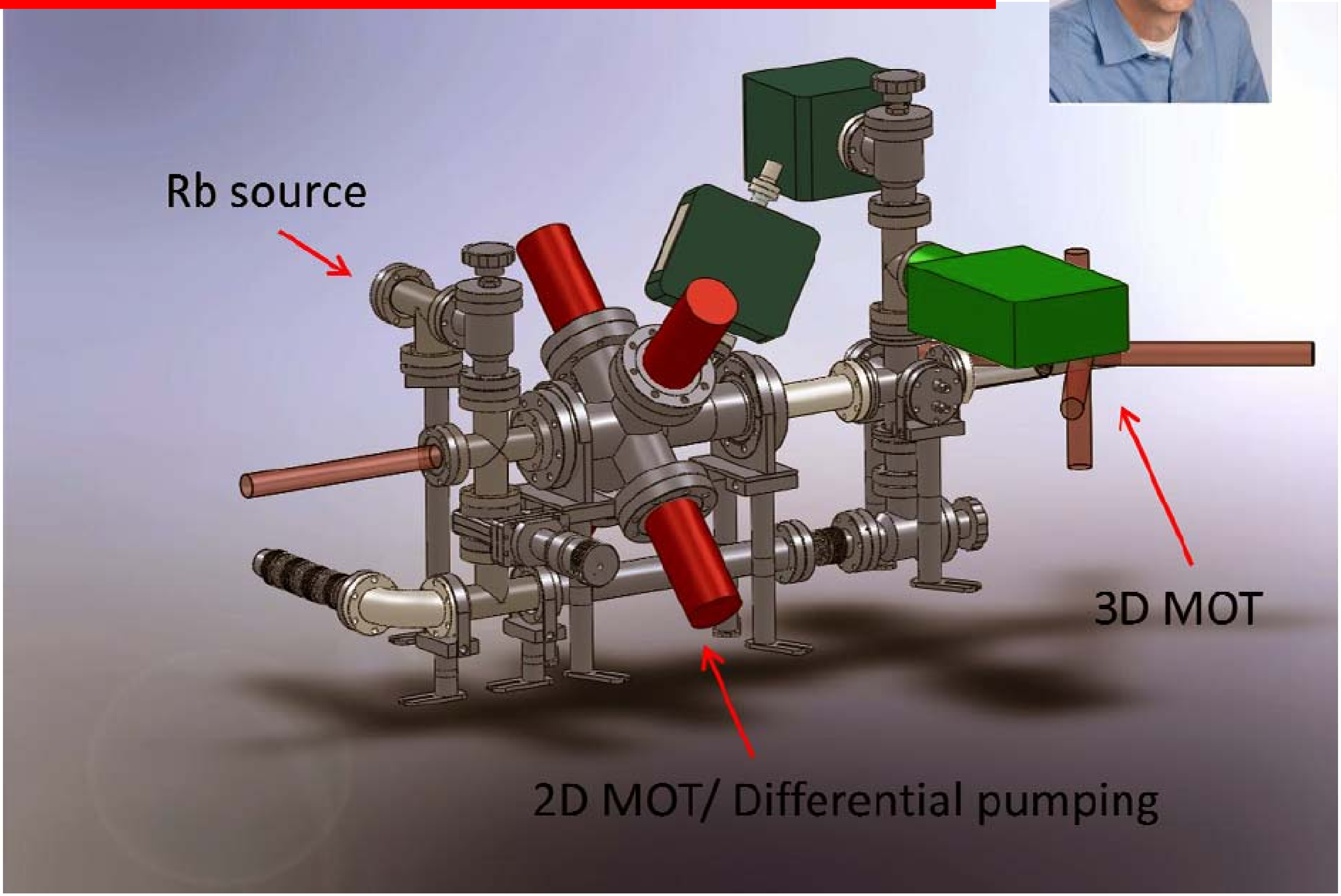
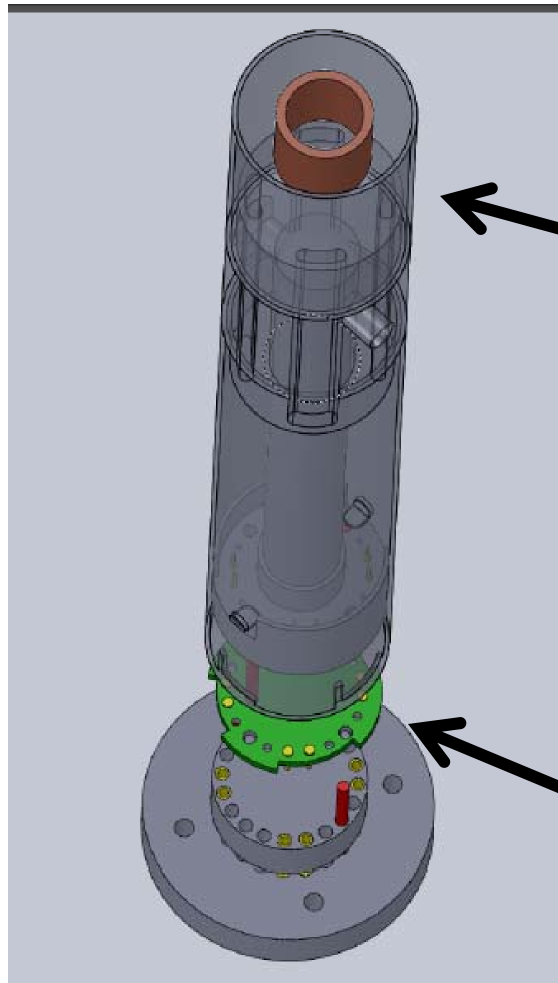
Received 21 February 2009, in final form 23 June 2009
Published 18 August 2009
Online at stacks.iop.org/JMM/19/095001

Abstract
We describe the fabrication and characterization of sub-nanoliter volume nuclear magnetic resonance (NMR) transceiver coils that are easily amenable to integration within PDMS-based microfluidics. NMR coils were constructed by the injection of liquid metal into solenoidal cavities created around a microchannel using consecutive replica molding and bonding of PDMS layers. This construction technique permits the integration of NMR coils with solenoidal, toroidal or other three-dimensional geometries within highly integrated microfluidic systems and are one step toward NMR-based chemical screening and analysis on chip. The current proof-of-principle implementation displays limited sensitivity and resolution due to the conductivity and magnetic susceptibilities of the construction materials. However, NMR measurements and finite-element simulations made with the current device geometry indicate that optimization of these materials will allow for the collection of spectra from sub-millimolar concentration samples in less than 1 nL of solution.

2D Magneto-Optical Trap
(Kirk Madison)



Low-temperature sample transfer mechanism (Josh Folk)



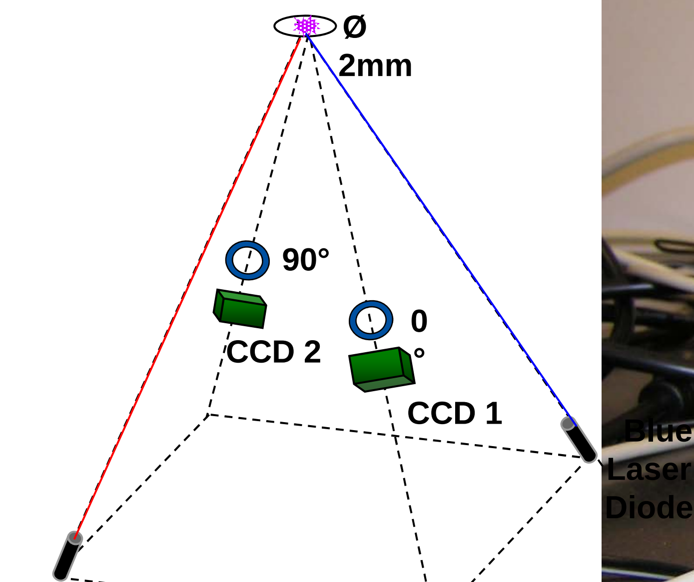
2m long tube reaching into the dilution fridge

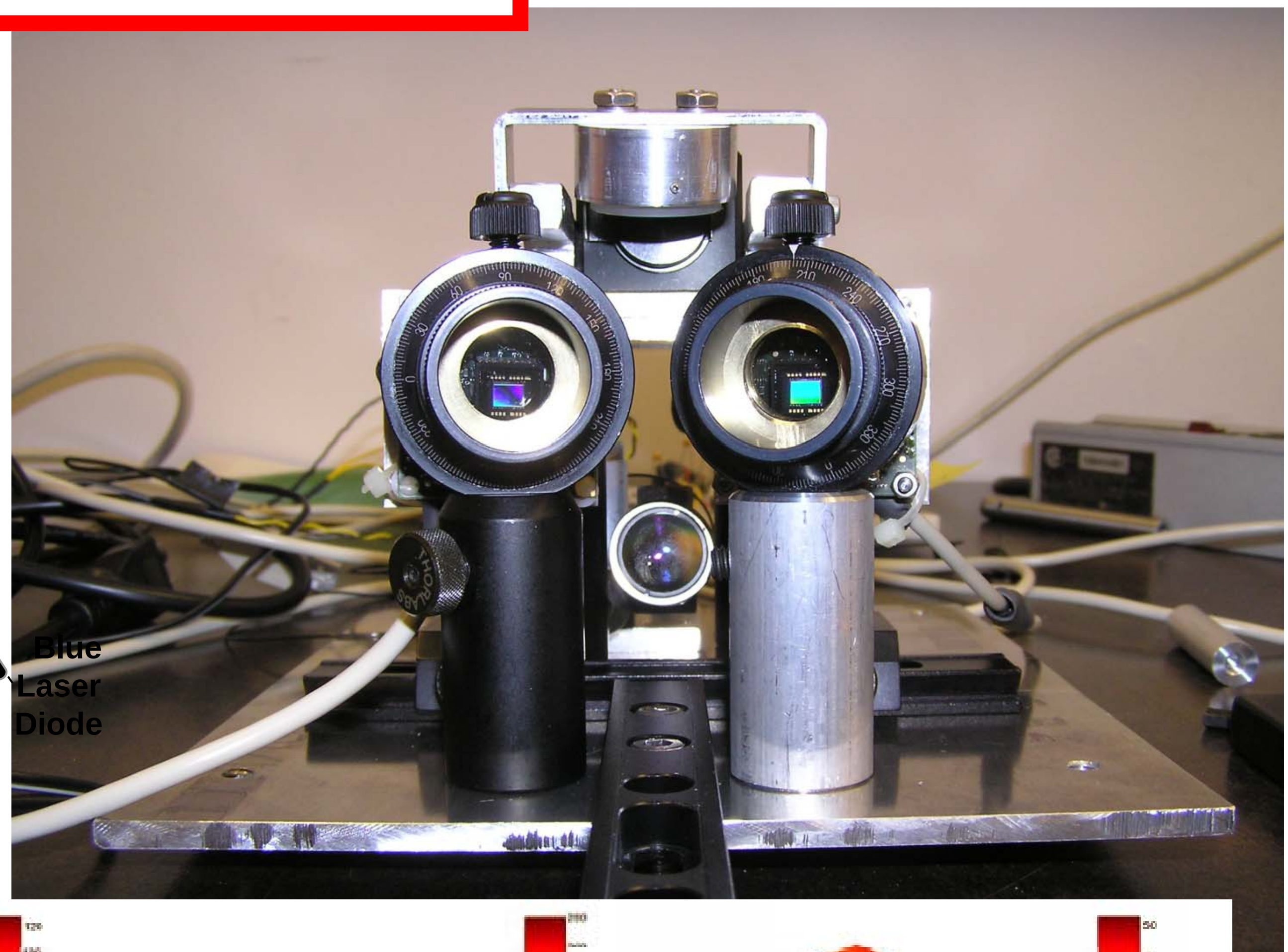
Circuit board with sample is ~1cm diameter

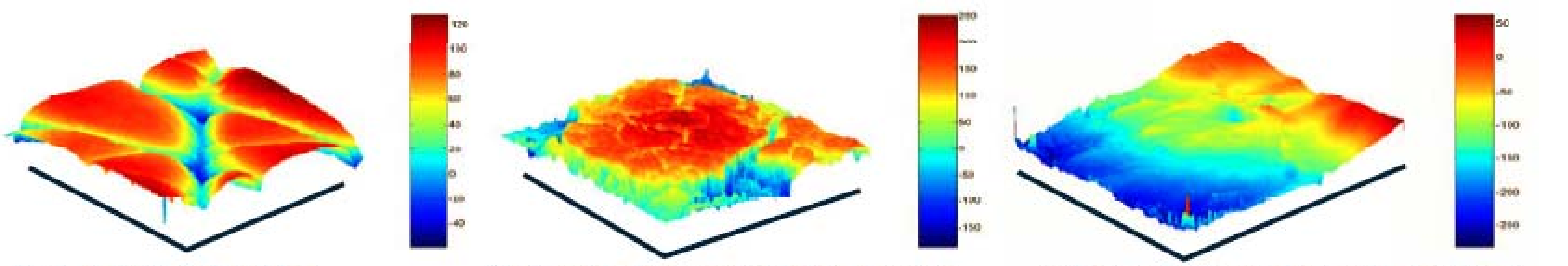
laser speckle imaging system for measuring surface roughness

Tim Lee, Haishan Zeng

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





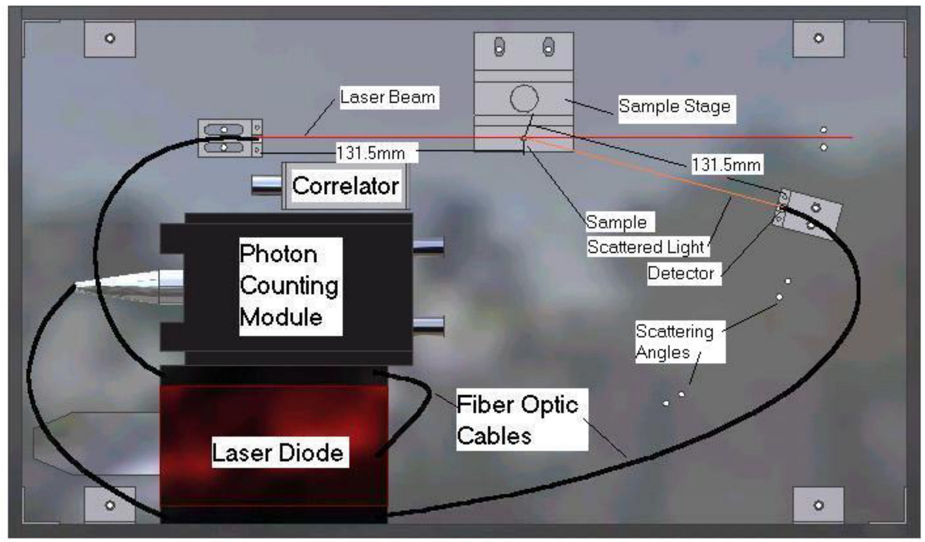


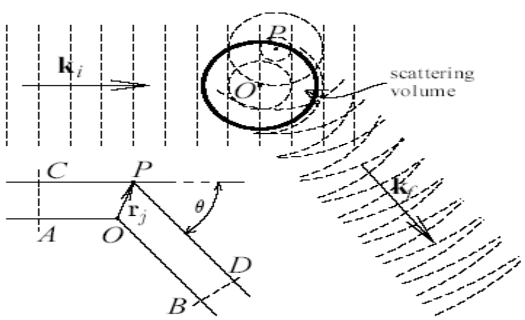
(a) normal skin (b) seborrheic keratosis (c) malignant melanoma.

Dynamic Light Scattering Prototype for Measuring Platelet Quality

(Elisabeth Maurer)

Canadian Blood Services
Société canadienne du sang

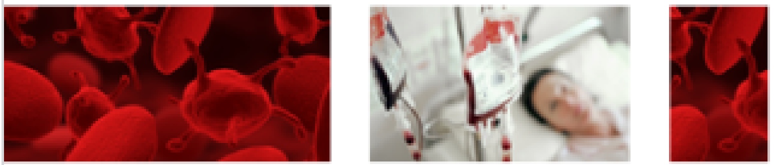




Company started based using 479 prototype

LightIntegra TECHNOLOGY

Home | About | Technology | Publications | Contact



Platelets save lives.
We save platelets.

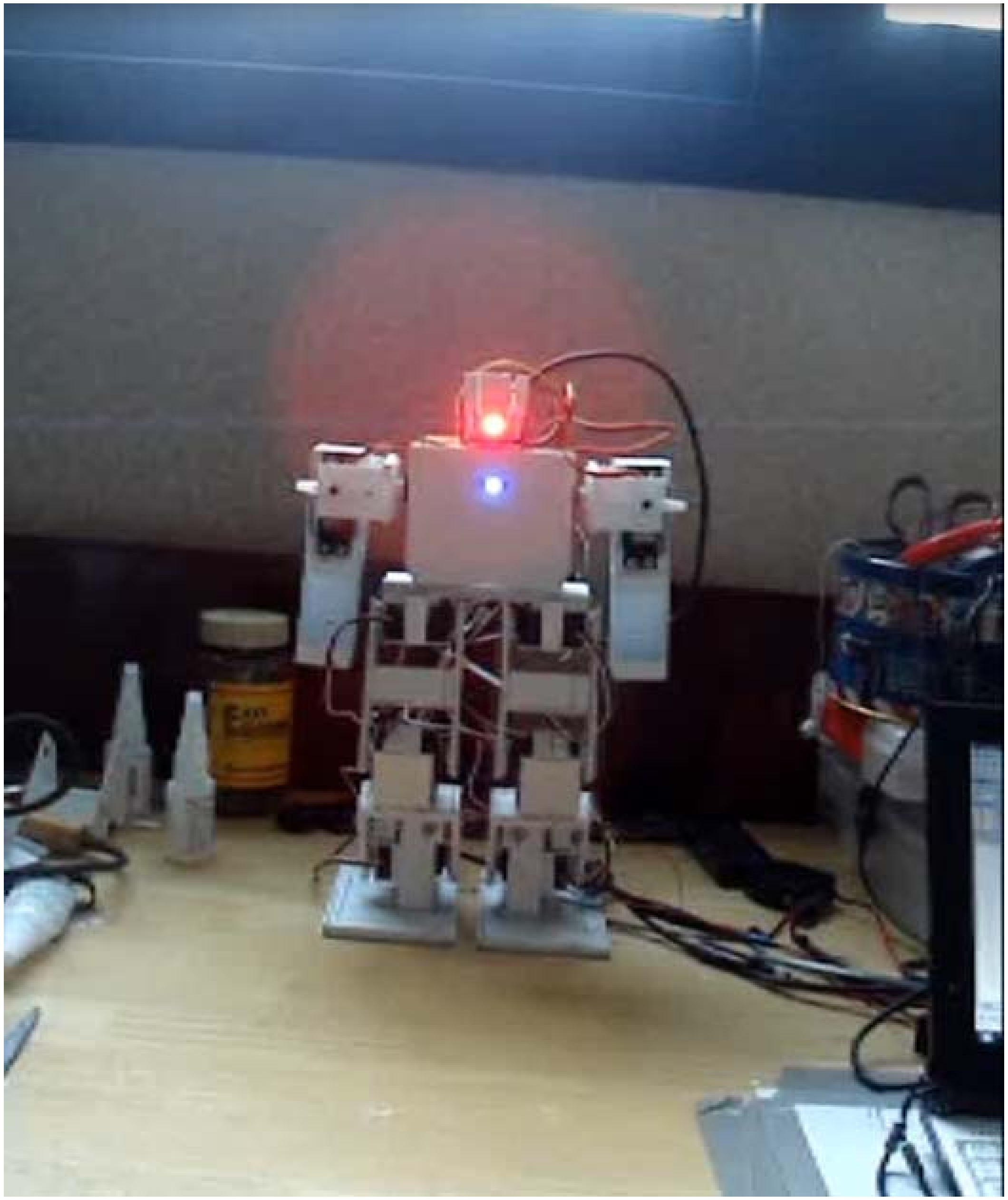
ThromboLUX™ is a quick and simple diagnostic test for platelet quality and function that will make it easy to screen platelets prior to transfusion.

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.

1. Project Sponsors from PHAS and across campus.

2. Off-Campus and Self-Sponsored Projects

Walking robot

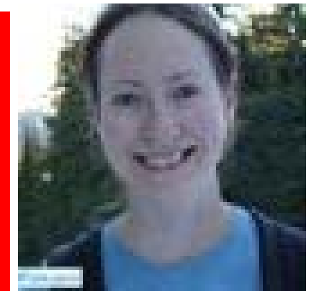


Automated kite flying for power generation

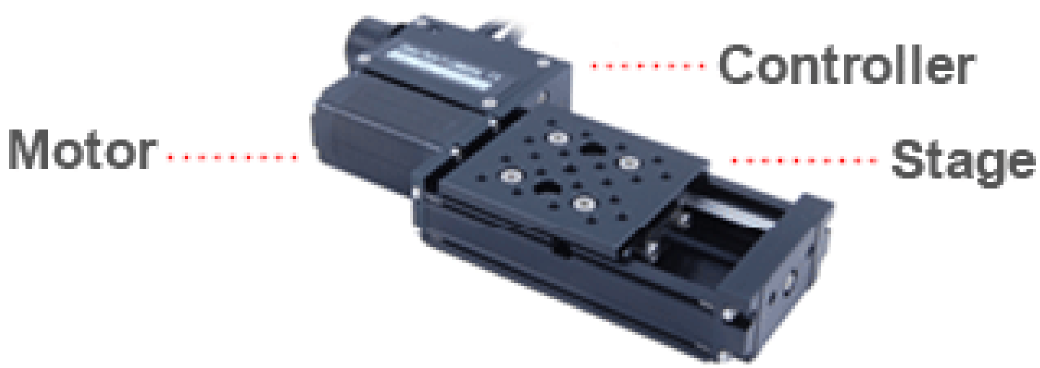
http://www.youtube.com/watch?v=w5bFlTGGIJs

Zaber Technologies

(Eliza Boyce, Andrew Lau + other Engphys alums)



Many of Zaber's devices have built-in controllers, like the T-LSM shown here:



- Free software with source code
- RS232 or USB interface
- Daisy-chain additional devices
- Set-up easy as 1-2-3

Surgical flashlight

Titanoboa vs. the Mondo Spider

Charlie Brinson

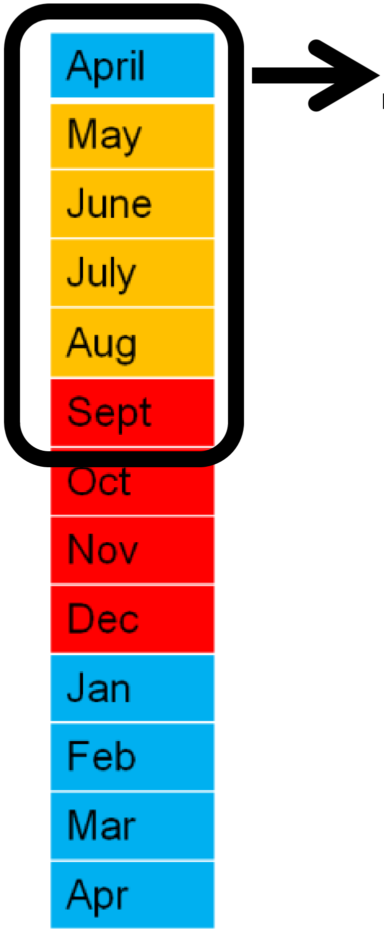
http://www.youtube.com/watch?v=Ocyhbij9JYQ

83 projects posted in Sept 2011

List of Projects

1. Transport Box Redesign (Frogbox)
2. Transport Box Service Station (Frogbox)
3. & Autonomous Sand Painting Robot (EverydayDesign)
4. & Origami Engineering (Olson)
5. Light weight, High strength Egg-carton from 100% recycled fibre (Olson)
6. Quantum Materials Lab - Research Topics (Damascelli)
7. Topics in Acoustics (Waltham)
8. ALS Design Competition (ALSBC)
9. Design and implementation of a temperature compensation system for Silicon-Pl
10. Micro Induction-Heating and Temperature Sensing System (UBC Rapid)
11. & Waste-to-Anything Recycling Machine (UBC Rapid)
12. & Harmonograph (Wanner)
13. Planar Bellows Actuator for Suntracking Array (Lumira)
14. Methods for Monitoring of Human Movement (Leung)
15. Energy conservation and management tools for the home (Leung)
16. An Electronic White Cane for the Visually Impaired (Leung)
17. Error Control Coding for Flash Memory (Leung)
18. Circular Saw Vibration Frequency and Mode Shape Indicator (Schajer)
19. Droplet Sorter (Hansen)
20. Computational Modeling of Hydrodynamic Cell Trapping (Hansen)
21. Human Communication Technologies Lab
22. Assembly and characterization of an ultra-cold atomic jet (Madison)
23. Laser Power Stabilization System (Madison)
24. & Direct digital synthesizer (Madison)
25. Ultra-low noise amplified photodetectors for "atom counting" in laser cooled ato
26. & Hansch-Couillard Stabilized Reference Cavity and Lock (Madison)
27. Miniaturization of a saturated absorption lock for commercial applications of las
28. Ultra-fast intensity stabilization for absorption beam measurements (Madison)
29. & Electronic Photonic Integrated Circuits (EPIC) (Chrostowski)
30. Diffraction Interferometer (Zaber)
31. & Capacitive or Inductive Linear Encoder (Zaber)
32. Light weight direct drive ring stepper motor (Zaber)
33. Black Box Identification of Stepper Motor (Zaber)
34. Design and construction of a position sensor for a scanning tunneling microsco
35. Design and construction of high resolution strain gauges to monitor in real time transfer arm (Pennec)
36. Submarine Data Logger/Display (UBC SUBC)
37. Submarine Power Meter (UBC SUBC)
38. Submarine Velocimeter (UBC SUBC)
39. Submarine Steering System (UBC SUBC)
40. & Stepper Motor Matrix (TangibleInteraction)
41. System for the Microfluidic Testing of Optical Oxygen Sensors (Cheung)
42. Life Support Systems for AquaVan (VancouverAquarium)
43. & Twitter Parsing Location Information for the Eat St. App (EatStDigital)
44. Microsoft Kinect: (a) computer vision detection of negative obstacles / (b) mounting calibration (Mitchell)
45. Video Recording of Wheelchair Training Sessions on an Android Tablet (Mitchell)
46. Optical Microscope-Based Spectroscopy of Single Nanostructures (YoungRieger)
47. & Numerical modeling of quantum antiferromagnet under a staggered field (Lau)
48. Software development for an numerical scheme for the modeling of quantum antiferromagnet (Lau)
49. Tracking Wandering Residents (HaroPark)
50. 3D Angular Momentum Controlled Satellite (Kotlicki)
51. & Sound-source localization antenna (Hodgson)
52. Building acoustical-environment monitoring system (Hodgson)
53. Replace on-site transformer oil testing, with remote diagnostic device (Grubner)
54. & Modified Bicycle Front Suspension Fork with Electric Motor (Zender)
55. & ROV Construction, Field Test and Trouble-Shooting (Vancouver Aquarium)
56. & Underwater light Project (Dennison/HarveyClark)
57. Pan & Tilt Drop Camera (Dennison/HarveyClark)
58. Bidirectional Single Cable Power and Signal to ROV (Dennison/HarveyClark)
59. & ROV (Dennison/HarveyClark)
60. Digital Caliper Measurement Improvement (SOCRobotics)
61. 3D Printing - now in foam (Kotlicki)
62. RoboCup@Home (ThunderbirdRobotics)
63. Development of a Novel Nerve Refraction modality to facilitate Electrosurgical endoluminal Bladder/Prostate Surgery (Nq
64. Development of a Magnetic Stone Attractant Catheter for Endourological Ureteroscopy and Laser Lithotripsy (Nguan)
65. Conceptual development of an improved urethral catheterization system (Nguan)
66. Development of a novel imaging method using transcorporeal transmitted light (Nguan)
67. Transblood Imaging of Surgical Areas (Nguan)
68. Development of a System for Assisting Visualization and Tracking of Urinary Stones for Targetting during Extracorpore (Nguan)
69. Web-based Citation Comparison of Scientific Computing Research Articles (Mitchell)
70. Design of a compact high-resolution atomic force microscope for future integration with optics and liquid environment (
71. & Rodent Deterrent (UBCFarm)
72. Novel Tensor-based Features for DTI Registration (Abugharbieh)
73. Virtual Bronchoscopy (Abugharbieh)
74. High Altitude GPS Glider, revisited (Halpern/Waltham)
75. Robotic Parts-Cart for Human-Robot Collaborative Manufacturing (CARISLab)
76. Design and build a high efficiency keel foil for use in robotic sailing competition (UBCSailbot)
77. Develop programing logic and code for a wind direction controlled steering system for use in Robotic Sailing competitio
78. Slipstream Hovercraft Fan Design (Slipstream)
79. Lateral Tilt Axle and Bearing (SunnyHill)
80. Lever Drive Caster for Manual Wheelchairs (SunnyHill)
81. Floor Raiser (Scissor Lift) System (TetraSociety)
82. Suspension Design for UBC Solar
83. Development of a fast load/unload procedure for ultra-low temperature electronics measurements (Folk)

What to do for the next 8 months

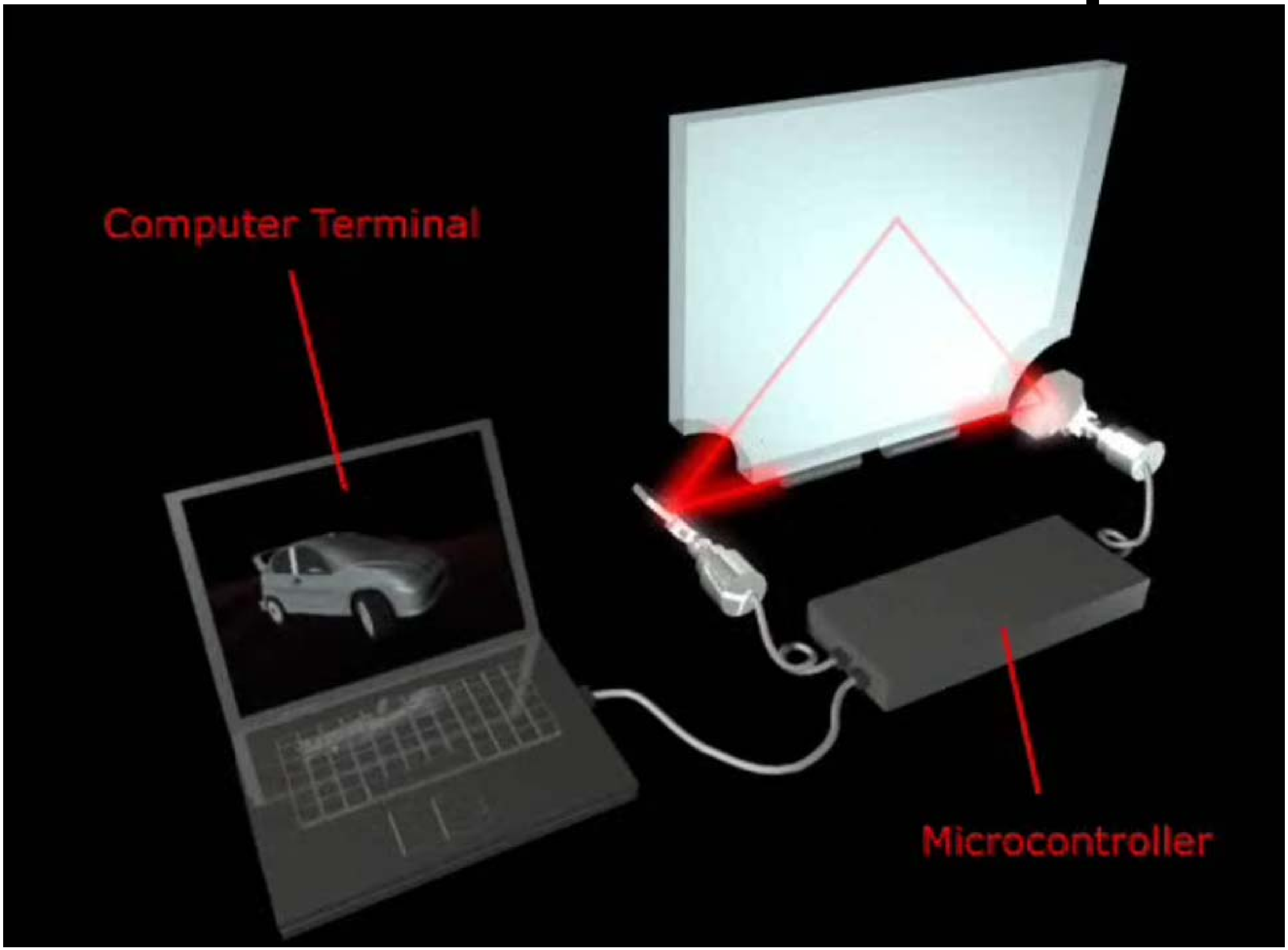


Pick your project and group (2-3 people)

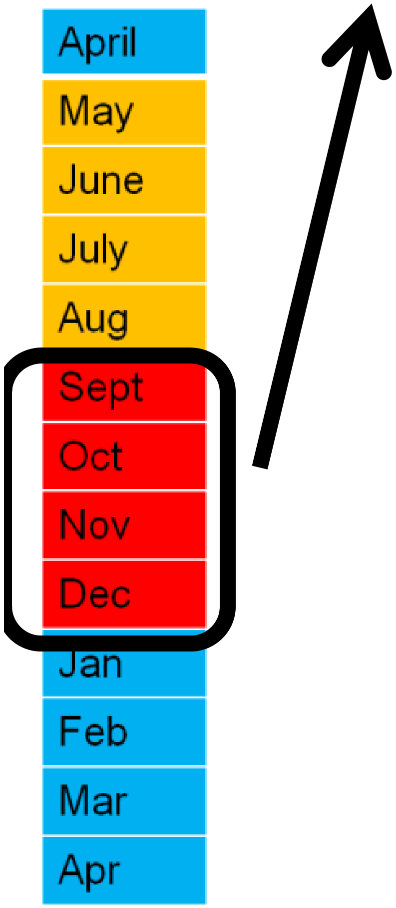
1. Has a well-defined Deliverable/Endpoint
2. Has an appropriate technical scope
3. Has all required resources and support available.
4. Should be fun and genuinely interesting to you

- Consider entrepreneurial start-up ideas (can lead to APSC 480 or APSC 481 credit)
- All Intellectual Property stays with the Project Sponsors – including self-sponsored projects.

3d visualization example.



Proposal Preparation



3 or 4 iterations from Sept-Dec (Stay in touch with team and sponsors throughout the term)

Proposals submitted for review every 3 weeks starting early Oct.

4-6 hours per week.

95% of groups don't do nearly enough research and info gathering.

End with the most important slide