

Thursday, March 1, 2018

7:30am – 8:00am – Registration

8:00am – 8:05am – Welcome and Opening Remarks

Jaydev P. Desai, Georgia Institute of Technology, USA

8:05am – 8:20am – Welcome and Opening Remarks

Stephen Cross, Executive VP Research, Georgia Institute of Technology, USA

Semi-Plenary Session 1 (8:20am – 9:50am)

Session Chair: Leonardo De Mattos, Istituto Italiano di Tecnologia, Italy

8:20am - 8:50am - *Sherif Nour, Emory University, USA* - Medical Robotics: Opportunities in MRI-Guided Interventions

8:50am - 9:10am - *Iulian Iordachita, Johns Hopkins University, USA* - Safe Tissue Manipulation in Retinal Microsurgery via Force Sensing Instruments

9:10am - 9:30am - *John Oshinski, Emory University, USA* - Interventional MRI in the Spine and the Potential Role for Robotics

9:30am – 9:50am - *Elena DeMomi, Politecnico di Milano, Italy* - Smart Technologies for Neurosurgical Diagnosis and Procedure Planning

Panel Discussion on Semi-Plenary Talks (9:50am - 10:05am)

Rapid Fire Poster Presentations (1min each) (10:05am - 10:20am)

1. Learning and Imitation of a Therapist's Interaction with a Patient in Robot-assisted Cooperative Therapy Exercises
Carlos Martínez, Jason Fong, Quentin Ranson, and Mahdi Tavakoli
2. Modular Force Sensing Soft Robotic Pneumatic Actuator
Austin J. Taylor, Rudy Montayre, Zhuo Zhao, Zion Tsz Ho Tse
3. A smart handheld robot to assist drilling through the pedicle of a vertebra
Ping-Lang Yen, Ting-Ya Shiao, Zong Han He, and Shao-Feng Xu
4. The Effect of Visual-Haptic Colocation in Robot-Assisted Rehabilitation
Renz Ocampo and Mahdi Tavakoli
5. Toward robot-assisted beating-heart operation for anchor deployment in mitral valve surgery
Lingbo Cheng and Mahdi Tavakoli
6. Image-Enabled Process Metrics for Quantification of Surgical Skill
Joseph Singapogu, Richard Groff and Venkat Krovi
7. Pneumatic Piston Stepper Motor for Actuating MRI-Guided Robotic Devices
Brian Boland, Bradford Wood, Sheng Xu, Zion Tse
8. Flexible and MRI Visible Template to Assist Prostate Cancer Diagnosis
Rui Li, Sheng Xu, Ivane Bakhtashvili, Bradford Wood, Zion Tsz Ho Tse
9. 3D Printed Ultra Low-cost Body Temperature Sensing and Monitoring Device
Rui Li, Aaron Smith, Harshitha Tadinada, Zion Tsz Ho Tse
10. Piano Mattress: IoT Smart Robotic Mattress
Kavita Krishnaswamy and Tim Oates
11. Event-triggered 3D Needle Control Using A Reduced-Order Bicycle Model
Jay Carriere, Mohsen Khadem, Carlos Rossa, Nawaid Usmani, Ronald Sloboda, Mahdi Tavakoli
12. Intraoperative Identification of Tissue Young Modulus During Prostate Brachytherapy
Thomas Lehmann, Carlos Rossa, Nawaid Usmani, Ronald Sloboda, and Mahdi Tavakoli

13. Active Feeding System using a General-purpose Manipulator

Daehyung Park, Yuuna Hoshi, Harshal P Mahajan, Wendy Rogers, and Charles C. Kemp

14. Enhancing Neurosurgery: Image Guided Laser Resection of Brain Tissue

Ian Hill, Matthew Tucker, Weston Ross, and Patrick Codd

10:20am - 10:55am – Coffee Break and Poster Session

10:55am - 11:35am – KEYNOTE

Mahdi Tavakoli, University of Alberta, Canada - Closed-loop Control of Steerable Needles for Prostate Brachytherapy

Oral Presentations – Session 1 (11:35am - 12:35pm - 12mins/paper (10 mins presentation + 2 mins Q&A))

Session Chair: Jayender Jagadeesan, Brigham and Women's Hospital, Harvard University, USA

- *Soumya K Manna and Venketesh N Dubey.* A Novel Hardware Approach to Integrating Active and Passive Rehabilitation in a Single Exoskeleton
- *Vatsal Patel, Sanjay Krishnan, Aimee Goncalves, Carolyn Chen, Walter Doug Boyd and Ken Goldberg.* Using Intermittent Synchronization to Compensate for Rhythmic Body Motion During Autonomous Surgical Cutting and Debridement
- *Shahriar Sefati, Farshid Alambeigi, Iulian Iordachita, Russell Taylor and Mehran Armand.* On The Effect of Vibration on Shape Sensing of Continuum Manipulators Using Fiber Bragg Gratings
- *Shrey Pareek, Pramod Chembrammel and Thenkurussi Kesavadas.* Development and Evaluation of a Haptics-based Rehabilitation System
- *Jun Sheng and Jaydev Desai.* A Highly Compact Fiberoptic Rotation Sensor for a Neurosurgical Robot

12:35pm - 1:35pm – Lunch and Networking

Semi-Plenary Session 2 (1:35pm – 3:15pm)

Session Chair: Iulian Iordachita, Johns Hopkins University, USA

1:35pm – 1:55pm - *Ann Majewicz, UT Dallas, USA* - Designing Human-in-the-Loop Systems for Surgical Training and Intervention

1:55pm - 2:15pm - *Leonardo De Mattos, Istituto Italiano di Tecnologia, Italy* - Computer-Assisted Technologies for Laser Microsurgery

2:15pm - 2:35pm - *Jayender Jagadeesan, Brigham and Women's Hospital, Harvard University, USA* - Precision-enabled Image-guided Surgery

2:35pm - 2:55pm - *Nabil Simaan, Vanderbilt University, USA* - Intraoperative Sensing for Complementary Perception, Situational Awareness Augmentation and Surgical Assistance

2:55pm – 3:15pm - *Sarthak Misra, University of Twente, Netherlands* - Medical Microrobotics: Wireless Control of Miniaturized Agents

Panel Discussion on Semi-Plenary Talks (3:15pm - 3:30pm)

3:30pm-4:00pm – Coffee break

4:00pm-4:40pm – KEYNOTE

Neville Hogan, Massachusetts Institute of Technology, USA - Technology and Science to Improve Motor Function

Oral Presentations – Session 2 (4:40pm – 5:55pm - 12mins/paper (10 mins presentation + 2 mins Q&A))

Session Chair: Mahdi Tavakoli, University of Alberta, Canada

- *Niravkumar Patel, Ehsan Azimi, Reza Monfaredi, Karun Sharma, Kevin Cleary and Iulian Iordachita.* Robotic System for MRI Guided Shoulder Arthrography: Accuracy Evaluation
- *Riccardo Seoli and Ferdinando Rodriguez y Baena.* Experimental Validation of Curvature Tracking with a Programmable Bevel-Tip Steerable Needle
- *Nicolas Zevallos, R Arun Srivatsan, Hadi Salman, Lu Li, Jianing Qian, Saumya Saxena, Mengyun Xu, Kartik Patath and Howie Choset.* A surgical system for automatic registration, stiffness mapping and dynamic image overlay
- *Rashid Yasin, Long Wang, Colette Abah and Nabil Simaan.* Using Continuum Robots for Force-Controlled Semi Autonomous Organ Exploration and Registration

- *Nicolo Garbin, Long Wang, James H. Chandler, Nabil Simaan, Keith L. Obstein and Pietro Valdastrì.* A Disposable Continuum Endoscope Using Piston-driven Parallel Bellow Actuator
- *Zhuoqi Cheng, Brian Davies, Darwin Caldwell and Leonardo Mattos.* SDOP: A Smart handheld Device for Overpuncture Prevention during pediatric peripheral intravenous catheterization

6:00pm - 7:30pm – Welcome Reception

8:00pm onward – Dinner (By Invitation only)

Friday, March 2, 2018

8:00am - 8:40am – KEYNOTE

Jonathan Lewin, Emory University School of Medicine, USA - Innovation and Information-Intensive Intervention

Semi-Plenary Session 3 (8:40am - 10:20am)

Session Chair: Paolo Fiorini, University of Verona, Italy

8:40am - 9:00am - *Gabor Fichtinger, Queen's University, Canada - Rapid Prototyping of Ultrasound- Guided Interventions*

9:00am - 9:20am - *Russell H. Taylor, Johns Hopkins University, USA - A Thirty Year Perspective on Medical Robotics*

9:20am - 9:40am - *Conor Walsh, Harvard University, USA - Soft Wearable Robots for the Community and the Home*

9:40am - 10:00am - *Ferdinando Rodriguez y Baena, Imperial College, UK - Towards an Enhanced Delivery Ecosystem for Precision Neurosurgery*

10:00am - 10:20am - *Antoine Ferreira, INSA Centre Val de Loire, France - Microrobotics for Drug Delivery Applications*

Panel Discussion on Semi-Plenary Talks (10:20am – 10:35am)

10:35am - 11:05am – Coffee Break and Poster Session

Oral Presentations – Session 3 (11:05am - 12:20pm - 12mins/paper (10 mins presentation + 2 mins Q&A)

Session Chair: Antoine Ferreira, INSA Centre Val de Loire, France

- *Christos Bergeles, Malindie Sugathapala and Guang-Zhong Yang. Retinal Surgery with Flexible Robots: Biomechanical Advantages*
- *Meenakshi Narayan, Michael Choti and Ann Majewicz Fey. Data-driven Detection of Adverse Events in Robotic Needle Steering*
- *Ali Torabi, Mohsen Khadem, Kouros Zareinia, Garnette Sutherland and Mahdi Tavakoli. Manipulability of Teleoperated Surgical Robots with Application in Design of Master/Slave Manipulators*
- *Austin Taylor, Tony Pham, Zhuo Zhao, Rommel Montayre, Sheng Xu, Bradford Wood and Zion Tse. CT-guided Abdominal Biopsy Training Phantom*
- *Changsheng Li, Nicolas Kon Kam King and Hongliang Ren. Preliminary Development of A Skull-Mounted Lightweight Parallel Robot Toward Minimally Invasive Neurosurgery*
- *Vatsal Patel, Sanjay Krishnan, Aimee Goncalves and Ken Goldberg. SPRK: A Low-Cost Stewart Platform For Motion Study In Surgical Robotics*

12:20pm - 1:20pm – Lunch and Networking

Semi-Plenary Session 4 (1:20pm - 3:20pm)

Session Chair: Ferdinando Rodriguez y Baena, Imperial College, UK

1:20pm - 1:40pm - *Pierre Dupont, Boston Children's Hospital, Harvard Medical School, USA - Autonomous Navigation Inside the Beating Heart*

1:40pm - 2:00pm - *Nabil Zemiti, LIRMM, CNRS - Université de Montpellier, France - Recent Results in Computer-Assisted Medical Interventions at LIRMM*

2:00pm - 2:20pm - *Zion Tse, University of Georgia, USA - MRI-guided Therapy for Prostate, Cardiovascular and Spinal Treatment*

2:20pm - 2:40pm - *Pietro Valdastri, University of Leeds, UK - Lifesaving Capsule Robots*

2:40pm - 3:00pm - *Stefano Stramigioli, University of Twente, Netherlands - How to fight breast cancer with robotics*

3:00pm - 3:20pm - *Paolo Fiorini, University of Verona, Italy - Preliminary considerations on autonomy in robotic surgery*

Panel Discussion on Semi-Plenary Talks (3:20pm - 3:35pm)

3:35pm - 4:05pm – Coffee break

4:05pm - 4:45pm – KEYNOTE

Arianna Menciassi, Scuola Superiore Sant'Anna, Italy - Robotic technologies for targeted therapies and chronic diseases

Oral Presentations – Session 4 (4:45pm - 6:00pm - 12mins/paper (10 mins presentation + 2 mins Q&A))

Session Chair: Pietro Valdastri, University of Leeds, UK

- *Yun-Hsuan Su, Kevin Huang and Blake Hannaford.* Real-Time Vision-Based Surgical Tool Segmentation with Robot Kinematics Prior
- *Fausto Medola, Gustavo Lahr, Guilherme Bertolaccini, Sara Silva, Valeria Elui and Carlos Fortulan.* Biomechanical and Perceptual Evaluation of the use of a Servo-Controlled Power-Assistance System in Manual Wheelchair Mobility
- *Jin Xu, De'Aira Bryant, Yu-Ping Chen and Ayanna Howard.* Robot Therapist versus Human Therapist: Evaluating the Effect of Corrective Feedback on Human Motor Performance
- *Jason Fong and Mahdi Tavakoli.* Kinesthetic Teaching of a Therapist's Behavior to a Rehabilitation Robot
- *Lu Li, John Schnellenberger, Mark Nandor, Sarah Chang, Kevin Foglyano, Ryan-David Reyes, Rudi Kobetic, Musa Audu, Ronald Triolo and Roger Quinn.* Embedded Control System for Stimulation-Driven Exoskeleton
- *Anna French, John O'Neill, Ryan Madson and Timothy M. Kowalewski.* Dynamic Additive Manufacturing onto Free-Moving Human Anatomy via Temporal Coarse/Fine Control

7:00pm - 9:30pm – Symposium Banquet

Saturday, March 3, 2018

8:00am - 8:40am – KEYNOTE

Steven L. Wolf, Emory University School of Medicine, USA - Robotics and Rehabilitation: A Marriage or a Mirage?

Semi-Plenary Session 5 (8:40am - 10:20am)

Session Chair: Jun Ueda, Georgia Institute of Technology, USA

8:40am - 9:00am - *Tim Kowalewski, University of Minnesota, USA - Measuring and Amplifying Surgical Skills*

9:00am - 9:20am - *Robert Webster, Vanderbilt University, USA - New Frontiers in the Lung for Surgical Robots*

9:20am – 9:40am - *Michael Yip, UC San Diego, USA - Towards safe autonomous surgical robots via machine-learning based control and motion planning*

9:40am - 10:00am - *Sang-Eun 'Sam' Song, University of Central Florida, USA - A Concept of Medical Expertise Pooling by Tele Sensing and Manipulation*

10:00am - 10:20am - *Greg Hager, Johns Hopkins University, USA - Quantifying Surgery: Improving Interventional Medicine Through Data Science*

Panel Discussion on Semi-Plenary Talks (10:20am – 10:35am)

10:35am - 11:05am – Coffee Break and Poster Session

Oral Presentations – Session 5 (11:05am - 12:20pm - 12mins/paper (10 mins presentation + 2 mins Q&A))

Session Chair: Venkat Krovi, Clemson University, USA

- *Nathan Kong, Trevor Stephens and Timothy Kowalewski. Da Vinci Tool Torque Mapping over 50,000 Grasps and its Implications on Grip Force Estimation Accuracy*
- *Tyson Heo, Kevin Huang and Howard Chizeck. Performance Evaluation of Haptically Enabled sEMG*
- *Alberto Favaro, Leonardo Cerri, Davide Scorza and Elena De Momi. Automatic multi-trajectory planning solution for steerable catheters*
- *Amiel Hartman, Richard Gillberg, C. T. Lin and Vidya Nandikolla. Design and development of an autonomous robotic wheelchair for medical mobility*
- *Euisun Kim, Waiman Meinhold and Jun Ueda. Assessment of Robot Necessity in Time Interval Dependent Rehabilitation Therapy*
- *Heather Humphreys, Wayne Book and Grace Deetjen. Advanced Patient Transfer Assist Device*

12:20pm - 1:30pm – Lunch and Networking

Semi-Plenary Session 6 (1:30pm – 3:30pm)

Session Chair: Greg Hager, Johns Hopkins University, USA

1:30pm - 1:50pm - *M. Cenk Cavusoglu, Case Western Reserve University, USA - Towards Intelligent Robotic Surgical Assistants*

1:50pm - 2:10pm - *Charles C. Kemp, Georgia Institute of Technology, USA - Mobile Manipulators for Intelligent Physical Assistance*

2:10pm - 2:30pm - *Venkat Krovi, Clemson University, USA - Quantitative System for Technical Assessment and Training of Skills (STATS) for Surgical Performance*

2:30pm – 2:50pm - *Jun Ueda, Georgia Institute of Technology, USA - Robotic Induction of Neuromodulation in Human Motor System*

2:50pm - 3:10pm - *Tianming Liu, University of Georgia, USA - Neuroimaging-enabled Human Robot Interaction: Perspectives and Initial Experience*

3:10pm – 3:30pm - *Jaydev P. Desai, Georgia Institute of Technology, USA - Flexible, 3D-printed, Meso-scale Robotic Systems for Surgical Interventions*

Panel Discussion on Semi-Plenary Talks (3:30pm-3:45pm)