ENPH 459
Engineering Project I

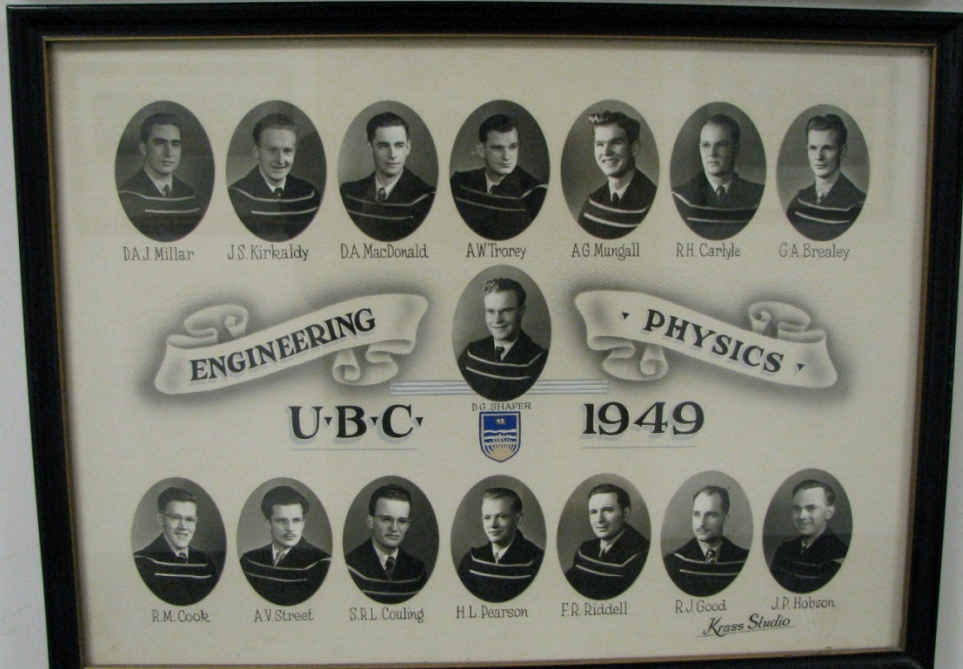| Month |
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Info session for 2016/17
Talks and links are online.

Google: ENPH 459 Kickoff 2016

2016 March 31

History

1st Engphys Grad Classes 1948, 1949

ENGINEERING PHYSICS

E.B.D.Lambe   J.E.Piercy   J.H.Duffus   W.E.Lawrie

F.R.Lipsett *President*

U·B·C 1948

D.W.Morgan   R.D.Lawson   C.B.Jeffery   F.A.Woodward

Kross Studio

D.A.J.Millar   J.S.Kirkaldy   D.A.MacDonald   A.W.Trorey   A.G.Mungall   R.H.Carlyle   G.A.Brealey

ENGINEERING PHYSICS

D.G.SHAFER

U·B·C 1949

R.M.Cook   A.V.Street   S.R.L.Couling   H.L.Pearson   F.R.Riddell   R.J.Good   J.P.Hobson

Kross Studio

ENGINEERING PHYSICS

1973

Stuart Foster

1974

Mark Spowage

Engphys Project Lab started in late 1980's 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**)

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Summary
   ID potential team members (2-3 members per group)
   Discuss self-guided projects, possible topics

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

Term 2   (8-12hrs/week)
   Project work officially begins
   Final Reports submitted

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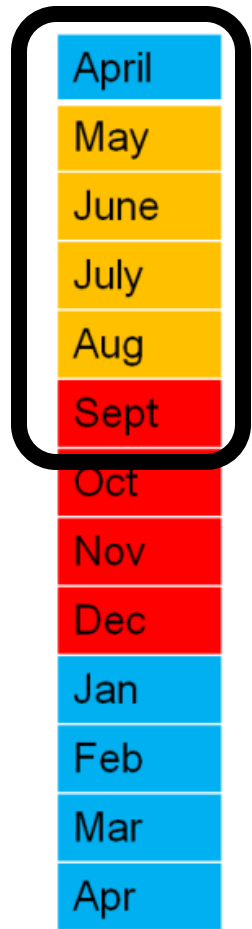
Stage 1: Pick your project and group (2-3 people)

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.

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Stage 2 – Research and Proposal Prep until December

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.

Most groups don't spend enough time in this stage. More info gathering!

Recent Projects with UBC Faculty

Microfluidics + NMR
(Carl Hansen, Carl Michal)
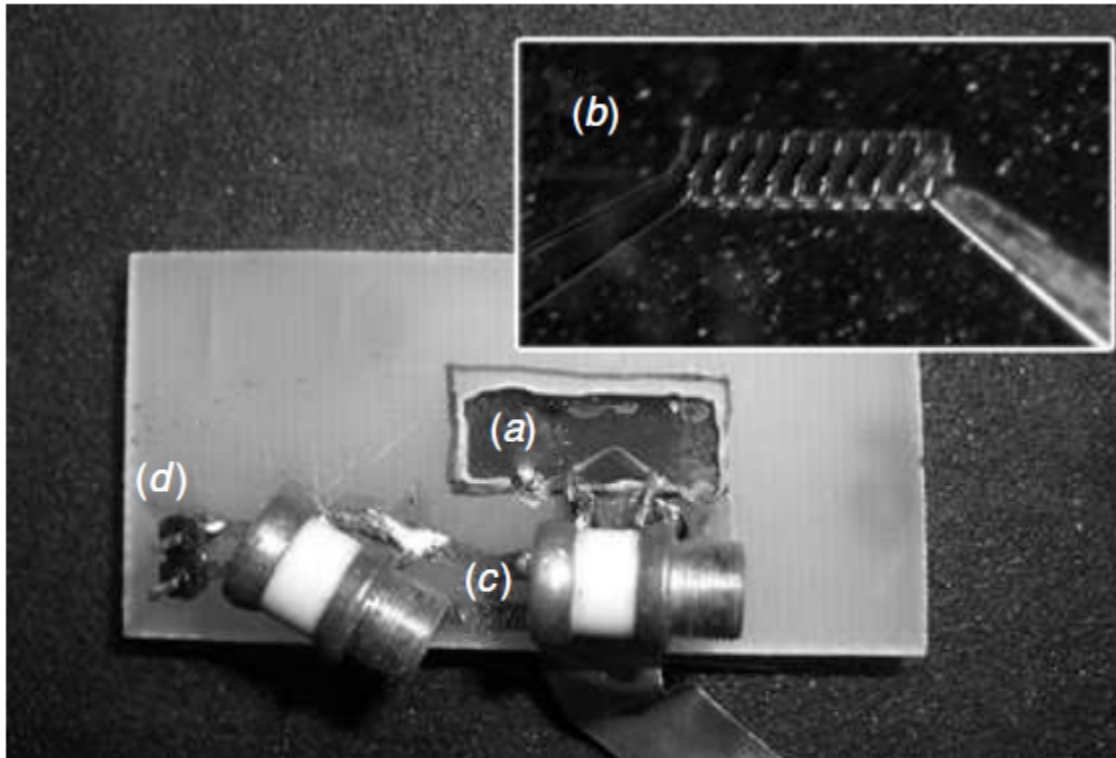
Figure 2. Photograph of the microcoil and tuning circuit, showing (*a*) a microfluidic chip with the coil beneath the printed circuit board, (*b*) inset with a close-up photograph of the microcoil (*c*) tuning and match capacitors, (*d*) electrical connection to coax cable.
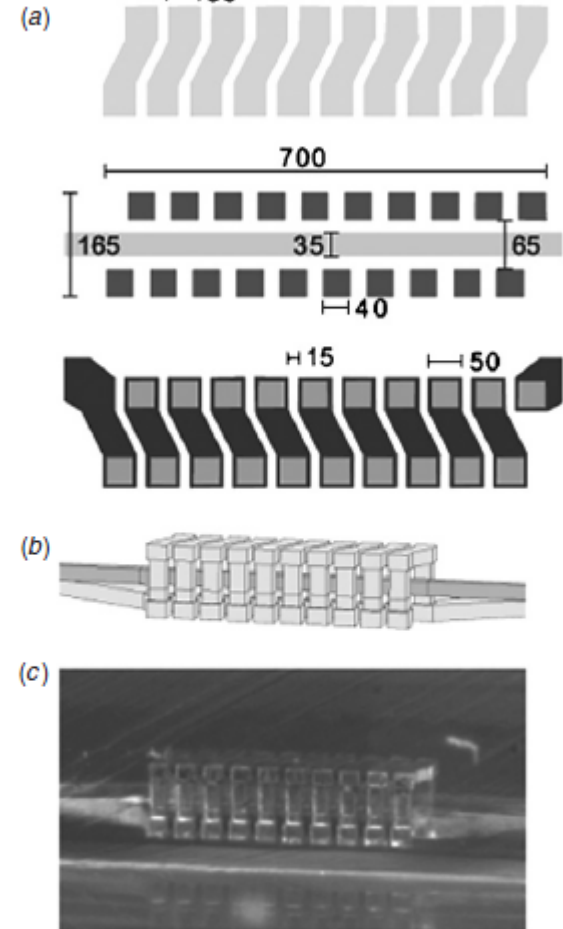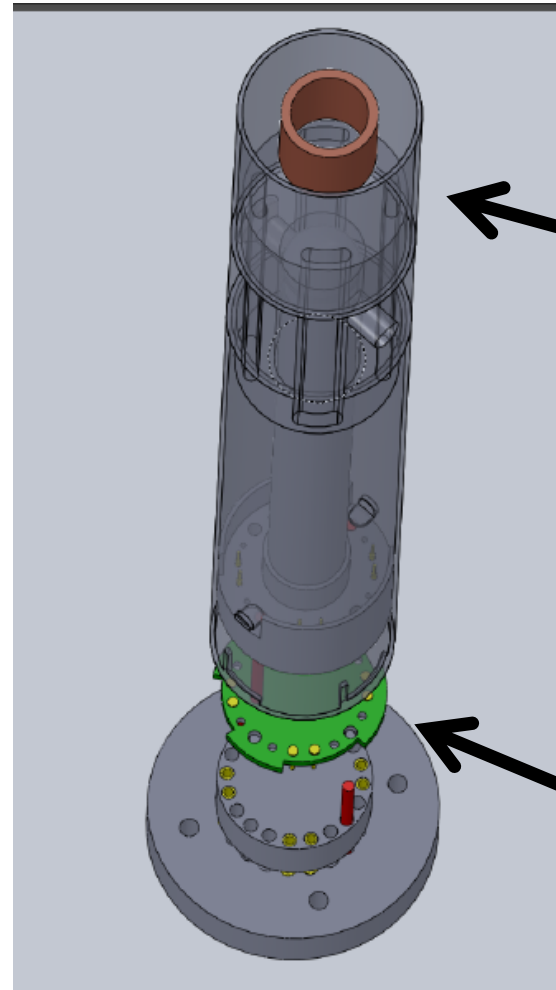
Figure 1. (*a*) CAD drawing of three individual layers used in constructing the coils. Dimensions listed are in μm. (*b*) CAD drawing of a finished coil assembly. (*c*) Optical microscope image of a completed coil.

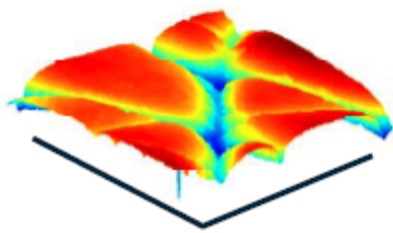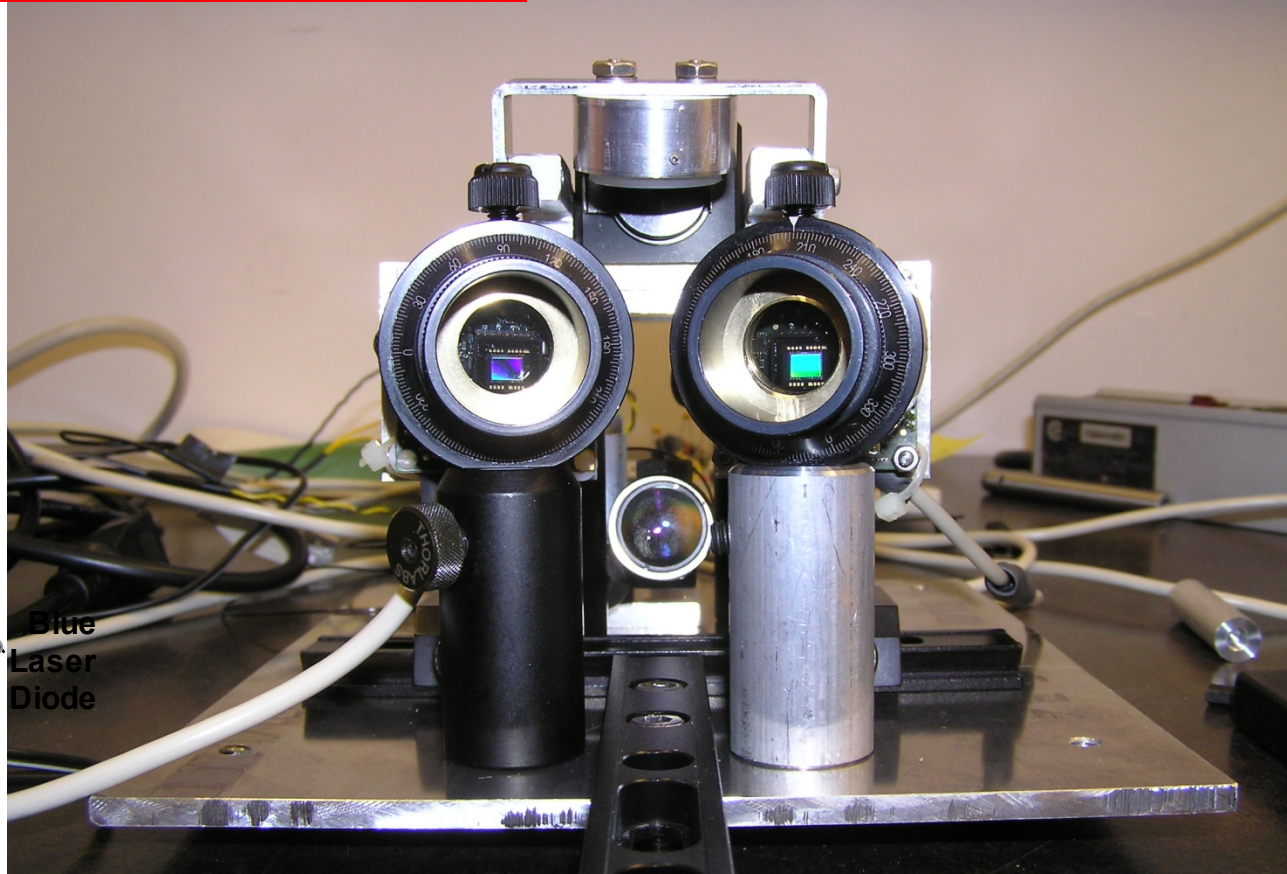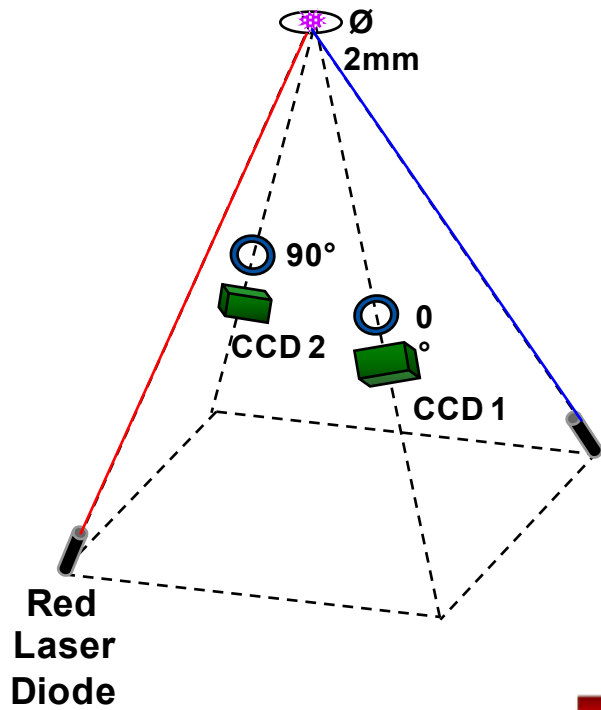# Low-temperature sample transfer mechanism (Josh Folk)
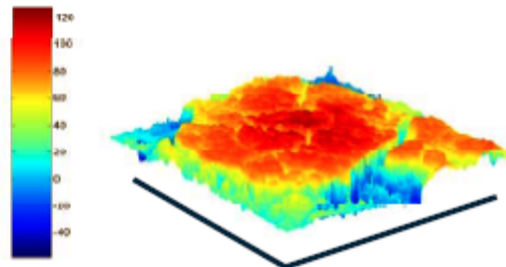

2m long tube reaching into the dilution fridge

Circuit board with sample is ~1cm diameter

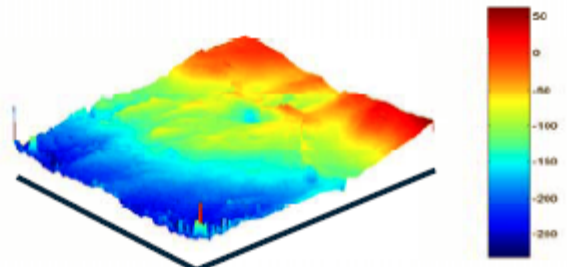# laser speckle imaging system for measuring surface roughness

Tim Lee, Haishan Zeng (BC Cancer Research Centre / BCCA)

Ø
2mm

90°
CCD 2

0°
CCD 1

Blue
Laser
Diode

Red
Laser
Diode

(a) normal skin

(b) seborrheic keratosis

(c) malignant melanoma.

Cow tracking system (IR + visible camera) UBC Dairy Centre / Land and Food Systems
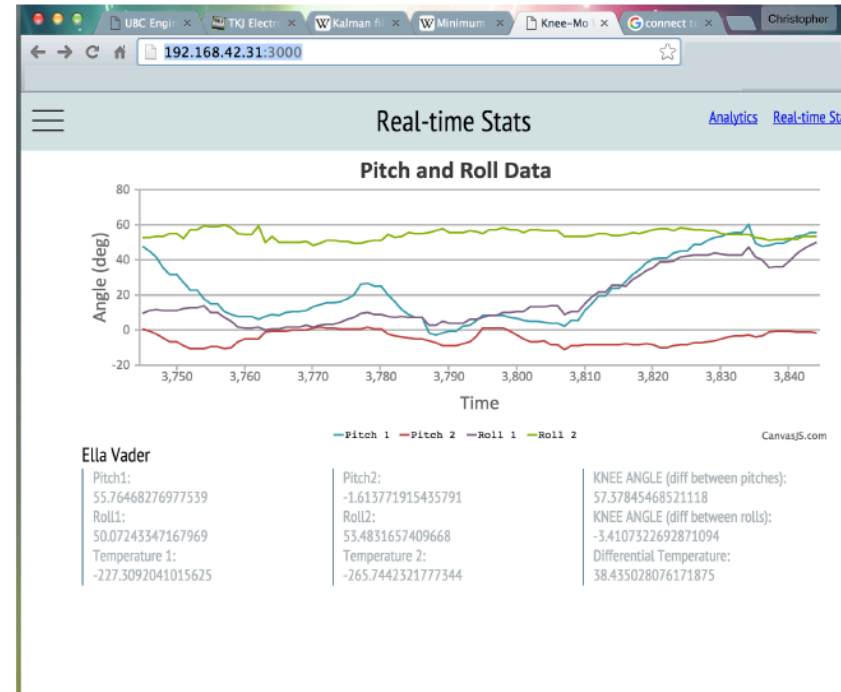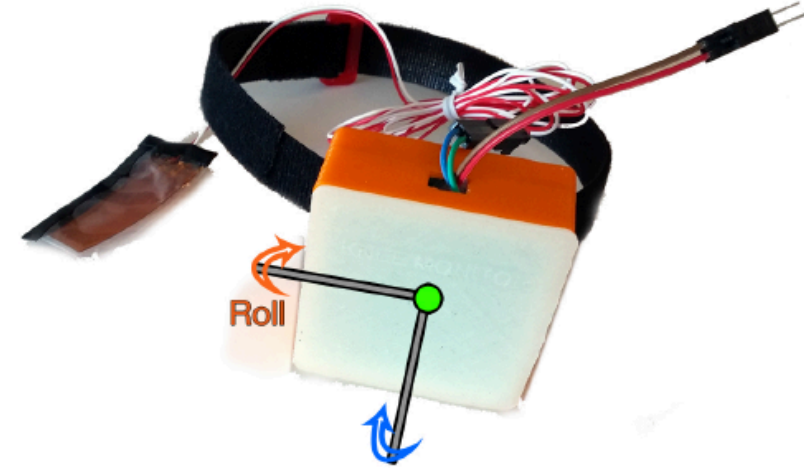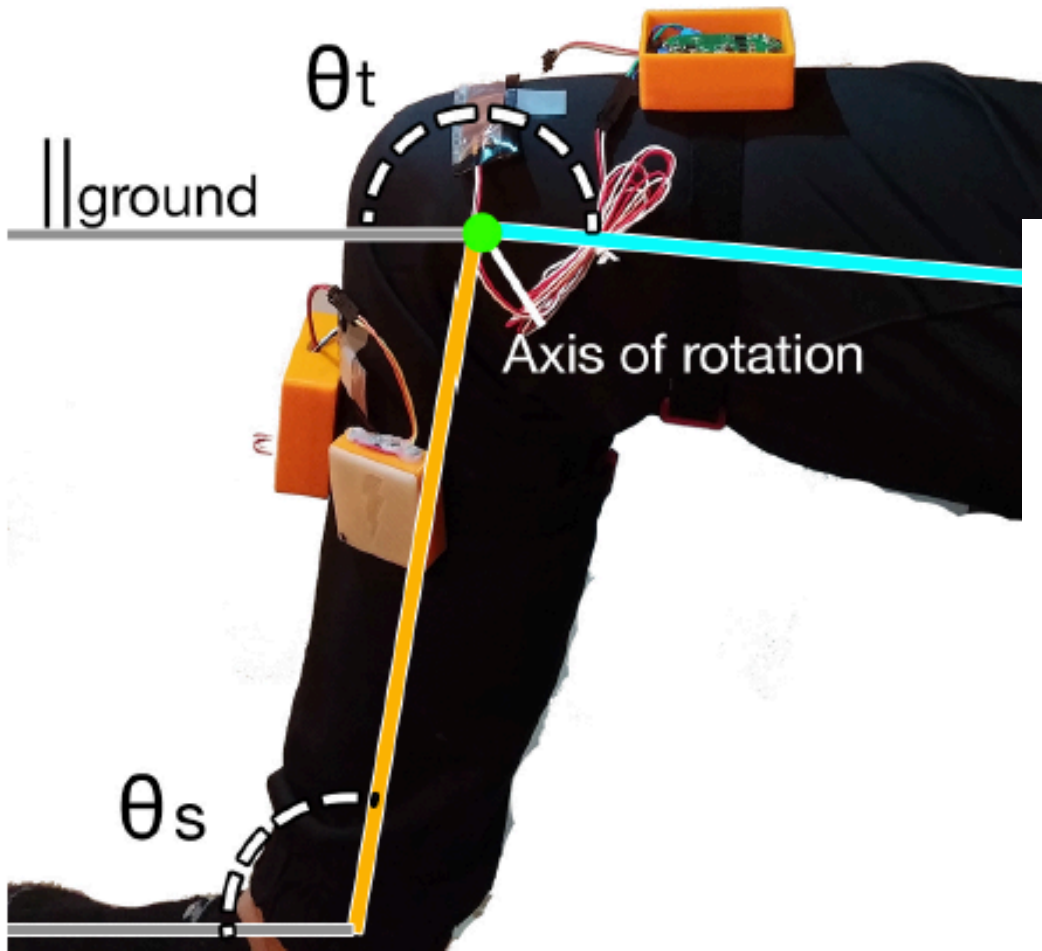

Figure 2: the original image

Figure 6: the output of the algorithm

Finding Knee-Mo - Tracking knee motion and infection after knee replacement surgery

70-80 posted projects each year

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-PI
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 (N
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 competition
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)

Recent Self-Sponsored Projects

Automated kite flying for power generation

http://www.youtube.com/watch?v=w5bFITGGIJs

Recycle Plastic
Into anything you want
For Free

Introducing ProtoCycler

The first complete desktop filament re-cycler,
Featuring fully integrated grinding and spooling.
Create 3D printing filament sustainably, on
demand, for free.

Watch The Video ▶

Supported by

AUTODESK   MaRS   UBC ENGINEERING   Botman

Resources for self-sponsored projects

- **Bycast Prize**
  - $10k/year for Engphys-based Entrepreneurial teams
  - 4 groups awarded since 2012/13
    - IlluSense (pipeline inspection)
    - ReDeTec (3d printer filament recycling)
    - BlackCrow (bee pollination)
    - Iris Automation (vision systems for UAVs)
  - submissions in Sept/Oct
- **AMS Sustainability Fund**
  - ~$100k/year in projects (e-mini got over $6k and got to keep their purchases) Mentorship:
- **Lean Launchpad (Iain Verigin)**
- **entrepreneurship@UBC** (networking, patent searches, office space)
- **ENPH alumni** (join ENPH LinkedIn group)

End by repeating the most important slide

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