distinguished speakers series

The Department of Mechanical and Materials Engineering presents:

Dr. Josephine GALIPON

Keio University Institute for Advanced Biosciences, Japan

The biomimetics of 3D microstructures

Living organisms evolved over the span of millions of years into an ensemble of intricate functional units that are marvelously well-adapted to their respective environments. Biomimetics aims to create biologically-inspired functional shapes by reverse-engineering these biological units. The functional living unit of all living organisms is the cell. Therefore, 3D data acquisition on the micrometer-scale is essential to understand the inner workings of these biological units, and advances in microscopy have made 3D data acquisition possible. However, this 3D data is more often than not confined to a collection of 2D pictures within a publication, or to a rotating 3D model on a 2D computer display. Our research seeks to generalize the 3D printing of microscopy data. We successfully 3D printed models based on very different microscope techniques (X-ray microtomography, scanning electron microscope & laser confocal microscope), and some of our models will be on display during the lecture. However, all of these microscopes are very costly. To make 3D microstructure acquisition more accessible, we are taking a machine learning-based approach to enable the accurate reconstruction of 3D models from data viewed with an ordinary optical microscope after slicing of samples into ultra-thin (0.1 ~ 10 µm) consecutive slices with a microtome. This technology has been perfected since its beginnings in the 18th century, meaning that many such data is lying around unused in museums around the world, ready to be recycled. We believe these tools will accelerate developments in the fields of regenerative medicine and biomimetics, but also bioart and science education. Anyone interested is welcome to join the lecture.

Queen's UNIVERSITY

MONDAY, JULY 10th - 11:00 a.m. McLAUGHLIN HALL ROOM 312