10 YEARS

The Hamlyn Symposium on Medical Robotics

Programme

25 - 28 June, 2017

Contents

Monday 26th June 2017

08:30	**Registration and Coffee**
09:15	**Welcome Address: Guang-Zhong Yang**
09:20	**Opening Address: Ara Darzi**

Session 1 – Emerging Surgical Robot Platforms

Chairs: Koji Ikuta and Leo Joskowicz

09:30 **Keynote Lecture: Dong-Soo Kwon, Korea Advanced Institute of Science and Technology (KAIST), Korea**
KAIST Efforts Towards the Minimum Invasive Surgery

10:15 **Development of an Endoscopic Surgical Robotic System – from Bench to Animal Studies**
K. C. Lau[2], E. Leung[2], C. C. Y. Poon[1], J. Y. W. Lam[1,3], Y. Yam[2,3], P. W. Y. Chiu[1,3]
[1]*Department of Surgery, The Chinese University of Hong Kong (CUHK), China*
[2]*Department of Mechanical and Automated Engineering, CUHK, China*
[3]*Chow Yuk Ho Technology Centre for Innovative Medicine, CUHK, China*

10:30 **SAID: A Semi-Autonomous Intravenous Access Device for Paediatric Peripheral Intravenous Catheterisation**
Z. Cheng[1], B. L. Davies[1,2], D. G. Caldwell[1], L. S. Mattos[1]
[1]*Department of Advanced Robotics, Istituto Italiano di Tecnologia, Genova, Italy*
[2]*Department of Mechanical Engineering, Imperial College London, London, UK*

10:45 **Image-Guided Robot-Assisted Fracture Surgery: a Cadaveric Study**
G. Dagnino[1], I. Georgilas[1], S. Morad[1], P. Gibbons[1], P. Tarassoli[2], R. Atkins[2], S. Dogramadzi[1]
[1]*Bristol Robotics Laboratory, Bristol, UK*
[2]*University Hospitals Bristol, Bristol, UK*

11:00 **A Variable Stiffness Mechanism for Minimally Invasive Surgical Needles**
C. Culmone*[1], I. De Falco*[2], A. Menciassi[2], J. Dankelman[1], J. J. van den Dobbelsteen[1]
[1]*Department of BioMechanical Engineering, Delft University of Technology, The Netherlands*
[2]*The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy*

11:15 **Coffee Break and Poster Session**

11.45 Poster Teaser Session (3 minute presentations)

Chairs: Arianna Menciassi and Rajni Patel

P1 **Mining Robotic Surgery Data: Training and Modeling using the DVRK**

P. Fiorini[1], D. Dall'Alba[1], G. De Rossi[1], D. Naftalovich[2], J. W. Burdick[2]
[1]*University of Verona, Department of Computer Science, Verona, Italy*
[2]*California Institute of Technology, Mechanical and Civil Engineering, Pasadena, USA*

P2 **Robust Shape Recovery of Deformable Soft-tissue Based on Information from Stereo Scope for Minimal Invasive Surgery**

J. Song, J. Wang, L. Zhao, S. Huang, G. Dissanayake
Centre for Autonomous Systems, University of Technology, Sydney, Australia

P3 **A Case Study of a Passive Robotic Arm for Conventional Transanal Microsurgery**

J. Liu[1], N. Penney[2], P. Wisanuvej[1], A. Darzi[2], G.-Z. Yang[1]
[1]*The Hamlyn Centre for Robotic Surgery, Imperial College London, UK*
[2]*Department of Surgery & Cancer, Imperial College London, UK*

P4 **Safety Enhancement Framework for Robotic Minimally Invasive Surgery**

V. Penza[1,2], E. De Momi[2], N. Enayati[2], T. Chupin[2], J. Ortiz[1], L. S. Mattos[1]
[1]*Department of Advanced Robotics, Istituto Italiano di Tecnologia, Genoa, Italy*
[2]*Department of Electronics, Information and Bioengineering, Politecnico di Milano, Italy*

P5 **Toward a Low-Cost Soft Robotic Manipulator based on Fluid-Actuated Bellows for Gastric Cancer Screening**

N. Garbin[1], A. Stilli[2], A. Shiva[2], J. Fras[3], P. R. Slawinski[1], K. L. Obstein[4], K. Althoefer[3], H. A. Wurdemann[5], P. Valdastri[6]
[1]*Department of Mechanical Engineering, Vanderbilt University, Nashville, TN, USA*
[2]*Department of Informatics, King's College London, UK*
[3]*School of Engineering and Materials Science, Queen Mary University of London, UK*
[4]*Division of Gastroenterology, Hepatology, and Nutrition, Vanderbilt University Medical Center, USA*
[5]*Department of Mechanical Engineering, University College London, UK*
[6]*School of Electronic and Electrical Engineering, University of Leeds, UK*

P6 **"Losing Your Nerve in the Operating Room" – Prefrontal Attenuation is Associated with Performance Degradation under Temporal Demands**

H. Singh*, H. N. Modi*, G.-Z. Yang, A. Darzi, D. R. Leff
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P7 **Design and Evaluation of a Novel Soft MAGS Endoscope**

T. Cheng[1], C. S. H. Ng[1], P. W. Y. Chiu[1,2], Z. Li[1,2]
[1]*Department of Surgery, The Chinese University of Hong Kong (CUHK), China*
[2]*Chow Yuk Ho Technology Centre for Innovative Medicine, CUHK, China*

P8 **On-line Dexterity Maps for Guiding Redundant Surgical Robots**

K. Leibrandt, P. Berthet-Rayne, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P9 **Approaches to Real-Time Ventricular Wall Strain Measurement for the Control of Soft Robotic Ventricular Assist Devices**

D. Van Story[1], M. Saeed[1], K. Price[1], I. Wamala[1], P. E. Hammer[1], D. Bautista-Salinas[1], D. M. Vogt[2], C. J. Walsh[2], R. J. Wood[2], N. V. Vasilyev[1]
[1]*Boston Children's Hospital, Harvard Medical School, USA*
[2]*Wyss Institute for Biologically Inspired Engineering and Harvard John A. Paulson School of Engineering and Applied Science, USA*

P10 **Strong Continuum Manipulator for Flexible Endoscopic Surgery**

M. Hwang, D.-S. Kwon
Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Korea

P11 **A New Tool for Microsurgical Training and Skill Assessment**

M. Berthelot[1], S. Shurey[2], C. Shurey[2], G.-Z. Yang[1], B. Lo[1]
[1]*The Hamlyn Centre for Robotic Surgery, Imperial College London, UK*
[2]*Northwick Park Institute for Medical Research (NPIMR), St Marks Hospital, UK*

P12 **Attachable Robotic Handler to Endoscope and Instrument for Solo-Endoscopy**

D.-H. Lee, B. Cheon, M. Hwang, D.-S. Kwon
Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Korea

P13 **Vision Based Shape Reconstruction of Tendon Driven Snake-Like Surgical Robots**

P. Berthet-Rayne, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P14 **Recovering Dense Tissue Multispectral Signal from *in vivo* RGB Images**

J. Lin[1,2], N. T. Clancy[1,3], D. S. Elson[1,3]
[1]*The Hamlyn Centre for Robotic Surgery, Imperial College London, UK*
[2]*Department of Computing, Imperial College London, UK*
[3]*Department of Surgery and Cancer, Imperial College London, UK*

P15 **A Magnetic Laser Scanner for Non-Contact Endoscopic Ablations**

A. Acemoglu, N. Deshpande, L. S. Mattos
Department of Advanced Robotics, Istituto Italiano di Tecnologia, Genova, Italy

P16 **Low Coherence Interferometry based Proximity Sensors for Medical Robotics**

A. Bradu[1], M. Hughes[1], G.-Z. Yang[2], A. Podoleanu[1]
[1]*Applied Optics Group, School of Physical Science, University of Kent, UK*
[2]*The Hamlyn Centre for Robotic Surgery, Imperial College London, UK*

P17 **Effect of Path History on Concentric Tube Robot Model Calibration**
J. Ha, G. Fagogenis, P. E. Dupont
Department of Cardiovascular Surgery, Boston Children's Hospital, Harvard Medical School, Boston, USA

P18 **Towards Biocompatible Conducting Polymer Actuated Tubes for Intracorporeal Laser Steering**
M. T. Chikhaoui[2], A. Cot[1], K. Rabenorosoa[1], P. Rougeot[1], N. Andreff[1]
[1]AS2M Department, FEMTO-ST Institute, Univ. Bourgogne Franche-Comté/CNRS/ENSMM, Besançon, France
[2]Laboratory for Continuum Robotics, Leibniz Universität Hannover, Germany

P19 **Discussion of Link Designs for Fibre-optic Shape-Sensing in a Snake-like Robot**
A. Schmitz, A. J. Thompson, P. Berthet-Rayne, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P20 **Design of an Ultrasonic Bone Cutting Tool for the da Vinci Platform**
A. Gordon, P. Francis, R. Saab, T. Looi, J. Drake, C. R. Forrest
Center for Image Guided Innovation and Therapeutic Intervention (CIGITI), The Hospital for Sick Children, Toronto, Canada

P21 **A Multiscale Airway Descriptor for Peripheral Bronchoscopic Navigation**
M. Shen[1], S. Giannarou[1], P. Shah[2], G.-Z. Yang[1]
[1]The Hamlyn Centre for Robotic Surgery, Imperial College London, UK
[2]National Heart & Lung Institute, Imperial College London, UK

P22 **3D Gaze Tracking based on Eye and Head Pose Tracking**
D. García-Mato[1,3], A. Lasso[1], A. Szulewski[2], J. Pascau[3], G. Fichtinger[1]
[1]Laboratory for Percutaneous Surgery, School of Computing, Queen's University, Canada
[2]Department of Emergency Medicine, Kingston General Hospital, Canada
[3]Departamento de Bioingeniería e Aerospacial, Universidad Carlos III de Madrid, Instituto de Investigación Sanitaria Gregorio Marañón, Spain

P23 **Deep-Learning for Motion Compensation in Robotic Surgery**
P. Triantafyllou, J. Liu, G.-Z. Yang, S. Giannarou
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

P24 **First Results on a Flexible Variable Stiffness Endoport for Single-Site Partial Nephrectomy**
E. Amanov[1], T.-D. Nguyen[1], F. Imkamp[2], J. Burgner-Kahrs[1]
[1]Laboratory for Continuum Robotics, Leibniz Universität Hannover, Germany
[2]Clinic for Urology and Urologic Oncology, Hannover Medical School, Germany

13:00 Lunch and Poster Session

Session 2 – From Platform Development to Neurointervention

Chairs: Thomas Looi and Leonardo Mattos

14:15 **Invited Lecture: Catherine Mohr, Intuitive Surgical, USA**

Surgical Robots as a Technology Platform

15:00 **Nintendo for Neurointerventionists: Technology for Remote Neurovascular Navigation**

T. C. Gopesh[1], B. Yan[4], A. M. Norbash[2], A. A. Khalessi[3], J. R. Friend[1]

[1]Center for Medical Devices and Instrumentation, Department of Mechanical and Aerospace Engineering, UC San Diego, USA

[2]Department of Radiology, UC San Diego, USA

[3]Department of Neurosurgery, UC San Diego, USA

[4]Neurointervention Unit, Royal Melbourne Hospital, Melbourne, Australia

15:15 **Exploring Reflected Light Intensity to Estimate Depth of the Basal Turn in Cochlear Implant Surgery**

R. Yasin, G. Aiello, N. Simaan

Mechanical Engineering, Vanderbilt University, USA

15:30 **Neuromonitoring during Robotic Cochlear Implantation – First Clinical Experience**

J. Ansó[1], O. Scheidegger[2], W. Wimmer[1], D. Schneider[1], J. Hermann[1], C. Rathgeb[1], N. Gerber[1], M. Stebinger[1], K. Gavaghan[1], G. Mantokoudis[3], M. Caversaccio[3], S. Weber[1]

[1]ARTORG Center for Biomedical Engineering, University of Bern, Switzerland

[2]Department of Neurology, ENMG-Station, University Hospital Bern, Switzerland

[3]Department of Head and Neck Surgery, University Hospital Bern, Switzerland

15:45 **Toward Safer Neurosurgery with an Active Handheld Instrument**

F. Prudente[1], S. Moccia[1,2], A. Perin[3], R. F. Sekula[4], L. S. Mattos[2], J. R. Balzer[4], W. Fellows-Mayle[4], E. De Momi[1], C. N. Riviere[5]

[1]Department of Electronics, Information and Bioengineering, Politecnico di Milano, Italy

[2]Department of Advanced Robotics, Istituto Italiano di Tecnologia, Genoa, Italy

[3]Besta NeuroSim Center, IRCCS Istituto Neurologico C. Besta, Milan, Italy

[4]Department of Neurological Surgery, University of Pittsburgh, Pittsburgh, USA

[5]Robotics Institute, Carnegie Mellon University, Pittsburgh, USA

16:00 **Coffee Break and Poster Session**

Session 3 – Surgical Vision and Navigation

Chairs: Sanja Dogramadzi and Joe Wang

16:30 **Image-based Contact Stabilisation Inside the Beating Heart**

B. Rosa[1,2], G. Fagogenis[1], J. Ha[1], P. E. Dupont[1]
[1]*Cardiac Surgery Department, Boston Children's Hospital, Boston, MA, USA*
[2]*Cube, CNRS, University of Strasbourg, Strasbourg, France*

16:45 **Controlling Virtual Views in Navigated Breast Conserving Surgery using Tracked Instrument**

T. Vaughan[1], T. Ungi[1,2], A. Lasso[2] , G. Gauvin[2], C. J. Engel[2], J. Rudan[1,2], G. Fichtinger[1,2]
[1]*School of Computing, Queen's University, Kingston, Ontario, Canada*
[2]*Department of Surgery, Queen's University, Kingston, Ontario, Canada*

17:00 **Positioning and Stabilisation of a Minimally Invasive Laser Osteotome**

M. Eugster[1], P. Weber[1], P. Cattin[2], A. Zam[3], G. Kosa[1], G. Rauter[1]
[1]*BIROMED, Department of Biomedical Engineering, University of Basel, Switzerland*
[2]*CIAN, Department of Biomedical Engineering, University of Basel, Switzerland*
[3]*BLOG, Department of Biomedical Engineering, University of Basel, Switzerland*

17:15 **Robotic-assisted Platform for USgFUS Treatment of Moving Organs**

A. Diodato[1], A. Schiappacasse[2], A. Cafarelli[1], S. Tognarelli[1], G. Ciuti[1], A. Menciassi[1]
[1]*The BioRobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy*
[2]*Camelot Biomedical Systems S.r.l., Italy*

17:30 **Augmented 3D Catheter Navigation using Constrained Shape from Template**

R. Trivisonne, E. Kerrien, S. Cotin
Inria, France

17:45 **Self-Supervised Siamese Learning on Stereo Image Pairs for Depth Estimation in Robotic Surgery**

M. Ye[1], E. Johns[2], A. Handa[3], L. Zhang[1], P. Pratt[4], G.-Z. Yang[1]
[1]*The Hamlyn Centre for Robotic Surgery, IGHI, Imperial College London, UK*
[2]*Dyson Robotics Laboratory, Imperial College London, UK*
[3]*OpenAI, USA*
[4]*Department of Surgery and Cancer, Imperial College London, UK*

18:00 **Close**

19:00 **10th Anniversary Celebration at the Science Museum**

Tuesday 27th June 2017

08:30 **Registration and Coffee**

Session 4 – From Miniature Robots to Molecular Machines

Chairs: Peter Kazanzides and Ichiro Sakuma

09:00 **A Wirelessly Actuated Robotic Arm for Endoscopy**

T. Qiu[1], S. Palagi[1], F. Adams[1,2], U. Wetterauer[2], A. Miernik[2], P. Fischer[1,3]
[1]*Max Planck Institute for Intelligent Systems, Stuttgart, Germany*
[2]*Department of Urology, University Medical Centre Freiburg, Germany*
[3]*Institute of Physical Chemistry, University of Stuttgart, Germany*

09:15 **Disposable Force Sensing Clip for Robotic Surgical Instruments**

C. A. Seneci, S. Anastasova, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, IGHI, Imperial College London, UK

09.30 **Closed-loop Autonomous Needle Steering during Cooperatively Controlled Needle Insertions for MRI-guided Pelvic Interventions**

M. Wartenberg[1], J. Schornak[1], P. Carvalho[1], N. Patel[1], I. Iordachita[2], C. Tempany[3], N. Hata[3], J. Tokuda[3], G. S. Fischer[1]
[1]*Automation and Interventional Medicine Lab, WPI, Worcester, MA, USA*
[2]*Laboratory for Computational Sensing and Robotics, JHU, Baltimore, MD, USA*
[3]*Surgical Navigation and Robotics Laboratory, BWH Radiology, Boston, MA, USA*

09:45 **More Ports = Less Invasive? A Multi-Needle Robot for Lung Ablation**

A. W. Mahoney[1,3], P. L. Anderson[1,3], F. Maldonado[2,3], R. J. Webster III[1,3]
[1]*Department of Mechanical Engineering, Vanderbilt University, USA*
[2]*Division of Allergy, Pulmonary & Critical Care Medicine, Vanderbilt University Medical Center, USA*
[3]*Vanderbilt Institute for Surgery and Engineering, USA*

10:00 **Wearable Soft Robotic Device Supports the Failing Heart *in vivo***

C. J. Payne[1], I. Wamala, C. Abah[2], T. Thalhofer[1], M. Saeed[2], D. Bautista-Salinas[2], M. A. Horvath[1], N. V. Vasilyev[2], E. T. Roche[1], F. A. Pigula[2], C. J. Walsh[1]
[1]*Wyss Institute for Biologically Inspired Engineering and School of Engineering and Applied Sciences, Harvard University, USA*
[2]*Boston Children's Hospital, Harvard Medical School, USA*

10:15 **Invited Lecture: Andrew Turberfield, University of Oxford, UK**

Programming Autonomous Molecular Machinery

11:00 **Coffee Break and Poster Session**

11:30 Leaders' Forum

Chairs: Russ Taylor and Guang-Zhong Yang

Nikolay Vasilyev

Nikolay V. Vasilyev's research interests include development of image-guided beating-heart intracardiac interventions. In particular, his research is focused on instruments and device design for valve interventions and septal defects closure, new imaging techniques, computer modeling and simulation. In addition, Dr. Vasilyev has been working on developing of novel concepts for atrio-ventricular valve annuloplasty.

Howie Choset

Howie Choset is a Professor of Robotics at Carnegie Mellon University where he serves as the co-director of the Biorobotics Lab and as director of the Robotics Major. Choset's research group reduces complicated high-dimensional problems found in robotics to low-dimensional simpler ones for design, analysis, and planning. Motivated by applications in confined spaces, Choset has created a comprehensive program in modular, high DOF, and multi- robot systems, which has led to basic research in mechanism design, path planning, motion planning, and estimation.

Bradley Nelson

Brad Nelson has been the Professor of Robotics and Intelligent Systems at ETH Zürich since 2002, where his research focuses on microrobotics and nanorobotics. Fundamentally, he is interested in how to make tiny intelligent machines that are millimeters to nanometers in size. Prof. Nelson has over thirty years of experience in the field of robotics and has received a number of awards for his work in robotics, nanotechnology, and biomedicine.

Rick Satava

Richard Satava, MD, FACS, is Professor of Surgery at the University of Washington Medical Center, and Senior Science Advisor at the US Army Medical Research and Materiel Command in Ft. Detrick, MD. He has been continuously active in surgical education and surgical research, with more than 200 publications and book chapters in diverse areas of advanced surgical technology, including Surgery in the Space Environment, Video and 3-D imaging, Telepresence Surgery, Virtual Reality Surgical Simulation, and Objective Assessment of Surgical Competence and Training.

Panel Discussion

Sponsored by:

Science Robotics

AAAS

13:00 **Lunch and Poster Session**

Session 5 – Tracking and Kinematic Modelling

Chairs: Philip Chiu and Simon DiMaio

14:15 **Endoscopic Transsphenoidal Surgical Robot with Optical Tracking Control**

J. Suthakorn[1], S. Chumnanvej[1,2]

[1]Center for Biomedical and Robotics Technology (BART LAB), Faculty of Engineering, Mahidol University, Thailand

[2]Neurosurgery Division, Department of Surgery, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand

14:30 **Design and Kinematic Modelling of a Miniature Compliant Wrist for the da Vinci Research Kit**

P. Francis, K. W. Eastwood, V. Bodani, T. Looi, J. M. Drake

Center for Image-Guided Innovation and Therapeutic Intervention (CIGITI), The Hospital for Sick Children, Toronto, Canada

14:45 **A Novel Variable Stiffness Mechanism for Minimally Invasive Surgery using Concentric Anisotropic Tube Structure**

J. Kim[1], C. Kim[2], S. Kang[2], K. -J. Cho[1]

[1]The School of Mechanical and Aerospace Engineering, Seoul National University, Korea

[2]Robot and Media Research Institute, Korea Institute of Science and Technology (KIST), Korea

15:00 **Top 10 Posters Revisited**

A selection of the most highly rated poster presentations at the 10th Hamlyn Symposium on Medical Robotics

15:45 **Coffee Break and Poster Session**

Session 6 – Storz-Hopkins Lecture and Awards

Chair: Guang-Zhong Yang

16:15 **Karl Storz - Harold Hopkins Lecture: Joseph J. Y. Sung, Chinese University of Hong Kong (CUHK), Hong Kong, China**

AI and Robotic Surgery: What is the Role of Future Medics?

17:00 **Surgical Robot Challenge Highlights**

17:30 **Closing Remarks & Best Paper Awards**

10 YEARS

The Hamlyn Symposium on Medical Robotics

Workshop

25 - 28 June, 2017

Surgical Robot Challenge 2017

A competition for academia and industry

Sunday 25th June
Royal Geographical Society

Surgical Robot Challenge 2017 Entries

Automated Blunt Dissection
D. Á. Nagy MD, R. Elek, T. D. Nagy, T. Haidegger
Antal Bejczy Center for Intelligent Robotics (iRob), Óbuda University, Budapest, Hungary

Robot Assisted Ultrasound Imaging for Localisation Control During Radiotherapy
P. K. Seitz, R. Bendl
Heilbronn University, Medical Informatics, Germany

Stormram 4: An MRI-compatible Robotic System for Breast Biopsy
V. Groenhuis, F. J. Siepel, J. Veltman, S. Stramigioli
Robotics and Mechatronics group, University of Twente, Enschede, The Netherlands
Department of Radiology, Ziekenhuisgroep Twente, Almelo, The Netherlands

Smart Autonomous Unknown Deformable Object Manipulation Using the da Vinci Research Kit: From Soft Tissues to Continuum Robots Manipulation
F. Alambeigi, Z. Wang, Y.-H. Liu, M. Armand, R. H. Taylor
Johns Hopkins University, USA
The Chinese University of Hong Kong, China

Robotic Assistance Technology for Safe and Successful Retinal Vein Cannulation
A. Gijbels, J. Smits, L. Schoevaerdts, K. Willekens, P. Stalmans, E. B. Vander Poorten, D. Reynaerts
Dep. of Mechanical Engineering University of Leuven, 3001 Heverlee, Belgium
Dep. of Ophthalmology, University of Leuven, 3000 Leuven, Belgium

Bipolar Robotic Neurosurgical Tool (BRNT) for the DVRK
K. A. X. J. Luo, A. Deonarain, P. Francis, A. Gordon, L. MacLean, R. Saab, S. Sabetian, A. Swarup, J. Wang, T. Looi, V. Bodani, J. Drake
Centre for Image-Guided Innovation and Therapeutic Intervention at The Hospital for Sick Children, University of Toronto, Canada

The Intuitive Imaging Sensing and Kinematically Enhanced Quadri Robotic Platform for Ear Nose Throat Surgery: The i^{2}Snake
P. Berthet-Rayne, G. Gras, K. Leibrandt, A. Schmitz, C. A. Seneci, P. Wisanuvej, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

Collaborative Robotic Platform for Laparoscopic Surgery
G. Morel, P. Gauthier, L. Dong, A. Mario, X. Sezeur
ISIR - Université Pierre et Marie Curie, France

Three-Dimensional Robotic-Assisted Endomicroscopy with a Force Adaptive Robotic Arm
P. Wisanuvej, K. Vyas, P. Giataganas, K. Leibrandt, J. Liu, M. Hughes, G.-Z. Yang
The Hamlyn Centre for Robotic Surgery, Imperial College London, UK

Constrained Semi-Autonomous Telemanipulated Palpation with Assistive Virtual Fixtures
P. Chalasani, R. M. Yasin, L. Wang, N. Simaan, P. Kazanzides, R. H. Taylor
Vanderbilt University, USA
The Johns Hopkins University, USA

Sunday 25th June

Royal Geographical Society – Drayson Room

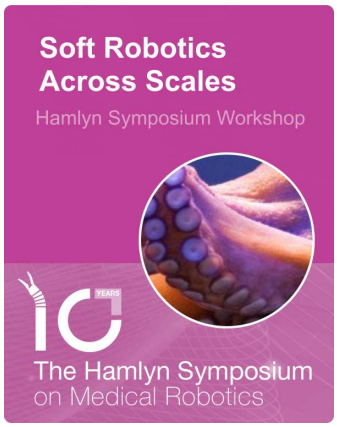
Co-Chairs and Organisers:

Su-Lin Lee - Hamlyn Centre, Imperial College London, UK

Celia Riga - St Mary's Hospital, London, UK

EPSRC
Engineering and Physical Sciences Research Council

	Workshop Schedule
09.00	**Registration and Coffee**
09:45	**Welcome and Introduction** *Su-Lin Lee and Celia Riga*
10:00	**A New Master-Slave Catheter and Guidewire Driving System for Vascular Interventions** *Prof ByungJu Yi, Hanyang University, Seoul, Korea*
10:30	**An Efficient Cardiac Mapping Strategy for Radiofrequency Catheter Ablation with Active Learning** *Yingjing Feng, Imperial College London, UK*
10:45	**Tea and Coffee Break**
11:15	**Simultaneous Catheter and Environment Modelling** *Dr Liang Zhao, University of Technology Sydney, Australia*
11:45	**A Learning Based Training and Skill Assessment Platform with Haptic Guidance for Endovascular Catheterisation** *Wenqiang Chi, Imperial College London, UK*
12:00	**Modelling and Skill Assessment for Robot-Assisted Endovascular Catheterisation** *Hedyeh Rafii-Tari, Auris Robotics, USA*
12:30	**Discussion**
13:00	**Closing Remarks and Lunch**



Sunday 25th June

Royal Geographical Society – Ondaatje Theatre

Co-Chairs:

Cecilia Laschi - Biorobotics Institute, Scuola Superiore Sant'Anna, Italy
Koji Ikuta - RCAST, University of Tokyo, Japan
Guang-Zhong Yang - Imperial College London, UK

Organisers:

Christopher Payne - Wyss Institute, Harvard University, USA
Mohamed Abdelaziz - Imperial College London, UK

	Workshop Schedule
08.30	**Registration and Coffee**
09:00	**Introduction**
09:05	**A Soft Touch to Biomedical Robotics** *Cecilia Laschi, Biorobotics Institute, Scuola Superiore Sant'Anna, Italy*
09:35	**Additive Manufacturing of Soft Pneumatic Actuators using Low-Cost 3D Printers** *Donal Holland, University College Dublin, Ireland*
10:05	**Milli- and Micrometre Scale Light-Driven Polymer Robots and Smart Actuators** *Piotr Wasylczyk, Ultrafast Phenomena Lab, Warsaw University, Poland*
10:35	**Tea and Coffee Break**
11:05	**Soft Components for Wearable Technology** *Jamie Paik, Reconfigurable Robotics Lab, EPFL, Switzerland*
11:35	**Stroke Rehabilitation using BMI and a Soft Robotic Exo-glove** *Adam Stokes, School of Engineering, The University of Edinburgh, UK*
12:05	**Innovative Soft Robotic Micro Devices for Future Medicine** *Koji Ikuta, RCAST, University of Tokyo, Japan*
12:35	**Lunch** (*Posters and Demonstrations)*

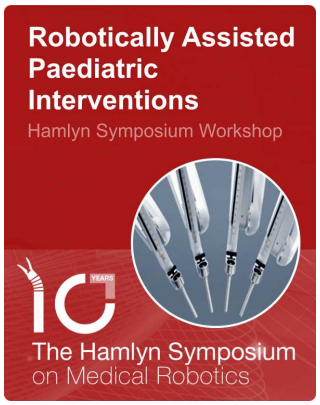
Workshop Schedule

13:30	**Soft Robotics for Healthcare: From Smart Skins and Assistive Clothing to Edible and Implantable Robots** *Jonathan Rossiter, Bristol Robotics Laboratory, University of Bristol, UK*
14:00	**Soft Technologies for New Abilities in Diagnosis and Surgery** *Arianna Menciassi, Biorobotics Institute, Scuola Superiore Sant'Anna, Italy*
14:30	**Model-free Design Automation of Soft Robotic Hands** *Fumiya Iida, Biologically Inspired Robotics Laboratory, Cambridge University, UK*
15:00	**Closing Remarks**

Wednesday 28th June
Royal Geographical Society – Drayson Room

Co-Chairs and Organisers:
Thomas Looi - Hospital for Sick Children, Canada
James Drake - Hospital for Sick Children, Canada

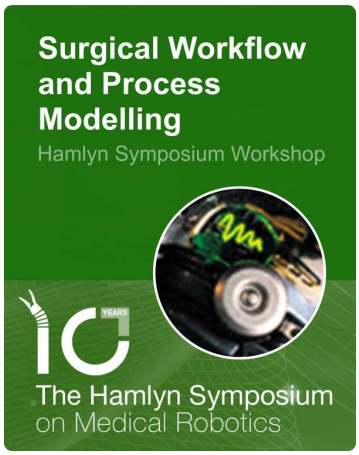
	Workshop Schedule
08:30	**Registration and Coffee**
09:00	**Welcome and Introduction to Speakers and Format**
09:10	**Clinical Introductions**
09:15	**Challenges and Opportunities in Neurosurgery** *James Drake, Hospital for Sick Children, Canada*
09:35	**Challenges and Opportunities in Otolarygology** *Vito Forte, Hospital for Sick Children, Canada*
09:55	**Challenges and Opportunities in General Surgery** *Ted Gerstle, Hospital for Sick Children, Canada*
10:15	**Challenges and Opportunities in Plastic Surgery** *Thomas Looi, Hospital for Sick Children, Canada*
10:35	**Tea and Coffee Break**
11:05	**Technical Introductions**
11:10	**Concentric and Continuum Manipulators** *Robert Webster, Vanderbilt University, USA*
11:30	**Shape and Force Sensing** *Rajni Patel, Western University, Canada*
11:50	**Workspace Design and Planning** *Christos Bergeles, University College London, UK*
12:10	**Roundtable Discussion on Clinical Opportunities and Technology**
12:45	**Highlight Top 3 Clinical and Technical Challenges**
13:00	**Closing Remarks and Lunch**



Wednesday 28th June
Royal Geographical Society – Sunley Room

Co-Chairs and Organisers:
Kevin Cleary - Children's National Health System, USA
Raymond Sze - Children's National Health System, USA

	Workshop Schedule
08:30	**Registration and Coffee**
09:00	**Introduction**
09:05	**Interventional Cardiovascular MRI for Minimally Invasive Procedures** *Jessica Schulz, Siemens Healthineers, Germany*
09:35	**GIFT-Surg Project: Guided Instrumentation for Fetal Therapy and Surgery** *Gianni Borghesan, KU Leuven, Belgium*
10:05	**Robotic Rehabilitation for Children with Cerebral Palsy** *Kevin Cleary, Children's National, USA*
10:35	**Tea and Coffee Break**
11:00	**Robotics and Rehabilitation for Paediatrics** *Etienne Burdet, Imperial College London, UK*
11:30	**Robotic Guidance for Paediatric Interventional Radiology** *Karun Sharma, Children's National, USA*
12:00	**Robotic in Paediatric Surgery** *Kate Davenport, Arizona State University, USA*
12:30	**HIFU for Paediatrics** *Ari Partanen, Philips, USA*
13:00	**Closing Remarks and Lunch**



Wednesday 28th June
Royal Geographical Society – Lowther Room

Co-Chairs and Organisers:
Paolo Fiorini - University of Verona, Italy
Joel Burdick - California Institute of Technology, USA
Diego Dall'Alba - University of Verona, Italy
Daniel Paolo Naftalovich - California Institute of Technology / University of South California, USA

	Workshop Schedule
08:30	**Registration and Coffee**
09:00	**Introduction** *Paolo Fiorini, University of Verona, Italy*
09:05	**Defining the Workflow for Focused Ultrasound Surgery: Key Aspects and Typical Problems** *Arianna Menciassi, Scuola Superiore Sant'Anna, Italy*
09:25	**Embedding Real Time Cognitive Load Assessment into Surgical Workflow** *Marco Zenati, Harvard Medical School, USA*
09:45	**Implications of Human Robot Interaction for Continuum Robotics in Cognitive Surgery** *Jessica Burgner-Kahrs, Leibniz Universität Hannover, Germany*
10:05	**Surgical Workflow Analysis for Skill Analysis and Situation Awareness** *Pierre Jannin, INSERM, France*
10:25	**Tea and Coffee Break**
11:00	**Machine Learning Tools for Surgical Training and Situation Awareness** *Elena de Momi, Politecnico di Milano, Italy*
11:20	**Can we really Automate Abdominal Surgery? Practical examples** *Alberto Arezzo, University of Torino, Italy*
11:40	**Attentive "OR" for the Support of the Surgeon** *Joerg Raczkowsky, Karlsruhe Institute of Technology, Germany*
12:00	**From Data to Cognition: The Analysis of DVRK Data** *Joel Burdick, California Institute of Technology, USA*
12:20	**Roundtable and Discussion**
13:00	**Closing Remarks and Lunch**

Wednesday 28th June

Royal Geographical Society – Education Centre

Co-Chairs and Organisers:

Kev Dhaliwal - The University of Edinburgh, UK
Adrian Podoleanu - University of Kent, UK
Kawal Rhode - King's College London, UK
Andreas Melzer - University of Dundee, UK
Sebastien Ourselin - University College London, UK
Daniel Elson - Hamlyn Centre, Imperial College London, UK
Matina Giannarou - Hamlyn Centre, Imperial College London, UK

Sponsored by:

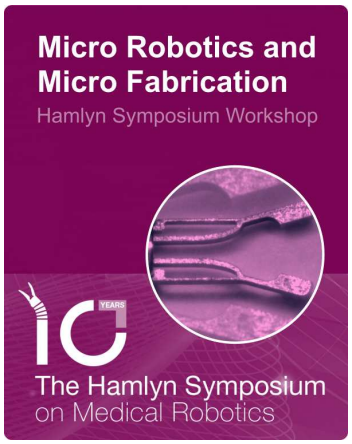
EPSRC UK-IGT Network+ and EPSRC-NIHR Healthcare Technology Co-operative (HTC) Partnership Network Plus: Technology Network on Devices for Surgery and Rehabilitation, in partnership with the Enteric HTC at Barts Health NHS Trust and the Queen Mary University of London

EPSRC Engineering and Physical Sciences Research Council

NHS National Institute for Health Research

	Workshop Schedule
08:30	**Registration and Coffee**
09:30	**Welcome and Introduction**
09:40	**What You See is What You Get: Applications of Computer Vision in Interventional Medicine** *Greg Hager, Johns Hopkins University, USA*
10:25	**Monitoring the Radiation Exposure of Staff and Patient in 3D during Interventional Procedures: A Computer Vision Approach** *Nicolas Padoy, University of Strasbourg, France*
11:10	**Tea and Coffee Break**
11:30	**Relevance-based multimodal perceptual augmentation for Computer Assisted Interventions** *Nassir Navab, TUM, Germany*
12:15	**Integrating Image Guidance in the Orthpaedic Trauma OR – Relevant Applications and Clinical Obstacles** *Greg Osgood, Johns Hopkins Hospital, USA*
13:00	**Lunch**

	Workshop Schedule
14:00	**Image-Guided Cardiac Resynchronisation Therapy: GuideCRT** *Peter Mountney, Siemens/King's College London, UK*
15:00	**Ultrasound and MR Guided Focused Ultrasound Therapy: SonoRay** *Andreas Melzer, University of Dundee, UK*
15:50	**Tea and Coffee Break**
16:10	**Molecular Fluorescence Guided Surgery, Pathology and Endoscopy – New Avenues for Theranostics** *Gooitzen van Dam, University of Groningen, The Netherlands*
17:00	**Closing Remarks**



Wednesday 28th June

Royal Geographical Society – Ondaatje Theatre

Co-Chairs and Organisers:

Maura Power - Hamlyn Centre, Imperial College London, UK
Florent Seichepine - Hamlyn Centre, Imperial College London, UK
Gilgueng Hwang - CNRS, France
Guang-Zhong Yang - Hamlyn Centre, Imperial College London, UK

Sponsored by:

EPSRC Programme Grant: Micro-Robotics for Surgery

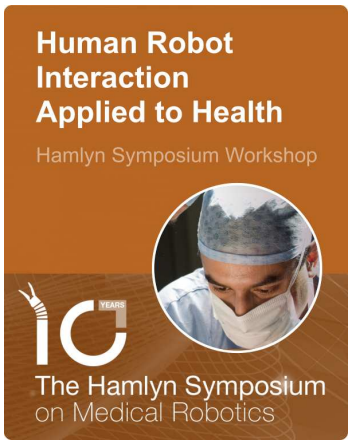
EPSRC
Engineering and Physical Sciences Research Council

Workshop Schedule

08:30	**Registration and Coffee**
09:00	**Welcome & Introduction**
09:05	**Micro-robots that Write, Image, Repair, Destroy, Deliver and Isolate** *Joseph Wang, UCSD, USA*
09:35	**3D micro/nano fabrication and theoretical analysis for advancing various microrobotics** *Koji Ikuta, University of Tokyo, Japan*
10:05	**Soft Microrobotics** *Bradley Nelson, ETH Zurich, Switzerland*
10:35	**Tea and Coffee Break, industry stands**
11:05	**Materializing Ideas by Additive Microfabrication** *Martin Hermatschweiler, Nanoscribe, Germany*
11:25	**Picture Perfect – SEM for Microrobotics** *Paul Wood, Tescan, UK*
11:45	**Modular Deposition Systems** *Lars Allers, Korvus Technology, UK*
12:05	**Bubble-Propelled and Biohybrid Micromotors** *Oliver Schmidt, IFW Dresden, Germany*
12:35	**Micro-Nano Manipulation** *Florent Seichepine, Hamlyn Centre, Imperial College London, UK*
13:00	**Lunch**

Workshop Schedule

14:00	**Self-Replicating and Self-Assembled Natural Nanorobots for Cancer Therapy** *Sylvain Martel, Polytechnique Montréal, Canada*
14:30	**Micromanipulation and Microrobotics for Cell Surgery** *Dong Sun, City University of Hong Kong, China*
15:00	**Propulsion of Microrobots in Complex Media** *Stefano Palagi, Max Planck Institute, Germany*
15:30	**Panel Discussion**
16:00	**Closing Remarks**



Wednesday 28th June
Royal Geographical Society – Sunley Room

Co-Chairs:
Brian Davies - Imperial College London, UK
Guang-Zhong Yang - Hamlyn Centre, Imperial College London, UK

Organisers:
Daniel Freer - Imperial College London, UK
Gurvinder Virk - CLAWAR & Innotec UK, UK
Daniel Leff - Imperial College London, UK

Sponsored by:
EPSRC-NIHR Healthcare Technology Co-operative Partnership Award: Technology Network on Devices for Surgery and Rehabilitation, in partnership with the NIHR Trauma Management HTC and University Hospitals of Birmingham NHS Foundation Trust

EPSRC Engineering and Physical Sciences Research Council

NHS National Institute for Health Research

	Workshop Schedule
14:00	**Introduction** *Brian Davies, Imperial College London, UK*
14:10	**Safety of Wearable Robots** *Gurvinder Virk, CLAWAR & Innotec UK, UK*
14:30	**Wearable Robots: Translational and Rehabilitative Challenges** *Luciano Bissolotti, Casa di Cura Ancelle, Italy*
14:50	**Wearable Robots and Neuroprosthetics for Tremor Suppression** *Jose Pons, Cajal Institute, CSIC, Spain*
15:10	**Tea and Coffee Break**

Workshop Schedule

15:40	**Decoding Muscular Signals for Human-Robot Interaction** *Dario Farina, Imperial College London, UK*
16:00	**Brain Machine Interfaces for Motor Rehabilitation** *Ander Ramos-Murguialday, University of Tübingen / Neural Engineering TECNALIA Health, Spain*
16:20	**Bringing BMI Out of the Lab and Into Our Lives: Technical and Neuroethical Challenges** *Surjo Soekadar, University of Tübingen, Germany*
16:40	**Enhancing Human Collaboration with Artificial Intelligence Systems Through Brain-Computer Interfaces** *Erin Solovey, Drexel University, USA*
17:00	**Discussion**
17:30	**Concluding Remarks**

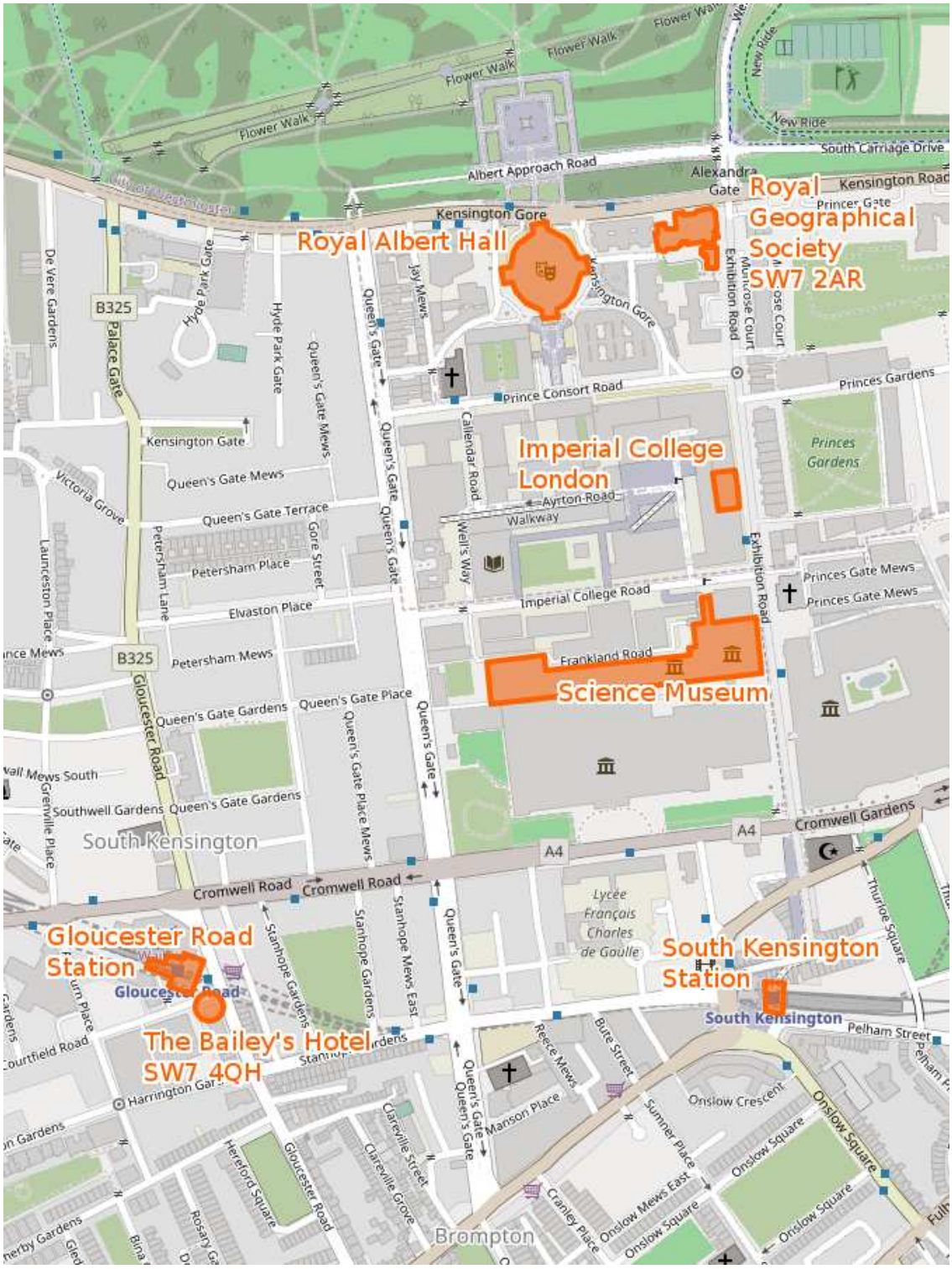
Wednesday 28th June
Royal Geographical Society – Drayson Room

Co-Chairs and Organisers:
Pierre Dupont - Boston Children's Hospital,
Harvard Medical School, USA
Russell Taylor - Johns Hopkins University, USA
Christos Bergeles - University College London, UK

	Workshop Schedule
14:00	**First in Human: First for Howie** *Howie Choset, Carnegie Mellon University / MedRobotics, USA*
14:30	**The World's First Robot-Assisted Eye Surgery** *Gerrit Naus, PrecEyes, The Netherlands*
15:00	**The Robodoc Experience: Lab Prototype to Commercial Product – Or How I Spent 7 Years with Little Sleep and No Social Life** *Peter Kazanzides, Johns Hopkins University / Robodoc, USA*
15:30	**Tea and Coffee Break**
16:00	**The Long and Winding Road to the Bionic Pancreas** *Ed Damiano, Boston University / BetaBionics, USA*
16:30	**How Academic Research can Best Use Medical Device Engineering Firms** *Derek Henderson, Cambridge Consultants, UK*
17:00	**A Rollercoaster Ride (and it's not over)** *Bradley Nelson, ETH Zurich / Aeon Scientific, Switzerland*
17:30	**Closing Remarks**

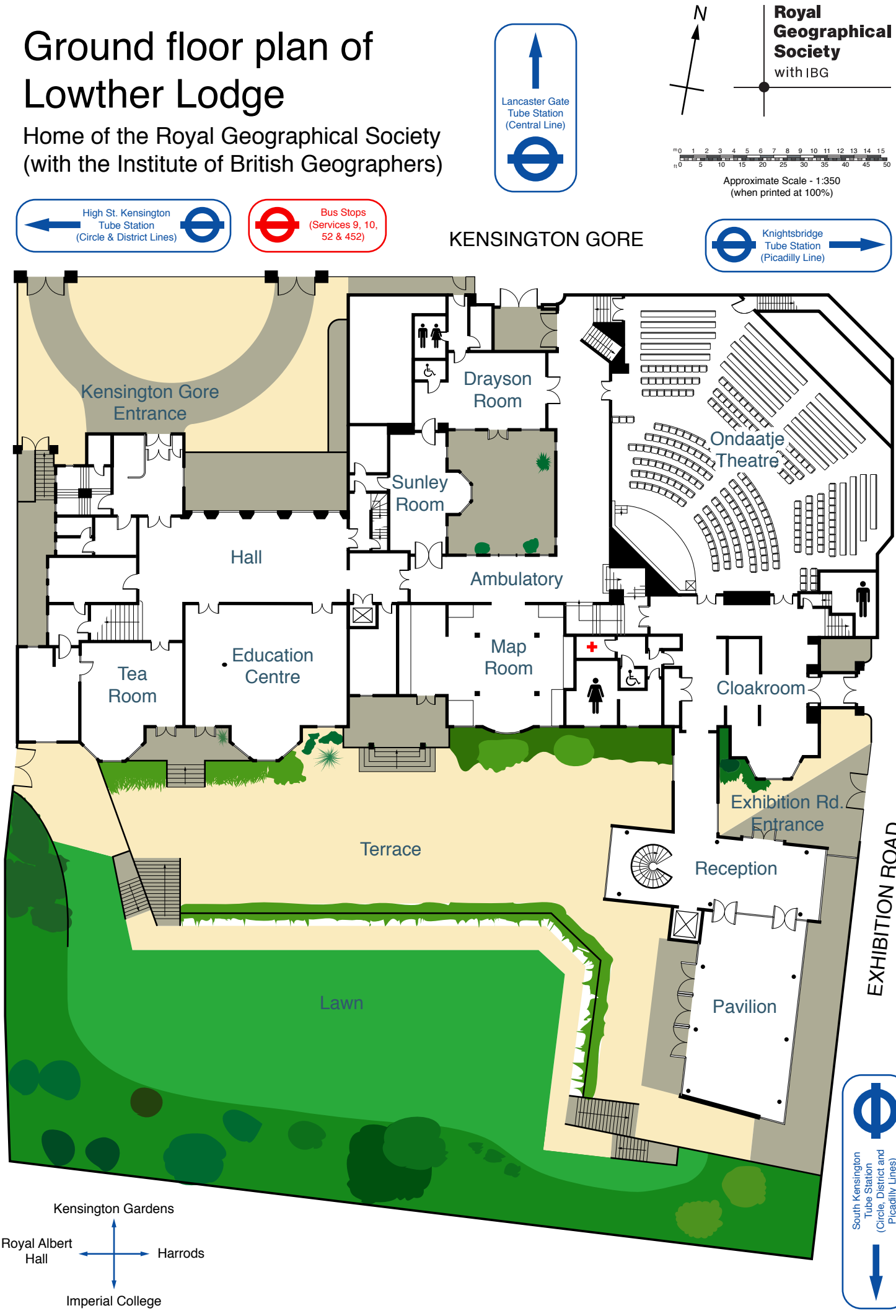
3 Directions

Royal Geographical Society
1 Kensington Gore,
Kensington,
London SW7 2AR



Ground floor plan of Lowther Lodge

Home of the Royal Geographical Society
(with the Institute of British Geographers)



UK Robotics Week 2017

Sunday 25 June – Friday 30 June

www.roboticsweek.uk

International Robotics Showcase

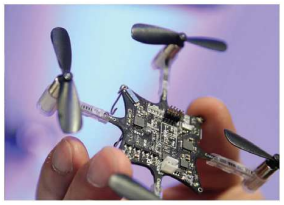
Friday 30 June

www.roboticsweek.uk/events/international-robotics-showcase

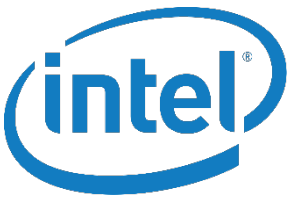
Following the huge success of the inaugural UK Robotics Week last year, the 2017 UK Robotics Week will once more come to a close with the pinnacle event of this celebration: the International Robotics Showcase.

Location

IET London
Savoy Place,
London
WC2R 0BL



The 10th Hamlyn Symposium on Medical Robotics is sponsored by:



The Hamlyn Symposium on Medical Robotics

25 - 28 June, 2017
Imperial College London and
the Royal Geographical Society, London