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Robotic Interventions, and Modeling**

Ziv R. Yaniv
Robert J. Webster III
Editors

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- 10 Keynote and 2D/3D Registration
Robert J. Webster III, Vanderbilt University (United States)
Ziv R. Yaniv, Children's National Medical Center (United States)
- 11 Abdominal and Pelvic Procedures
Purang Abolmaesumi, The University of British Columbia (Canada)

Introduction

Welcome to the 2015 edition of the SPIE Image-Guided Procedures, Robotic Interventions, and Modeling conference Proceedings. This year we received approximately 119 abstract submissions and accepted 94 into the final program for oral and poster presentation.

The keynote presentation by Prof. J. Michael Fitzpatrick from Vanderbilt University was standing room only. The title of the talk was **Twenty-five Years of Error**. Prof. Fitzpatrick provided the “behind the scenes” story of how the theory describing errors associated with paired point registration was developed. This work introduced new terminology into our domain's nomenclature. Terms that today's students are all familiar with, including: Fiducial Localization Error (FLE), Fiducial Registration Error (FRE), and Target Registration Error (TRE). He described both the high and low points of his research towards a general theory of registration error, highlighting the fact that research requires one to be tenacious. The key message of the talk was that students should not be discouraged by criticism or setbacks, as new results often encounter unjustified critical reviews and making mistakes is part of doing research.

The topic of this year's workshop was **Novel Robots for Less Invasive Surgery**. The workshop highlighted cutting edge robotics research from three continents. First, Shing Cheng from the University of Maryland, USA, discussed neurosurgical robots for cerebral hemorrhage removal and cancer therapy. Next Jessica Burgner from Hannover University, Germany, spoke about concentric tube robots with application to endonasal surgery, cerebral hemorrhage evacuation, and cochlear implantation. Sungchul Kang then presented work from the Korea Institute of Science and Technology on both tendon-driven and concentric tube robots for endonasal surgery and minimally invasive spine procedures. Lastly, Gregory Fisher from Worcester Polytechnic Institute, USA, presented research on magnetic resonance imaging compatible robotic systems for neurosurgery and other applications throughout the body. A major theme that emerged from the workshop was that surgical robots are continually getting smaller and more dexterous, and that the next generation of surgical robots may look more like tentacles or steerable needles, and less like traditional robots. Another theme was the value of both preoperative and intraoperative imaging working in conjunction with robots, as well as the need for novel sensors and image-based control algorithms to unlock the full potential of robots in surgical applications.

This year's Young Scientist Award was given to Xiaofeng Yang from Emory University (USA) for his paper titled **A MR-TRUS registration method for ultrasound-guided prostate interventions**. The runner up for the young scientist award was Ali Uneri from Johns Hopkins University (USA) for his paper **Known-component 3D-2D registration for image guidance and quality assurance in spine surgery pedicle**

screw placement. We would like to thank Siemens for sponsoring the Young Scientist Award prizes, and Northern Digital Inc. for sponsoring prizes for our best poster awards.

We are grateful to all of our committee members for their help in reviewing abstracts, evaluating student papers, and judging posters. Their commitment enables us to maintain the high scientific standards of our conference. We also bid farewell to Dr. Kenneth Wong (Virginia Tech) who has served on our committee for nine years and was the conference co-chair for four years. He initiated what has since become a tradition, having joint sessions with our sister conferences.

Finally, we would like to thank all the attendees who gave talks, presented posters, and actively participated in the meeting. This year the weather played an active role in our meeting, with more than a few authors unable to attend due to the severe weather in the northeast part of the continent. We greatly appreciate the efforts of students and colleagues who stepped up and presented the work of their fellow researchers who could not attend the meeting. The success of the conference is in no small part due to you. Next year, SPIE Medical Imaging will take place in San-Diego, California. We look forward to seeing you there for another successful conference.

Ziv R. Yaniv
Robert J. Webster III

2015 Medical Imaging Award Recipients

Robert F. Wagner Best Student Paper Award

Robert F. Wagner was an active scientist in the SPIE Medical Imaging meeting, starting with the first meeting in 1972 and continuing throughout his career. He ensured that the BRH, and subsequently the CDRH, was a sponsor for the early and subsequent Medical Imaging meetings, helping to launch and ensure the historical success of the meeting. The Robert F. Wagner All-Conference Best Student Paper Award (established 2014) is acknowledgment of his many important contributions to the Medical Imaging meeting and his many important advances to the field of medical imaging.



This award is cosponsored by:



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2015 Recipients:

First Place: **Automatic discrimination of color retinal images using the bag of words approach** (9414-54)

I. Sadek, D. Sidibé, F. Meriaudeau, Univ. of Burgundy (France)

Second Place: **Automated pulmonary lobar ventilation measurements using volume-matched thoracic CT and MRI** (9417-42)

F. Guo, S. Svenningsen, E. Bluemke, M. Rajchl, J. Yuan, A. Fenster, G. Parraga, The Univ. of Western Ontario (Canada)

Conference 9415 Awards

Young Scientist Awards sponsored by Siemens

First Place: **A MR-TRUS registration method for ultrasound-guided prostate interventions** (9415-69)

Xiaofeng Yang, Peter Rossi, Hui Mao, Ashesh B. Jani, Tomi Ogunleye, Walter J. Curran, Tian Liu, Winship Cancer Institute of Emory Univ. (United States)

Runner Up: **Known-component 3D-2D registration for image guidance and quality assurance in spine surgery pedicle screw placement** (9415-50)

A. Uneri, J. W. Stayman, T. De Silva, A. S. Wang, Johns Hopkins Univ. (United States);
G. Kleinszig, S. Vogt, Siemens Healthcare XP Division (Germany); A. J. Khanna,
J.-P. Wolinsky, Z. L. Gokaslan, Johns Hopkins Medical Institute (United States);
J. H. Siewerdsen, Johns Hopkins Univ. (United States)

Cum Laude Poster Award

First Place: **B-Mode ultrasound pose recovery via surgical fiducial segmentation and tracking** (9415-84)

Alessandro Asoni, Michael Ketcha, Nathanael Kuo, Lei Chen, Emad Boctor,
Devin Coon, Jerry L. Prince, Johns Hopkins Univ. (United States)