Since the proposal submission in September of 2009 several new articles have published and several new releases of CIBC software were authored. The list of these accomplishments follows:

**Recently Published or Accepted Journal Articles and Conference Proceedings:**


S. Kurugol, Jennifer Dy, Gregory Sharp, and Dana H. Brooks, 3D level set esophagus segmentation in thoracic CT images using spatial, appearance, and shape models. accepted for *ISBI 2010*, Rotterdam, the Netherlands, April 2010

**Recently Released Software:**

**ImageVis3D** released on November 3rd, 2009 (V 1.2) and will an additional release (V 1.3) planned for February 12th.

*ImageVis3D* is a new volume rendering program developed by the NIH/NCRR Center for Integrative Biomedical Computing (CIBC). The main design goals of ImageVis3D are: simplicity, scalability, and interactivity. Simplicity is achieved with a new user interface that gives an unprecedented level of flexibility. Scalability and interactivity for ImageVis3D mean that ImageVis3D runs on a notebook computer as well as on a high-end graphics workstation, the user can interactively explore terabyte-sized data sets. Finally, the open source nature as well as the strict component-by-component design allow developers to extend ImageVis3D itself and also reuse parts of it, such as the rendering core. This rendering core for instance is planned to replace the volume rendering subsystems in many applications at the SCI Institute and with our collaborators.

**ImageVis3D Mobile** released on October 1, 2009 (V 1.0.1)

ImageVis3D Mobile is a version of the ImageVis3D system build for the iPhone

“ImageVis3D” running in the background on a multi-screen, high-resolution display and “ImageVis3D Mobile” running in the foreground on an iPhone.
SCIRun 4.3 with BioMesh3D was released on November 19th, 2009

SCIRun 4.3 contains new modules, bug fixes and support for Windows 7, OS X Snow Leopard (10.6) and newer Linux distributions. A new tutorial on defibrillation simulations has been added to the SCIRun documentation; supporting data files are available in the latest SCIRunData tar and zip archives. The beta version of BioMesh3D, an automated meshing pipeline for building tetrahedral meshes for biomedical applications, is also included.

Miscellaneous:

Outreach:
Unilever Corporation contract with Northeastern University (Brooks), Segmenting reflectance confocal image stacks of human skin. Oct. 2009 through June 2010; $85,000

Letters:

Additionally, the CIBC received several letters after submission of the original proposal. Two of these letters follow:

Mario R. Capecchi, Ph.D.
Distinguished Professor of Human Genetics, Investigator of the Howard Hughes Medical Institute
University of Utah

Carl-Fredrik Westin, Ph.D.
Director, Laboratory of Mathematics in Imaging (LMI)
Associate Professor of Radiology
Harvard Medical School
September 28, 2009

Chris Johnson, Ph.D.
Director
Scientific Computing and Imaging Institute
Distinguished Professor, School of Computing
University of Utah

Dear Chris,

I enthusiastically support your proposal to renew your NIH NCRR Center and I am very excited about the establishment of the means for automated mouse mutant phenotyping of skeletal malformations by micro-CT imaging of live animals. Such a protocol would find enormous use by both the basic medical science and translational medical science communities. I know of no other group in the nation that has, at your level of expertise, the combination of computer software development skills and multiple modality micro-imaging skills needed to carry out and implement such an important project.

The collaboration we started in my laboratory along these lines on HOX A11/D11 was very successful and I am pleased and excited that Dr. Charles Keller, a former member of my laboratory and an independent faculty member since January 2005 at the Greehey Children's Cancer Research Institute, University of Texas Health Science Center at San Antonio, has extended this work with multiple other outstanding projects recently published and highlighted in Circulation. It is suiting that Dr. Keller has recently become a major collaborator within your NIH Center.

I am sure that your innovative proposal will have an enormous impact on biomedical research in many areas, from cancer biology, cardiovascular pulmonary disease to birth defects. The use of mouse models for the analysis of human disease continues to explode and the need for more effective means of phenotyping continually grows. For these and related projects, I am happy to play an advisory role to your Center.

We are very fortunate to have you here at Utah, which will ensure the Utah NCRR will continue to be a great success.

Sincerely,

Mario R. Capecchi, Ph.D.
Distinguished Professor of Human Genetics and
Investigator of the Howard Hughes Medical Institute
University of Utah School of Medicine

Mario R. Capecchi, Ph.D.
University of Utah
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801.581.7096 • Fax 801.585.3425 • mario.capecchi@genetics.utah.edu
September 30, 2009

Chris Johnson, Ph.D.
Director, Scientific Computing and Imaging Institute
Distinguished Professor and Director,
School of Computing, University of Utah

Dear Professor Johnson:

I enthusiastically support your proposal to renew your NIH NCRR Center for Biological Field Modeling, Simulation, and Visualization, and I am quite excited to be part of your collaboration team. The SCI Institute’s reputation for producing cutting-edge, open source software, along with its expertise and reputation as one of the international leaders in biomedical computing and visualization research, will help ensure that your NCRR Center will meet both my own and other biomedical scientist’s research needs.

I am particularly excited about our proposed collaborative project to visualize and analyze Diffusion Tensor MRI data. We propose to leverage the strengths of your SCIRun as a tool for exploratory visualization and computational steering, to evaluate existing fiber tracking algorithms in detail, and to drive the development of new fiber tracking and feature extraction algorithms. We intend to facilitate the application of fiber tracking to large-scale problems where existing software tools are insufficient. Being able to more closely work with SCIRun, which this collaboration will enable, will help advance my own research goals. As you know we have several ongoing image segmentation projects at BWH using the open source software platform Slicer3, and we plan to leverage your center’s segmentation tool, Seg3D, which combines a flexible manual segmentation interface with powerful higher-dimensional image processing. Since your tool is based on the open source Insight Toolkit, interoperability with Slicer3, will be straightforward.

I look forward to our research collaborations and working with you to make the Utah NCRR a success.

Sincerely,

Carl-Fredrik Westin, Ph.D.
Director Laboratory of Mathematics in Imaging