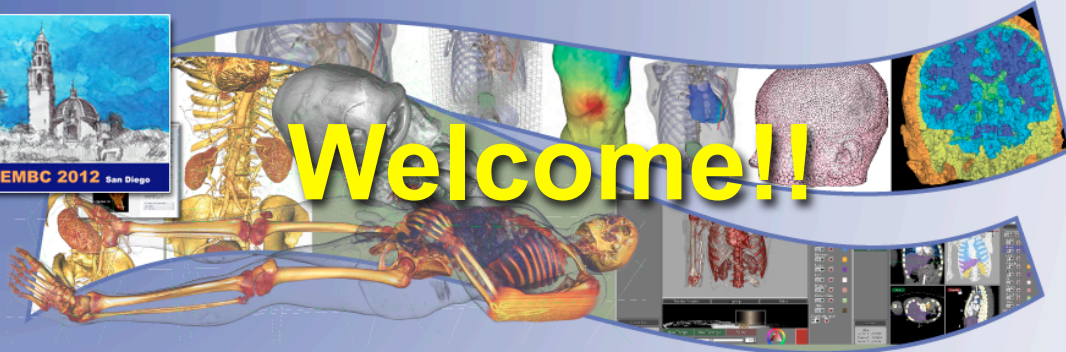
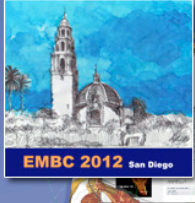


Introduction



University of Utah
CENTER FOR INTEGRATIVE BIOMEDICAL COMPUTING



Software Tools for Image Based Modeling, Simulation, and Visualization

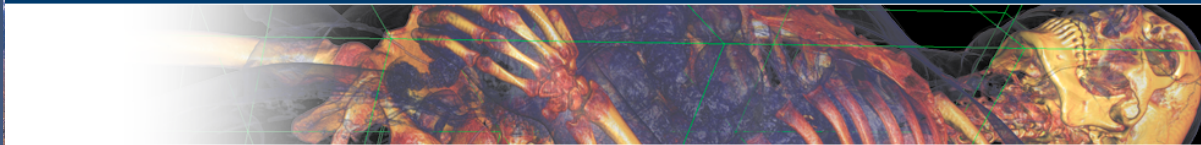


Welcome from Utah/Boston

Introduction



University of Utah
CENTER FOR INTEGRATIVE BIOMEDICAL COMPUTING



Center for Integrative Biomedical Computing

Goals

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



Center for Integrative Biomedical Computing

University of Utah
CENTER FOR INTEGRATIVE BIOMEDICAL COMPUTING

CIBC Home About CIBC Research Personnel Software/Datasets Publications Events Contact SCI Home

National Institute of General Medical Sciences
Biomedical Technology Research Centers

The NIH/NIGMS Center for Integrative Biomedical Computing
The Center for Integrative Biomedical Computing (CIBC) is dedicated to producing open-source software tools for biomedical image-based modeling, biomedical simulation and estimation, and the visualization of biomedical data. The Center works closely with software users and collaborators in a range of scientific domains to produce user-optimized tools and provides advice, technical support, workshops, and education to enhance user success. Biological projects and collaborations drive our development efforts, all with a single unifying vision: to develop the role of image-based modeling and analysis in biomedical science and clinical practice.
BTRC Software Dissemination

Research Highlights

Subject-Specific Multiscale Simulation of Electrophysiology
Over the past year the CIBC, in partnership with our collaborators, has begun to introduce a generalized processing pipeline and associated software to the biomedical community. This work has been largely influenced by DBP collaborators such as those...

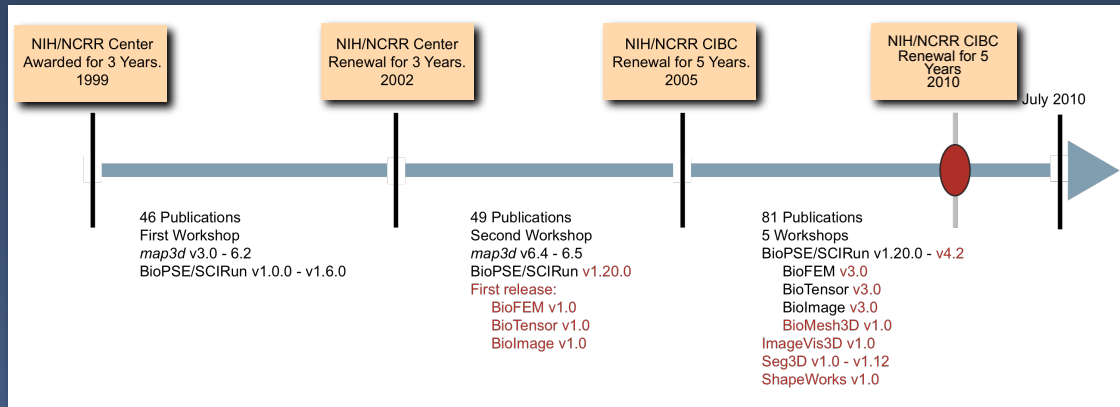
CIBC News

- August 08, 2012
Announcing SCIX 2012, Nov 13th
- August 08, 2012
ImageVis3D Mobile Universal 4.0 Released
- July 30, 2012
CIBC Workshop to be held at EMBC 2012
- July 12, 2012
ImageVis3D 2.1.0 Released



History of the CIBC

Introduction



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Center Goal

To achieve scientific breakthroughs through the use of computational technology

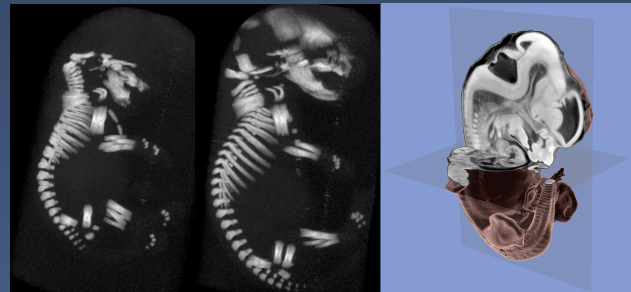
Introduction



Mario Capecchi
and Charles Keller

Nobel Prize 2007

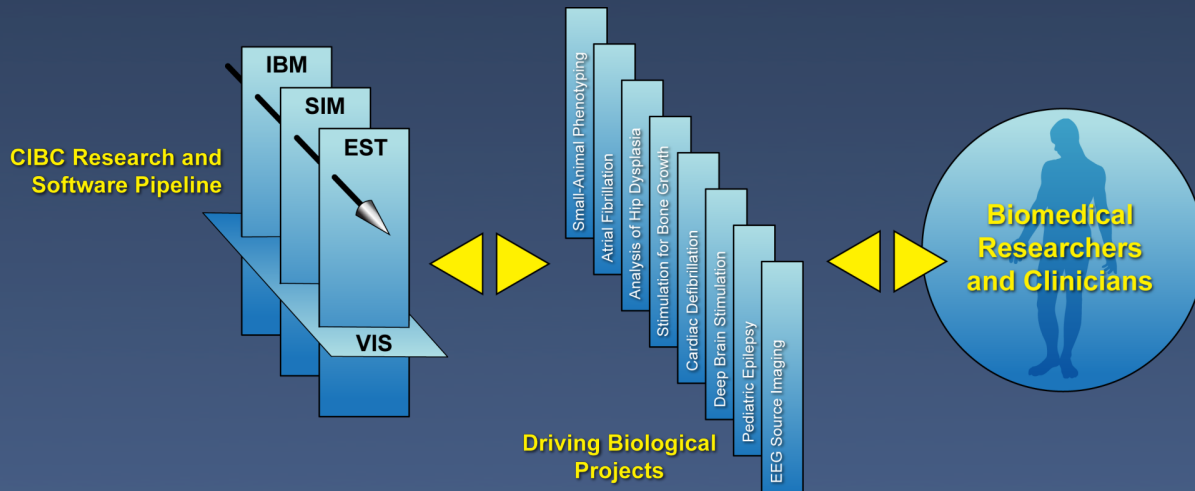
J.T. Johnson III, M.S. Hansen, I. Wu, L.J. Healy, C.R. Johnson, G.M. Jones, M.R. Capecchi, C. Keller. PLoS Genetics, Vol. 2, No. 1, pp. 471-477, 2006.



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Center Organization

Introduction



Collaborations

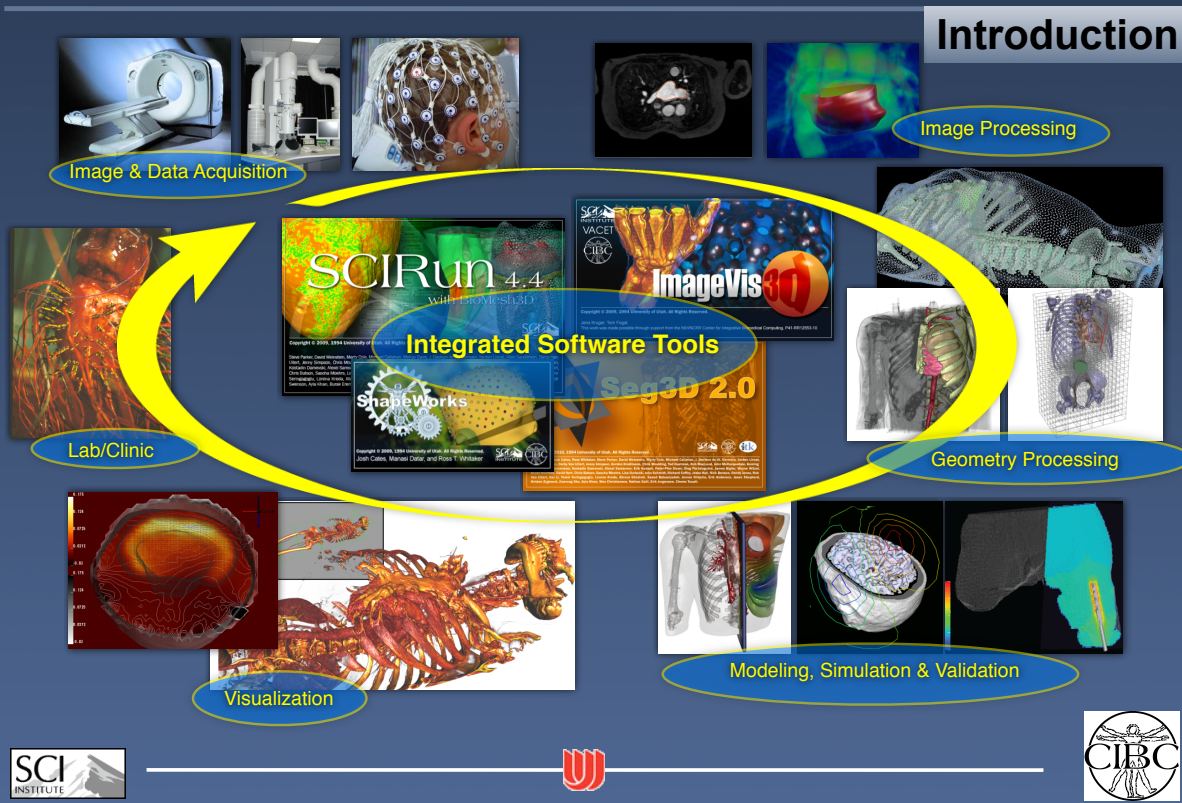
Introduction

Essential

Challenge

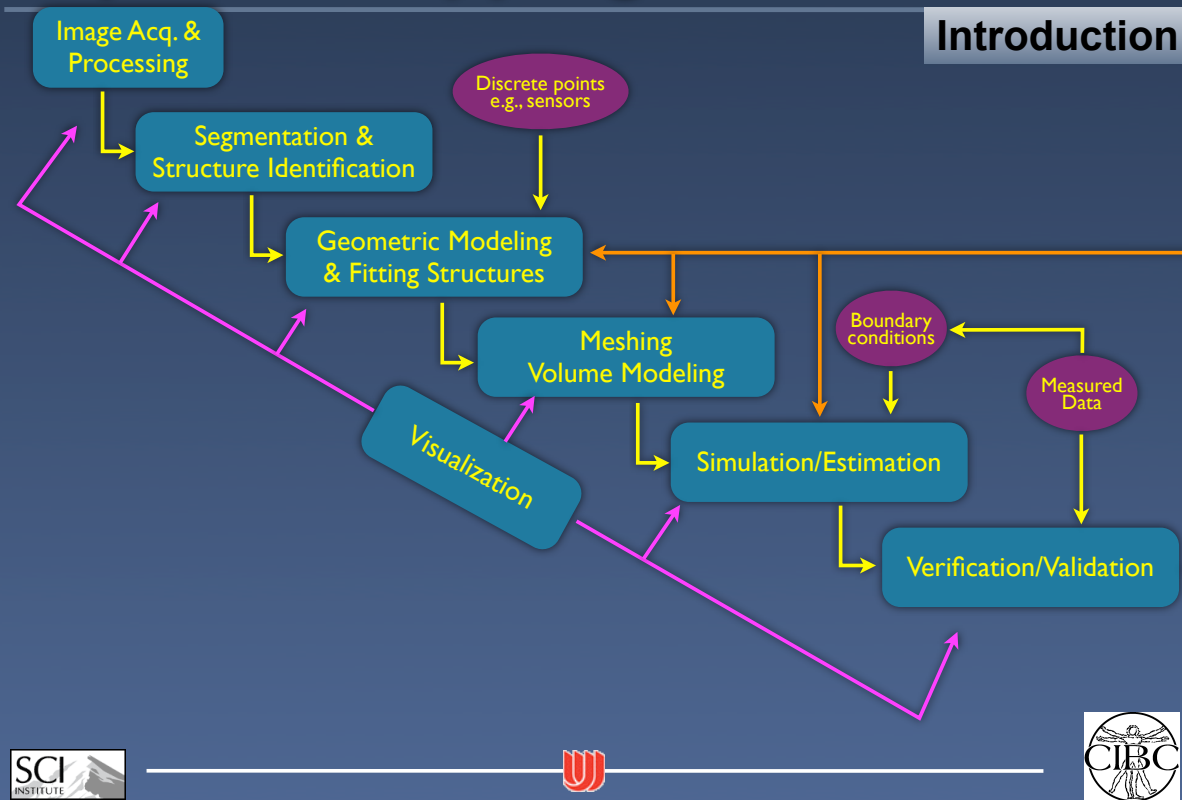


Center Vision



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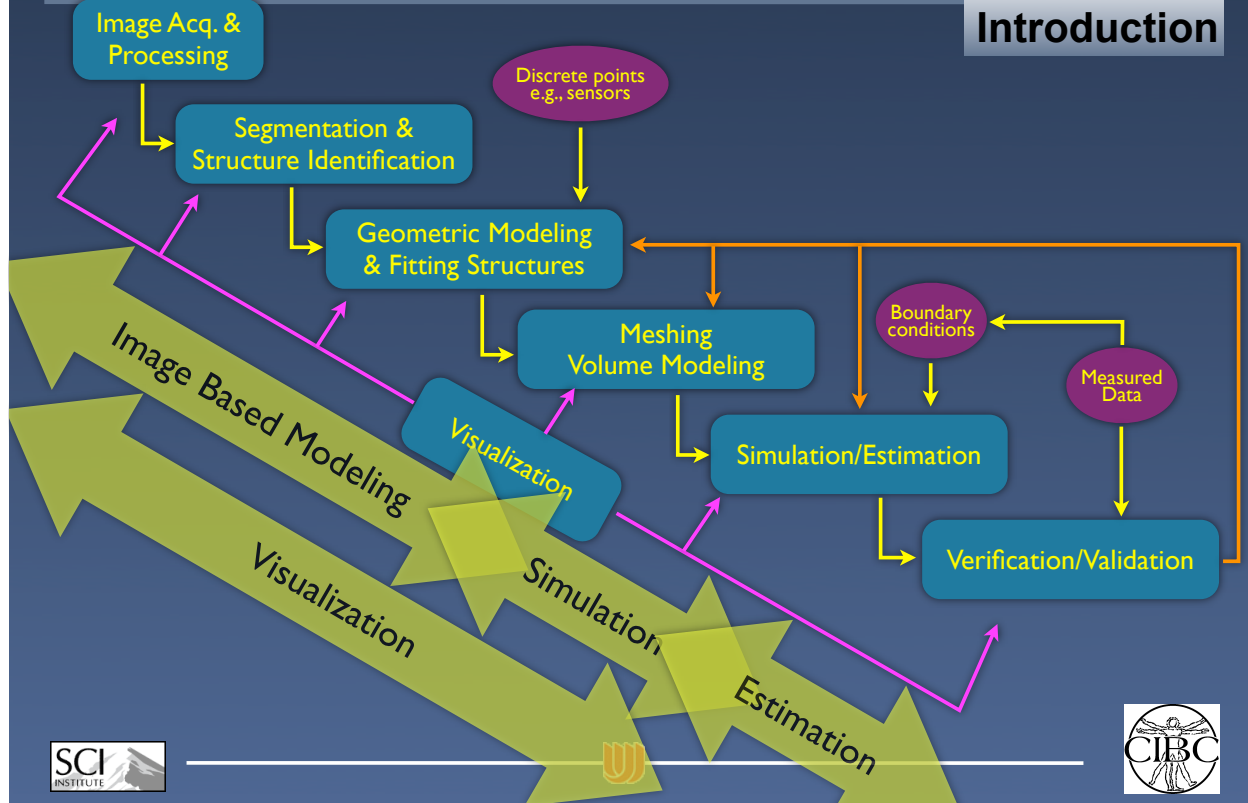
Pipeline Mapping



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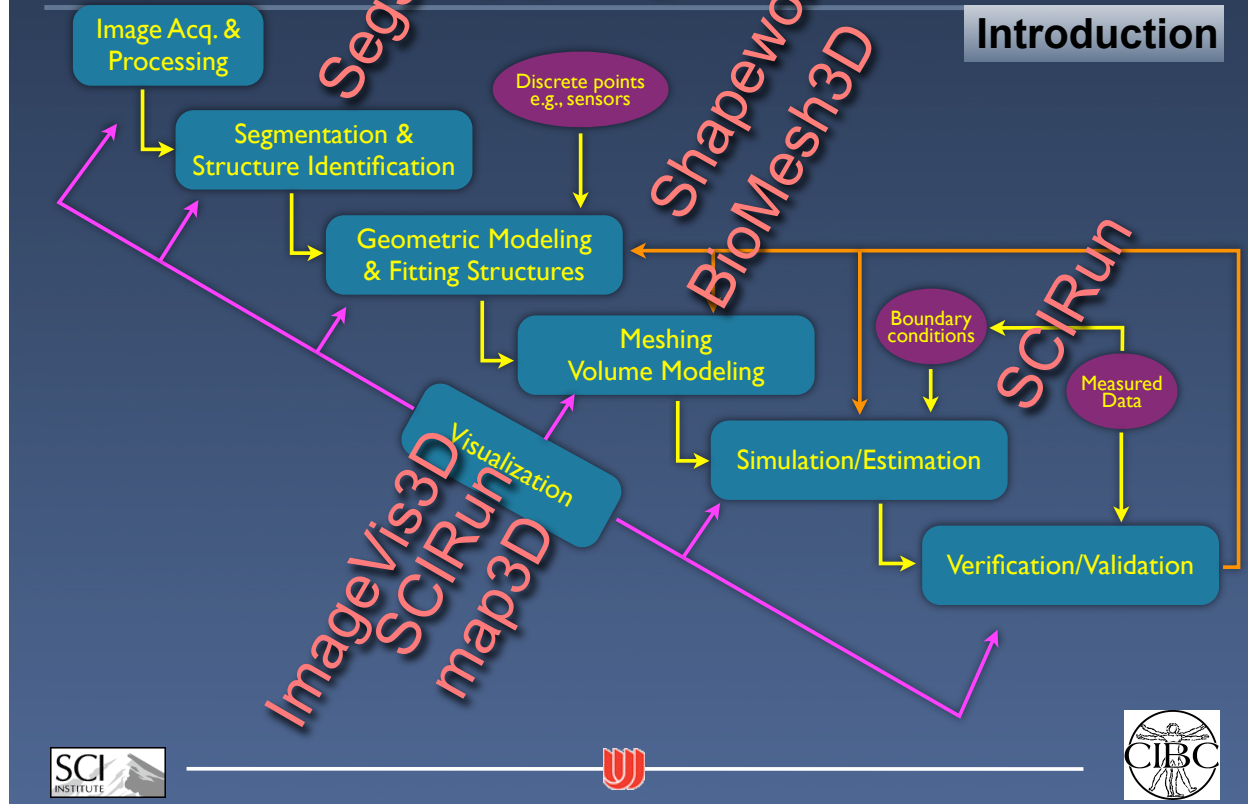
Pipeline Mapping

Introduction



Pipeline Mapping

Introduction



Center Software Infrastructure

Introduction



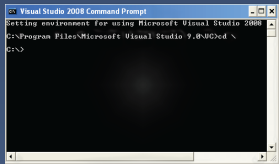
SCIRun (Prototype testing)



Seg3D (segmentation)



BioMesh3D (Meshing)

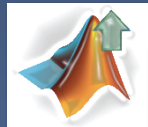


Command line tools

SCIRun Infrastructure
Core Layer
Algorithm Layer
Control Layer



ImageVis3D (Visualization)



Matlab/Python

Flexible, Extensible Environment
Open Source Software (MIT Public License)
Problem Solving Environment (BioPSE)
PowerApps (Seg3D, ImageVis3D, BioMesh3D, Shapeworks)
Linux, Mac OSX, Windows

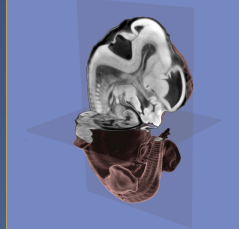
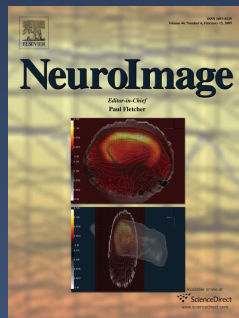


map3D (Visualization)



Biomedical Research Impact

Introduction



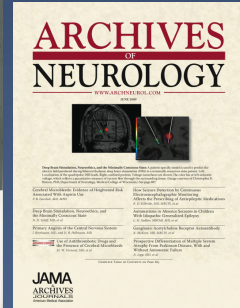
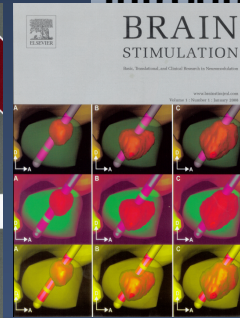
HeartRhythm
The Official Journal of the Heart Rhythm Society

Volume 5, Issue 4 April 2008

Novel ICD placements in children Exco-oscillatory dynamics causing VF

The Official Journal of the Cardiac Electrophysiology Society

Heart Rhythm Society
Restoring the Rhythm of Life



Clinical Impact #1

Introduction



Atrial Fibrillation

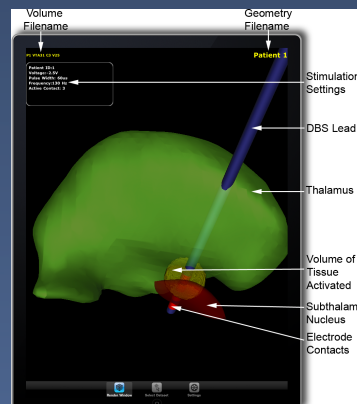


Clinical Impact #2

Introduction



Deep Brain Stimulation



Clinical Impact #3

Introduction

Shape Statistical Modeling

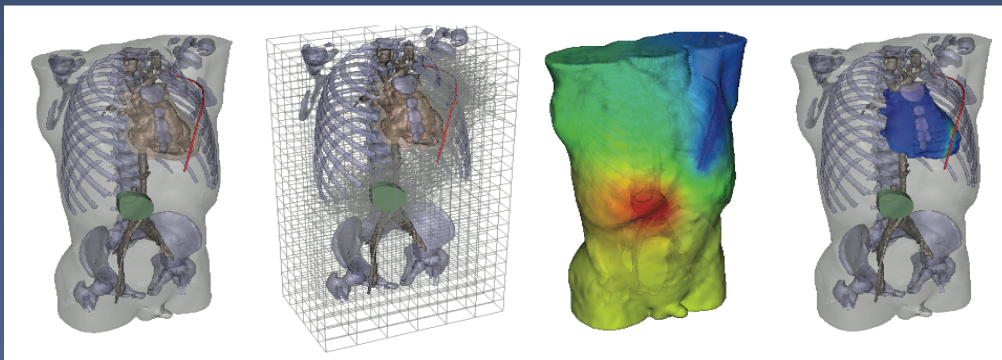
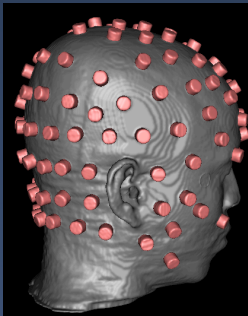


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Clinical Impact #4

Introduction

Anatomical Mesh Generation



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Clinical Impact #5

Introduction

Transcranial Stimulation Cardiac Defibrillation



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Key Center Personnel

Introduction

PI's

- Chris Johnson
- Rob MacLeod
- Ross Whitaker
- Dana Brooks

Technical Management

- Liz Jurrus

Administrative Team

- Deb Zemek
- Greg Jones
- Corinne Garcia



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Workshop Team

Introduction



Rob MacLeod



Liz Jurrus



Tom Fogal



Ayla Khan



Moritz Dannhauer



James Hughes



Manasi Datar



Şeyhmus Güler



Dafang Wang



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Schedule

Introduction

Agenda

8:30 - 8:45	Introduction	Rob MacLeod
8:45 - 9:00	Case Study I: Image based analysis of patients with atrial fibrillation	Rob MacLeod
9:00 - 9:15	Demo I: Seg3D demo and tutorial	Rob MacLeod & Ayla Khan
9:15 - 10:00	Lab I: Segmentation with Seg3D	
10:00 - 10:15	Break I	
10:15 - 10:30	Case Study II: Visual Comparison of Deep Brain Stimulation Parameters	Tom Fogal
10:30 - 10:45	Demo II: ImageVis3D/map3d demo and tutorial	Tom Fogal & James Hughes
10:45 - 11:30	Lab II: Visualization with ImageVis3D and map3d	
11:30 - 11:45	Case Study III: Statistical shape modeling in orthopedics	Manasi Datar
11:45 - 12:00	Demo III: ShapeWorks demo and tutorial	Liz Jurrus & Manasi Datar
12:00 - 12:45	Lab III: Shapeworks	
12:45 - 1:45	Lunch	
1:45 - 2:00	Case Study IV: Geometric modeling of the heart and head	Rob MacLeod & Moritz Dannhauer
2:00 - 2:15	Demo IV: BioMesh3D demo and tutorial	Moritz Dannhauer & Seyhmus Guler
2:15 - 3:00	Lab IV: Mesh generation with BioMesh3D	
3:00 - 3:15	Break II	
3:15 - 3:30	Case Study V: Simulation of brain potentials from transcranial stimulation	Rob MacLeod & Moritz Dannhauer
3:30 - 3:45	Demo V: SCIRun demo and tutorial	Moritz Dannhauer & Seyhmus Guler
3:45 - 4:30	Lab V: Simulation with SCIRun	
4:30 - 4:40	Summary and wrap Up	Rob MacLeod
4:40 - 5:25	Open lab	



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