Introduction

CIBC Workshop 2006

Welcome! (also from Chris...)

Nora Eccles Harrison Cardiovascular Research and Training Institute

Molecular Cellular Whole Organ

SCIENTIFIC COMPUTING AND IMAGING INSTITUTE
**Key Center Personnel**

**PI’s**
- Chris Johnson
- Rob MacLeod
- Ross Whitaker
- Dana Brooks

**Technical Management**
- Jeroen Stinstra
- Dave Weinstein

**Administrative Team**
- Deb Zemek
- Greg Jones

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**Staff Scientists/PostDocs**
- Jeroen Stinstra
- Allen Sanderson
- Jens Krüger

**Software Engineering**
- Jeroen Stinstra
- Ayla Hlan

**Developers**
- Jeroen Stinstra
- Ayla Khan
- Tom Fogal

**Students**
- Josh Blauer (Afib Imaging)
- Darrell Swenson (Meshing/Ischemia)
- Dafang Wang (Inverse problems)
- Josh Cates (Shape statistics)
- Fangxiang Jiao (Brain modeling)

**Media Team**
- Erik Jorgensen
- Chems Touati
- Nathan Galli
NCRR and P41’s

CIBC

Introduction

Center for Integrated Biomedical Computation

Goals

- Produce cutting edge software for biomedical researchers
- Develop new techniques and algorithms in image processing, geometric modeling, simulation and visualization
- Carry out original research in segmentation, bioelectric field simulation, and visualization
Introduction

History of the Utah NCRR P41

Software development
Applications focus on bioelectric fields
Driven by collaborations
Renewal submission: May, 2009

CIBC Organization

Technical Cores
- Image processing and geometric modeling
- Mathematical modeling and simulation
- Visualization
- Biomedical Problem Solving Environment: BioPSE
CIBC Software Goals

Extend SCIRun/BioPSE
- More functionality
- More portability
- More modularity

Build bridges
- To libraries
- To programs
- To data sources

Support Collaborations
- Dedicated solutions leading to
- Generalized application programs

Collaborations

Essential to a P41
- Ensure relevance
- Provide motivation, guidance and feedback
- Metric for success (and renewal)

Challenge a P41
- Cannot receive funding
- Must remain motivated
- Must amplify impact of the Center
Collaboration Lifecycle

- Introduction
- Initial Discussion
- Evaluation of Need/Match
- Preparation of Proposal
- Evaluation of Proposal
- Implementation & Evaluation
- External Funding
- Maintenance & Service
- Concept and Specification
- Research and Development
- Completion

Collaboration Management

- Introduction
- Create collaboration hierarchy
  - Primary and secondary
- Link to cores
  - Identify common needs across collaborations
  - Match software to users (functionality, interface, platform)
- Communicate
  - Identify key people
  - Create PI-led collaboration teams
  - Establish regular meetings/visits
Current Primary Collaborators

1) Mouse skeletal phenotyping
   • Mario Capecchi laboratory, UofU
   • Charles Keller, CCRI, UTHSCSA

2) Microscopy Image Analysis and Visualization
   • NCMIR project, UCSD

3) Multiscale electrophysiological modeling
   • Craig Henriquez laboratory, Duke

4) Epilepsy Detection: Combined EEG, Source Localization and MR Imaging
   • Scott Makeig (UCSD), Greg Worrell (Mayo Clinic)
   • Simon Warfield (Harvard)

5) Simulation of cardiac defibrillation in children
   • John Triedman laboratory, Children’s Hospital Boston

6) CT Imaging of Blood Vessels in Mice
   • Charles Keller, CCRI, UTHSCSA

Secondary Collaborators

Bioelectric Fields
   • David Isaacson (RPI)
   • Dirar Khoury (Baylor)
   • Cameron MacIntrye (Cleveland Clinic)
   • Bruno Taccardi (UofU)
   • Simon Warfield (SPL/Brigham and Women’s)

Image-based Anatomy
   • John Bridge (UofU)
   • George Chen (MGH)
   • Robert Marc (UofU)
   • Vasilis Ntziachristos (MGH)
   • Stephen Wong (SPL)
   • Chi-Bin Chein (UofU)
   • Paul Thompson (UCLA)
Secondary Collaborators

Multiscale Tissue Modeling
- Alonso Moreno (UofU)
- Chuck DiMarzio (NEU)

Technical Exchange
- Mark Ellisman (UCSD)
- Ron Kikinis (SPL)
- Les Loew (UCHC)
- CF Westin (SPL)
- Carsten Wolters (Münster)
- Al Johnson (Duke)
- Andrew McColloch (UCSD)

Software from the Center

- SCIRun
- Seg3D
- map3d
- ImageVis3D

Beta 0.02
Purpose of the Workshop

- Describe our software
- Use our software
- Improve our software
- Develop relationships

Workshop Logistics
Schedule Today

Workshop outline:

Thursday 4 December (Seg3D/ImageVis3D workshop):
8:30 - 9:00  Breakfast
9:00 - 9:30  Welcome to SCI (Rob MacLeod)
9:30 - 10:10  Strategies for Effective Segmentation (Ross Whitaker)
10:10 - 10:45  Segmentation using Seg3D (Josh Blauer)
10:45 - 11:05  Break -
11:05 - 12:00  Lab1: Seg3D Tutorial (Jeroen Stinstra, Josh Blauer, Allen Sanderson)
12:00 - 12:30  Case Study: Development of an Electrical Stimulation Device for Osseointegrated Amputee (Brad Isaacson)
12:30 - 1:30  Lunch Break -
1:30 - 2:30  ImageVis3D and Scientific Visualization (Jens Kruger)
2:30 - 3:00  Break -
3:00 - 4:00  Lab2: ImageVis3D Tutorial (Jens Kruger, Tom Fogal)
4:00 - 4:30  Demo: map3D (Rob MacLeod)
4:30 - 4:50  Installing/Downloading SCI Software (Ayla Khan)
4:50 - 5:00  Requests for additional topics on Friday (Jeroen Stinstra)
7:00  Dinner

Schedule Tomorrow

Friday 5 December (SCIRun workshop):
8:30 - 9:00  Breakfast
9:00 - 9:30  General Introduction into SCIRun and Scientific Computing Part 1 (Dave Weinstein)
10:00 - 10:30  Break -
10:30 - 11:00  General Introduction into SCIRun and Scientific Computing Part 2 (Dave Weinstein)
11:00 - 12:00  Lab3: SCIRun Basics Visualization (Ayla Khan, Dave Weinstein, Jeroen Stinstra, Tom Fogal, Allen Sanderson)
12:00 - 1:00  Lunch Break -
1:00 - 1:40  Case study: Current challenges in Pediatric Defibrillation (Matt Jolley)
1:40 - 2:10  Introduction into Meshing and Simulation using SCIRun (Jeroen Stinstra)
2:10 - 2:30  Break -
2:30 - 4:00  Lab4: SCIRun Simulation (Jeroen Stinstra, Ayla Khan, Darrell Swenson, Tom Fogal, Allen Sanderson)
4:00 - 5:00  Additional topics (by request)
Workshop Dinner Plans

Silver Fork Lodge
Dinner Transportation

From SCI
• 6:15 pm

From Guesthouse??

Return from Silverfork
• 9:00
• to Guesthouse and SCI

Memo (to self)

Please turn cell phones/pagers on vibrate
### Workshop Outline:

**Thursday 4 December (Seg3D/ImageVis3D workshop):**

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