

**The 20th IEEE-EMBS International Summer School and Symposium on
Medical Devices and Biosensors
in conjunction with
The 16th International School and Symposium on Biomedical and Health Engineering, and
The 3rd International Summit on Cerebro-Cardiovascular Health Engineering**

**Co-Organized by: Hong Kong Centre for Cerebro-Cardiovascular Health Engineering (COCHE)
The University of Oxford
Sponsored by: IEEE Engineering in Medicine & Biology Society (EMBS)**

(Final Programme)

12-14th December 2022

About Conferences

<https://www.mdbs-che.org>

The IEEE-EMBS International Summer School and Symposium on Medical Devices and Biosensors (MDBS) was launched at the University of Wisconsin-Madison in 2002, held subsequently at CUHK in 2004, MIT in 2005, University of Cambridge in 2007, and most of the rest editions in Hong Kong except for those cancelled due to the SARS in 2003 and COVID-19 in 2020. The 20th IEEE International Summer School and Symposium on Medical Devices and Biosensors (20thMDBS) will be held in hybrid mode on 12-14th December 2022 in conjunction with the 16th International School and Symposium on Biomedical and Health Engineering and the 3rd International Summit on Cerebro-Cardiovascular Health Engineering (3rdCHE). The 20thMDBS-3rdCHE on 13th December 2022 will be held both virtually via zoom and physically on-site at **Units 1115-1119 and 1120, Building 19W, 19 Science Park West Avenue, Hong Kong Science Park, Hong Kong SAR, China**, while the rest of the joint conferences on 12th and 14th December will be conducted virtually via Zoom.

The distinguished scientists and faculty members from the world leading universities in different countries are invited to give speeches and present state-of-the-art technologies in the areas of biomedical and health engineering especially biosensors and wearable medical devices, medical imaging, robotics and AI with applications in the prediction and control of cardiovascular diseases (CVD). The main theme of 20thMDBS-3rdCHE is "Emerging Technologies for the Prevention of Acute Cardiovascular Diseases (CVD)".

Main Topics include:

- Precise and Rapid Contact Tracing Technologies for the Control of COVID
- Multi-Modal Biomedical Imaging
- AI in Biomedical and Health Engineering
- Bio-Inspired Robotics and Biomimics
- Flexible, Stretchable and Printable Bioelectronics
- Body Sensors Networks (BSN)/Body Area Networks (BAN)/Body Net
- Unobtrusive Physiological Sensing
- Nano-Sensing and Nano-Technologies for Bio-Marker Detection
- Multi-Scale Modelling and Information Fusion
- Application in Coronavirus Disease 2019 (COVID-19)
- Health Engineering and Informatics for Precision Medicine
- Applications in Cardiovascular, Stroke, Neurological and Other Major Diseases

Organizing Committee

Conference Chair: Yuan-ting Zhang / Hong Kong Centre for Cerebro-Cardiovascular Health Engineering and City University of Hong Kong
Conference Co-Chair: David Clifton / The University of Oxford
Conference Co-Chair: Paolo Bonato / Harvard Medical School

HKSTP



Chair



Yuan-ting Zhang

Co-Chairs



David Clifton



Paolo Bonato

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Final Programme Overview

Lectures available on  **Zoom**

Hong Kong Time	US Central Time	Europe Time London	Activities	
13th December 2022 Tuesday (Physically on-site and virtually by Zoom) Zoom Link				
09:00-09:30	19:00-19:30 (12 Dec)	01:00-01:30	Registration Units 1115-1119 and 1120, Building 19W, 19 Science Park West Avenue, Hong Kong Science Park, Hong Kong SAR, China	
09:30-09:35	19:30-19:35 (12 Dec)	01:30-01:35	Opening Speech by Metin AKAY FIEEE, FIAMBE, FFAAS, President of IEEE EMBS Founding Chair and John S Dunn Endowed Chair Professor, University of Houston	
09:35-09:40	19:35-19:40 (12 Dec)	01:35-01:40	Opening Speech by Dong SUN JP, FCAE, FEASR, FIAMBE, FIEEE, FAIMBE, Secretary for Innovation, Technology and Industry, HKSAR Government	
09:40-09:45	19:40-19:45 (12 Dec)	01:40-01:45	Opening Speech by Organizers: Paolo BONATO and Yuanting ZHANG	
09:45-10:20	19:45-20:20 (12 Dec)	01:45-02:20	COCHE Distinguished Lecture and Keynote: Guangzhong YANG FIEEE, FIET, FAIMBE, FIAMBE, FMICCAI, FCGI, Founding Dean, Chair Professor, Medical Robotics Institute, Shanghai Jiao Tong University <i>Moderator: May Dongmei WANG, FAIMBE, FIAMBE, FIEEE, Fkavli, The Wallace H. Coulter Distinguished Faculty Fellow, Professor and Director of Biomedical Big Data, Georgia Institute of Technology and Emory University</i>	
10:20-10:55	20:20-20:55 (12 Dec)	02:20-02:55	Keynote: Daniel FRANKLIN Assistant Professor, Ted Rogers Chair in Cardiovascular Engineering, Ted Rogers Center for Heart Research, Institute of Biomedical Engineering, University of Toronto "Spectral Wearables for Continuous Hemodynamic Monitoring" <i>Moderator: Bee Luan KHOO, Assistant Professor, Department of Biomedical Engineering, Innovator under 35 by the MIT Technology Review, City University of Hong Kong, Associate Scientist of COCHE</i>	
10:55-11:30	20:55-21:30 (12 Dec)	02:55-03:30	Keynote: Alberto AVOLIO FIEEE, Professor Emeritus, Macquarie Medical School, Faculty of Medicine, Health and Human Sciences, Macquarie University, Sydney, Australia "Cuffless Devices and Arterial Blood Pressure: A Challenge of Measurement and Physiology" <i>Moderator: Bee Luan KHOO, Assistant Professor, Department of Biomedical Engineering Innovator under 35 by the MIT Technology Review, City University of Hong Kong, Associate Scientist of COCHE</i>	
11:30-12:05	21:30-22:05 (12 Dec)	03:30-04:05	Keynote: Peng SHI Professor, Department of Biomedical Engineering, City University of Hong Kong, Senior Scientist of COCHE "Spatial-Temporal Epigenetic Profiling Based on High-Throughput Single Cell Intracellular Biopsy" <i>Moderator: Bee Luan KHOO, Assistant Professor, Department of Biomedical Engineering Innovator under 35 by the MIT Technology Review, City University of Hong Kong, Associate Scientist of COCHE</i>	
12:05-13:05	22:05-23:05 (12 Dec)	04:05-05:05	Break	
Scientific Section on Wearable and Flexible Sensing <i>Moderators:</i> Xinge YU, Associate Professor, Department of Biomedical Engineering, City University of Hong Kong, Associate Director of COCHE Nan Ji, Postdoctoral Fellow of COCHE				
13:05-13:20	23:05-23:20 (12 Dec)	05:05-05:20	Shuaichen WANG Postdoctoral Fellow of COCHE "Super-Flexible Metal Bioelectrode Ensure Comfort Wearing Aiming to Develop Sensing System for the Control of CVD"	
13:20-13:35	23:20-23:35 (12 Dec)	05:20-05:35	Nan Ji Postdoctoral Fellow of COCHE "An Intelligent Multimodal Unobtrusive TAG Monitoring Module"	
13:35-13:50	23:35-23:50 (12 Dec)	05:35-05:50	Zhiqiang MA Postdoctoral Fellow of COCHE "FLIPS- A Thin, Flexible and Conformal Pulse Sensor for Cardiovascular Monitoring/FLIPS"	
13:50-14:05	23:50-00:05 (12 Dec)	05:50-06:05	Chun Ki YIU Ph.D. student of COCHE-City U "Transcutaneous Electrical Stimulation for Hypertension"	
14:05-14:20	00:05-00:20	06:05-06:20	Xiao YANG Associate Research Scientist of COCHE "A Smart Microneedle System for Treating Arrhythmia or Hypertension"	
14:20-14:35	00:20-00:35	06:20-06:35	Jiyu LI Postdoctoral Fellow of COCHE "Ultra-Thin, Soft, Radiative Cooling Coating for Advanced Thermal Management in Skin Electronics for CVD Monitoring"	
14:35-14:50	00:35-00:50	06:35-06:50	Atif HASSAN Ph.D. Student of COCHE "LED Array-Based Lensless Tomographic Phase Imaging of Physiological Signals in Real Time"	

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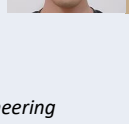
Final Programme Overview

Lectures available on  zoom

Hong Kong Time	US Central Time	Europe Time London	Activities	
13th December 2022 Tuesday (Physically on-site and virtually by Zoom) Zoom Link				
14:50-15:05	00:50-01:05	06:50-07:05	Break	
<p style="text-align: center;">Scientific Section on Imagine and AI in Health <i>Moderators:</i> Lei CLIFTON, Official Fellow in AI & Machine Learning, Reuben College, Senior Researcher, Nuffield Department of Population Health, The University of Oxford, UK, Senior Scientist of COCHE Kannie WY CHAN, Associate Professor, Department of Biomedical Engineering, City University of Hong Kong, Associate Director and Scientist of COCHE</p>			 	
15:05-15:20	01:05-01:20	07:05-07:20	Abdul-Mojeed Olabisi ILYAS Postdoctoral Fellow of COCHE "Deep Learning-Based Imaging Approaches for CVD Diagnosis"	 
15:20-15:35	01:20-01:35	07:20-07:35	Jing SUN Ph.D. student of COCHE-City U "3D Image Cytometer for High-Throughput and Label-Free Cardiovascular Cell Analysis"	
15:35-15:50	01:35-01:50	07:35-07:50	Tianfu ZHANG Associate Research Scientist of COCHE "Multifunctional Fluorescence Materials for Tissue labelling and Photothermal Therapy"	
15:50-16:15	01:50-02:15	07:50-08:15	Invited Talk: Lei CLIFTON Official Fellow in AI & Machine Learning, Reuben College Senior Researcher, Nuffield Department of Population Health The University of Oxford, UK Senior Scientist of COCHE "Polygenic Risk Scores in Machine Learning and Medical Statistics: A Worked Example" <i>Moderator:</i> Alireza KERAMAT, Research Assistant Professor, The Hong Kong Polytechnic University, Research Scientist of COCHE	
16:15-16:50	02:15-02:50	08:15-08:50	COCHE Distinguished Lecture and Keynote: David CLIFTON FRAE, FOCC in AI & ML, Professor of Clinical Machine Learning, Department of Engineering Science, University of Oxford, UK, Associate Director of COCHE "Advances in ML for Fusing Medical Data" <i>Moderator:</i> Alireza KERAMAT, Research Assistant Professor, The Hong Kong Polytechnic University, Research Scientist of COCHE	
<p style="text-align: center;">25th COCHE Seminar on Optical Imagine and Microscopy <i>Moderators:</i> Renjie ZHOU, Assistant Professor, Department of Biomedical Engineering, Chinese University of Hong Kong, Honorary Associate Scientist of COCHE</p>				
16:50-17:05	02:50-03:05	08:50-09:05	Xinrui WANG Ph.D. student of COCHE-City U "Point-of-care Surface Enhanced Raman Spectroscopy for Whole Blood CVD Biomarker Detection, with Integrated Physiological Parameter Monitoring Function"	 
17:05-17:20	03:05-03:20	09:05-09:20	Hao YUE Ph.D. student of COCHE-City U "2nd Generation Intravascular Optical Coherence Tomography for Imaging of Plaque"	
17:20-17:35	03:20-03:35	09:20-09:35	Hongjin LI Ph.D. student of COCHE-City U "High-Speed Line Scanning Super-Resolution Microscopy"	 
17:35-17:50	03:35-03:50	09:35-09:50	Gan LIU Ph.D. student of COCHE-City U "Physics-Informed RNN Based Wavefront Sensing for In Vivo Application"	
17:50-18:00	03:50-04:00	09:50-10:00	Group Photo at staircase on the 1/F, 19W	
18:00-19:20	04:00-05:20	10:00-11:20	Conference Dinner/ Annual Award Ceremony	

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20th MDBS-3rd CHE Virtual Sessions on 12th and 14th December

Final Programme Overview			Lectures available on 
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12th December 2022 Monday (by Zoom) Zoom Link			
Scientific Section Moderator: <i>Xuecheng TAI, Chief Research Scientist of COCHE</i>			
16:00-16:15	02:00-02:15	08:00-08:15	<i>Jiangan XU Postdoctoral Fellow of COCHE "Piezoelectric Theory and Modeling with Experimental Correlation"</i>  
16:15-16:30	02:15-02:30	08:15-08:30	<i>XI ZHAO Postdoctoral Fellow of COCHE "Exosome-Mediated Therapy for Cardiovascular Disease"</i>  
16:30-16:45	02:30-02:45	08:30-08:45	<i>Lingfeng LI Postdoctoral Fellow of COCHE "Solving Partial Differential Equations with Neural Networks and Potential Applications in BP Estimations"</i>  
16:45-17:10	02:45-03:10	08:45-09:10	<i>Invited Talk: Ting MA Member of IEEE, Professor, Department of Electronics & Information Engineering, Harbin Institute of Technology at Shenzhen "Brain Connectome Computing and Its Application in Neural Degeneration Diseases"</i> Moderator: Yuan ZHANG, Professor, College of Electronic and Information Engineering Southwest University  
14th December 2022 Wednesday (by Zoom) Zoom Link			
Scientific Section on Unobtrusive Sensing and Sleep Monitoring Moderator: <i>Xuecheng TAI, Chief Research Scientist of COCHE Xiaorong DING, Associate Researcher, School of Life Science and Technology, University of Electronic Science and Technology of China</i>			
09:30-10:05	19:30-20:05 (13 Dec)	01:30-02:05	Keynote: May Dongmei WANG FAIMBE, FIAMBE, FIEEE, Fkavli, The Wallace H. Coulter Distinguished Faculty Fellow, Professor and Director of Biomedical Big Data, Georgia Institute of Technology and Emory University "Advancing Biomedical AI for Addressing Global Health Challenge"  
10:05-10:30	20:05-20:30 (13 Dec)	02:05-02:30	Invited Talk: Yali ZHENG Associate Professor, Department of Biomedical Engineering, College of Health Science and Environmental Engineering, Shenzhen Technology University "Biophysical and Data-driven Modeling for Cuffless Blood Pressure Measurement"  
10:30-10:55	20:30-20:55 (13 Dec)	02:30-02:55	Invited Talk: Yuan ZHANG Professor, College of Electronic and Information Engineering, Southwest University "Healthy Sleep Structure for Cardiocerebral Health-Intelligent Sleep Staging"  
10:55-11:20	20:55-21:20 (13 Dec)	02:55-03:20	Invited Talk: Wei CHEN Senior member of IEEE, Professor, School of Information Science and Technology, Fudan University "Unobtrusive Sensing and Health Informatics"  
11:20-11:25	21:20-11:25 (13 Dec)	03:20-03:25	Closing Remark: David CLIFTON FRAE, FOCC in AI & ML, Professor of Clinical Machine Learning, Department of Engineering Science, University of Oxford, UK, Associate Director of COCHE  
End			

For free registration please visit: <https://www.mdbs-che.org/registration-1>



Metin AKAY

*IEEE, FIAMBE, FAAAS, President of IEEE EMBS
Founding Chair and John S Dunn Endowed Chair Professor
University of Houston
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Prof. Metin AKAY is currently the founding chair of the new Biomedical Engineering Department and the John S. Dunn professor of biomedical engineering at the University of Houston. He received his B.S. and M.S. in Electrical Engineering from Bogazici University, Istanbul, Turkey in 1981 and 1984, respectively, and a Ph.D. degree from Rutgers University in 1990.

Prof. AKAY has played a key role in promoting biomedical education in the world by writing and editing several books, editing several special issues of prestigious journals, including the Proc of IEEE, and giving more than a hundred keynote, plenary, and invited talks at international conferences, symposiums, and workshops regarding emerging technologies in biomedical engineering.

His Neural Engineering and Informatics Lab is interested in developing an intelligent wearable system for monitoring motor functions in Post-Stroke Hemiplegic Patients and detecting coronary artery disease. In addition, his lab is currently investigating the effect of nicotine on the dynamics of ventral tegmental area (VTA) dopamine neural networks as well as the detection of coronary occlusions.

Dong SUN

*JP, FCAE, FEASR,FIAMBE, FIEEE, FAIMBE
Secretary for Innovation,
Technology and Industry, HKSAR Government
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Prof. Dong SUN grew up in Beijing. He studied his doctorate degree in Hong Kong in 1994 and pursued further studies overseas. After his return to Hong Kong in 2000, he joined the City University of Hong Kong (CityU) as professor and started a high-tech company. Prior to his appointment as Secretary for Innovation, Technology and Industry, Prof. Sun DONG was CityU's Head and Chair Professor of Department of Biomedical Engineering, and Director of Center for Robotics and Automation.

Prof. Dong SUN is currently Fellow of the Canadian Academy of Engineering in Canada, Member of the European Academy of Sciences and Arts, Fellow of the International Academy of Medical and Biological Engineering, and Fellow of Institute of Electrical and Electronic Engineers (IEEE) in the USA. He has been committed in promoting higher education and frontline scientific research in Hong Kong for more than 20 years, nurturing for Hong Kong many talents in the field of innovation and technology. He was a Legislative Council Member from January to June 2022.

Paolo BONATO

*Associate Professor,
Department of Physical Medicine and Rehabilitation,
Adjunct Professor of Biomedical Engineering,
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Prof. BONATO serves as Director of the Motion Analysis Laboratory at Spaulding Rehabilitation Hospital, Boston MA. He is an Associate Professor in the Department of Physical Medicine and Rehabilitation, Harvard Medical School, and an Adjunct Professor of Biomedical Engineering at the MGH Institute of Health Professions, Harvard Medical School. He has held Adjunct Faculty positions at the Massachusetts Institute of Technology, the University of Ireland Galway, and the University of Melbourne. At the Wyss Institute for Biologically Inspired Engineering, he brings his experience in rehabilitation technology with special emphasis on wearable technology and robotics.

Dr. BONATO serves as Member of the Advisory Board of the IEEE Journal of Biomedical and Health Informatics and as Associate Editor of the IEEE Journal of Translational Engineering in Health and Medicine. He served as Founding Editor-in-Chief of the Journal of NeuroEngineering and Rehabilitation. Dr. Bonato served as an Elected Member of the IEEE Engineering in Medicine and Biology Society (EMBS) AdCom (2007-2010) and currently serves as IEEE EMBS Vice-President for Publications (2013-present). He served as President of the International Society of Electrophysiology and Kinesiology (2008-2010). He also served as Chair of the 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (2011) and as Chair of the IEEE EMBS Technical Committee on Wearable Biomedical Sensors and Systems in 2008, a committee of which he was a founding member in 2006 and on which he served until 2012. He received the M.S. degree in electrical engineering from Politecnico di Torino, Turin, Italy in 1989 and the Ph.D. degree in biomedical engineering from Universita di Roma “La Sapienza” in 1995.

Guangzhong YANG

*IEEE, FIET, FAIMBE, FIAMBE, FMICCAI, FCGI,
Founding Dean, Chair Professor,
Medical Robotics Institute,
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Prof. Guangzhong YANG is the founding dean of the Medical Robotics Institute, Shanghai Jiao Tong University. He was the founding director of the Hamlyn Centre for Robotic Surgery, Imperial College London. Prof. YANG is also the Chairman of the advisory board, the UK-RAS Network (<http://ukras.org>). Prof. YANG's main research interests are in medical imaging, sensing and robotics. He is a Fellow of the Royal Academy of Engineering, fellow of IEEE, IET, AIMBE, IAMBE, MICCAI, CGI and a recipient of the Royal Society Research Merit Award and listed in The Times Eureka 'Top 100' in British Science. Prof. YANG is the founding editor of Science Robotics– a journal of the Science family dedicated to the latest advances in robotics and how it enables or underpins new scientific discoveries. He was awarded a CBE in the Queen's 2017 New Year Honour for his contribution to biomedical engineering.

Daniel FRANKLIN

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Ted Rogers Chair in Cardiovascular Engineering,
Ted Rogers Center for Heart Research,
Institute of Biomedical Engineering,
Translational Biology & Engineering Program(TBEP),
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Dr. Daniel FRANKLIN is an Assistant Professor in the Institute of Biomedical Engineering (BME) at the University of Toronto, and the Ted Rogers Chair in Cardiovascular Engineering at the Ted Rogers Centre for Heart Failure. He received his doctorate in Physics at the University of Central Florida studying light-matter interactions and developing experimental optoelectronic technologies. As a Post-Doctoral Fellow at Northwestern University, he worked with Professor John Rogers in the fields of bio-integrated electronics and soft-matter photonics. There, Dr. FRANKLIN developed novel bioresorbable materials, laser systems, and flexible wireless implants and wearables for hemodynamic monitoring.

Throughout this work, he has won numerous awards including the Baxter Young Investigator Award and the Displaying Futures Award from Merck KGaA, Germany – the world’s largest producer of liquid crystal material. Now, in his new role at University of Toronto, Dr. FRANKLIN’s lab combines optics, engineering, and physiology to produce medical technologies for commercial translation, in partnership with industry-leading semiconductor manufacturers.

Spectral Wearables for Continuous Hemodynamic Monitoring

Alberto AVOLIO

FIEEE,

Professor Emeritus,

Macquarie Medical School,

Faculty of Medicine, Health and Human Sciences,

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Prof. Alberto AVOLIO, BE, PhD (UNSW), FIAMBE, is Professor of Biomedical Engineering in The Australian School of Advanced Medicine at Macquarie University, Sydney, Australia. He has acquired international recognition in the field of cardiovascular haemodynamics. He has taught in the fields of cardiovascular dynamics and in the broad area of engineering in medicine and biology and has extensive experience in PhD supervision and in examination of local and international higher degree theses. Current research areas include pulsatile relationships between blood pressure and flow, characterization of pressure-dependent indices of vascular function, cellular and molecular mechanisms of arterial stiffness, pulse wave analysis and non-invasive estimation of central aortic pressure, retinal vascular function and non-invasive assessment of cerebral dynamics, cerebral aneurysms, cardiovascular modelling and biological signal processing. He has received over \$7 million in collaborative research grant support and is on the assessment panel of national and international granting bodies. He is on the editorial board of journals of cardiovascular research and hypertension (Hypertension, Journal of Hypertension, Artery Research, Current Hypertension Reviews, Advanced Biomedical Engineering, Pulse) and is a reviewer for over 40 international scientific journals. He has over 170 publications including a book, book chapters and peer reviewed articles.

Prof. AVOLIO is a Visiting Professor at the Tokyo Medical University and external assessor of Biomedical Engineering curriculum at the University of Malaya. He has recently been elected a Fellow of the International Academy of Medical and Biological Engineering.

Cuffless Devices and Arterial Blood Pressure: A Challenge of Measurement and Physiology

Peng SHI

*Professor,
Department of Biomedical Engineering,
City University of Hong Kong,
Senior Scientist of COCHE
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Dr. Peng SHI is a professor in the Department of Biomedical Engineering at City University of Hong Kong. He received his bachelor's degree in electrical engineering from Wuhan University and a Ph.D. degree in Biomedical Engineering from Columbia University. After his postdoctoral training at MIT in Electrical Engineering and Biological Engineering, he joined CityU Hong Kong and has been a faculty member in the BME department since 2011. Dr. SHI works at the convergence between neuroscience and engineering by taking advantage of an interdisciplinary approach that involves nano-/micro-fabrication, microfluidics, ultra-fast optics, high-resolution microscopy, and imaging processing. He focuses on solving important emerging problems in translational neuro-engineering, especially in the development of high-throughput technology and screening platform for the discovery of novel therapeutic targets. His work has led to more than 70 publications in top-tier research journals, including Nature Material Review, Science Advances, Nature communications and Advanced Materials etc., and 12 international patents and disclosures, one of which has been the foundation technology of a spin-off biotech company. Dr. SHI received the Simon's research award in 2010, and was elected to the 1000 China Young Talent program in 2015. He also received the President Award for research excellence in 2017, outstanding supervisor award in 2018 at CityU, and a special recognition as Young Scholars by World Cultural Council in 2018. Currently, he is an associate editor for the journal Brain Research.

Spatial-Temporal Epigenetic Profiling Based on High-Throughput Single Cell Intracellular Biopsy

David CLIFTON

FRAE, FOCC in AI & ML

Professor of Clinical Machine Learning

Department of Engineering Science, University of Oxford, UK

Associate Director of COCHE

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Prof. David CLIFTON is Professor of Clinical Machine Learning and leads the Computational Health Informatics (CHI) Lab. He is OCC Fellow in AI & ML at Reuben College, a Research Fellow of the Royal Academy of Engineering, Visiting Chair in AI for Health at the University of Manchester, and a Fellow of Fudan University, China. He studied Information Engineering at Oxford's Department of Engineering Science, supervised by Professor Lionel Tarassenko CBE. His research focuses on 'AI for healthcare'.

In 2018, the CHI Lab opened its second site, in Suzhou (China), with support from the Chinese government. In 2019, the Wellcome Trust's first "Flagship Centre" was announced, which joins CHI Lab to the Oxford University Clinical Research Unit in Vietnam, focused on AI for healthcare in resource-constrained settings.

He is a Grand Challenge awardee from the UK Engineering and Physical Sciences Research Council, which is an EPSRC Fellowship that provides long-term strategic support for nine "future leaders in healthcare." He was joint winner of the inaugural "Vice-Chancellor's Innovation Prize", which identifies the best interdisciplinary research across the entirety of the University of Oxford.

Advances in ML for Fusing Medical Data

May Dongmei WANG

*FAIMBE, FIAMBE, FIEEE, FKavli Fellow
The Wallace H. Coulter Distinguished Faculty Fellow
Professor and Director of Biomedical Big Data,
Georgia Institute of Technology and Emory University
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Dr. May Dongmei WANG is Wallace H. Coulter Distinguished Faculty Fellow and full professor in BME and ECE at Georgia Institute of Technology (GT) and Emory University (EU). She is Director of Biomedical Big Data Initiative, Georgia Distinguished Cancer Scholar, Petit Institute Faculty Fellow, Kavli Fellow, AIMBE Fellow, IAMBE Fellow, IEEE Fellow, and Board of Directors in American Board of AI in Medicine. Her research is in *Biomedical Big Data with AI-Driven Intelligent Reality (IR) for predictive, personalized, and precision health (pHealth)*. During 20+ years academic professorship and ~4 years industrial research, she published 260+ articles in referred journals and conference proceedings and delivered 250+ invited and keynote lectures. Dr. WANG received BEng from Tsinghua University China, and M.S with Ph.D. degrees from GT. She is a recipient of GT Outstanding Faculty Mentor Award, and EU MilliPub Award (for a high-impact paper that is cited over 1,000 times).

Dr. WANG is the Senior Editor for IEEE Journal of Biomedical & Health Informatics (JBHI, Impact Factor 7.02), an Associate Editor for IEEE Transactions for BME, and IEEE Reviews for BME, a panelist for NIH CDMA Study Section, NSF Smart and Connect Health, Brain Canada, and multiple European countries. She was 2016 IEEE Engineering in Medicine and Biology Society (EMBS) Annual Conference Co-Chair, 2014-2015 EMBS Distinguished Lecturer and Emerging Area Editor for Proceedings of National Academy of Sciences (PNAS). Dr. Wang has helped grow Biomedical and Health Informatics (BHI) community since 2012 and is chair for IEEE Biomedical and Health Informatics Technical Community. She currently serves in IEEE Future Directions Committee and International Academy of Medical and Biological Engineering (IAMBE) Executive Committee. At Georgia Institute of Technology (GT), Dr. WANG is in 2022 President Leading Women Program and 2021 Provost Emerging Leaders Program, and is 2018-2021 Carol Ann and David Flanagan Distinguished Faculty Fellow. She was 2015-2017 GT Biomedical Informatics Program Co-Director in Atlanta Clinical and Translational Science Institute (ACTSI), and was Director of Bioinformatics and Biocomputing Core in NIH/NCI-sponsored U54 Center for Cancer Nanotechnology Excellence, and Co-Director of GT Center of Bio-Imaging Mass Spectrometry for over 10 years. Dr. WANG's research has been supported by NIH, NSF, CDC, Georgia Research Alliance, Georgia Cancer Coalition, Shriners' Hospitals for Children, Children's Health Care of Atlanta, Enduring Heart, Coulter Foundation, Microsoft Research, HP, UCB, and Amazon

Advancing Biomedical AI for Addressing Global Health Challenge

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Prof. Yuan ZHANG (Senior Member, IEEE) received the M.S. degree in communication systems and the Ph.D. degree in control theory and engineering from Shandong University, Jinan, China, in 2003 and 2012, respectively. He is currently a Professor with the College of Electronic and Information Engineering, Southwest University, Chongqing, China. He was a Visiting Professor with the Computer Science Department, Georgia State University, Atlanta, GA, USA, in 2014. His current research interests include wearable sensing for smart health, machine learning for auxiliary diagnosis, and biomedical big data analytics. Prof. ZHANG is a Senior Member of Association for Computing Machinery (ACM) and a member of IEEE Engineering in Medicine and Biology Society (EMBS) Wearable Biomedical Sensors and Systems Technical Committee. He is an Associate Editor for IEEE Reviews in Biomedical Engineering, IEEE Open Journal of Engineering in Medicine and Biology, and IEEE Access. He has served as a Leading Guest Editor for six special issues of IEEE, Elsevier, Springer, and InderScience publications. He has served on the technical program committee for numerous international conferences.

Healthy Sleep Structure for Cardiocerebral Health-Intelligent Sleep Staging

Wei CHEN

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Prof. Wei CHEN received her B. Eng. degree in 1999 and M. Eng. degree in 2002 in telecommunication systems and smart sensor systems, from the School of Electrics and Information Engineering, Xian Jiaotong University, China. She obtained her Ph.D. degree in 2007 in performance monitoring and impairment mitigation for optical communication systems, from the Department of Electrical & Electronics Engineering, The University of Melbourne, Australia. She worked at Bell Laboratories Germany, Alcatel-Lucent, Stuttgart, Germany as an intern in 2005. From 2007 to 2015, she was an Assistant Professor at Eindhoven University of Technology, the Netherlands. Since Oct. 2015, she has been a full professor and director of the Center for Intelligent Medical Electronics (CIME) at the Department of Electronic Engineering, School of Information Science and Technology, Fudan University. She is a Senior Member of IEEE and associate editor of the IEEE Journal on Biomedical Health Informatics (J-BHI).

Prof. CHEN has been carrying out research in the multidisciplinary areas of wireless sensor systems, patient health monitoring, ambient intelligent system design, and digital signal processing for performance optimization. The application areas include neonatal monitoring, elderly care, smart rehabilitation, and interactive and cognitive environments. She has graduated with five Ph.D. students and five PDEng (Professional Doctorate in Engineering) students and among them, three were awarded Cum Laude Ph.D. (top 5%).

Unobtrusive Sensing and Health Informatics

Ting MA

Member of IEEE,

*Professor, Department of Electronics & Information Engineering,
Harbin Institute of Technology at Shenzhen*

Email: tma@hit.edu.cn



Professor Ting MA (Member, IEEE) received the B.Eng. and M.Sc. degrees from the Harbin Institute of Technology, Harbin, China, in 1999 and 2001, respectively, and the Ph.D. degree in biomedical engineering from the Chinese University of Hong Kong (CUHK), Hong Kong, in 2004. From 2004 to 2009, she was a Postdoctoral Fellow with CUHK. From 2014 to 2016, she was a Visiting Professor with Johns Hopkins University, Baltimore, MD, USA. Since June 2009, she has been with the School of Electronics and Information Engineering, Harbin Institute of Technology, Shenzhen, China, where she is currently an Associate Professor. Her research interests include neural computing, neural image processing, and brain informatics. Prof. MA's research interest focuses on neuroinformatics, including neural image computing, brain-computer-interface, and related translational research in neural diseases.

Brain Connectome Computing and Its Application in Neural Degeneration Diseases

Brain structural and functional alterations have been consistently proposed to be involved in the neurobiological underpinnings of aging and neurodegenerative disorders, such as Alzheimer's disease and Parkinson's disease. Despite the considerable amount of neuroimaging research conducted in this area over the last decade, pathological perturbations of the brain are rarely confined to a single region. Instead, they often spread via axonal pathways to influence other regions. It is becoming increasingly accepted that connectome reorganization plays a key role in determining cognitive or motor disability. Correspondingly, hypothesis-free connectome-wide association studies (CWAS), may potentially allow for the identification of novel neural correlates of neurodegeneration at the whole-brain scale. Further elucidating how brain-network topology can shape neural responses to damage is needed to better understand disease status and progression.

In this talk, I will address several methodological challenges to precisely quantify brain connectome neurofingerprints of neurodegenerative disorders within the CWAS framework, and demonstrate the unique time-evolving trajectory of brain network reorganization related to neurodegeneration progress.

Lei CLIFTON

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Dr. Lei CLIFTON joined the Nuffield Department of Population Health in 2019 as the team leader of the Translational Epidemiology Unit, under its Director Professor David Hunter. She leads a programme of research in translational cancer epidemiology. Key research includes assessing the performance of large-scale information on lifestyle and environment, assisting in development of exposure assessment instruments suitable for use at scale.

She manages specialist grant-funded research projects, including the recruitment, supervision and operational management of a research group. She line manages other members of the team, contributing to their development through induction, appraisal, and coaching.

From 2014 - 2018, she worked for Prof. Doug Altman in the Centre for Statistics in Medicine (CSM), where she led statistical work on clinical trials, observational studies, and research on trial methodology. She was a senior advisor on the NIHR Research Design Service team, which provided free advice on research design to researchers in the South Central region. She collaborated extensively with principal investigators in trial design and grant applications.

During her 5 years in CSM, she also provided statistical supervision in fellowship applications, taught statistics at the postgraduate level, and review grant proposals for the NIHR. She was a Scientific Research Committee member of the Northern Ireland Chest Heart and Stroke, responsible for reviewing proposals and allocating research grants.

From 2009 - 2014, she worked at the Institute of Biomedical Engineering, at the University of Oxford, where she undertook research into statistical time-series models for providing early warning of deterioration in post-surgery patients. From 2007-2009, she was a post-doctoral researcher in the Nuffield Department of Clinical Neurosciences, University of Oxford, where she developed mathematical models and prototype apparatus for measuring the lung function of ICU patients.

She was awarded a Ph.D. in Statistical Machine Learning in 2007 from UMIST (now the University of Manchester), after completing my BSc and MSc degrees in Electrical Engineering at the Beijing Institute of Technology, China. She joined CSM in 2014.

Polygenic Risk Scores in Machine Learning and Medical Statistics: A Worked Example

Yali ZHENG

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Dr. Yali ZHENG is currently an Associate Professor at Department of Biomedical Engineering, Shenzhen Technology University, Shenzhen, China. She received her PhD degree from the Dept. of Electronic Engineering, the Chinese University of Hong Kong in 2014. She was a Postdoctoral Fellow from 2014 to 2018 with the Department of Surgery, Faculty of Medicine, The Chinese University of Hong Kong. Dr. Zheng published more than 30 scientific papers, and one journal paper published on IEEE Transactions on Biomedical Engineering is ranked as the ESI highly-cited paper in the Engineering field. She is currently the affiliated member of IEEE-EMBS Wearable Biomedical Sensors and Systems Technical Committee, and the Executive Committee Member of IEEE EMB Hong Kong-Macau Joint Chapter. She also served as a member of the Organizing Committee for 16th and 17th IEEE International Conference on Wearable and Implantable Body Sensor Networks (IEEE-BSN) in 2019 and 2021, and the session chair of the special session on “Advancements in Sensors, Algorithms and Clinical Trials for Non-invasive and Cuffless Blood Pressure Monitoring” in BSN’2021. Her research is mainly focused on unobtrusive sensing and wearable health informatics for cardiovascular healthcare.

Biophysical and Data-driven Modeling for Cuffless Blood Pressure Measurement

Jiangang XU

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Piezoionic Theory and Modeling with Experimental Correlation

Xi ZHAO

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Exosome-Mediated Therapy for Cardiovascular Disease

Lingfeng LI

Postdoctoral Fellow of COCHE
Email: lfli@hkcoche.org



Solving Partial Differential Equations with Neural Networks and Potential Applications in BP Estimations

Moderator:

Xuecheng TAI, Chief Research Scientist and Executive Programme Director of COCHE

Shuaichen WANG

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Super-Flexible Metal Bioelectrode Ensure Comfort Wearing Aiming to Develop Sensing System for the Control of CVD

Nan JI

Postdoctoral Fellow of COCHE

Email: nji@hkcoche.org



An Intelligent Multimodal Unobtrusive TAG Monitoring Module

Zhiqiang MA

Postdoctoral Fellow of COCHE

Email: zqma@hkcoche.org



FLIPS- A Thin, Flexible and Conformal Pulse Sensor for Cardiovascular Monitoring/FLIPS

Moderator:

- Xinge YU, Associate Professor, Department of Biomedical Engineering, City University of Hong Kong, Associate Director of COCHE
- Nan JI, Postdoctoral Fellow of COCHE

Chun Ki YIU

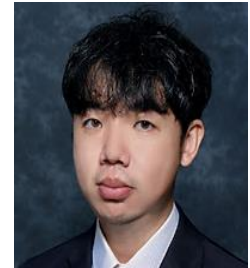
Ph.D. student of COCHE-City U
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Transcutaneous Electrical Stimulation for Hypertension

Xiao YANG

Associate Research Scientist of COCHE
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A Smart Microneedle System for Treating Arrhythmia or Hypertension

Jiyu LI

Postdoctoral Fellow of COCHE
Email: jyli01@hkcoche.org



Ultra-thin, Soft, Radiative Cooling Coating for Advanced Thermal Management in Skin Electronics for CVD Monitoring

Atif HASSAN

Ph.D student of COCHE-City U
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LED Array Based Lensless Tomographic Phase Imaging of Physiological Signals in Real Time

Moderator:

- Xinge YU, Associate Professor, Department of Biomedical Engineering, City University of Hong Kong, Associate Director of COCHE
 - Nan JI, Postdoctoral Fellow of COCHE
-

Lectures available on ZOOM and in Units 1115-1119 and 1120, 11/F, Building 19W, Hong Kong Science Park

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Deep Learning-Based Imaging Approaches for CVD Diagnosis

Jing SUN

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3D Image Cytometer for High-Throughput and Label-Free Cardiovascular Cell Analysis

Tianfu ZHANG

Associate Research Scientist of COCHE

Email: tfzhang@hkcoche.org



Multifunctional Fluorescence Materials for Tissue labelling and Photothermal Therapy

Moderator:

- Lei CLIFTON, Official Fellow in AI & Machine Learning, Reuben College, Senior Researcher, Nuffield Department of Population Health, The University of Oxford, UK, Senior Scientist of COCHE
 - Kannie CHAN, Associate Professor, Department of Biomedical Engineering, City University of Hong Kong, Associate Director and Scientist of COCHE
-

Xinrui WANG

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Point-of-care Surface Enhanced Raman Spectroscopy for Whole Blood CVD Biomarker Detection with Integrated Physiological Parameter Monitoring Function

Hao YUE

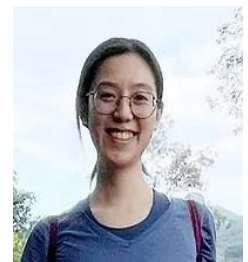
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2nd Generation Intravascular Optical Coherence Tomography for Imaging of Plaque

Hongjin LI

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High-Speed Line Scanning Super-Resolution Microscopy

Gan LIU

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Physics-Informed RNN Based Wavefront Sensing for In Vivo Application

Moderator:

- Renjie ZHOU, Assistant Professor, Department of Biomedical Engineering, The Chinese University of Hong Kong, Honorary Associate Scientist of COCHE
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