Hamlyn Symposium 2014 Programme

Sunday 13th July 2014

08:30 Registration and Coffee

09:15 Welcome (Guang-Zhong Yang)

09:25 Opening Address (Ara Darzi)

Session 1 - From Exo-Skeletons to Surgical Robots

Chairs: Leo Joskowicz, Lee Swanstrom TBC

09:30 Invited Lecture: Homayoon Kazerooni, Berkeley University of California, USA

New Developments on Lower Extremity Exoskeleton Systems

10:15 Quantifying Innovation in Robotic Surgery

A. Hughes-Hallett*,1, E. Mayer*,2, P. Pratt*,2, J. Vale*,2, A. Darzi†1,2

1 The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
2 Department of Surgery and Cancer, Imperial College London, UK

10:30 Identification of Non-technical Roadblocks in Cognitive Robotic Surgery

E. Bergés*,1, A. Casals†1,2

1 Institute of Bioengineering of Catalonia, IBEC, Spain
2 Technical University of Catalonia, UPC, Spain

10:45 A Framework for Multilateral Manipulation in Surgical Tasks

K. Nichols*, A. Okamura

Department of Mechanical Engineering, Stanford University, USA

11:00 Realisation of Robotics in Spinal Surgery

M. Shoham*

Robotic Laboratory, Technion - Israel Institute of Technology, Israel

11:15 Coffee Break and Poster Session
11:45 Poster Teaser Session 1 (3 minute presentations)

Chairs: Julian Teare, Daniel Elson TBC

P1 ROS GPU Acceleration Framework for Image Guided Surgical Robots
F. Liu*, G. Sison, F. Rodriguez Y Baena
Mechanical Department, Imperial College London, UK

P2 Evaluation of a Novel EM Tracking System in a Breathing Lung Model
K. O’Donoghue*, A. Corvo¹, P. Nardelli¹, C. O’Shea¹, K. A. Kahn², M. Kennedy², P. Cantillon-Murphy³
¹School of Engineering, University College Cork, Ireland
²Department of Pulmonology, Cork University Hospital, Ireland

P3 The Face, Content and Construct Validity of a FAST Phantom
M. Chaudery*, J. Clark¹, D. Apladydd², J. Dunn², G.-Z. Yang¹, A. Darzi¹,²
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²St Mary’s Hospital, Imperial College Healthcare NHS Trust, UK

P4 Prototype Design of Flexi-Hand for Single Incision Laparoscopic Surgery
G. Zhang, S. Wang*, J. Li, Y. Sun, Y. Xing
Key Lab for Mechanism Theory and Equipment of Ministry of Education, Tianjin University, China

P5 Shedding Light on Surgeons' Cognitive Resilience: A Novel Method of Topological Analysis for Brain Networks
M. Kiani*, J. A. Perez, D. Leff, A. Darzi¹, G.-Z. Yang¹,²
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Surgery and Cancer, Imperial College London, UK

P6 Development of a Force-Sensing System for Endoscopic Submucosal Dissection
K. Naito*, T. Ando¹, J. Wang³, H. Kiyomatsu³, E. Kobayashi¹, M. Fujishiro², I. Sakuma³
¹Graduate School of Engineering, The University of Tokyo, Japan
²The University of Tokyo Hospital, Japan

P7 Why LopeRA Failed to Recruit? A Qualitative Study.
R. Jalil*, E. Mayer¹, N. Sevdalis², E. Hall³, J. Green⁴, J. Vale², A. Darzi¹,²
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Surgery and Cancer, Imperial College London, UK
³The Institute of Cancer Research, UK
⁴Barts Health NHS Trust, UK
P8  3D Motion Planning for Steerable Needles using Path Sets
S. Sanan*, Y.-C. Chen¹, C. Lehocky², C. Gong¹, C. Riviere¹,², H. Choset¹
¹The Robotics Institute, Carnegie Mellon University, USA
²Biomedical Engineering, Carnegie Mellon University, USA

P9  Success and Limitations of Robotic Surgery in Infants
T. Cundy*, S. Rowland², N. Alizai², A. Najmaldin³
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Paediatric Surgery, Leeds General Infirmary, UK

P10  Real-Time Modelling of Intra-operative Brain Shift Based on Video Tracking
I. Rasin¹, Z. Pekar¹, O. Sadowsky*², A. Forte³, S. Galvan³, D. Dini³, M. Shoham⁴, L. Joskowicz²
²Avtech Scientific, Israel
³School of Engineering, The Hebrew University of Jerusalem, Israel
⁴Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Israel

H. Marcus*, A. Hughes-Hallett¹, T. Cundy³, G.-Z. Yang¹, D. Nandi², A. Darzi¹,²
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Neurosurgery, Imperial College Healthcare NHS Trust, UK

P12  Pre-Operative Planning of Femoral Neck Fractures: A Tool for Accuracy
A. Tsanaka*, S. Dogramadzi², S. Dogramadzi¹
¹Bristol Robotics Laboratory, UK
²Department of Trauma and Orthopaedics, University Hospital Bristol NHS Trust, UK

12:45  Lunch and Poster Session

Session 2 - Haptics and Teleoperation

Chairs: Gabor Fichtinger, Rick Satava TBC

14:30  Invited Lecture: Rajni Patel, CSTAR

Teleoperation and Haptics in Medical Robotics

15:15  Instrument-Based Registered Strain Imaging for Remote Palpation in Robot-Assisted Laparoscopic Surgery
O. Mohareri*, C. Schneider, T. Salcudean
Robotics and Control Laboratory, University of British Columbia, Canada
15:30 Multi-Fingered Palpation using Pseudo-Haptic Feedback
M. Li*¹, S. Sareh¹, L. Seneviratne¹, P. Dasgupta², H. Wurdemann¹, K. Althoefer¹
¹Centre for Robotics Research, King’s College of London, UK
²MRC Centre for Transplantation, DTIMB and NIHR BRC, King’s College London, UK

15:45 Demonstration of Autonomous Atraumatic Cochleostomy by Combined Advanced Surgical Robot Systems
X. Du*, P. Brett², S. Weber², B. Bell², N. Gerber², T. Williamson², M. Caversaccio³, D. Proops³, C. Coulson³, A. Reid⁴
²Brunel Institute for Bioengineering, Brunel University Hospital, UK
³ARTORG Centre, University of Bern, Switzerland
⁴Department of ENT, Head of Neck Surgery, Bern University Hospital, Switzerland

16:00 Robotic versus Non-Robotic Instruments for Minimally Invasive Surgery in Spatially Constrained Operative Workspaces
T. Cundy*, H. Marcus¹, A. Hughes-Hallett¹, T. MacKinnon¹, K. Shetty¹, A. Najmaldin¹, G.-Z. Yang¹, A. Darzi¹
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Paediatric Surgery, Leeds General Infirmary, UK

16:15 Coffee Break and Poster Session

Session 3 - From Rehabilitation to Surgical Training

Chairs: Dennis Fowler, Azad Najmaldin

Invited Lecture: Robert Riener, ETH Zurich
Robots can outperform conventional therapy

16:45 A Haptic Simulator for Upper Gastrointestinal Endoscopy
S.Chakravarthy*, A. Rao, G.K. Ananthasuresh
Department of Engineering, Indian Institute of Science, India

17:00 Computational Simulations of Airflow in Tracheal Compression due to Retrosternal Goitre; Guiding Surgeons
R. Cetto*, A. Bates¹, A. Comerford¹, D. Doorly¹, N. Tolley²
¹Department of Aeronautics, Imperial College London, UK
²Department of Endocrine Surgery, Imperial College Healthcare NHS Trust, UK
17:15  Development of a Dynamic Soft Tissue Phantom for Cooperative Control Testing in Robotic Surgery
M. Cattilino¹, R. Secoli², A. Forte², S. Galvan², D. Dini², F. Rodriguez Y Baena*²
¹Polytechnic of Turin, Italy
²Imperial College London, UK

17:30  Trainee Learning Curve for Transoral Surgery with a Novel Flexible Endoscopic Surgery System
U. Duvvuri*, D. Clayburgh¹, N. Godse¹, H. Choset²
¹Veterans Affairs Pittsburgh Health System, Department of Otolaryngology, University of Pittsburgh, USA
²Biorobotics Laboratory, Carnegie Mellon University, USA
### Monday 14th July 2014

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:45</td>
<td>Registration and Coffee</td>
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| 09:15 | Keynote Lecture: Toshio Fukuda, Nagoya University  
*Single Cell Analysis and Assembly by Micro and Nano Robotics System* |
| 10:10 | Concentric Tube Robots for Transurethral Prostate Surgery: Matching the Workspace to the Endoscopic Field of View  
R. Hendrick*, C. Mitchell*, S. Herrell, R. Webster III,  
1Department of Mechanical Engineering, Vanderbilt University Medical Centre, USA  
2Department of Urologic Surgery, Vanderbilt University Medical Centre, USA |
| 10:15 | Design and Evaluation of a Concentric Tube Robot for Minimally-Invasive Endoscopic Paediatric Neurosurgery  
V. Bodani*, H. Azimian, T. Looi, J. Drake  
1Centre for Image Guided Intervention and Therapeutic Innovation, The Hospital for Sick Children, Toronto, Canada  
2Department of Neurosurgery, University of Toronto, Canada |
| 10:30 | A Master Slave Y-type Single Port Laparoscopic Surgery Robot with High Force Transmission and Large Workspace  
S. Shim*, D. Ji, M. Hashizume, J. Arata, J. Hong  
1Department of Robotics Engineering, Daegu Gyeongbuk Institute of Science and Technology (DGIST), Korea  
2Faculty of Medical Sciences, Kyushu University, Fukuoka, Japan |
| 10:45 | Augmented Instrument Control for the CYCLOPS Robotic System  
V. Vitiello, T. Cundy, A. Darzi, G.-Z. Yang, G. Mylonas  
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK |
| 11:00 | Coffee Break and Poster Session |
11:30  Poster Teaser Session 2 (3 minute presentations)

Chairs: Len Fass, Ferdinando Rodriguez Y Baena TBC

P13  Origami-Inspired SMA Actuated Constant Velocity Coupling for Dexterous Telesurgical Robot and Self-Morphing Medical Robots
K. Zhang*¹, M Salerno², J. Dai¹
¹Centre for Robotics Research, King’s College London, UK
²The BioRobotics Institute of Scuola Superiore Sant’Anna, Italy

P14  MRI-Compatible Needle Positioner for Laser Ablation of the Liver: Preliminary Evaluation in a 3T MRI Scanner
E. Franco*, M. Ristic
Department of Mechanical Engineering, Imperial College London, UK

P15  Fluidic Actuators for Minimally Invasive Neurosurgical Instruments
K. Eastwood*¹, J. Drake², T. Looi³, H. Naguib¹
¹Institute of Biomaterials and Biomedical Engineering, The University of Toronto, Canada
²The Hospital for Sick Children, Toronto, Canada

P16  Preliminary Development of a Novel Amphibious Locomotion System for Use in Inter-Luminal Surgical Procedures
W. Mayfield*¹, A. Alazmani³, A. Hood², J. Boyle¹, P. Culmer¹, R. Hewson¹, A. Neville¹, D. Jayne²
¹School of Mechanical Engineering, University of Leeds, UK
²Leeds Academic Surgical Unit, St James’ University Hospital, UK

P17  A Study of Socially Acceptable Movement for Assistive Robots Concerning Personal and Group Workspaces
J. Correa*, S. McKeague, J. Liu, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P18  A Bio-inspired Flexible Robot with Hybrid Actuation Mechanisms for Endoscopic Surgery
Y. Hu¹*, K. Luo¹, C. Poon¹*
¹Department of Surgery, The Chinese University of Hong Kong, China
²Department of Mechanical and Automation Engineering, University of Hong Kong

P19  Design of a Bi-Manual End-Effector for an Endoscopic Surgical Robot
C. A. Seneci*, J. Shang, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
P20 Ontology-Based Modular Architecture for Surgical Autonomous Robots
1Department of Electronics, Milan Polytechnic, Italy
2Department of Informatics, University of Verona, Italy

P21 Paediatric Robot-Assisted Laparoscopic Heminephroureterectomy
T. Cundy*, S. Rowland, J. Harikrishnan, A. Najmaldin
1The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
2Department of Paediatric Surgery, Leeds General Infirmary, UK

P22 Investigation of Performance Log Files of Freehand SPECT Acquisitions for Usage Characteristics and Surgical Phase Determination
A. Okur*, R. Voigt, R. Stauder, N. Navab
1Computer Assisted Medical Procedures, Technical University of Munich, Germany
2Department of Nuclear Medicine, Technical University of Munich, Germany

P23 Detecting and Analysing the Surgical Workflow to Aid Human and Robotic Scrub Nurses
R. Stauder*, A. Okur, N. Navab
Computer Assisted Medical Procedures, Technical University of Munich, Germany

12:30 Lunch and Poster Session

14:00 Panel Discussion and Debate

Chairs: Guang-Zhong Yang, Ara Darzi TBC

Session 5 - Image Guidance and Fusion

Chairs: Russ Taylor, Kaspar Allofetter TBC

14:45 Accuracy Evaluation of Interventional Nuclear Tomographic Reconstruction using Mini Gamma Cameras
P. Matthies*, J. Gardiazabal, A. Okur, T. Lasser, N. Navab
1Computer Aided Medical Procedures (CAMP), Technical University of Munich, Germany
2Department of Nuclear Medicine, Technical University of Munich, Germany

15:00 A Pilot Study of Augmented Reality from Intraoperative CBCT for Image-Guided Thoracic Robotic Surgery
Johns Hopkins University, USA
15:15  Intraoperative 3D Fusion of Microscopic and Endoscopic Images in Transanal Endoscopic Microsurgery
P. Giataganas¹, C. Bergeles*¹, P. Pratt¹, M. Hughes¹, A. Darzi¹², G.-Z. Yang¹
¹The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
²Department of Surgery and Cancer, Imperial College London, UK

15:30  Robotic Image-guidance of an MR-compatible Catheter for Left Atrium Ablation with Flattened Maps for Procedure Planning
R. Karim*¹, A. Ataollahi², S. Wang³, J. Back³, H. Liu³, R. Razavi³, K. Althoefer², T. Schaeffter³, K. Rhode³
¹Division of Imaging Sciences and Biomedical Engineering, King’s College London, UK
²Centre for Robotics Research, Department of Informatics

15:45  Coffee Break and Poster Session

Session 6 - Tracking, Navigation and Open Platforms

Chairs: Simon DiMaio, Justin Vale TBC

16:15  Karl Storz - Harold Hopkins Lecture: Lee Swanstrom, Oregon Clinic
Let’s start again: creating a needs based robot for general surgery

17:00  Real-Time Electromagnetic Navigation for Breast Tumour Resection: Proof of Concept
G. Gauvin¹, C. Yeo*², T. Ungi², G. Fichtinger²; J. Rudan¹, C. Engel¹
¹Department of Surgery, Queen’s University, Canada
²School of Computing, Queen’s University

17:15  Boosted Hybrid EM-Video Endoscopic Navigation Using Organ Centerline Constraint and Structural Measure under Tissue Deformation
X. Luo*, T. Peters
Robarts Research Institute, University of Western Ontario, Canada

17:30  Implementation of a Motion Planning Framework for the da Vinci Surgical System Research Kit
Z. Zhang, A. Munawar, G. Fischer*
Automation and Intervention Medicine (AIM) Robotics Research Laboratory, Worcester Polytechnic Institute, USA

17:45  da Vinci® Auxiliary arm as a Robotic Surgical Assistant for Semi-autonomous Ultrasound Guidance during Robot-assisted Laparoscopic Surgery
O. Mohareri*, T. Salcudean
Robotics and Control Laboratory, University of British Columbia, Canada

18:00  Closing Remarks & Awards followed by Drinks Reception