Scientific Computing

CBC Talk by Chris Villangco - June 18, 2014

PhD student Christopher Villangco, from the Cardio Mechanics group at UCSD will give a talk in connection to the Summer School at Simula.

Total number of participants: 13
Total number of guests outside of CBC: 13
Number of different nationalities represented: 8
Total number of speakers: 1
Total number of talks: 1

About Christopher Villangco

The goal of my research is to investigate the mechanisms by which cardiac resynchronization therapy (CRT) treats dyssynchronous heart failure. Dyssynchronous heart failure is characterized by abnormal patterns of electrical activation within the heart, impairing the patient's ability to efficiently pump blood. CRT attempts to normalize the activation pattern by applying electrical stimuli to the ventricles via implanted pacemaker leads. However, CRT is effective in only 70% of selected patients; it is unclear why the remaining patients see no improvement despite a cumbersome and costly surgery. Choosing parameters for CRT to optimize its effectiveness are also not completely understood.

As a computational bioengineer, I make extensive use of computer models of the heart to quantitatively understand how biological properties at the cellular level up to the whole organ affect cardiac function. In the context of dyssynchronous heart failure and CRT, this approach allows me the unique ability to:
1. create personalized computer models tailored to an individual patient's anatomical, mechanical, hemodynamical, and electrophysiological properties based on a variety of clinical measurements;
2. simulate the unique disease state of each patient;
3. predict the effects of CRT on each patient's disease state;
4. investigate the mechanisms of disease and therapy, particularly those which cannot be measured or observed with current clinical techniques.

The computational approach allows the integration of discoveries and principles from all areas of cardiac research from the last century into a single, compact model. The skills and knowledge required for this interdisciplinary work span the fields of biology, mathematics, physics, engineering, and computer science; an aptitude for visual art enhances conceptualization and communication. My graduate work is just one small front in the larger technological advancement toward the reality of personalized medicine.

What	
When	Jun 18, 2014 from 12:00 AM to 01:00 PM
Where	Storstua @ Simula
Contact Name	Lena Korsnes
Attendees	Abhishek Murthy Chris Villangco Eilleen Ao-ieong Giulia Pizzichelli Jonas van den Brink Karoline Horgmo Jæger Karoline Kalleberg Kimberly McKabe Lars Bonde Steffen Docken Tapaswini Das Vegard Vinje Viviane Timmermann
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