

8:00 am - 9:30 am

Oral --- Friday, October 23, 2015

	Session 1D. MEL: Elasticity Imaging of small Structures <i>Chair: Kathy Nightingale Duke University</i>	Session 2D. MCA: Microbubbles and Nanodroplets Applications <i>Chair: Nico de Jong Erasmus Medical Centre</i>	Session 3D. MPA: Photoacoustic Imaging of Atherosclerosis and Cancer <i>Chair: Georg Schmitz Ruhr-Universität Bochum</i>	Session 4D. MIM: Image Fusion and Classification Methods for Improved Diagnostics <i>Chair: Hans Bosch Erasmus Medical Center</i>	Session 5D. Frontiers of Ultrasonics <i>Chair: David Greve Carnegie Mellon University</i>	Session 6D. Opto-Acoustics <i>Chair: John Larson Avago Technologies</i>	Session 7D. Reduction of TCF <i>Chair: Robert Aigner Qorvo Inc.</i>	Session 8D. Transducers for IVUS <i>Chair: Qifa Zhou University of Southern California</i>	
	Plenary Hall	VIP	201BC	201DE	103	201F	201A	102	
8:00 am	1D-1 Characterizing Sclerotic Skin Stiffness with Acoustic Radiation Force Impulse (ARFI) and Shear Wave Elasticity Imaging (SWEI) Mark Palmeri ¹ , A. Rambi Cardones ² , Seung Yun Lee ¹ , Kathryn Nightingale ¹ ¹ Biomedical Engineering, Duke University, Durham, NC, USA; ² Dermatology, Duke University, Durham, NC, USA	2D-1 Live Cytodynamics Imaging During Single-Site Sonoporation: Rapid Activation of Annexin Self-Defense Response by Vibrating and Collapsing Microbubbles Wenjing Zhong ¹ , Alfred C. H. Yu ¹ ¹ Medical Engineering Program, University of Hong Kong, Pokfulam, Hong Kong	3D-1 Ex-vivo photoacoustic imaging of atherosclerotic carotid plaques M.U. Arabul ¹ , H.M. Heres ¹ , M.C.M. Rutten ¹ , M.R.H.M. van Sambeek ² , R.G.P. Lopata ¹ ¹ Cardiovascular Biomechanics Group, Department of Biomedical Engineering, Technical University of Eindhoven, Netherlands; ² Vascular Surgery, Catharina Hospital Eindhoven, Netherlands	4D-1 Spatiotemporal registration of 3D volumetric echocardiographic images Adriyana Danudibroto ^{1,2} , Jørn Bersvendsen ^{2,3} , Olivier Gerard ² , Oana Mirea ¹ , Jan D'hooge ¹ , Eigil Samset ^{2,3} ¹ Dept. of Cardiovascular Sciences, KU Leuven, Belgium; ² GE Vingmed Ultrasound, Oslo, Norway; ³ University of Oslo, Oslo, Norway	5D-1 In-chip GHz Ultrasonic Pulses for Information Processing Amit Lal ¹ ¹ SonicMEMS, Electrical and Computer Engineering, Cornell University, Ithaca, NY, USA	6D-1 Depth-Profiling of Acoustic, Optic and Acousto-Optic Spatial Inhomogeneities by Technique of Picosecond Ultrasonic Interferometry Vitaliy Gusev ¹ ¹ LAUM, UMR-CNRS 6613, LUNAM, Université du Maine, Le Mans, France	7D-1 The study of the anomalous thermomechanical effect of fluorine-doped silicon dioxide (FSG) films using temperature dependent FTIR measurements Matthias Knapp ^{1,2} , Philipp Jäger ² , Werner Ruile ² , Matthias Honal ² , Ingo Bleyl ² , Leonhard M. Reindl ¹ ¹ Department of Microsystems Engineering, University of Freiburg, Freiburg, Germany; ² TDK Corporation, Munich, Germany	8D-1 High Frequency Single Crystal Composite for Ultrasound Applications Jian Tian ¹ , Kevin Meneou ¹ , Brandon Stone ¹ , Pengdi Han ¹ , Stephen Dynan ¹ ¹ CTG Advanced Materials, Bolingbrook, Illinois, USA	
8:15 am	1D-2 Model-based assessment of the mechanical properties of the animal crystalline lens in situ using acoustic radiation force and optical coherence elastography system Chen Wu ¹ , Zhaolong Han ¹ , Shang Wang ^{1,2} , Jiasong Li ¹ , Manmohan Singh ¹ , Chih-hao Liu ¹ , Stanislav Emelianov ³ , Fabrice Manns ^{1,5} , Kirill Larin ^{1,2} , Aglyamov Salavat ³ ¹ Biomedical Engineering, University of Houston, Houston, Texas, USA; ² Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, Texas, USA; ³ Biomedical Engineering, University of Texas at Austin, Austin, Texas, USA; ⁴ Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, Florida, USA; ⁵ Biomedical Engineering, University of Miami College of Engineering, Miami, Florida, USA	2D-2 Effect of shell loading on the mechanical properties and dynamic response of Optison™ microbubbles. Camilo Perez ^{1,2} , Yujin Zong ³ , Cheng-Hui Wang ⁴ , Jarred Swallow ⁵ , Juan Tu ⁶ , Thomas Matula ² ¹ Bioengineering, University of Washington, Seattle, Washington, USA; ² Center for Industrial and Medical Ultrasound- Applied Physics Laboratory, University of Washington, Seattle, Washington, USA; ³ Department of Biomedical Engineering, Xian Jiaotong University, Xi'an, China, People's Republic of; ⁴ Institute of Applied Acoustics, Shaanxi Normal University, Xi'an, China, People's Republic of; ⁵ Oceanography, University of Washington, Seattle, Washington, USA; ⁶ Physics, Nanjing University, China, People's Republic of	3D-2 Optical and acoustic spectroscopy of atherosclerotic plaque photoacoustics Verya Daeichin ¹ , Min Wu ¹ , Antonius F. W. van der Steen ^{1,2} , Gijs van Soest ¹ ¹ Erasmus MC, Rotterdam, Netherlands; ² Interuniversity Cardiology Institute of the Netherlands, Netherlands	4D-2 Anatomically Verified Algorithm for Image Fusion of 3D Echocardiography and Coronary Computed Tomography Angiography Tim Nordenfur ¹ , Aleksandar Babic ^{2,3} , Ivana Bulatovic ⁴ , Anders Giesecke ⁴ , Jonaz Ripsweden ⁴ , Eigil Samset ^{2,3} , Reidar Winter ^{4,5} , Matilda Larsson ¹ ¹ Medical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden; ² University of Oslo, Oslo, Norway; ³ GE Vingmed Ultrasound, Oslo, Norway; ⁴ Karolinska Institutet, Stockholm, Sweden; ⁵ Department of Cardiology, Danderyd Hospital, Stockholm, Sweden				7D-2 Increased Piezoelectric Coupling Factor in Temperature Compensated Film Bulk Acoustic Resonators Tokihito Nishihara ¹ , Shinji Taniguchi ¹ , Masanori Ueda ¹ ¹ TAIYO YUDEN CO.,LTD., Japan	8D-2 A PMN-PT Micromachined 1-3 Composite IVUS Ultrasound Array Sibo Li ¹ , Zhuochen Wang ¹ , Jinwook Kim ¹ , Wenbin Huang ¹ , Jian Tian ² , Pengdi Han ² , Chao Zhang ³ , Xiaoning Jiang ¹ ¹ North Carolina State University, Raleigh, North Carolina, USA; ² CTG Advanced Materials, Bolingbrook, Illinois, USA; ³ Tsinghua University in Shenzhen, Shenzhen, Guangdong, China, People's Republic of

<p>8:30 am</p>	<p>1D-3 Factors Impacting Detection of Untethered Scatterers within Viscoelastic Background by ARFI Surveillance of Subcutaneous Hemorrhage (ASSH): In Silico Demonstration</p> <p>Tomasz Czernuszewicz¹, Robert Hinson¹, Caterina Gallippi^{1,2} ¹Joint Department of Biomedical Engineering, University of North Carolina/North Carolina State University, Chapel Hill, NC, USA, ²Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC, USA</p>	<p>2D-3 Effects of the Microbubble Shell Physicochemical Properties on Ultrasound-Mediated Drug Delivery to the Brain</p> <p>Shih-Ying Wu¹, Cherry Chen¹, Yao-Sheng Tung¹, Oluayemi Olumolade¹, Elisa Konofagou^{1,2} ¹Biomedical Engineering, Columbia University, New York, USA, ²Radiology, Columbia University, New York, USA</p>	<p>3D-3 Photoacoustic microscopy of lipids using a graded-index multimode fiber amplifier</p> <p>Jessica Farland¹, Margaret Ferrari¹, Takashi Buma¹ ¹Union College, USA</p>	<p>4D-3 Simultaneous Positron Emission Tomography and Ultrafast Doppler Imaging in vivo</p> <p>Jean Provost¹, Aniketos garofalakis², Thomas Viel², Damien Bouda², Joevin Sourdon², Mathieu Pernot³, Bertrand Tavitian², Mickael Tanter³ ¹Institut Langevin, ESPCI ParisTech, INSERM, Paris, France, ²PARCC INSERM UMR 970, France, ³Institut Langevin, ESPCI ParisTech, INSERM, France</p>	<p>5D-2 Mechanical Properties of Comet 67P/Churyumov-Gerasimenko Measured by CASSE and DIM on Board Rosetta's Lander Philae</p> <p>Walter Arnold^{1,2}, Thomas Albin³, Claudia Faber⁴, Hans-Herbert Fischer⁵, Alberto Flandes⁶, Attila Hirn⁷, Martin Knapmeyer⁴, Harald Krüger³, Alexander Loose³, Diedrich Möhlmann⁴, Klaus-Jürgen Seidensticker⁴, Klaus Thiel⁸ ¹Department of Materials and Materials Technology, Saarland University, Saarbrücken, Germany, ²I. Phys. Institut, Georg-August Universität, Göttingen, Germany, ³Max Planck Institute for Solar System Research, Germany, ⁴DLR Institute of Planetary Research, Germany, ⁵DLR MUSC Cologne, Germany, ⁶Instituto de Geofísica, Mexico, ⁷MTA Centre for Energy Research, Hungary, ⁸University of Cologne, Germany</p>	<p>6D-2 Fast wave velocity measurement by Brillouin scattering using induced phonon from ScAlN piezoelectric thin film</p> <p>Masahiko KAWABE¹, Takahiko YANAGITANI², Hayato ICHIHASHI¹, Shinji TAKAYANAGI¹, Masashi SUZUKI³, Mami MATSUKAWA¹ ¹Doshisha University, Kyoto, Japan, ²Waseda University, Tokyo, Japan, ³Nagoya Institute of Technology, Nagoya, Japan</p>	<p>7D-3 c-Axis parallel oriented ScAlN films grown by ion-beam assisted RF magnetron sputtering</p> <p>Mineki Oka¹, Shinji Takayanagi¹, Takahiko Yanagitani², Mami Matsukawa¹ ¹Doshisha University, Kyotanabe, Japan, ²Waseda University, Tokyo, Japan</p>	<p>8D-3 Intravascular Acoustic Radiation Force Imaging: Feasibility Study</p> <p>Carl Herckhoff¹, Mark Palmeri², Jeremy Dahl¹ ¹Radiology, Stanford University, Palo Alto, CA, USA, ²Biomedical Engineering, Duke University, Durham, NC, USA</p>
<p>8:45 am</p>	<p>1D-4 High Frequency Point Shear Wave Elastography (HF-pSWE): A Novel Technique for High Resolution Soft Tissue Elasticity Mapping</p> <p>Pei-Yu Chen¹, Chih-Chung Huang¹, Ma Teng², Qifa Zhou², K. Kirk Shung² ¹Department of biomedical engineering, National Cheng Kung University, Taiwan, ²Department of Biomedical Engineering, University of Southern California, USA</p>	<p>2D-4 High-Speed Fluorescence Microscopy of Near-Wall Shedding of Drug-Lipid Complexes from Phase-Change Droplets</p> <p>Shih-Tsung Kang¹, Tsung-Lun Chang¹, Chih-Kuang Yeh¹ ¹Department of Biomedical Engineering & Environmental Sciences, National Tsing Hua University, Hsinchu, Taiwan</p>	<p>3D-4 Photoacoustic assessment of spatially and temporally varying oxygen saturation and perfusion in an orthotopic rat model of human hepatocellular carcinoma</p> <p>Katherine Dextraze^{1,2}, Nina Munoz³, Steven Huang³, Tomas Figueira³, Andrew Heinmiller⁴, Rony Avritscher³, Richard Bouchard^{1,2} ¹Imaging Physics, University of Texas MD Anderson Cancer Center, Houston, TX, USA, ²University of Texas at Houston Graduate School of Biomedical Sciences, Houston, TX, USA, ³Interventional Radiology, University of Texas MD Anderson Cancer Center, Houston, TX, USA, ⁴FUJIFILM VisualSonics, Inc., Toronto, Canada</p>	<p>4D-4 Detection and Characterization of Sentinel Lymph Node using Contrast-Enhanced Ultrasound and Photoacoustic Imaging</p> <p>Stanislav Emelianov¹, Alexander Hannah¹, Geoffrey Luke¹ ¹University of Texas at Austin, Austin, Texas, USA</p>	<p>5D-3 Magnetic sensing by ultrasonic excitation</p> <p>Kenji Ikushima¹, Hisato Yamada¹, Miki Uehara¹ ¹Department of Applied Physics, Tokyo University of Agriculture and Technology, Tokyo, Japan</p>	<p>6D-3 Fourier synthesis and timbre tuning of radio frequency nanomechanical pulses</p> <p>Achim Wixforth¹, Florian Schuelein², Hubert Krenner² ¹Institute of Physics, University of Augsburg, Augsburg, Germany, ²University of Augsburg, Germany</p>	<p>7D-4 Estimation of temperature dependence of C₄₄ elastic constant in 42°Y-X cut LiTaO₃ single crystals</p> <p>Minerva Gonzalez^{1,2}, Fabien Henrot¹, Florent Bassignot¹, Ausrine Bartasyte¹, Bernard Dulmet¹, Sylvain Ballandras³, Claudia Kajiyama⁴, Ingo Bleyl⁵, Jean Michel Brice² ¹Institut FEMTO-ST, Besançon, France, ²TDK Electronics France SAS, Valbonne Sophia Antipolis, France, ³Frec/n/sys SASU, Besançon, France, ⁴Epcos Inc. (a TDK group company), San Jose, CA, USA, ⁵TDK Corporation, Munich, Germany</p>	<p>8D-4 Dual-element Ultrasonic Transducer for Intravascular Acoustic Radiation Force Impulse (IV-ARFI) Imaging</p> <p>Teng Ma¹, Xuejun Qian¹, Mingyue Yu¹, Qifa Zhou¹, K. Kirk Shung¹ ¹NIH Resource Center on Medical Ultrasonic Transducer Technology Department of Biomedical Engineering, University of Southern California, Los Angeles, CA, USA</p>

8:00 am - 9:30 am

Oral --- Friday, October 23, 2015

<p>9:00 am</p>	<p>1D-5 Shear Wave Elasticity Imaging for Preclinical Research on Small Animals and 3D Cell Cultures</p> <p>Pai-Chi Li¹ <i>¹National Taiwan University, Taipei, Taipei, Taiwan, Taiwan</i></p>	<p>2D-5 Image-Guided Characterization of Phase-shift Droplets at Pre-clinical Frequencies In Vitro and In Vivo</p> <p>Paul S. Sheeran^{1,2}, Kimoon Yoo³, Ross Williams¹, Yasaman Daghighi¹, Emmanuel Cherin¹, F. Stuart Foster^{1,2}, Peter N. Burns^{1,2} <i>¹Physical Sciences, Sunnybrook Research Institute, Toronto, Canada, ²Medical Biophysics, University of Toronto, Toronto, Canada, ³Chemical Engineering, University of Waterloo, Waterloo, Canada</i></p>	<p>3D-5 Detection of Lipid in Ex-Vivo Atherosclerotic Rabbit Vessels using a Dual-Frequency Intravascular Imaging Probe for Ultrasound and Frequency Domain Photoacoustic Imaging</p> <p>Robin Castelino^{1,2}, Hyunggyun Lee², F. Stuart Foster^{1,2} <i>¹Medical Biophysics, University of Toronto, Canada, ²Imaging Research, Sunnybrook Research Institute, Canada</i></p>	<p>4D-5 Random Forest Classification and Local Region-Based, Level-Set Segmentation for Quantitative Ultrasound of Human Lymph Nodes</p> <p>Thanh Minh BUI¹, Alain Coron¹, Jonathan Mamou², Emi Saegusa-Becroft³, Junji Machi³, Lori Bridal¹, Ernest Feleppa² <i>¹Sorbonne Universités, UPMC Univ Paris 06, INSERM, CNRS, LIB, Paris, France, ²F. L. Lizzi Center for Biomedical Engineering, Riverside Research, New York, NEW YORK, USA, ³University of Hawaii and Kuakini Medical Center, Honolulu, Hawaii, USA</i></p>	<p>5D-4 Non-contact mass measurement of droplet based on free oscillation under ultrasonic levitation.</p> <p>Sae Ito¹, Ryohei Nakamura¹, Hiroki Tanaka¹, Yosuke Mizuno¹, Marie Tabaru¹, Kentaro Nakamura¹ <i>¹Precision and Intelligence Laboratory, Tokyo Institute of Technology, Yokohama, Japan</i></p>	<p>6D-4 Surface-wave resonance on substrates with copper nanowires</p> <p>Hirotsugu Ogi¹, Shoichi Masuda¹, Akira Nagakubo¹, Masahiko Hirao¹ <i>¹Osaka University, Japan</i></p>	<p>7D-5 Multiphysics Modeling of BAW Filters</p> <p>Andreas Tag¹, Dominik Karolewski², Bernhard Bader³, Maximilian Pitschi³, Robert Weigel¹, Amelie Hagelauer¹ <i>¹Institute for Electronics Engineering, University of Erlangen-Nuremberg, Erlangen, Germany, ²Institut für Mikroelektronik- und Mechatronik-Systeme gemeinnützige GmbH, Germany, ³TDK Corporation, Germany</i></p>	<p>8D-5 Dual frequency IVUS transducer for acoustic radiation force impulse imaging (ARFI)</p> <p>Zhuochen Wang¹, Tomasz Czernuszewicz², Caterina Gallippi², Xiaoning Jiang¹ <i>¹North Carolina State University, USA, ²University of North Carolina, USA</i></p>
<p>9:15 am</p>		<p>2D-6 High-speed imaging of vaporization and recondensation dynamics of ICG-loaded PFP droplets irradiated by a short pulse laser</p> <p>Jaesok Yu^{1,2}, Xucai Chen¹, Flordeliza S. Villanueva¹, Kang Kim^{1,2} <i>¹Center for Ultrasound Molecular Imaging and Therapeutics, University of Pittsburgh School of Medicine and University of Pittsburgh Medical Center, Pittsburgh, PA, USA, ²Department of Bioengineering, University of Pittsburgh School of Engineering, Pittsburgh, PA, USA</i></p>	<p>3D-6 Tri-modal imaging for surgical guidance: preliminary in vivo experiment</p> <p>Jeeun Kang¹, Jin Ho Chang^{1,2}, Brian C. Wilson^{3,4}, Sun Mi Kim⁵, Hak Jong Lee⁵, Tai Kyong Song¹ <i>¹Electronics Engineering, Sogang University, Seoul, Korea, Republic of, ²Sogang Institute of Advanced Technology, Korea, Republic of, ³Princess Margaret Cancer Centre, University Health Network, Canada, ⁴Medical Biophysics, University of Toronto, Canada, ⁵Department of Radiology, Seoul National University of Bundang Hospital, Korea, Republic of</i></p>	<p>4D-6 Automatic detection of ischemic myocardium by spatio-temporal analysis of echocardiographic strain and strain rate curves</p> <p>Mahdi Tabassian^{1,2}, Martino Alessandrini², Lieven Herbots², Oana Mirea², Jan Engvall¹, Luca De Marchi¹, Guido Masetti¹, Jan D'hooge² <i>¹Department of Electrical, Electronic and Information Engineering, University of Bologna, Bologna, Italy, ²Department of Cardiovascular Sciences, Laboratory of Cardiovascular Imaging and Dynamics, KU Leuven, Belgium, ³Department of Medical and Health Sciences, Linköping University, Sweden</i></p>	<p>5D-5 High sensitivity liquid sensor based on slotted phononic crystal</p> <p>Liufeng Geng^{1,2}, Feiyan Cai², Fei Li², Long Meng², Chen Wang², Shuhong Xie¹, Hairong Zheng² <i>¹School of Materials Science and Engineering, Xiangtan University, Xiangtan, Hunan, China, People's Republic of, ²Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, People's Republic of</i></p>	<p>6D-5 THz acoustic spectroscopy by using GaN-based double quantum wells as the acoustic transducer</p> <p>Jun Wei Fan¹, Jinn-Kong Sheu², Kung-Hsuan Lin¹ <i>¹Institute of Physics, Academia Sinica, Taipei, Taiwan, ²Department of Photonics, National Cheng Kung University, Tainan, Taiwan</i></p>	<p>7D-6 SAW Characteristics of AlN/SiO₂/3C-SiC Layered Structure with Embedded Electrodes</p> <p>Qiaozhen Zhang¹, Tao Han¹, Jing Chen¹, Kenya Hashimoto² <i>¹Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai, China, People's Republic of, ²Graduate School of Engineering, Chiba University, Japan</i></p>	<p>8D-6 Design and Fabrication of Intravascular Focused Ultrasound Transducers</p> <p>Junsu Lee¹, Jihun Jang¹, Jin Ho Chang^{1,2} <i>¹Department of Electronic Engineering, Sogang University, Korea, Republic of, ²Interdisciplinary Program of Integrated Biotechnology, Korea, Republic of</i></p>

10:30 am -12:00 pm

Oral --- Friday, October 23, 2015

	Session 1E. <i>Clinical Ultrasound</i>	Session 2E. <i>MEL: Characterizing Vascular disease</i>	Session 3E. <i>MTH: Bubbles and HIFU</i>	Session 4E. <i>MBB: Beamforming III</i>	Session 5E. <i>Signal Processing</i>	Session 6E. <i>General Physical Acoustics & Ultrasonic Motors & Actuators</i>	Session 7E. <i>Emerging Technologies</i>	Session 8E. <i>Front-End and Integrated Electronics</i>
	<i>Chair: Yi-Hong Chou Taipei Veterans General Hospital (Taiwan)</i>	<i>Chair: Chris de Korte Radboud University Medical Center</i>	<i>Chair: Emad Ebbini Univ. of Minnesota</i>	<i>Chair: Jørgen Jensen Technical University of Denmark</i>	<i>Chair: Jafar Saniie Illinois Institute of Technology</i>	<i>Chair: Andreas Mayer HS Offenburg</i>	<i>Chair: Jan Kuypers Qorvo Inc.</i>	<i>Chair: David Cowell University of Leeds</i>
	Plenary Hall	VIP	201BC	201DE	103	201F	201A	102
10:30 am	<p>1E-1 Ultrasound-guided high intensity focused ultrasound: clinical experience</p> <p>Jae Young Lee¹ ¹Radiology, Seoul National University Hospital, Seoul, Korea, Republic of</p>	<p>2E-1 Evaluating Arterial and Plaque Elasticity with Shear Wave Elastography in an ex vivo Porcine Model</p> <p>Erik Widman^{1,2}, Elira Maksuti¹, Carolina Amador Carrascal³, Matthew W. Urban³, Matilda Larsson¹ ¹KTH Royal Institute of Technology, Stockholm, Sweden, ²Department of Molecular Medicine and Surgery, Karolinska Institutet, Stockholm, Sweden, ³Department of Physiology and Biomedical Engineering, Mayo Clinic College of Medicine, Rochester, MN, USA</p>	<p>3E-1 Large diameter microbubbles produced by a catheter-based microfluidic device for sonothrombolysis applications</p> <p>Adam Dixon¹, Brian Shin¹, Vamsi Meka¹, Joseph Kilroy¹, Alexander Klibanov¹, John Hossack¹ ¹Biomedical Engineering, University of Virginia, Charlottesville, VA, USA</p>	<p>4E-1 An automatic method for determining the anatomical relevant space for fast volumetric cardiac imaging</p> <p>Alejandra Ortega¹, Brecht Heyde¹, João Pedrosa¹, Ling Tong², Jan D'hooge¹ ¹Department of Cardiovascular Sciences, KU Leuven, Leuven, Belgium, ²Department of Biomedical Engineering, Tsinghua University, Beijing, China, People's Republic of</p>	<p>5E-1 Sparse Inversion SVD for Multichannel Ultrasonic Guided Waves Analysis in Cortical Bone</p> <p>Kailiang Xu^{1,2}, Jean-Gabriel Minonzio², Dean Ta¹, Bo Hu¹, Weiqi Wang¹, Pascal Laugier¹ ¹Department of Electronic Engineering, Fudan University, Shanghai, China, People's Republic of, ²Laboratoire d'Imagerie Biomedicine, UMR CNRS 7371 - INSERM U1146 - UPMC, Paris, France</p>	<p>6E-1 Four ways to justify temporal memory operators in the lossy wave equation</p> <p>Sverre Holm¹ ¹Informatics, University of Oslo, Oslo, Norway</p>	<p>7E-1 Heterogeneous integration technology using wafer-to-wafer transfer</p> <p>Shuji Tanaka¹ ¹Department of Bioengineering and Robotics, Tohoku University, Sendai, Japan</p>	<p>8E-1 Development of a Hybrid Custom / Commercial Multi-Channel, High-Frequency Transmit Pulser and Beamformer System</p> <p>Holly Lay¹, Romans Poltarjonoks¹, Florence Nduim¹, David Lines², Geoffrey Lockwood³, Sandy Cochran¹ ¹University of Dundee, Dundee, United Kingdom, ²Diagnostic Sonar Ltd, Livingston, United Kingdom, ³Queen's University (deceased), Kingston, Canada</p>
10:45 am		<p>2E-2 2D versus 3D cross-correlation-based radial and circumferential strain imaging in a 3D atherosclerotic carotid artery model using ultrafast plane wave ultrasound</p> <p>Stein Fekkes¹, Abigail E.S. Swillens², Hendrik H.G. Hansen¹, Anne E.C.M. Saris¹, Maartje M. Nillesen¹, Francesco Iannaccone², Patrick Segers², Chris L. de Korte¹ ¹Medical UltraSound Imaging Center (MUSIC), Department of Radiology and Nuclear Medicine, Radboud university medical center, Nijmegen, Netherlands, ²Department of Electronics and Information Systems, Ghent University, Belgium</p>	<p>3E-2 High Pulse Reputation Frequency Crushing Model Renal Calculi Using Cavitation Bubbles Induced by Dual-Frequency Ultrasound Pulses</p> <p>Masamizu Osuga¹, Jun Yasuda¹, Hayato Jinbo¹, Shin Yoshizawa¹, Shin-ichiro Umemura¹ ¹Tohoku University, Japan</p>	<p>4E-2 Coded Excitation Reconstruction by Impulse Response Estimation and Retrospective Acquisition: Application to B-mode Imaging</p> <p>John Flynn¹, Lauren Pflugrath¹, Peter Kaczkowski¹, Ron Daigle¹ ¹Verasonics, Inc, Kirkland, WA, USA</p>	<p>5E-2 Ultrasonic Flow Detection using Support Vector Machine Classification</p> <p>Kushal Virupakshappa¹, Erdal Oruklu¹ ¹ECE Department, Illinois Institute of Technology, Chicago, Illinois, USA</p>	<p>6E-2 LONGITUDINAL SHEAR WAVE AND TRANSVERSE COMPRESSIONAL WAVE IN ELASTIC SOLIDS</p> <p>Stefan Catheline¹, Nicolas Benech², Ali Zorgani³ ¹INSERM, University of Lyon, Lyon, France, ²Physics institute, University of Montevideo, Montevideo, Uruguay, ³University of Lyon, France</p>		<p>8E-2 A Mixed-Signal Multiplexing System for Cable-Count Reduction in Ultrasound Probes</p> <p>Qilong Liu¹, Chao Chen¹, Zu-yao Chang¹, Christian Prins², Michiel A. P. Pertjjs¹ ¹Electronic Instrumentation Laboratory, Delft University of Technology, Delft, Netherlands, ²Oldelft Ultrasound, Delft, Netherlands</p>

<p>11:00 am</p>	<p>1E-2 Clinical Application of Liver Elastography</p> <p>Yi-Hong Chou¹, Hsin-Kai Wang¹ ¹Taipei Veterans General Hospital, Taiwan</p>	<p>2E-3 A novel intravascular ultrasound (IVUS) elastography based on high resolution acoustic radiation force impulse (ARFI) imaging for assessing the elastic properties of atherosclerosis</p> <p>Cho-Chiang Shih¹, Pei-Yu Chen¹, Lei Sun², Chih-Chung Huang¹ ¹Department of biomedical engineering, National Cheng Kung University, Taiwan, ²Interdisciplinary division of biomedical engineering, The Hong Kong Polytechnic University, Hong Kong</p>	<p>3E-3 The accumulation and behaviour of ultrasound stimulated bubbles on a compliant surface: implications for sonothrombolysis</p> <p>Ben Leung¹, Christopher Acconcia^{1,2}, Kullervo Hynynen^{1,2}, David Goertz^{1,2} ¹Physical Sciences Platform, Sunnybrook Research Institute, Toronto, Ontario, Canada, ²Medical Biophysics, University of Toronto, Canada</p>	<p>4E-3 Image quality degradation from transmit delay profile quantization</p> <p>Matthias Bo Stuart¹, Jørgen Arendt Jensen¹ ¹CFU - Technical University of Denmark, Kgs. Lyngby, Denmark</p>	<p>5E-3 Simultaneous Multi-Mode Analysis of Surface Acoustic Wave Device Temperature Stability using Time-Frequency Methods</p> <p>Christopher J. Harrison¹, Samuel J. Ippolito^{1,2}, K. M. Mohibul Kabir², Glenn I. Matthews¹ ¹School of Electrical and Computer Engineering (SECE), RMIT University, Melbourne, Victoria, Australia, ²Centre for Advanced Materials and Industrial Chemistry (CAMIC), School of Applied Sciences, RMIT University, Melbourne, Victoria, Australia</p>	<p>6E-3 Ultrasound bonding characterization of a bi-layer metal/epoxy with different chemical and mechanical interface treatments.</p> <p>Camille GAUTHIER¹, Damien LEDUC¹, Jocelyne Galy², Mounif ECHCHERIF ELKETTANI¹, Jean-Louis IZBICKI¹ ¹LOMC CNRS 6294, University of Le Havre, Le Havre, France, ²IMP CNRS 5223, INSA of Lyon, France</p>	<p>7E-2 Transverse modes in STW resonators on quartz</p> <p>Victor Plessky¹, Ventsislav Yantchev², Weibiao Wang³, Michael Yang⁴, Bob Hsiao⁴ ¹GVR Trade SA, Switzerland, ²Uppsala University, Sweden, ³Nanjing Electronic Devices Institute, China, People's Republic of, ⁴Tai-SAW Technology Ltd., Taiwan</p>	<p>8E-3 A Single-Cable PVDF Transducer Readout IC for Intravascular Photoacoustic Imaging</p> <p>Chao Chen¹, Verya Daechin², Qing Ding¹, Gijs van Soest², Geert Springeling², Ton van der Steen³, Michiel Pertijs¹, Nico de Jong^{2,3} ¹Electronic Instrumentation Lab, Delft University of Technology, Delft, Netherlands, ²Dept. of Biomedical Engineering, Erasmus MC, Rotterdam, Netherlands, ³Lab of Acoustical Wavefield Imaging, Delft University of Technology, Delft, Netherlands</p>
<p>11:15 am</p>	<p>2E-4 A 1D model-based inverse problem for recovery of spatially varying vessel stiffness for Pulse Wave Imaging</p> <p>Matthew McGarry¹, Ronny Li¹, Iason Apostolakis¹, Elisa Konofagou^{1,2} ¹Biomedical Engineering, Columbia University, New York, New York, USA, ²Radiology, Columbia University, New York, NY, USA</p>	<p>2E-4 A 1D model-based inverse problem for recovery of spatially varying vessel stiffness for Pulse Wave Imaging</p> <p>Matthew McGarry¹, Ronny Li¹, Iason Apostolakis¹, Elisa Konofagou^{1,2} ¹Biomedical Engineering, Columbia University, New York, New York, USA, ²Radiology, Columbia University, New York, NY, USA</p>	<p>3E-4 A Theoretical Model for Acoustic Microstreaming Generated by Two Interacting Contrast Microbubbles</p> <p>Alexander Doinikov¹, Ayache Bouakaz¹ ¹Inserm U930, Université François-Rabelais, Tours, France</p>	<p>4E-4 Enhancement of specular reflection using Directional Spatial Coherence with 2D Phased Array</p> <p>Raja Sekhar Bandaru^{1,2}, Anders Sornes¹, Margot Pasternak^{1,2}, Eigil Samset^{1,3}, Jan D'hooge² ¹GE Vingmed Ultrasound, Oslo, Norway, ²Cardiovascular Imaging and Dynamics, KU Leuven, Leuven, Belgium, ³Department of Informatics, University of Oslo, Oslo, Norway</p>	<p>5E-4 A clustering-based damage segmentation for ultrasonic C-Scans of CFRP plates</p> <p>Antonio Rodriguez^{1,2}, Angel M. Gomez², Nicolas Bochud³, Juan M. Soto², Antonio M. Peinado² ¹Depto. de Teoría de la Señal y Comunicaciones, Universidad Carlos III de Madrid, Leganés, Madrid, Spain, ²Depto. de Teoría de la Señal, Telemática y Comunicaciones and CITIC-UGR, Universidad de Granada, Granada, Spain, ³Depto. de Mecánica de Estructuras e Ingeniería Hidráulica, Universidad de Granada, Granada, Spain</p>	<p>6E-4 Study on Micro Ultrasonic Motor using a Preload Mechanism</p> <p>Tomoaki Mashimo¹ ¹Toyohashi University of Technology, Japan</p>	<p>7E-3 Characterization of Thin ScAlN Film based Natural Single-Phase Unidirectional SAW Transducers using Sagnac Interferometer</p> <p>Abhay Kochhar¹, Yasuo Yamamoto², Akihiko Teshigahara², Ken-ya Hashimoto³, Shuji Tanaka¹, Masayoshi Esashi¹ ¹Tohoku University, Japan, ²DENSO CORPORATION, Japan, ³Chiba University, Japan</p>	<p>8E-4 A Row-Column Addressed CMUT Probe with Integrated Electronics for Volumetric Imaging</p> <p>Thomas Lehrmann Christiansen¹, Mathias Engholm¹, Christopher Beers², Michael Berkheimer², Lars Nordahl Moesner³, Jan Peter Bagge³, Matthias Bo Stuart⁴, Anders Lei¹, Søren Elmin Diederichsen¹, Jørgen Arendt Jensen¹, Erik Vilain Thomsen¹ ¹Department of Micro- and Nanotechnology, Technical University of Denmark, Kgs. Lyngby, Denmark, ²Sound Technology, State College, PA, USA, ³BK Medical, Herlev, Denmark, ⁴Center for Fast Ultrasound Imaging, Department of Electrical Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark</p>

10:30 am -12:00 pm

Oral --- Friday, October 23, 2015

<p>11:30 am</p>	<p>1E-3 Ultrasound Fusion Imaging of Liver Tumor: Recent Progress and Clinical Relevance</p> <p>Masatoshi Kudo¹ <i>¹Department of Gastroenterology and Hepatology, Kinki University School of Medicine</i></p>	<p>2E-5 Mechanical Characterization of Abdominal Aortic Aneurysms using 4D Ultrasound</p> <p>E.M.J. van Disseldorp^{1,2}, N.J. Petterson¹, F.N. van de Vosse¹, M.R. van Sambeek², R.G.P. Lopata¹ <i>¹Cardiovascular Biomechanics Group, Department of Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands, ²Department of Vascular Surgery, Catharina Hospital Eindhoven, Netherlands</i></p>	<p>3E-5 High Intensity Focused Ultrasound applied to the placental unit: First results of an in vivo study in monkeys</p> <p>David Melodelima¹, Jonathan Caloone^{1,2}, Anthony Kocot¹, Jeremy Vincenot¹, Cyril Huissoud² <i>¹LabTAU - U1032, INSERM, France, ²Hopital de la Croix Rousse, France</i></p>	<p>4E-5 2D Wire Orientation using Directional Spatial Coherence with 2D Phased Array</p> <p>Raja Sekhar Bandaru^{1,2}, Anders Sornes¹, Eigil Samsset^{1,3}, Jan D'hooge² <i>¹GE Vingmed Ultrasound, Oslo, Norway, ²Cardiovascular Imaging and Dynamics, KU Leuven, Leuven, Belgium, ³Department of Informatics, University of Oslo, Oslo, Norway</i></p>	<p>5E-5 A new methodology to reduce the activation sequence in SAFT techniques</p> <p>Javier Villazon-Terrazas¹, David Romero-Laorden¹, Alberto Ibañez¹, Oscar Martinez-Graullera¹, Montserrat Parrilla¹ <i>¹Instituto de Tecnologías Físicas y de la Información Leonardo Torres Quevedo, Consejo Superior de Investigaciones Científicas, Madrid, Spain</i></p>	<p>6E-5 Small Size Pneumatic Valve for Smooth Flow Control using PZT vibrator</p> <p>Daisuke HIROOKA¹, Tomomi YAMAGUCHI¹, Naomichi FURUSHIRO¹, Koichi SUZUMORI², Takefumi KANDA³ <i>¹Kansai University, Japan, ²Tokyo Institute of Technology, Japan, ³Okayama University, Japan</i></p>	<p>7E-4 Evaluation of Acoustic Properties of CaTiO₃-(K,Na)NbO₃ Film Using Microfabricated Structure</p> <p>Ryosuke Kaneko¹, Michio Kadota¹, Yuji Ohashi², Jun-ichi Kushibiki¹, Shinsuke Ikeuchi³, Shuji Tanaka¹ <i>¹Graduate school, Tohoku University, Sendai, Miyagi, Japan, ²Institute for Material Research, Tohoku University, Sendai, Miyagi, Japan, ³Devices Development, Murata Manufacturing Co., Ltd., Nagaokakyo, Kyoto, Japan</i></p>	<p>8E-5 Front end circuit simulation for CMUT systems based on an accurate nonlinear CMUT array model</p> <p>Jaemyung Lim¹, Gwangrok Jung¹, Evren Fatih Arkan², F. Levent Degertekin², Maysam Ghovanloo¹ <i>¹School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA, ²G.W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA</i></p>
<p>11:45 am</p>	<p>2E-6 Detection of Coronary Artery Disease with Myocardial Elastography with validation against myocardial perfusion imaging and coronary angiography</p> <p>Julien Grondin¹, Marc Waase², Vincent Sayseng¹, Elisa E Konofagou^{1,3} <i>¹Department of Biomedical Engineering, Columbia University, New York, NY, USA, ²Department of Medicine, Columbia University, New York, NY, USA, ³Department of Radiology, Columbia University, New York, NY, USA</i></p>	<p>3E-6 3D focusing of high intensity ultrasound pulses using a time reversal cavity</p> <p>Justine Robin¹, Bastien Arnal¹, Mathias Fink¹, Mickael Tanter¹, Mathieu Pernot¹ <i>¹Institut Langevin, France</i></p>	<p>4E-6 Frequency Domain Beamforming for Coherent Plane-Wave Compounding</p> <p>Tanya Chernyakova¹, Regev Cohen¹, Yael Sde-Chen¹, Christophe Fraschini², Jeremy Bercoff², Yonina Eldar¹ <i>¹EE, The Technion, IIT, Haifa, Israel, ²SuperSonic Imagine, France</i></p>	<p>5E-6 On the Use of Parametric Models for Cancelling Reverberations in Imaging of Thin Materials</p> <p>Miguel Castaño Arranz¹, Johan E. Carlson¹, Biao Jiang¹, Philip Lindblad¹ <i>¹Div. of Signals and Systems, Department of Computer Science, Electrical and Space Engineering, Luleå University of Technology, Luleå, Sweden</i></p>	<p>6E-6 Low flow rate spraying using a torsional ultrasonic transducer</p> <p>Shunsuke Tsuyuki¹, Takefumi Kanda¹, Koichi Suzumori², Shin-ichiro Kawasaki³, Shoki Ofuji¹ <i>¹Okayama University, Okayama, Japan, ²Tokyo Institute of Technology, Tokyo, Japan, ³National Institute of Advanced Industrial Science and Technology, Miyagi, Japan</i></p>	<p>7E-5 Dry Deagglomeration and Alignment of Carbon Nanotubes using the Acoustic and Electric Fields of SAW</p> <p>Morteza Miansarigavzan^{1,2}, James Friend² <i>¹Mechanical and Aerospace Engineering, Monash University, Clayton, VIC, Australia, ²Center for Medical Devices, Dept of Mech and Aero Engineering, University of California, San Diego, La Jolla, CA, USA</i></p>	<p>8E-6 Development of High-Sensitive and Wideband FET-Based Ultrasound Receiver Directly Driven by Piezoelectric Effect</p> <p>Hiroki Makino¹, Jing Zhu¹, Tsuyoshi Okubo^{1,2}, Yhisin Ho¹, Norio Tagawa¹, Ming Yang¹ <i>¹Graduate School of System Design, Tokyo Metropolitan University, Tokyo, Japan, ²Konica Minolta, Inc., Japan</i></p>	

1:00 pm -2:30 pm

Oral --- Friday, October 23, 2015

		Session 2F. <i>Ultrasonics in Biometrics</i>	Session 3F. <i>MEL: Mechanical Characterization of the Heart</i>	Session 4F. <i>MSP: Compressive Sensing and Image Reconstruction</i>	Session 5F. <i>Industrial Applications</i>	Session 1F. <i>MSD: Novel Imaging Systems</i>	Session 8F. <i>Applications of CMUTs</i>
		<i>Chair: Manfred Wehnacht Leibniz Institute for Solid State and Materials Research</i>	<i>Chair: Elisa Konofagou Columbia University</i>	<i>Chair: Svetoslav Nikolov BK Medical</i>	<i>Chair: Kentaro Nakamura Tokyo Institute of Technology</i>	<i>Chair: Piero Tortoli Università di Firenze</i>	<i>Chair: Omer Oralkan North Carolina State University</i>
		VIP	201ABC	201DE	103	201F	102
1:00 pm	2F-1 Acoustic-property maps of cornea for improved high-frequency ultrasound corneal biometric accuracy Daniel Rohrbach ¹ , Harriet O. Lloyd ² , Ronald H. Silverman ² , Raksha Urs ² , Jonathan Mamou ¹ ¹ Lizzi Center for Biomedical Engineering, Riverside Research, New York, NY, USA, ² Department of Ophthalmology, Columbia University Medical Center, New York, New York, USA	3F-1 Semi-3D strain imaging in normal and LVAD supported ex vivo beating hearts N.J. Petterson ¹ , K.A.M.A. Pennings ¹ , S. van Tuijl ² , M.C.M. Rutten ¹ , F.N. van de Vosse ¹ , R.G.P. Lopata ¹ ¹ Biomedical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands, ² LifeTec Group, Eindhoven, Netherlands	4F-1 Joint compressive sampling and deconvolution in ultrasound medical imaging Zhouye Chen ¹ , Adrian Basarab ¹ , Denis Kouamé ¹ ¹ IRIT, UMR CNRS 5505, University of Toulouse, France	5F-1 Blind Component Separation Analysis for Highly Corrupted Ultrasonic Signals in Real-Time Spot Weld Inspection Aryaz Baradarani ¹ , Andriy M. Chertov ¹ , Waldo Perez Regalado ¹ , Roman Maev ¹ ¹ Institute for Diagnostic Imaging Research, University of Windsor, Windsor, Canada	1F-1 A Live Color Encoded Speckle Imaging Platform: Towards Bedside Visualization of Complex Flow Patterns Alfred C. H. Yu ¹ , Billy Y. S. Yiu ¹ , Marcin Lewandowski ² , Mateusz Walczak ² , Damien Garcia ³ ¹ Medical Engineering Program, University of Hong Kong, Pokfulam, Hong Kong, ² Department of Ultrasound, Polish Academy of Sciences Institute of Fundamental Technological Research, Warsaw, Poland, ³ Department of Radiology, University of Montreal, Montreal, Canada	8F-1 Reliability measurements of CMUT arrays of a semiconductor manufacturer Christophe Antoine ¹ , Erik Tarvin ¹ , Sushil Bharatan ¹ , Urvi Shah ¹ , Rob O'Reilly ¹ , Michael Judy ¹ ¹ Analog Devices Inc., Wilmington, MA, USA	
1:15 pm	2F-2 Theory and Experimental Analysis of Scratch Resistant Coating for Ultrasonic Fingerprint Sensors Stephanie Fung ¹ , Yipeng Lu ¹ , Hao-Yen Tang ² , Julius M. Tsai ³ , Michael Daneman ³ , Bernhard E. Boser ² , David A. Horsley ¹ ¹ Department of Mechanical and Aerospace Engineering, University of California, Davis, CA, USA, ² Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA, USA, ³ Invensense, San Jose, CA, USA	3F-2 Myocardial passive shear wave detection Hendrik Vos ^{1,2} , Bas van Dalen ³ , Johannes Bosch ¹ , Antonius van der Steen ^{1,2} , Nico de Jong ^{1,2} ¹ Biomedical Engineering, Erasmus MC, Rotterdam, Netherlands, ² Acoustical Wavefield imaging, Delft university of Technology, Netherlands, ³ Cardiology, Erasmus MC, Rotterdam, Netherlands	4F-2 Compressed sensing reconstruction of line-wise sub-sampled 3D echographic images based on dictionary learning: an experimental study Oana Lorintiu ¹ , Hervé Liebgott ¹ , Adeline Berndard ¹ , Olivier Bernard ¹ , Denis Friboulet ¹ ¹ Université de Lyon, CREATIS ; CNRS UMR5220 ; Inserm U1044 ; INSA-Lyon ; Université Lyon 1, Lyon, France	5F-2 Ultrasonic Welding Using a Long and Thin Complex Transverse Vibration Welding Tip with Vibration Detector and Static Pressure Controller Jiromaru Tsujino ^{1,2} , Eiichi Sugimoto ³ ¹ Kanagawa University, Yokohama, Japan, ² R & D Center, Asahi EMS Co. Ltd, Yokohama, Kanagawa, Japan, ³ Asahi EMS Co. Ltd, Tokyo, Japan	1F-2 ULA-OP 256: a portable high-performance research scanner Enrico Boni ¹ , Luca Bassi ¹ , Alessandro Dallai ¹ , Gabriele Giannini ¹ , Francesco Guidi ¹ , Valentino Meacci ¹ , Riccardo Matera ¹ , Alessandro Ramalli ¹ , Monica Scaringella ¹ , Jacopo Viti ¹ , Stefano Ricci ¹ , Piero Tortoli ¹ ¹ Dipartimento di Ingegneria dell'Informazione, Università degli studi di Firenze, Firenze, Italy		

<p>1:30 pm</p>	<p>F2-3 Ultrasonics and Biometrics: 130 years past Galton</p> <p>James Wayman¹ ¹San José State University, San José, Ca, USA</p>	<p>3F-3 A Systematic Investigation of Feasible Acoustic Windows and the Impact of Myocardial Anisotropy for In Vivo Human Cardiac Shear Wave Elastography</p> <p>Pengfei Song¹, Xiaojun Bi^{2,3}, Daniel C. Mellema¹, Armando Manduca¹, Matthew W. Urban¹, James F. Greenleaf¹, Shigao Chen¹ ¹Dept. of Physiology and Biomedical Engineering, Mayo Clinic College of Medicine, Rochester, Minnesota, USA, ²Dept. of Cardiovascular Diseases, Mayo Clinic College of Medicine, Rochester, Minnesota, USA, ³Department of Medical Ultrasound, Tongji Hospital Medical College, Wuhan, Hubei, People's Republic of China</p>	<p>4F-3 Compressed Sensing for Beamformed Ultrasound Computed Tomography</p> <p>Ruud van Sloun¹, Ashish Pandharipande², Massimo Misch¹, Libertario Demi¹ ¹Electrical Engineering, Eindhoven University of Technology, Eindhoven, Netherlands, ²Philips Research, Eindhoven, Netherlands</p>	<p>5F-3 Novel real-time diagnostic of injection molding process at nozzle by high-temperature ultrasonic transducer</p> <p>Che-Hue Yang¹, Chin-Chi Cheng², Makiko Kobayashi³, Yi Lin Wu¹ ¹Graduate Institute of Mechanical and Electrical Engineering, National Taipei University of Technology, Taiwan, ²Dept. of Energy and Refrigerating Air-Conditioning Engineering, National Taipei University of Technology, Taipei, Taiwan, ³Dept. of Computer Science and Electrical Engineering, Kumamoto University, Japan</p>	<p>1F-3 Implementation of real-time duplex synthetic aperture ultrasonography</p> <p>Martin Christian Hemmsen¹, Thomas Kjeldsen¹, Lee Lassen², Jesper Mosegaard², Jørgen Arendt Jensen¹ ¹Electrical Engineering, Technical University of Denmark, Lyngby, Denmark, ²Computer Graphics Lab, Alexandra Institute, Aarhus, Denmark</p>	<p>8F-2 Dual-Mode Integrated Circuit for Imaging and HIFU With 2-D CMUT Arrays</p> <p>Ji Hoon Jang¹, Anshuman Bhuyan¹, Hyo-Seon Yoon¹, Jung Woo Choe¹, Amin Nikoozadeh¹, Douglas Stephens², Butrus Khuri-Yakub¹ ¹Electrical Engineering, Stanford University, Stanford, California, USA, ²Biomedical Engineering, University of California, Davis, Davis, California, USA</p>
<p>1:45 pm</p>	<p>3F-4 Investigation of the effects of myocardial anisotropy for shear wave elastography at different frequencies using acoustic radiation force and harmonic vibration</p> <p>Matthew Urban¹, Bo Qiang¹, Pengfei Song¹, Ivan Nenadic¹, Shigao Chen¹, James Greenleaf¹ ¹Physiology and Biomedical Engineering, Mayo Clinic College of Medicine, Rochester, Minnesota, USA</p>	<p>3F-4 Investigation of the effects of myocardial anisotropy for shear wave elastography at different frequencies using acoustic radiation force and harmonic vibration</p> <p>Matthew Urban¹, Bo Qiang¹, Pengfei Song¹, Ivan Nenadic¹, Shigao Chen¹, James Greenleaf¹ ¹Physiology and Biomedical Engineering, Mayo Clinic College of Medicine, Rochester, Minnesota, USA</p>	<p>4F-4 Extension of FM-Chirp Super Resolution Imaging for Ultrasound Synthetic Aperture System</p> <p>Takayuki Wada¹, Yihsin Ho¹, Norio Tagawa¹, Kan Okubo¹ ¹Graduate School of System Design, Tokyo Metropolitan University, Tokyo, Japan</p>	<p>5F-4 High temperature performance of PbTiO₃/PZT ultrasonic transducer above 400°C</p> <p>Taiga Kibe¹, Tsukasa Kaneko¹, Makiko Kobayashi¹ ¹Kumamoto University, Japan</p>	<p>1F-4 A New Wireless Hand-held Ultrasound System with Smartphone, Tablet for Mobile Healthcare</p> <p>Dong-Ki Ahn¹, Suyeol Lee¹, Sung-Hyun Kim¹, Jeongwon Ryu^{1,2} ¹Advanced Medical Technology Laboratory, Healcerion Co., Ltd., Seoul, Korea, Republic of, ²Clinical Neuroscience & Development Lab, Korea Advanced Institute of Science and Technology, Daejeon, Korea, Republic of</p>	<p>8F-3 A dual-mode CMUT array optimized for tissue harmonic imaging</p> <p>Søren Elmin Diederichsen¹, Mathias Johannes Grøndahl Mølgaard¹, Anders Lei¹, Matthias Bo Stuart², Jørgen Arendt Jensen², Erik Vilain Thomsen¹ ¹Dept. of Micro- and Nanotechnology, Technical University of Denmark, Denmark, ²Center for Fast Ultrasound Imaging, Dept. of Electrical Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark</p>
<p>2:00 pm</p>	<p>3F-5 Repeatability of Systolic-to-Diastolic Displacement Ratios in Transthoracic Cardiac ARFI Imaging</p> <p>Vaibhav Kakkad¹, Lily Kuo¹, David Bradway¹, Joseph Sivak², Joseph Kisslo², Gregg Trahey¹ ¹Biomedical Engineering, Duke University, Durham, North Carolina, USA, ²Cardiology, Duke University Hospital, Durham, North Carolina, USA</p>	<p>3F-5 Repeatability of Systolic-to-Diastolic Displacement Ratios in Transthoracic Cardiac ARFI Imaging</p> <p>Vaibhav Kakkad¹, Lily Kuo¹, David Bradway¹, Joseph Sivak², Joseph Kisslo², Gregg Trahey¹ ¹Biomedical Engineering, Duke University, Durham, North Carolina, USA, ²Cardiology, Duke University Hospital, Durham, North Carolina, USA</p>	<p>4F-5 Spatiotemporal clutter filtering of Ultrafast ultrasound data highly increases Doppler and fUltrasound sensitivity</p> <p>Charlie Demené¹, Thomas Deffieux¹, Mathieu Pernot¹, Olivier Baud², Mickael Tanter¹ ¹Institut Langevin, ESPCI ParisTech, CNRS UMR7587, Inserm U979, Paris, France, ²INSERM U1141 and Neonatal Intensive Care Unit, Paris Diderot University, Children's hospital Robert, Paris, France</p>	<p>5F-5 Non-contact Measurement of Elastic Property of Fruits by using Parabolic-Reflector Airborne Ultrasonic Transducer</p> <p>Marie Tabaru¹, Kentaro Nakamura¹ ¹Precision and Intelligence Laboratory, Tokyo Institute of Technology, Yokohama, Kanagawa, Japan</p>	<p>1F-5 Fast ultrasound signal and image processing on a tablet device</p> <p>Gabriel Kiss¹, Naiad Hossain Khan¹, Eva Tegnander^{2,3}, Sturla H. Eik-Nes^{2,3}, Hans Torp¹ ¹Department of Circulation and Medical Imaging and MI Lab, Norwegian University of Science and Technology, Trondheim, Norway, ²National Center for Fetal Medicine, St. Olavs Hospital, Norway, ³Department of Laboratory Medicine, Children's and Women's Health, Norwegian University of Science and Technology, Trondheim, Norway</p>	<p>8F-4 A High-Frequency (~30-MHz), Broadband (FBW>100%) 1-D Linear CMUT Array Fabricated by Anodic Bonding</p> <p>Xiao Zhang¹, F. Yalcin Yamaner², Omer Oralkan¹ ¹Department of Electrical and Computer Engineering, NCSU, Raleigh, North Carolina, USA, ²Department of Electrical and Electronics Engineering, Istanbul Medipol University, Istanbul, Turkey</p>
<p>2:15 pm</p>	<p>3F-6 SNRe Improvements in Two-Dimensional Cardiac Strain Estimation using Coherent Compounding <i>in silico</i> and <i>in vivo</i></p> <p>Ethan Bunting¹, Julien Grondin¹, Clement Papadacci¹, Elisa Konofagou^{1,2} ¹Department of Biomedical Engineering, Columbia University, New York, New York, USA, ²Department of Radiology, Columbia University, New York, New York, USA</p>	<p>3F-6 SNRe Improvements in Two-Dimensional Cardiac Strain Estimation using Coherent Compounding <i>in silico</i> and <i>in vivo</i></p> <p>Ethan Bunting¹, Julien Grondin¹, Clement Papadacci¹, Elisa Konofagou^{1,2} ¹Department of Biomedical Engineering, Columbia University, New York, New York, USA, ²Department of Radiology, Columbia University, New York, New York, USA</p>	<p>4F-6 Contrast-Enhanced Ultrasound Imaging with Chirps: Signal Processing and Pulse Compression</p> <p>Sevan Harput¹, James McLaughlan¹, David Cowell¹, Steven Freear¹ ¹School of Electronic and Electrical Engineering, University of Leeds, Leeds, United Kingdom</p>	<p>5F-6 Development of a real-time acoustic backscatter system for solids concentration measurement during nuclear waste cleanup</p> <p>David Cowell¹, Hugh Rice², Tim Hunter², Derrick Njoubenwu², Jeff Peakall³, Michael Fairweather², Geoff Randall⁴, Steven Freear¹ ¹School of Electronic and Electrical Engineering, University of Leeds, Leeds, United Kingdom, ²School of Chemical and Process Engineering, University of Leeds, Leeds, United Kingdom, ³School of Earth and Environment, University of Leeds, Leeds, United Kingdom, ⁴Sellafield Ltd, United Kingdom</p>	<p>1F-6 Miniature Single-Supply Ultrasonic Imager for Personal Fitness Tracking</p> <p>Hao-Yen Tang¹, Dongjin Seo¹, Michel M. Maharbiz², Bernhard E. Boser¹ ¹EECS, UC Berkeley, Berkeley, CA, USA</p>	<p>8F-5 Capsule Ultrasound (CUS) Device</p> <p>Farah Memon¹, Gerard Touma¹, Amin Nikoozadeh¹, Jung Woo Choe¹, Amin Arbabian¹, Eric W. Olcott^{2,3}, R. Brooke Jeffrey², Butrus (Pierre) T. Khuri-Yakub¹ ¹Stanford University, Stanford, California, USA, ²Stanford University School of Medicine, Stanford, California, USA, ³Palo Alto Veterans Affairs Health Care System, Palo Alto, California, USA</p>

3:30 pm -5:00 pm

Oral --- Friday, October 23, 2015

	Session 2G. MBB: Beamforming IV <i>Chair: Jan D'hooge</i> <i>Catholic University of Leuven</i>	Session 3G. MEL: New Applications of Elasticity Imaging <i>Chair: Caterina Gallippi</i> <i>UNC Chapel Hill and NCSU</i>	Session 4G. MIM: Medical Imaging I <i>Chair: John Hossack</i> <i>Univ. of Virginia</i>	Session 1G. MTC: High Frequency Tissue Characterization <i>Chair: Michael Oelze</i> <i>Univ. of Illinois</i>	Session 6G. Physics of Thin-Film Resonators <i>Chair: Vincent Laude</i> <i>FEMTO-ST / CNRS</i>	Session 8G. Transducers for Therapy <i>Chair: Anne-Christine HLADKY</i> <i>IEMN</i>
	VIP	201ABC	201DE	103	201F	102
3:30 pm	2G-1 Nonlinear beamforming of aperture domain signals Brett Byram¹ <i>¹Biomedical Engineering, Vanderbilt University, TN, USA</i>	3G-1 Ultrasound Strain Relaxation Time Ratio: A Quantitative Marker for Assessment of Cortical Inflammation/edema in Renal Allografts Jing Gao¹, Robert Min¹, Keith Hentel¹, Jonathan Rubin² <i>¹Radiology, Weill Cornell Medical College, New York, New York, USA, ²Radiology, University of Michigan, Ann Arbor, Michigan, USA</i>	4G-1 Evaluation of directional reflectivity characteristics as new modality for 3D Ultrasound Computer Tomography Ernst Kretzek¹, Patrick Hucker¹, Nicole Ruiter¹ <i>¹Karlsruhe Institute of Technology (KIT), Institute for Data Processing and Electronics (IPE), Eggenstein-Leopoldshafen, Germany</i>	1G-1 Fine resolution elastic property maps of myopic sclera by means of acoustic microscopy Daniel Rohrbach¹, Quan Wen², Quan Hoang², Sally McFadden³, Ronald H. Silverman², Jonathan Mamou¹ <i>¹Lizvi Center for Biomedical Engineering, Riverside Research, USA, ²Department of Ophthalmology, Columbia University Medical Center, USA, ³Vision Sciences Group, Faculty of Science and IT, School of Psychology, University of Newcastle, NSW, Australia</i>	6G-1 Finite element analysis of BAW devices: principles and perspectives Robert Thalhammer¹, John Larson² <i>¹Avago Technologies, Munich, Germany, ²Avago Technologies, San Jose, CA, USA</i>	8G-1 Capsule-based Ultrasound-mediated Targeted Gastrointestinal Drug Delivery Fraser Stewart¹, Antonella Verbeni², Yongqiang Qiu¹, Benjamin Cox¹, Jan Vorstius³, Sandy Cochran¹ <i>¹Institute for Medical Science and Technology, University of Dundee, United Kingdom, ²The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy, ³School of Engineering, Mathematics and Physics, University of Dundee, United Kingdom</i>
3:45 pm		3G-2 Ex vivo measurement of shear wave speed dispersion in placenta using Transient Elastography. Samuel CALLE¹, Emmanuel SIMON^{1,2}, Marie-Coline DUMOUX¹, Emmanuel NICOLAS¹, Franck PERROTIN^{1,2}, Jean-Pierre REMENIERAS¹ <i>¹INSERM U930 - F. Rabelais University, TOURS, France, ²Department of obstetrics, gynecology and fetal medicine, University Hospital Center of Tours, TOURS, France</i>	4G-2 Quantitative imaging of speed of sound in echo ultrasonography Michael Jaeger¹, Martin Frenz¹ <i>¹University of Bern, Switzerland</i>	1G-2 Ultrasonic Characterization of Extra-Cellular Matrix in Decellularized Murine Kidney and Liver Lauren A. Wirtzfeld¹, Elizabeth S. L. Bernd¹, Michael C. Kolios¹ <i>¹Ryerson University, Canada</i>		8G-2 Capacitive Micro-machined Ultrasound Transducers for High Intensity Ultrasound Applications W. Apoutou N'DJIN¹, Bjoern GEROLD¹, Michael CANNEY², Nicolas SENEGOND³, Mathieu ROY³, Alexandre CARPENTIER², Jean-Yves CHAPELON¹ <i>¹LabTau, Inserm, U1032; Université de Lyon, Lyon, France, ²CarThera, Paris, Ile-de-France, France, ³Vermon SA, Tours, Centre, France</i>
4:00 pm	2G-2 Improved array beam steering capability by compensation of inter-element cross-talk Alessandro Ramalli¹, Alessandro Stuart Savoia², Giosue Caliano², Piero Tortoli¹ <i>¹Information Engineering Department, University of Florence, Firenze, Italy, ²Department of Engineering, Università degli Studi Roma Tre Roma, Rome, Italy</i>	3G-3 3D Ultrasound Strain Imaging of Skeletal Muscle Deformation Kaj Gijsbertse¹, André Sprengers², Nico Verdonshot^{2,3}, Chris de Korte¹ <i>¹Medical UltraSound Imaging Center (MUSIC), Department of Radiology and Nuclear Medicine, Radboud university medical center, Netherlands, ²Orthopaedic Research Laboratory, Department of Orthopaedics, Radboud university medical center, Netherlands, ³Department of Biomechanical Engineering, University of Twente, Netherlands</i>	4G-3 Needle detection by Image Source Localization Alfonso Rodriguez-Molares¹, Lasse Lovstakken¹, Ingvild Kinn Ekroll¹, Hans Torp¹ <i>¹Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway</i>	1G-3 Structure Function: Relating Ultrasonic Measurement to Theory and Histology Aiguo Han¹, William D. O'Brien, Jr.¹ <i>¹Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA</i>	6G-2 Laterally Coupled FBAR resonator filters Kun Wang¹, Robert Thalhammer², Steven Martin³, Uli Koelle¹, John D Larson III¹ <i>¹Avagotech, San Jose, USA, ²Avagotech, Munich, Germany, ³Avagotech, Fort Collins, USA</i>	8G-3 Development and acoustic characterization of lead-free high intensity focused ultrasound transducers Elaheh Taghaddos¹, Teng Ma², Mehdi Hejazi¹, Qifa Zhou², Hui Zhong³, Ming Xi Wan¹, Ahmad Safari¹ <i>¹Materials Science and Engineering, Rutgers University, Piscataway, NJ, USA, ²Biomedical Engineering, University of Southern California, USA, ³Xi'an Jiaotong University, China, People's Republic of, Biomedical Engineering, Xi'an Jiaotong University, People's Republic of China</i>

<p>4:15 pm</p>	<p>2G-3 Time domain compressive beamforming: application to in-vivo echocardiography</p> <p>Guillaume David¹, Jean-luc Robert², Bo Zhang³, Andrew Laine¹ ¹Biomedical Engineering, Columbia University, New York City, New York, USA, ²Philips Research North America, USA, ³Medsys, Philips Research France, France</p>	<p>3G-4 Prostate Vibro-Elastography: Multi-frequency 1D over 3D Steady-State Shear Wave Imaging for Quantitative Elastic Modulus Measurement</p> <p>Julio Lobo¹, Ali Baghani¹, Hani Eskandari¹, Sara Mahdavi¹, Robert Rohling¹, Larry Goldenberg³, William James Morris⁴, Septimiu Salcudean¹ ¹Electrical and Computer Engineering, University of British Columbia, Vancouver, BC, Canada, ²British Columbia Cancer Agency, Vancouver, BC, Canada, ³Department of Urologic Sciences, Vancouver General Hospital, Vancouver, BC, Canada, ⁴Department of Oncology, British Columbia Cancer Agency, Vancouver, BC, Canada</p>	<p>4G-4 A sparse regularization approach for ultrafast ultrasound imaging</p> <p>Rafael Carrillo¹, Adrien Besson¹, Miaomiao Zhang², Denis Friboulet², Yves Wiaux³, Jean-Philippe Thiran¹, Olivier Bernard² ¹LTS5, Swiss Federal Institute of Technology, Lausanne, Switzerland, ²CREATIS, CNRS UMR5220, Inserm U630, University of Lyon, INSA-Lyon, University of Lyon1, Villeurbanne, France, ³Institute of Sensors, Signals and Systems, Heriot-Watt University, Edinburgh, United Kingdom</p>	<p>1G-4 Viscoelastic Imaging Using Acoustic Impedance Microscope and Its Application to Biological Tissue</p> <p>Naohiro Hozumi¹, Shota Kajima¹, Agus Indra Gunawan¹, Sachiko Yoshida¹, Kazuto Kobayashi², Yoshifumi Saijo³, Seiji Yamamoto⁴ ¹Toyoashi University of Technology, Japan, ²Honda Electronics Co., Ltd., Japan, ³Tohoku University, Japan, ⁴Hamamatsu Univ Sch Med, Japan</p>	<p>6G-3 High order mode polarity inverted AI-polar (0001) ScAIN/O-polar (000-1) ZnO film resonator</p> <p>Takeshi Mori¹, Takahiko Yanagitani², Masashi Suzuki¹ ¹Nagoya Institute of Technology, Japan, ²Waseda University, Tokyo, Japan</p>	<p>8G-4 Broadband Dual-Mode HIFU Array used for Therapy and Therapy Monitoring</p> <p>Kyle Morrison¹, George Keilman¹, Peter Kaczowski² ¹Sonic Concepts, Inc., Bothell, Washington, USA, ²Verasonics, Inc., Kirkland, Washington, USA</p>
<p>4:30 pm</p>	<p>2G-4 Multi-line transmit beamforming for high frame rate wide field-of-view tissue Doppler imaging: in-vivo validation and initial clinical findings</p> <p>Ling Tong^{1,2}, Alessandro Ramalli³, Giuseppe Fradella⁴, Sabina Caciolli⁴, Piero Tortoli³, Jianwen Luo¹, Jan D'hooge² ¹Department of Biomedical Engineering, Tsinghua University, Beijing, China, People's Republic of, ²Department of Cardiovascular Sciences, KU Leuven, Leuven, Belgium, ³Department of Information Engineering, Università degli Studi di Firenze, Florence, Italy, ⁴Cardiology Unit, Careggi Hospital, Florence, Italy</p>	<p>3G-5 Spleen Ultrasound Shear Wave Elastography in Monitoring Transjugular Intrahepatic Portosystemic Shunt Function</p> <p>Yuan-Yi Zheng¹, Xiao Zheng¹, Hai-Tao Ran¹, Zhi-Gang Wang¹, Jing Gao² ¹Ultrasound, Chongqing Medical University, Chongqing, China, People's Republic of, ²Radiology, Weill Cornell Medical College, New York, New York, USA</p>	<p>4G-5 Extension of Ultrasound Fourier Slice Imaging Theory to Sectorial Acquisition</p> <p>Miaomiao Zhang¹, Adrien Besson², Rafael E. Carrillo^{2,3}, François Varray¹, Hervé Liebgott¹, Jean-Philippe Thiran^{2,3}, Denis Friboulet¹, Olivier Bernard¹ ¹CREATIS, CNRS UMR5220; Inserm U630; University of Lyon; INSA-Lyon; University of Lyon1, Villeurbanne, France, ²Signal Processing Laboratory (LTS5), Ecole polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland, ³Department of Radiology, University Hospital Center (CHUV) and University of Lausanne (UNIL), Lausanne, Switzerland</p>	<p>1G-5 Ultrasound-scattering models based on quantitative acoustic microscopy of fresh samples and unstained fixed sections from cancerous human lymph nodes</p> <p>Jonathan Mamou¹, Daniel Rohrbach¹, Emi Saegusa-Becroft², Eugene Yanagihara², Junji Machi², Ernest J. Feleppa¹ ¹F. L. Lizzi Center for Biomedical Engineering, Riverside Research, USA, ²Department of General Surgery, University of Hawaii and Kuakini Medical Center, USA</p>	<p>6G-4 Elastic constant c_{ij}^E tensors of (0001) $Sc_xAl_{1-x}N$ films ($x=0-0.63$)</p> <p>Takahiko Yanagitani^{1,2}, Hayato Ichinashi³, Masashi Suzuki², Shinji Takayanagi¹, Mami Matsukawa³ ¹Faculty of Science and Engineering, Waseda University, Tokyo, Japan, ²Nagoya Institute of Technology, Nagoya, Aichi, Japan, ³Doshisha University, Kyotanabe, Kyoto, Japan</p>	<p>8G-5 Double-Focusing Ultrasound Transducer for Skin Disease Treatment</p> <p>Jihun Jang¹, Jin Ho Chang^{1,2} ¹Department of Electronic Engineering, Sogang University, Seoul, Korea, Republic of, ²Interdisciplinary Program of Integrated Biotechnology, Sogang University, Seoul, Korea, Republic of</p>
<p>4:45 pm</p>	<p>2G-5 Optimum beamformer strategy for detecting signals in clutter noise</p> <p>Hans Torp¹, Alfonso Rodriguez-Molares¹, Lasse Lovstakken¹ ¹Circulation and Medical Imaging, Norwegian University of Science and Technology, Norway</p>	<p>3G-6 Local Lung Ventilation Estimation Using Ultrasound Strain Measurements</p> <p>Jonathan Rubin¹, Jeffrey Horowitz², Thomas Sisson³, Kang Kim⁴, Luis Ortiz⁵, James Hamilton⁶ ¹Radiology, University of Michigan, Ann Arbor, Michigan, USA, ²Department of Internal Medicine, University of Michigan, USA, ³University of Michigan, USA, ⁴University of Pittsburgh, USA, ⁵University of Pittsburgh, USA, ⁶Epsilon Imaging, USA</p>	<p>4G-6 3D Post-processing of pre-beamformed RF Data in the Frequency-wavenumber Domain</p> <p>Hendrik Vos^{1,2}, Paul van Neer³, Martin Verweij², Nico de Jong^{1,2}, Arno Volker³ ¹Biomedical Engineering, Erasmus MC, Rotterdam, Netherlands, ²Acoustical Wavefield imaging, Delft university of Technology, Netherlands, ³TNO, Netherlands</p>	<p>1G-6 Plaque characterization using integrated electrochemical spectrum and intravascular ultrasound sensors</p> <p>Rongsong Li¹, Xiaoxiao Zhang², Teng Ma², Nelson Jen¹, Tyler Beebe¹, Jianguo Ma¹, K. Kirk Shung¹, Qifa Zhou¹, Yu-Chong Tai¹, Tzung Hsiai¹ ¹Department of Medicine, University of California, Los Angeles, California, USA, ²Department of Electrical Engineering and Applied Science Division, California Institute of Technology, Pasadena, California, USA, ³Department of Biomedical Engineering, University of Southern California, Los Angeles, California, USA</p>	<p>6G-5 Quasi-shear mode electromechanical coupling K'_{15} and shear wave velocity in c-axis tilted $Sc_xAl_{1-x}N$ films</p> <p>Masashi Suzuki¹, Takahiko Yanagitani² ¹Nagoya Institute of Technology, Japan, ²Waseda University, Japan</p>	<p>8G-6 Non-linear generation of harmonic content within high intensity ultrasound signals using granular chains</p> <p>Sevan Harput¹, James McLaughlan¹, Steven Freear¹, Pierre Gelat², Nader Saffari², Jia Yang³, Omololu Akanji³, Peter Thomas³, David Hutchins³ ¹School of Electronic and Electrical Engineering, University of Leeds, Leeds, United Kingdom, ²Department of Mechanical Engineering, University College London, London, United Kingdom, ³School of Engineering, University of Warwick, Coventry, United Kingdom</p>