



Proceedings of the IEEE

Special Issue on *Computational anthropomorphic anatomical models*

Guest Editors: Habib Zaidi and Benjamin M. W. Tsui

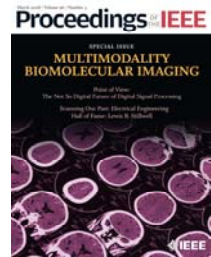
Call for Papers

The widespread availability of high performance computing and accurate and realistic computer simulation techniques has stimulated the development of computational anthropomorphic models of both the anatomy and physiological functions of humans and small animals. These simulation tools have been applied to different medical imaging modalities including ultrasound (US), single-photon emission computed tomography (SPECT), positron emission tomography (PET), x-ray computed tomography (CT), magnetic resonance imaging (MRI), optical imaging (OI), and multi-modality imaging with various combination of the above. The number of scientific contributions related to this subject has been increasing steadily during the last few years, which motivated the publication of this special issue as a snapshot of the dynamically changing field and its contributions and impact to biomedical imaging research and applications.

The Proceedings of the IEEE will publish a special issue on "*Computational anthropomorphic anatomical models*" in late 2009. This special issue will review the fundamental and technical challenges and future directions of developing computational models of normal and abnormal human anatomy and physiological functions with a particular focus on their applications to biomedical imaging and radiation dosimetry calculations. The combination of accurate and realistic computer generated models of human and small animals, radiation sources and distributions, transport of radiation through biological tissues, characteristics of the imaging system, and physics of the image formation process allows accurate and realistic simulation of biomedical imaging data and radiation dose distributions that are ever closer to those obtained from clinical and experimental small animal studies. These simulation tools and techniques will provide an increasingly important contribution and impact in the future of biomedical imaging and dosimetry calculations. This special issue will consist of authoritative review articles and original research papers describing the latest technical developments. With an impact factor of 3.82 in JCR 2007, we believe the proposed special issue will have a significant impact in the field.

The guest editors are seeking high quality contributing papers to the proposed special issue. Topics of potential papers should address but are not restricted to the following:

- Historical developments: 40 years of developments of computer generated anatomical and physiological models of human and small animals;
- Stylized mathematical models of the human anatomy including early stylized models, current stylized models, and recent dynamic (4-D) stylized models of physiological functions that include modeling of time-dependent geometries;
- Tomographic voxel-based models including a detailed description of existing tomographic models, the red bone marrow dosimetry model, and more recent efforts focusing on development of pediatric and pregnant female voxel-based models;
- Hybrid equation-voxel models that mathematically describe organ boundaries from definitions extracted from voxel data anatomical models where organ shapes are more realistic than stylized models while maintaining the flexibility for anatomical variations and organ deformation;
- Three-dimensional (3-D) and four-dimensional (4-D) realistic computer generated models of human anatomy and physiological functions based on human imaging data and computer graphics tools;
- Development of 3-D and 4-D realistic computer generated models of small-animals, especially rodents in molecular imaging, using stylized and mathematically based models or computer



graphics tools and actual image data obtained from serial cryo-sections or dedicated high resolution small-animal CT/MRI scanners;

- Applications and impact of anthropomorphic anatomical models to biomedical imaging, including x-ray CT, MRI, SPECT, PET, optical and other multi-modality imaging techniques, radiation dosimetry, external radiation therapy and radioimmunotherapy;
- Impact of the physiome and virtual physiological human (VPH) projects on medical imaging research;
- Integration of accurate models of disease states or processes (neurological disorders, cardiovascular disease, tumour growth, etc.) in computer generated models of humans and small animals;
- Development and creations of databases of populations of computer generated models that model realistic normal and pathological (abnormal) patient populations and associated images.
- Applications of populations of computer generated models to biomedical imaging.

Prospective authors are encouraged to discuss their submissions with the Guest Editors to determine suitability of their proposed manuscripts for this special issue. They are requested to send their abstracts and a short biography to the guest editors (habib.zaidi@hcuge.ch or btsui1@jhmi.edu) before the November 1, 2008 deadline. Authors of the accepted contributions will be invited to submit their manuscripts before March 1, 2009. The submitted manuscripts will undergo the usual peer-review process of the IEEE Proceedings by experts in the field. Authors should follow the Proceedings of the IEEE manuscript format described at the journal web site <http://www.ieee.org/web/publications/procieee/> and submit an electronic copy of their complete manuscript through the Proceedings of the IEEE manuscript tracking system at the journal's web site <http://mc.manuscriptcentral.com/pieee>, indicating that their contribution is for this special issue.

The timetable for the submission to publication is listed below:

Receive abstracts	November 1, 2008
Acceptance Notification	December 1, 2008
Manuscript Due	March 1, 2009
Paper peer reviews completed	May 1, 2009
Final Manuscript Due	July 1, 2009
Publication Date	3rd Quarter 2009

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