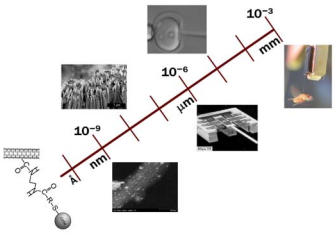
Undergrad Research Topics



Lab: Advanced Micro and Nanosystems Lab
http://amnl.mie.utoronto.ca

AMNL accepts strong undergraduate students from Engineering Science, Mechanical Engineering, Electrical and Computer Engineering, and Biomedical Engineering.

Topic 1: Cell Image Processing on Smartphone

Number of Students: 2 (EngSci/MIE/ECE)

Description: The student will adapt our image processing algorithms for processing motile cell images and implement the algorithms into an APP on Android and Apple phones. Previous experience in image processing and strong skills in programming are required.

Topic 2: Robotic Manipulation of Cells

Number of Students: 2 (EngSci/MIE/ECE)

Description: The student will develop motion controllers using microscopy visual feedback for manipulating biological cells. The work involves control systems and image processing/computer vision. The student will also participate in many biology experiments. Previous experience in image processing and control systems is required. Strong skills in programming will be greatly helpful.

Topic 3: Precision Instrument Development

Number of Students: 2 (EngSci/MIE/ECE)

Description: The student will perform mechanical design and circuits for developing an atomic force microscope (AFM). The student must have strong skills in designing analog circuits and microcontroller circuits. Specifically, low-noise sensor readout circuitries and high-voltage amplifiers will be developed. Experience in analog circuits and microcontroller circuits is required.

Topic 4: Manipulation and Measurement of Nanomaterials

Number of Students: 2 (EngSci/MIE/ECE)

Description: The student will program a nanorobotic manipulator for manipulating and measuring the mechanical properties of nanomaterials such as nanowires. Mechanics data will be collected and interpreted with mechanics models. All experiments will be conducted under scanning electron microscopy (SEM) imaging. The student should have a strong mechatronics background, have strong hands-on skills for experimentation, and understand mechanics of materials.

Contact: Prof. Yu Sun

Tel: 416-946-0549

Email: sun@mie.utoronto.ca

Prof. Sun is on the faculty of the following departments:

- Mechanical and Industrial Engineering
- Institute of Biomaterials and Biomedical Engineering
- Electrical and Computer Engineering