



IEEE
MeMeA 2021

Virtual Conference, June 23rd to 25th, 2021

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2021 CONFERENCE PROCEEDINGS

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2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA) Proceedings

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Welcome Message from the Chairpersons

Dear Attendees,

Similar to 2020, it is unfortunate that we were forced to run our conference virtually, yet again. As you can imagine, the original plan was to host you all in Neuchâtel, Switzerland, to both enjoy both the scientific sessions, as well as, the social events together at the **16th edition of IEEE International Symposium on Medical Measurements and Applications, IEEE MeMeA 2021!**

Anyway, we are going to run the symposium at best, enjoying two great keynotes, two great tutorials, and a great scientific program that will develop through a series of very interesting talks as provided by you, the authors of the papers, presented at the Regular Sessions, as well as, four top-interesting Special Sessions.

Please, let me grant a great thanks to all the people that have worked hard to organize such an amazing program: **Catherine Dehollain, Sabrina Grassini, Paola Saccomandi, Lorenzo Scalise, and Emiliano Schena**. Special thanks go to **Taylor Lineberger** for taking care of a very long series of issues that have enabled all details going into the right place for this conference. Of course, I also thank **Marco Parvis** and **Pasquale Daponte**, who have always supported me along the pathway. So, many thanks from the very bottom of my heart to all of these special persons: the conference exists this year because of them!

Since we are going to run the symposium virtually from Neuchâtel and surrounding regions, we try our best to host you and, therefore, we thought to also organize and offer you a virtual tour from **Neuchâtel** to the surrounding regions. We will move from Neuchâtel to fly into **Lausanne**, town of the main campus of EPFL (<https://www.epfl.ch/en/>) and site of the International Olympic Committee (<https://olympics.com/>), then to **Vevey**, a well representative town of the Lavaux' region (<https://www.region-du-leman.ch/en/Z9278/lavaux-unesco-terraced-vineyards>), finally to **Montreux**, town of the very famous Montreux Jazz Festival (<https://www.montreuxjazzfestival.com/en/>), before moving back to Neuchâtel by through **Gruyères**: the town of one of the most famous cheese in the world, and of a famous artist that gave the birth to the most famous science-fiction extraterrestrial-specie from Hollywood.

You will also receive a special gift from our conference realized in purpose for you, and inspired to this Swiss artist.

Please, enjoy our region and our symposium, even though only virtually, with joy in your heart to be part of a great community that is deeply contributing to the best of Measurement and Instrumentation for Applications to medical field!

Committee Members



Sandro Carrara
General Chair
EPFL, Switzerland



Catherine Dehollain
General Co-Chair
EPFL, Switzerland



Paola Saccomandi
Technical Program Chair
Politecnico di Milano, Italy



Emiliano Schena
Technical Program Chair
UCBM, Italy



Lorenzo Scalise
Special Sessions Chair
Marche Polytechnic University
Italy



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Politecnico di Torino, Italy



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A special thank goes to all reviewers for their important contribution to the scientific program.

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Karaböce, Baki	Zompanti, Alessandro

Special Sessions Organizers

SPS-1 Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology

Organizers: Valentina Agostini, Politecnico di Torino, Department of Electronics and Telecommunications, Italy
Cristiano De Marchis, Università degli Studi Roma Tre, Italy
Francesco Di Nardo, Università Politecnica delle Marche, Italy
Sandro Fioretti, Università Politecnica delle Marche, Italy

SPS-2 Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters

Organizers: Sara Casaccia, Università Politecnica delle Marche, Ancona, Italy
Lorenzo Scalise, Università Politecnica delle Marche, Ancona, Italy

SPS-3 From implantable devices to Smart Dust: solutions and challenges for a micro and nano scale precision and personalized medicine

Organizers: Danilo Demarchi, Politecnico di Torino, Italy
Paolo Motto Ros, Politecnico di Torino, Italy

SPS-4: The measurement and assessment of well-being during the Covid-19 pandemic: Implications in neurosciences, psychology and psychiatry.

Organizers: Eraldo Francesco Nicotra, University of Cagliari, Italy
Giorgio Marchese, National Research Council of Italy, Italy
Mirian Agus, University of Cagliari, Italy
Maria Pietronilla Penna, University of Cagliari, Italy
Pier Luigi Marconi, Artemis Neurosciences, Italy

Best Paper Awards

Domenico Grimaldi Best Paper Award

The "Domenico Grimaldi Best Paper Award" will be awarded to the best paper presented at the conference.

The best paper will be selected based on the technical quality and the review process of the initial full paper.

Best Student Paper Award

The Best Student Paper Award will be assigned to a paper whose first author is a student (undergraduate/PhD student) and marked as student paper on EDAS. The paper must be presented by the student.

The Best Student Paper will be selected based on the technical quality and the review process of the initial full paper.

Best Women in Engineering Paper Award

The Best Women in Engineering Paper Award will be assigned to a paper, whose first author is a woman who present it.

The Best Women in Engineering Paper will be selected based on the technical quality and the review process of the initial full paper.

All winners will be notified during the Symposium by email and announced by a virtual presentation, which will be uploaded on the MeMeA 2021 virtual conference platform by June 25, 2021. The awards winners will be also published on the MeMeA 2021 website and will receive a certificate following the conference.

Tutorial Speakers

Marco Carminati, Professor, Politecnico di Milano, Italy

“Charge Measuring Electronics in Medical Applications”



Marco Carminati, was born in 1981 in Milan (Italy). He received B. Sc. and M. Sc. in Electronic Engineering, both magna cum laude from Politecnico di Milano, in 2003 and 2005 respectively. In 2006 he joined DEI (Politecnico di Milano) and he completed the PhD in 2009, focusing on low-noise analog design and (bio)-electronic instrumentation. In 2007 he was awarded a Progetto Roberto Rocca Fellowship and spent the 2008 spring semester at MIT (USA) as a visiting student in prof. Joel Voldman's group, working on BioMEMS and microfluidics. From 2010 to 2015 he was post-doc researcher in the group of prof. Marco Sampietro contributing to the invention of original micro-sensors based on high-resolution impedance detection for silicon photonics and environmental monitoring. Since 2014 he is teacher of the “Biochip” course and serves as secretary of the IEEE I&M TC-34. Since 2016 he is Assistant Professor (tenure track) in the group led by prof. Carlo Fiorini, focusing on low-noise nuclear electronics, with applications spanning from medical imaging to neutrino physics.

He has co-authored 160+ peer-reviewed international publications (1770+ citations, h-index = 21), holds 4 patents and was awarded 3 best paper awards at IEEE conferences. He is IEEE Senior member and serves as Editor of IEEE TBioCAS.

Jean-Marie Fürbringer, Research Associate, EPFL, Switzerland

“A Gentle Introduction to DOE”



Jean-Marie Fürbringer graduated with a degree in Physics at EPFL in 1987. Developing his doctoral research on sensitivity analysis of simulation models, he was awarded the doctoral degree by EPFL in 1992.

From 1995 to 1997, Dr Fürbringer was visiting researcher at the NIST in Gaithersburg (Maryland).

In 1997, Dr Fürbringer was appointed visiting professor with the Faculty of Engineering Science at the Catholic University of Lima (PUCP). While at PUCP, he also established and managed the Learning Center of Graña y Montero, which provides training and competency management for the five companies of the group.

In 2001, Dr Fürbringer joined the laboratory of production and processes (LGPP) at EPFL where he led and managed several research projects on competency management and engineering education.

From 2007 to 2010, he was deputy director of the Institute of Mechanical Engineering.

Dr Fürbringer was appointed to the position of deputy dean of the EPFL Doctoral School in 2010 where he has worked till fall 2013.

Keynote Speakers

Michele Diana, Medical Scientific Director, IRCAD, France

“Endoscopic Luminescent Imaging for Oncologic Surgery: the ELIOS project”



Michele Diana, MD, Ph.D obtained the Medical Degree in Rome, Italy, and specialized in general surgery in Switzerland. He obtained a Ph.D in Medical Sciences and received the Venia Legendi at the University of Strasbourg (France). He is Scientific Director of the Research Institute against Cancer of the Digestive System (IRCAD), Strasbourg and the responsible of the Photonics for Health department of the ICube Lab (Strasbourg). He is faculty member of leading scholar surgical societies, including the European Association of Endoscopic Surgery (EAES), the International Society of Fluorescence Guided Surgery (ISFGS) and the International Society of Medical Innovation and Technology (iSMIT). His main translational research interests are image-guided surgery, virtual and augmented reality, optical imaging navigation systems, molecular fluorescence guided surgery, surgical robotics and machine and deep learning. He has authored more than 150 peer-reviewed papers and book chapters (h-index 32).

Taesung Kim, Professor, Sungkyunkwan University, South Korea

“Optical Fiber Sensors for Various Applications”



Dr. Taesung Kim received his Bachelor's in Mechanical Engineering from Seoul National University, Korea in 1994. He received his Master's, and Ph. D. in Mechanical Engineering from University of Minnesota, USA in 1998 and 2002, respectively. He joined Seagate Technology in 2002 and worked as Sr./Staff Engineer in Recording Head R&D.

Since 2005 Dr. Kim has been a professor in the School of Mechanical Engineering and SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University in Suwon, Korea. In 2014, he was appointed as SKKU Young Fellow and started working for SKKU Research & Business Foundation as a Vice President. His research interests include 2-D material synthesis, optical fiber sensors, semiconductor/display manufacturing process (CMP, cleaning and contamination control), and atmospheric/indoor aerosol control.

Program Schedule - Wednesday, June 23

8:30-9:00	Registration Opens		
9:00 – 10:00	Keynote Speaker Michele Diana- Medical Scientific Director, IRCAD "Endoscopic Luminescent Imaging for Oncologic Surgery: the ELIOS project"		
10:00-11:20	RS1- Bioengineering, rehabilitation and biomedical robotic methods - A	RS5- Instrumentation and processing techniques for biosignals – A	RS9- Measurement Systems for Supportive Technology
11:30-12:50	RS2- Bioengineering, rehabilitation and biomedical robotic methods - B	RS6- Instrumentation and processing techniques for biosignals – B	RS4- Estimation of tissue physical properties
13:00-14:00	BREAK		
14:00-15:20	RS3- Instrumentation and Measurements for intervention in clinical settings	RS7- Instrumentation and processing techniques for biosignals – C	
15:30-16:50	RS22- Health monitoring	RS23- Metrology, Medical Instrumentation Uncertainty and Calibrations – B	
17:00-18:00	Welcome Reception/Virtual Tour		

Program Schedule- Thursday, June 24

9:00 – 10:00	Keynote Speaker Taesung Kim- Sungkyunkwan University, South Korea “Optical Fiber Sensors for Various Applications”		
10:00-11:20	RS10- Advances in biomedical sensors and Instrumentation - A	RS13- Metrology, Medical Instrumentation Uncertainty and Calibrations – A	SS2-I- Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters I
11:30-12:50	RS11- Advances in biomedical sensors and Instrumentation - B	RS8- Measurements and Instrumentation for monitoring cardiovascular parameters	SS2-II- Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters II
13:00-14:00	BREAK		
14:00-15:20	RS12- Advances in biomedical sensors and Instrumentation - C		SS2- III- Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters III
15:30-16:50	RS24- Measurement systems for cognitive and behavioural monitoring		SS3- From implantable devices to Smart Dust: solutions and challenges for a micro and nano scale precision and personalized medicine
17:00-18:00	Tutorial Jean-Marie Fürbringer- EPFL, Switzerland “A Gentle Introduction to DOE”		

Program Schedule- Friday, June 25

8:30 – 10:00	Tutorial Marco Carminati, Politecnico di Milano, Italy “Charge Measuring Electronics in Medical Applications”		
10:00-11:20	RS14- Processing of biomedical signals – A	RS18- Advances in biomedical sensors and Instrumentation – D	SS1-I- Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology I
11:30-12:50	RS15- Processing of biomedical signals – B	RS19- Physiological measurements	SS1-II- Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology II
13:00-14:00	BREAK		
14:00-15:20	RS16- Image processing - A	RS20- Processing of biomedical signals – C	SS1-III- Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology III SS4-I- The measurement and assessment of well-being during the Covid-19 pandemic: Implications in neurosciences, psychology and psychiatry I
15:30-16:50	RS22- Health monitoring	RS23- Metrology, Medical Instrumentation Uncertainty and Calibrations – B	SS4-II- The measurement and assessment of well-being during the Covid-19 pandemic: Implications in neurosciences, psychology and psychiatry II
17:00-18:00	Award Ceremony and Closing Session		

8:30-9:00
Registration

9:00-10:00
Keynote Speech
"Endoscopic Luminescent Imaging For Oncologic Surgery: The ELIOS Project"
Chairs: Paola Saccomandi (Politecnico di Milano, Italy)

10:00-11:20
RS1: Bioengineering, rehabilitation and biomedical robotic methods - A
Chair: Laura Gastaldi (Politecnico di Torino, Italy)

10:00 Statistical correlation analysis between kinematic features and clinical indexes and scales for obese patients

Giuseppe Cesarelli (University of Naples & Federico II)
Leandro Donisi (University of Naples Federico II, Italy)
Giovanni Di Caprio (ICS Maugeri SPA SB, Italy)
Michelina Scioli (ICS Maugeri SPA SB, Italy)
Arcangelo Biancardi (ICS Maugeri SPA SB)
Giovanni D'Addio (ICS Maugeri SPA SB)

10:20 Repeatability of kinematic parameters related to the Timed Up and Go Test in patients with gait impairments

Gaetano Pagano (ICS Maugeri SB of Bari, Italy)
Leandro Donisi (University of Naples Federico II, Italy)
Vito Marsico (ICS Maugeri SPA SB, Italy)
Ernesto Losavio (ICS Maugeri SPA SB, Italy)
Mario Cesarelli (University of Naples Federico II, Italy)
Giovanni D'Addio (S. Maugeri Foundation, Rehabilitation Institute of Telese, Italy)

10:40 Sensors for Assistive Robotic Drinking with Physical Contact

Steffen Schöllmann (Westphalian University of Applied Sciences, Germany)
Pieter Try (Westphalian University of Applied Sciences, Germany)
Lukas Wöhle (Westphalian University of Applied Sciences, Germany)
Marion Gebhard (Westphalian University of Applied Sciences, Germany)

11:00 Mechanical Design of a Modular Gripper for Rehabilitation of Stroke Patients with Hemiplegia

Qing Zhu (Anhui University of Technology, China)
Jie Jin (Anhui University of Technology, China)
Qingyun Liu (Anhui University of Technology, China)
Mingxing Yang (Anhui University of Technology, China)
Heping Tong (Anhui University of Technology, China)

10:00-11:20
RS5: Instrumentation and processing techniques for biosignals - A
Chairs: Emiliano Schena (University Campus Bio-Medico of Rome, Italy), Roger Selzler (Carleton University, Canada)

10:00 Comparison of different similarity measures in hierarchical clustering

Marica Vagni (Politecnico di Torino, Italy)
Noemi Giordano (Politecnico di Torino, Italy)
Gabriella Balestra (Politecnico di Torino, Italy)
Samanta Rosati (Politecnico di Torino, Italy)

10:20 Impact of Subject-specific Training Data in Anxiety Level Classification from Physiologic Data

Roger Selzler (Carleton University, Canada)
Adrian D.C. Chan (Carleton University, Canada)
James R Green (Carleton University, Canada)

10:40 Cross Teager-Kaiser operator and Lempel-Ziv Index for the assessment of human posturographic data

Andrea Tigrini (Università Politecnica delle Marche, Italy)
Federica Verdini (Università Politecnica delle Marche, Italy)
Sandro Fioretti (Università Politecnica delle Marche, Italy)
Rosa Anna Rabini (INRCA Geriatric Hospital, Italy)
Oriano Mercante (INRCA Geriatric Hospital, Italy)
Alessandro Mengarelli (Università Politecnica delle Marche, Italy)

11:00 Efficient feature selection for electroencephalogram-based authentication

Nibras Abo Alzahab (Università Politecnica delle Marche, Italy)
Marco Baldi (Università Politecnica delle Marche, Italy)
Lorenzo Scalise (Università Politecnica delle Marche, Italy)

10:00-11:20

RS9: Measurement Systems for Supportive Technology

Chairs: *Gregorio Andria (Politecnico di Bari, Italy), Eduardo Palermo (Sapienza University of Rome, Italy)*

10:00 Electronic Travel Aid for Visually Impaired People: Design and Experimental of a Special Antenna

Alfredo De Leo (Università Politecnica dell Marche, Italy)
Paola Russo (Università Politecnica delle Marche, Italy)
Graziano Cerri (Università Politecnica delle Marche, Italy)

10:20 Measurement and Characterization of Hearing Protection Devices in the Presence of Impulse Sound

Bruno Tardif (Carleton University & National Defence - Canada, Canada)
David Lo (National Defence, Canada)
Rafik Goubran (Carleton University, Canada)

10:40 Supportive Smart Home Systems: Utilization Assessment for Internet Service Provider Networks

Saif Almhairat (Carleton University, Canada)
Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)
Julien Larivière-Chartier (Bruyère Research Institute, Canada)
Ali El-haraki (Telus, Canada)
Rafik Goubran (Carleton University, Canada)
Frank Knoefel (Bruyere Continuing Care, Canada)

11:00 Innovative Smart Face Mask to Protect Workers from COVID-19 Infection

Andrea Fois (2C Technologies Srl - University of Cagliari (Italy), Italy)
Filippo Tocco (University of Cagliari, Italy)
Antonio Dell'Osa (2C Technologies Srl – (University of Cagliari, Italy)
Laura Melis (2C Technologies Srl – University of Cagliari, Italy)
Ugo Bertelli (2C Technologies Srl - University of Cagliari, Italy)
Alberto Concu (University of Cagliari, Italy)
Andrea Manuello Bertetto (Politecnico di Torino, Italy)
Carmen Serra (Politecnico di Torino, Italy))

11:30-12:50

RS2: Bioengineering, rehabilitation and biomedical robotic methods - B

Chairs: *Catherine Dehollain (EPFL, Switzerland), Emil M. Petriu (University of Ottawa, Canada)*

11:30 Gait events detection from heel and toe trajectories: comparison of methods using multiple datasets

Vânia Guimarães (Fraunhofer Portugal AICOS, Portugal)
Ines Sousa (Fraunhofer Portugal AICOS, Portugal)
Miguel Correia (FEUP, Portugal)

11:50 Kinect-based wearable prototype system for ataxic patients neurorehabilitation: software update for exergaming and rehabilitation

Michela Franzo' (Sapienza, University of Rome, Italy)
Simona Pascucci (Sapienza, University of Rome, Italy)
Mariano Serrao (University of Rome Sapienza, Italy)
Franco Marinozzi (Sapienza University of Rome, Italy)
Fabiano Bini (SAPIENZA University of Rome, Italy)

12:10 Using Zigbee Sensors for Ambient Measurement of Human Gait - Analytical Considerations

Ashi Agarwal (Carleton University, Ottawa, Canada)
Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)
Laura Ault (Carleton University & Bruyere Research Institute, Canada)
Julien Larivière-Chartier (Bruyère Research Institute, Canada)
Frank Knoefel (Bruyere Continuing Care, Canada)
Rafik Goubran (Carleton University, Canada)
Jeffrey Kaye (Oregon Center for Aging & Technology, Canada)
Zachary Beattie (Oregon Health and Science University, USA)
Neil Thomas (Bruyère Research Institute, Canada)

12:30 Multi-Segments Kinematic Model of the Human Spine during Gait

Elisa Panero (Politecnico di Torino, Italy)
Elisa Digo (Politecnico di Torino, Italy)
Virginia Ferrarese (Politecnico di Torino, Italy)
Ugo Dimanico (Università degli Studi di Torino, Italy)
Laura Gastaldi (Politecnico di Torino, Italy)

11:30-12:50

RS4: Estimation of tissue physical properties

Chairs: *Joseph Cortner (Retired, USA), Zaccaria Del Prete (SAPIENZA University of Rome, Italy)*

11:30 Phantom Evaluation of a Time Warping Based Automated Arterial Wall Recognition and Tracking Method

Raj Kiran V (IIT Madras, India)
Nabeel PM (Indian Institute of Technology Madras & HTIC-IIT Madras Research Park, India)
Mohanasankar Sivaprakasam (IIT Madras, India)
Jayaraj Joseph (Indian Institute of Technology Madras, India)

11:50 An Image-Free Ultrasound Device for Simultaneous Measurement of Local and Regional Arterial Stiffness Indices

Nabeel PM (Indian Institute of Technology Madras & HTIC-IIT Madras Research Park, India)
Raj Kiran V (IIT Madras, India)
Malay Ilesh Shah (Healthcare Technology Innovation Centre (HTIC) & Indian Institute of Technology (IIT) Madras, India)
Abhidev V V (Healthcare Technology Innovation Centre, IIT Madras, India)
Rahul Manoj (Indian Institute of Technology Madras, India)
Mohanasankar Sivaprakasam (IIT Madras, India)
Jayaraj Joseph (Indian Institute of Technology Madras, India)

12:10 A Simple Instrument to Measure the Thermal Transport Properties of the Human Skin

Asier Zubiaga (ZHAW Zurich University of Applied Science, Switzerland)
Christoph Kirsch (ZHAW Zurich University of Applied Science, Switzerland)
Gernot Boiger (ZHAW Zurich University of Applied Science, Switzerland)
Mathias Bonmarin (Zurich University of Applied Sciences, Switzerland)

12:30 Multi-Gaussian Model for Estimating Stiffness Surrogate using Arterial Diameter Waveform

Rahul Manoj (Indian Institute of Technology Madras, India)
Raj Kiran V (IIT Madras, India)
Nabeel PM (Indian Institute of Technology Madras & HTIC-IIT Madras Research Park, India)
Mohanasankar Sivaprakasam (IIT Madras, India)
Jayaraj Joseph (Indian Institute of Technology Madras, India)

11:30-12:50

RS6: Instrumentation and processing techniques for biosignals - B

Chairs: *Paola Saccomandi (Politecnico di Milano, Italy), Pasquale Daponte (University of Sannio, Italy)*

11:30 Length of Stay Analysis at Neonatal Care Units with Data Science - Preliminary Results

Joao Rala Cordeiro (ISCTE-IUL, Lisbon University Institute & Instituto de Telecomunicações, IT-IUL, Portugal)
Octavian Adrian Postolache (Instituto de Telecomunicações, Lisboa/IT & Instituto Universitario de Lisboa, ISCTE-IUL, Portugal)

11:50 Comparison of Software Packages for the Analysis of Continuous Glucose Monitoring Data

Agnese Piersanti (Università Politecnica delle Marche, Italy)
Francesco Giurato (Università Politecnica delle Marche, Italy)
Laura Burattini (Università Politecnica delle Marche, Italy)
Andrea Tura (CNR Institute of Neuroscience, Italy)
Micaela Morettini (Università Politecnica delle Marche, Italy)

12:10 TSEA: An Open-Source Python-Based Annotation Tool for Time Series Data

Roger Selzler (Carleton University, Canada)
Adrian D.C. Chan (Carleton University, Canada)
James R Green (Carleton University, Canada)

12:30 Statistical Analysis of Mental Stress During Oral Presentation

Antony Raj (Project Engineer, India)
Vaishali B (Indian Institute of Technology, Madras, India)
Deepak Vagish (HTIC, IIT Madras, India)
Sricharan V (HTIC, IIT Madras, India)
Preejith Sp (HTIC-IITMadras, India)
Mohanasankar Sivaprakasam (IIT Madras, India)

13:00-14:00

Break

14:00-15:20

RS3: Instrumentation and Measurements for intervention in clinical settings

Chairs: Somayeh Asadi (Politecnico di Milano, Italy), Sundeep Singh (Wilfrid Laurier University, Canada)

14:00 A Deep Learning Force Estimator System for Intracardiac Catheters

Pedram Fekri (Concordia University, Canada)
Hamid Reza Nourani (Concordia University, Canada)
Masoud Razban (Concordia University, Canada)
Mehrdad H Zadeh (Kettering University, USA)
Javad Dargahi (Concordia University, Canada)
Ahmadreza Arshi (Amirkabir University of Technology, Iran)

14:20 Feedback-controlled thermal therapy of tissues based on fiber Bragg grating thermometers

Sanzhar Korganbayev (Politecnico di Milano, Italy)
Annalisa Orrico (Politecnico di Milano, Italy)
Leonardo Bianchi (Politecnico di Milano, Italy)
Martina De Landro (Politecnico di Milano, Italy)
Alexey Wolf (Institute of Automation and Electrometry SB RAS, Russia)
Alexander Dostovalov (Novosibirsk State University, Russia)
Paola Saccomandi (Politecnico di Milano, Italy)

14:40 Controlled photothermal therapy based on temperature monitoring: theoretical and experimental analysis

Annalisa Orrico (Politecnico di Milano, Italy)
Leonardo Bianchi (Politecnico di Milano, Italy)
Sanzhar Korganbayev (Politecnico di Milano, Italy)
Martina De Landro (Politecnico di Milano, Italy)
Paola Saccomandi (Politecnico di Milano, Italy)

15:00 Measurement of Enhanced Photothermal Effects of CuO-encapsulated Polymeric Nanospheres

Sanzhar Korganbayev (ORT Braude College, Italy)
Somayeh Asadi (Politecnico di Milano, Italy)
Inbal Maor (ORT Braude College, Italy)
Emiliano Schena (University Campus Bio-Medico of Rome, Italy)
Haim Azhari (Technion, Israel)
Iris Weitz (ORT Braude College, Israel)
Paola Saccomandi (Politecnico di Milano, Italy)

14:00-15:20

RS7: Instrumentation and processing techniques for biosignals - C

Chairs: Soroor Behbahani (Islamic Azad University South Tehran Branch, Iran), Salvatore Andrea Pullano (University Magna Graecia of Catanzaro, Italy)

14:00 Simultaneous Measurement of Heartbeat Intervals and Respiratory Signal using a Smartphone

Marco Scarpetta (Polytechnic University of Bari, Italy)
Maurizio Spadavecchia (Polytechnic University of Bari, Italy)
Gregorio Andria (Politecnico di Bari, Italy)
Mattia Alessandro Ragolia (Politecnico di Bari, Italy)
Nicola Giaquinto (Politecnico di Bari, Italy)

14:20 An Efficient Near-lossless Compression Algorithm for Multichannel EEG signals

Giuseppe Campobello (University of Messina, Italy)
Angelica Quercia (University of Messina, Italy)
Giovanni Gugliandolo (University of Messina, Italy)
Antonino Segreto (University of Messina, Italy)
Elisa Tatti (CUNY School of Medicine, USA)
Maria Ghilardi (CUNY School of Medicine, USA)
Giovanni Crupi (University of Messina, Italy)
Angelo Quartarone (University of Messina, Italy)
Nicola Donato (University of Messina, Italy)

14:40 Deterministic Compressed Sensing of heart sound signals

Pasquale Daponte (University of Sannio, Italy)
Luca De Vito (University of Sannio, Italy)
Grazia Iadarola (University of Sannio, Italy)
Francesco Picariello (University of Sannio, Italy)
Sergio Rapuano (University of Sannio, Italy)

15:00 Non-Linear and Chaos-based Analysis of Electroretinogram

Soroor Behbahani (Islamic Azad University, South Tehran Branch, Iran)
Sreeraman Rajan (Carleton University, Canada)

15:30-16:50

RS22: Health monitoring

Chairs: *Luca De Vito (University of Sannio, Italy), Daniela Lo Presti (Università Campus Bio-Medico di Roma, Italy)*

15:30 A Wearable SSVEP BCI for AR-based, Real-time Health Monitoring Applications

Pasquale Arpaia (University of Naples Federico II, Italy)
Egidio De Benedetto (University of Naples Federico II, Italy)
Nicola Donato (University of Messina, Italy)
Luigi Duraccio (Polytechnic University of Turin (Italy))
Nicola Moccaldi (University of Naples Federico II, Italy)

15:50 mHealth application for remote health monitoring useful during the COVID 19 pandemic

Virginia Sandulescu (National Institute of Research and Studies for Communications, Romania)
Sorin Puşcoci (National Institute for Studies and Research in Communications, Romania)
Monica Petre (National Institute for Studies and Research in Communications, Romania)
Minodora Dumitrache (National Institute for Studies and Research in Communications, Romania)
Viorel Bota (ElisaMed, Romania)
Alexandru Gîrlea (QuickWeb Info, Romania)

16:10 Multiple Input, Single Output Frequency Mixing Communication Technique for Low Power Data Transmission

Giuliana Emmolo (Politecnico di Torino, Italy & Imperial College, United Kingdom, Great Britain)
Daryl Ma (Imperial College London, United Kingdom, Great Britain)
Danilo Demarchi (Politecnico di Torino, Italy)
Pantelis Georgiou (Imperial College London, United Kingdom, Great Britain)

15:30-16:20

RS23: Metrology, Medical Instrumentation Uncertainty and Calibrations - B

Chairs: *Pasquale Daponte (University of Sannio, Italy), Marco Parvis (Politecnico di Torino, Italy)*

15:30 Impact of face coverings on the cough measurement characterization

Madison Cohen-McFarlane (Carleton University, Canada)
Pengcheng Xi (National Research Council Canada, Canada)
Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)
Julio Valdes (Researcher at the National Research Council of Canada, Canada)
Rafik Goubran (Carleton University, Canada)
Frank Knoefel (Bruyere Continuing Care, Canada)

15:50 Reducing effect of magnetic field noise on sensor position estimation in surgical EM tracking

Mattia Alessandro Ragolia (Politecnico di Bari, Italy)
Filippo Attivissimo (Politecnico di Bari, Italy)
Attilio Di Nisio (Politecnico di Bari, Italy)
Anna Maria Lucia Lanzolla (Polytechnic of Bari, Italy)
Marco Scarpetta (Polytechnic University of Bari, Italy)

16:10 A novel Sensitivity Index from the Flow Velocity Variation in Quality Control for PW Doppler: a preliminary study

Giorgia Fiori (Roma Tre University, Italy)
Fabio Fuiano (Roma Tre University, Italy)
Andrea Scorza (Roma TRE University, Italy)
Maurizio Schmid (Roma Tre University, Italy)
Jan Galo (IRCCS Children Hospital Bambino Gesù, Italy)
Silvia Conforto (University Roma Tre, Italy);
Salvatore Andrea Sciuto (University of ROMA TRE, Italy)

17:00-18:00

Welcome Reception/Virtual Tour

9:00-10:00

Keynote Speech

“Optical Fiber Sensors for Various Applications”

Chairs: *Emiliano Schena (University Campus Bio-Medico of Rome, Italy)*

10:00-11:20

RS10: Advances in biomedical sensors and instrumentation - A

Chair: *Luca Lombardo (Politecnico di Torino, Italy), Fabrizio Spano (ZHAW Zurich University of Applied Science, Switzerland)*

10:00 RL-EGOFET cell biosensors: A novel approach for the detection of action potentials

Giada Giorgi (University of Padova, Italy)
Nicolò Lago (Università di Padova, Italy)
Sarah Tonello (University of Padova, Italy)
Alessandra Galli (University of Padova, Italy)
Marco Buonomo (Università di Padova, Italy)
Morten Gram Pedersen (Università di Padova, Italy)
Andrea Cester (University of Padova, Italy)

10:20 A Capacitive Color Changing Electronic Skin for Touch Sensing Applications

Fabrizio Spano (ZHAW - Zurich University of Applied Sciences, Switzerland)

10:40 Equivalent Circuit Analysis of CMUTs-based Device for Measurement in Liquid Samples

Yihe Zhao Zhao (Xi'an Jiaotong University, China)
Libo Zhao (Xi'an Jiaotong University, China)
Gian Luca Barbruni (EPFL, Switzerland)
Zhikang Li (Xi'an Jiaotong University, China)
Zhuangde Jiang (Xi'an Jiaotong University, China)
Sandro Carrara (EPFL, Switzerland)

11:00 Parametric analysis for the design of hip joint replacement simulators

Shams Torabnia (KOC University, Turkey)
Şenay Mihçin (Izmir Institute of Technology, Turkey)
İsmail Lazoğlu (KOC University, Turkey)

10:00-11:20

RS13: Metrology, Medical Instrumentation Uncertainty and Calibrations - A

Chairs: *Andrea Scorza (Roma TRE University, Italy), Baki Karaböce (TÜBİTAK UME & National Metrology Institute of Turkey, Turkey)*

10:00 Comparison of Portable Calibrator Produced in TÜBİTAK UME for the Calibration of Infrared Ear Thermometers with the Primary Calibration System

Hüseyin Okan Durmuş (National Metrology Institute, Turkey)
Baki Karaböce (TÜBİTAK UME & National Metrology Institute of Turkey, Turkey)

10:20 Repeatability and reproducibility in the breathability measurement of surgical masks

Juri Taborri (University of Tuscia, Viterbo, Italy)
Beatrice Stocchi (University of Tuscia, Viterbo, Italy)
Giuseppe Calabrò (University of Tuscia, Italy)
Stefano Rossi (University of Tuscia, Italy)

10:40 A preliminary study on the dynamic characterization of a MEMS microgripper for biomedical applications

Federica Vurchio (University Roma Tre, Italy)
Gabriele Bocchetta (Roma Tre University, Italy)
Giorgia Fiori (Roma Tre University, Italy)
Andrea Scorza (Roma TRE University, Italy)
Nicola Pio Belfiore (Roma Tre University, Italy)
Salvatore Andrea Sciuto (University of ROMA TRE, Italy)

11:00 Characterization of Muscle Phantom Used in Calibration of Physiotherapy Ultrasound: Measurement of Acoustic Parameters of Phantom

Neslişah Gün (Marmara University Institute of Health Sciences & İstanbul Arel University, Turkey)
Baki Karaböce (TÜBİTAK UME & National Metrology Institute of Turkey, Turkey)
Ufuk Yurdalan (Marmara Üniversitesi, Turkey)

10:00-11:20

SS2- I: Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters

Chairs: Sara Casaccia (*Università Politecnica delle Marche, Italy*), Sergio Rapuano (*University of Sannio, Italy*)

10:00 A smart face mask based on photoplethysmography for cardiorespiratory monitoring in occupational settings

Riccardo Sabbadini (*Università Campus Bio-Medico di Roma, Italy*)
Joshua Di Tocco (*Università Campus Bio-Medico di Roma, Italy*)
Massimiliano Carassiti (*Università Campus Bio-Medico di Roma, Italy*)
Carlo Massaroni (*Università Campus Bio-Medico di Roma, Italy*)
Emiliano Schena (*University Campus Bio-Medico of Rome, Italy*)

10:20 Measuring the Effect of Rhythmic Auditory Stimuli on Parkinsonian Gait in Challenging Settings

Ilaria Miletì (*University Niccolò Cusano, Italy*)
Marco Germanotta (*Don Carlo Gnocchi Onlus Foundation, Milan, Italy*)
Chiara Iacovelli (*Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy*)
Giulia Di Lazzaro (*Università degli studi di Roma Tor Vergata, Italy*)
Zaccaria Del Prete (*SAPIENZA University of Rome, Italy*)
Maria Rita Lo Monaco (*Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy*)
Diego Ricciardi (*Fondazione Policlinico Universitario Agostino Gemelli, IRCCS, Rome, Italy*)
Anna Rita Bentivoglio (*Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Roma, Italy*)
Eduardo Palermo (*Sapienza University of Rome, Italy*)

10:40 Cardiorespiratory monitoring using a mechanical and an optical system

Daniela Lo Presti (*Università Campus Bio-Medico di Roma, Italy*)
Carlo Massaroni (*Università Campus Bio-Medico di Roma, Italy*)
Michele Arturo Caponero (*ENEA Frascati Research Centre, Italy*)
Domenico Formica (*Università Campus Bio-Medico di Roma, Italy*)
Emiliano Schena (*University Campus Bio-Medico of Rome, Italy*)

11:00 Few-shot Fall Detection using Shallow Siamese Network

Satyake Bakshi (*Carleton University, Canada*)
Sreeraman Rajan (*Carleton University, Canada*)

11:30 - 12:50

RS8: Measurements and Instrumentation for monitoring cardiovascular parameters

Chairs: Paola Saccomandi (*Politecnico di Milano, Italy*), Sergio Rapuano (*University of Sannio, Italy*)

11:30 Non-contact Blood Pressure Estimation Using a 300 GHz Continuous Wave Radar and Machine Learning Models

Marie Jung (*Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR, Germany*)
Michael Caris (*Fraunhofer FHR, Germany*)
Stephan Stanko (*Fraunhofer FHR, Germany*)

11:50 Effects of Region of Interest Size on Heart Rate Assessment through Video Magnification

Leen Yassin Kassab (*Carleton University, Canada*)
Andrew Law (*National Research Council, Canada*)
Bruce Wallace (*AGE-WELL NIH SAM3 & Carleton University, Canada*)
Julien Larivière-Chartier (*Bruyère Research Institute, Canada*)
Rafik Goubran (*Carleton University, Canada*)
Frank Knoefel (*Bruyere Continuing Care, Canada*)

12:10 Measuring Coronary Artery Capillary Resistance with Variable Inflow Conditions

Daniel Goubran (*University of British Columbia, Canada*)
Samuel Lichtenstein (*University of British Columbia, Canada*)
Rafik Goubran (*Carleton University, Canada*)
Julien Larivière-Chartier (*Bruyère Research Institute, Canada*)
James Abel (*University of British Columbia, Canada*)

12:30 Automated, Portable, and Low-Cost System for Home Screening of Peripheral Arterial Disease

Nosratollah Forghani (*Azad University-Science and Research Branch, Iran*)
Keivan Maghooli (*Department Islamic Azad University Science and Research Branch Tehran Iran, Iran*)
Nader Jafarnia Dabanloo (*Azad University-Science and Research Branch, Iran*)
Ali Vasheghani Farahani (*University of Tehran, Iran*)
Mohamad Forouzanfar (*École de Technologie Supérieure, University of Quebec, Canada & SRI International, USA*)

11:30-12:50

RS11: Advances in biomedical sensors and Instrumentation - B

Chairs: *Nicola Donato (University of Messina, Italy), Rafik Goubran (Carleton University, Canada)*

11:30 Design of Low-Power Highly Accurate CMOS Potentiostat Using the gm/ID Methodology

Yaohua Zhang (Imperial College London, United Kingdom (Great Britain))
Daryl Ma (Imperial College London, United Kingdom (Great Britain))
Sandro Carrara (EPFL, Switzerland)
Pantelis Georgiou (Imperial College London, United Kingdom (Great Britain))

11:50 Hydrogen chemoresistive sensor for the analysis of gut health

Alessio Gullino (Politecnico di Torino, Italy)
Sabrina Grassini (Politecnico di Torino, Italy)
Giovanni Gugliandolo (University of Messina, Italy)
Kaveh Moulaei (University of Messina, Italy)
Nicola Donato (University of Messina, Italy)
Marco Parvis (Politecnico di Torino, Italy)
Luca Lombardo (Politecnico di Torino, Italy)

12:10 Aptamer based Lateral Flow Assays for Rapid and Sensitive Detection of CKD marker Cystatin C

Satheesh Natarajan (Healthcare Technology Innovation Center (HTIC), India)
Malay Ilesh Shah (Healthcare Technology Innovation Centre (HTIC) & Indian Institute of Technology (IIT) Madras, India)
Maria Derosa (Carleton University, Canada, Canada)
Srinivasa Karthik (Healthcare Technology Innovation Centre, India)
Jayaraj Joseph (Indian Institute of Technology Madras, India)

12:30 Pressure sensors used as bioimpedance plantar electrodes: a feasibility study

Isabel Morales (Universidad de la República & Núcleo de Ingeniería Biomédica, Uruguay)
Rafael González-Landaeta (Universidad Autónoma de Ciudad Juárez, Uruguay)
Franco Simini (Universidad de la Republica, Uruguay)

11:30-12:50

SS2- II: Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters

Chairs: *Pasquale Arpaia (University of Naples Federico II, Italy), Carlo Massaroni (Università Campus Bio-Medico di Roma, Italy)*

11:30 Ensemble Empirical Mode Decomposition for Efficient R-Peak Detection in Electrocardiograms Acquired by Portable Sensors During Sport Activity

Sofia Romagnoli (Università Politecnica delle Marche, Italy)
Ilaria Marcantoni (Università Politecnica delle Marche, Italy)
Katyana Campanella (Università Politecnica delle Marche, Italy)
Agnese Sbröllini (Università Politecnica delle Marche, Italy)
Micaela Morettini (Università Politecnica delle Marche, Italy)
Laura Burattini (Università Politecnica delle Marche, Italy)

11:50 Autonomic Nervous System Assessment During Physical Rehabilitation Serious Game

Mariana Catela Jacob Rodrigues (ISCTE-IUL & Instituto de Telecomunicações, Portugal)
Octavian Adrian Postolache (Instituto de Telecomunicações, Lisboa/IT & Instituto Universitario de Lisboa, ISCTE-IUL, Portugal)
Francisco Cercas (ISCTE-IUL & Instituto de Telecomunicações, Portugal)

12:10 ML algorithms for the assessment of prescribed physical exercises

Sara García de Villa (University of Alcalá, Spain)
Andrea Martínez Parra (University of Alcalá, Spain)
Ana Jiménez Martín (University of Alcalá, Spain)
J. Jesús García (University of Alcalá, Spain)
David Casillas-Perez (Rey Juan Carlos University, Spain)

12:30 Impact of reconstruction algorithms on dynamic ECG compressed sensing

Pasquale Daponte (University of Sannio, Italy)
Luca De Vito (University of Sannio, Italy)
Enrico Picariello (University of Sannio, Italy)
Sergio Rapuano (University of Sannio, Italy)

13:00-14:00

Break

14:00-15:20

RS12: Advances in biomedical sensors and Instrumentation – C

Chairs: *Sabrina Grassini (Politecnico di Torino, Italy), Marco Tarabini (Politecnico di Milano, Italy)*

14:00 Preliminary Study of a Flexible Printed Multi-Sensing Platform for Electromyography and Lactate Measuring during Rehabilitation

Sarah Tonello (University of Padova, Italy)
Giada Giorgi (University of Padova, Italy)
Claudio Narduzzi (Università di Padova, Italy)
Tiziano Fapanni (University of Brescia, Italy)
Edoardo Cantù (University of Brescia, Italy)
Mauro Serpelloni (University of Brescia, Italy)
Emilio Sardini (University of Brescia, Italy)
Sandro Carrara (EPFL, Switzerland)

14:20 Electric field distribution analysis for the design of an electrode system in a 3D neuromuscular junction microfluidic device

Flavia Forconi (Sapienza Università di Roma, Italy)
Ludovica Apa (Sapienza, University of Rome, Italy)
Livio D'Alvia (Sapienza University of Rome, Italy)
Marianna Cosentino (Sapienza, University of Rome, Italy)
Emanuele Rizzuto (Sapienza University of Rome, Italy)
Zaccaria Del Prete (SAPIENZA University of Rome, Italy)

14:40 Design and response analysis of a circular patch antenna for adherent cell culture detection

Serena Carraro (Università di Roma Sapienza, Italy)
Livio D'Alvia (Sapienza University of Rome, Italy)
Francesca Cerminara (Sapienza University of Rome, Italy)
Zaccaria Del Prete (SAPIENZA University of Rome, Italy)
Emanuele Rizzuto (Sapienza University of Rome, Italy)

15:00 Enhancing the Fluorescence and Cycle Threshold of qPCR Devices Through Excitation Time Point Adjustment

Hsin-Yi Tsai (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)
Liang-Chieh Chao (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)
Cheng-Ru Li (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)
Kuo-Cheng Huang (Instrument Technology Research Center, Taiwan)
Yu-Hsuan Lin (Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan)
Dar-Bin Shieh (National Cheng Kung University & NCKU Hospital, Taiwan)

14:00-15:20

SS2- III: Wearable sensors in the era of remote and continuous monitoring of physiological and physical parameters

Chairs: *Luca De Vito (University of Sannio, Italy), Octavian Adrian Postolache (Instituto de Telecomunicações, Lisboa/IT & Instituto Universitario de Lisboa, ISCTE-IUL, Portugal)*

14:00 Wirelessly Powered Device for Optical Measurement of Respiration Rate

Yu-Chieh Chen (Taiwan Instrument Research Institute, NARL, Taiwan)
James Tsan (Ezinstrument Co., Ltd., Taiwan)
Wen-Yen Lin (Chang Gung University, Taiwan)

14:20 Smartwatches selection: market analysis and metrological characterization on the measurement of number of steps

Sara Casaccia (Università Politecnica delle Marche, Italy)
Gian Marco Revel (Università Politecnica delle Marche, Italy)
Giacomo Cucchieri (IRCCS INRCA, Italy)
Lorena Rossi (INRCA, Italy)
Lorenzo Scalise (Università Politecnica delle Marche, Italy)

14:40 Analysis of Galvanic Skin Response to Acoustic Stimuli by Wearable Devices

Grazia Iadarola (University of Sannio, Italy)
Angelica Poli (Università Politecnica delle Marche, Italy)
Susanna Spinsante (Università Politecnica delle Marche, Italy)

15:00 Metrological characterization and signal processing of a wearable sensor for the measurement of heart rate variability

Nicole Morresi (Università Politecnica delle Marche, Italy)
Sara Casaccia (Università Politecnica delle Marche, Italy)
Gian Marco Revel (Università Politecnica delle Marche, Italy)

15:30-16:50

RS24: Measurement systems for cognitive and behavioural monitoring

Chairs: *Anna Maria Lucia Lanzolla (Polytechnic of Bari, Italy), Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)*

15:30 The use of cognitive training, combined with tDCS, for craving reduction and inhibitory control improvement in cocaine dependence: a case study

Natale Salvatore Bonfiglio (University of Bologna, Italy)

Roberta Renati (University of Pavia, Italy)

Dilucia Kristel (University of Pavia, Italy)

Dolores Rollo (University of Parma, Italy)

Maria Pietronilla Penna (University of Cagliari, Italy)

15:50 PsySuite, an Android App for behavioural tests in the temporal domain

Alberto Inuggi (Istituto Italiano di Tecnologia, Italy)

Alessia Tonelli (Istituto Italiano di Tecnologia, Italy)

Monica Gori (Italian Institute of Technology, Italy)

16:10 Development of a multi-transduction system for breath analysis in neurodegenerative diseases

Giovanni Gugliandolo (University of Messina, Italy)

Giuseppe Campobello (University of Messina, Italy)

Zlatica Marinković (University of Nis, Serbia)

Giovanni Crupi (University of Messina, Italy)

Angelo Quartarone (University of Messina, Italy)

Giovanni Neri (University of Messina, Italy)

Nicola Donato (University of Messina, Italy)

15:30-16:50

SS3: From implantable devices to Smart Dust: solutions and challenges for a micro and nano scale precision and personalized medicine

Chairs: *Paolo Motto Ros (Politecnico di Torino, Italy), Danilo Demarchi (Politecnico di Torino, Italy)*

15:30 A 20 Mbps, 433 MHz RF ASK Transmitter to Inductively Power a Distributed Network of Miniaturised Neural Implants

Gian Luca Barbruni (EPFL, Switzerland)

Fabio Asti (EPFL, Switzerland)

Paolo Motto Ros (Politecnico di Torino, Italy)

Diego Ghezzi (EPFL, Switzerland)

Danilo Demarchi (Politecnico di Torino, Italy)

Sandro Carrara (EPFL, Switzerland)

15:50 A Real-Time DSP-Based Biohybrid MEA System for Seizure Detection In Vitro

Teresa Serrano-Gotarredona (National Microelectronics Center, CNM-CSIC, Spain)

Bernabe Linares-Barranco (Instituto de Microelectronica de Sevilla, Spain)

Javad Ahmadi-farsani (Instituto de Microelectrónica de Sevilla (IMSE-CNM), Spain)

Gabriella Panuccio (IIT, Italy)

Davide Caron (IIT, Italy)

16:10 A 300mV-Supply, 144nW-Power, 0.03mm²-Area, 0.2-PEF Digital-Based Biomedical Signal Amplifier in 180nm CMOS

Pedro Toledo (Politecnico di Torino, Italy)

Hamilton Klimach (UFRGS, Brazil)

Sergio Bampi (Federal University of Rio Grande do Sul & Microelectronics Group at UFRGS, Brazil)

Paolo S. Crovetto (Politecnico di Torino, Italy)

16:30 Capacitive Link for Data Communication Between Free Floating mm-sized Brain Implants

Xiao Sha (Stonybrook University, USA)

Yasha Karimi (Stony Brook University, USA)

Milutin Stanacevic (SUNY Stony Brook, USA)

Puyang Zheng (Stony Brook University, USA)

17:00-18:30

Tutorial

“A Gentle Introduction to DOE”

Chairs: *Lorenzo Scalise (Università Politecnica delle Marche, Ancona, Italy)*

8:30-10:00

Tutorial

“Charge Measuring Electronics in Medical Applications”

Chairs: Sabrina Grassini (Politecnico di Torino, Italy)

10:00-11:20

RS 14: Processing of biomedical signals - A

Chairs: Paolo Sommella (University of Salerno, Italy), Micaela Morettini (Università Politecnica delle Marche, Italy)

10:00 DeepHealth: A Secure Framework to Manage Health Certificates Through Medical IoT, Blockchain and Deep Learning

Gazi Abdur Rakib (Bangladesh University of Engineering and Technology, Bangladesh)

Mohammad Saiful Islam (University of London, Saudi Arabia)

Md Abdur Rahman (University of Prince Mugrin, Saudi Arabia)

Abdullah Maruf Syed (NGM Lab, Bangladesh)

M. Shamim Hossain (King Saud University & University of Ottawa, Saudi Arabia)

Nabil Alrajeh (King Saud University, Saudi Arabia)

Abdulmotaleb El Saddik (University of Ottawa, Canada)

10:20 Analysis of cough sound measurements including COVID-19 positive cases: A machine learning characterization

Julio Valdes (Researcher at the National Research Council of Canada, Canada)

Pengcheng Xi (National Research Council Canada, Canada)

Madison Cohen-McFarlane (Carleton University, Canada)

Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)

Rafik Goubran (Carleton University, Canada)

Frank Knoefel (Bruyere Continuing Care, Canada)

10:40 Distinguishing Stroke patients with and without Unilateral Spatial Neglect by means of Clinical Features: a Tree-based Machine Learning Approach

Leandro Donisi (University of Naples Federico II, Italy)

Pasquale Moretta (ICS Maugeri SPA SB, Italy)

Armando Coccia (University of Naples Federico II, Italy)

Federica Amitrano (University of Naples Federico II, Italy)

Arcangelo Biancardi (S. Maugeri Foundation, Italy)

Giovanni D'Addio (S. Maugeri Foundation, Rehabilitation Institute of Telesse, Italy)

11:00 Location Independence in Machine Learning Classification of Sitting-Down and Standing-Up Actions using Wi-Fi Sensors

Itaf O. Joudeh (Carleton University, Canada)

Ana-Maria Cretu (University of Quebec Outaouais, Canada)

Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)

Rafik Goubran (Carleton University, Canada)

Michel Allegue (Aerial, Canada)

Frank Knoefel (Bruyere Continuing Care, Canada)

10:00-11:20

RS18: Advances in biomedical sensors and instrumentation - D

Chairs: Emiliano Schena (University Campus Bio-Medico of Rome, Italy), Juri Taborri (University of Tuscia, Viterbo, Italy)

10:00 Unobtrusively Detecting Apnea and Hypopnea Events via a Hydraulic Bed Sensor

David Heise (Lincoln University, USA)

Ruhan Yi (University of Missouri, Columbia, USA)

Laurel A Despins (University of Missouri, Columbia, USA)

10:20 Contactless Continuous Monitoring of Respiration

Lorenzo Scalise (Università Politecnica delle Marche, Italy)

Mir farooq Ali (Marche Polytechnic University, Italy)

Luca Antognoli (Università Politecnica delle Marche, Italy)

10:40 Toward Continuous Estimation of Cardiorespiratory Parameters in Oscillometry: A Simulation Study

Mohammad Hasan Azad (K. N. Toosi University of Technology, Iran)

Ramin Farzam (K. N. Toosi University of Technology, Iran)

Hamidreza Sadeghi (K. N. Toosi University of Technology, Iran);

Nikta Zarif Yusefian (Université de Sherbrooke, Canada)

Mohamad Forouzanfar (École de Technologie Supérieure, University of Quebec, Canada & SRI International, USA)

11:00 Stability Analysis for Howland Current Source for Bioimpedance Measurement

Hanan Nouri (Technische Universität Chemnitz & Fakultät für Elektrotechnik und Informationstechnik, Germany)

Dhouha Bouchaala (Technische Universität Chemnitz, Germany & Digital Research Center of Sfax, Tunisia)

Olfa Kanoun (Chemnitz University of Technology, Germany)

10:00-11:20

SS1- I: Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology

Chairs: *Valentina Agostini (Politecnico di Torino, Italy), Francesco Di Nardo (Università Politecnica delle Marche, Italy)*

10:00 Analysis of Test-Retest Repeatability of Gait Analysis Parameters in Hereditary Spastic Paraplegia

Armando Coccia (University of Naples Federico II, Italy)
Federica Amitrano (University of Naples Federico II, Italy)
Pietro Balbi (Maugeri SPA SB, Italy)
Leandro Donisi (University of Naples Federico II, Italy)
Arcangelo Biancardi (S. Maugeri Foundation, Italy)
Giovanni D'Addio (S. Maugeri Foundation, Rehabilitation Institute of Telesse, Italy)

10:20 Influence of Gait Cycle Normalization on Principal Activations

Gregorio Dotti (Politecnico di Torino, Italy)
Marco Ghislieri (Politecnico di Torino, Italy)
Samanta Rosati (Politecnico di Torino, Italy)
Valentina Agostini (Politecnico di Torino, Italy)
Marco Knafitz (Politecnico di Torino, Italy)
Gabriella Balestra (Politecnico di Torino, Italy)

10:40 Effect of Deep Brain Stimulation Frequency on Gait Symmetry, Smoothness and Variability using IMU

Elisa Panero (Politecnico di Torino, Italy)
Elisa Digo (Politecnico di Torino, Italy)
Ugo Dimanico (Università degli Studi di Torino, Italy)
Carlo Alberto Artusi (Università degli Studi di Torino, Italy)
Maurizio Zibetti (Università degli Studi di Torino, Italy)
Laura Gastaldi (Politecnico di Torino, Italy)

11:00 Gait Parameters of Elderly Subjects in Single-task and Dual-task with three different MIMU set-ups

Elisa Digo (Politecnico di Torino, Italy)
Elisa Panero (Politecnico di Torino, Italy)
Valentina Agostini (Politecnico di Torino, Italy)
Laura Gastaldi (Politecnico di Torino, Italy)

11:30-12:50

RS15: Processing of biomedical signals - B

Chairs: *Aime' Lay-Ekuakille (University of Salento, Italy)*

11:30 Identifying High Risk of Atherosclerosis Using Deep Learning and Ensemble Learning

Hedieh Hashem Olhosseiny (University of Ottawa, Canada)
Mohammadsalar Mirzaloo (University of Ottawa, Canada)
Miodrag Bolic (University of Ottawa, Canada)
Hilmi R Dajani (University of Ottawa, Canada)
Voicu Groza (University of Ottawa, Canada)
Masayoshi Yoshida (University of Ottawa, Canada)

11:50 Detection of Sleep Apnea from Single-Lead ECG: Comparison of Deep Learning Algorithms

Mahsa Bahrami (K. N. Toosi University of Technology, Iran)
Mohamad Forouzanfar (École de Technologie Supérieure, University of Quebec, Canada & SRI International, USA)

12:10 Biological Data Classification via Faster MAXimum Feasible Subsystem Algorithm

Fereshteh Fakhhar Firouzeh (Carleton University, Canada)
John Chinneck (Carleton University, Canada)
Sreeraman Rajan (Carleton University, Canada)

12:30 Classification-based screening of Parkinson's disease patients through voice signal

Fulvio Cordella (Università La Sapienza & Technoscience, Italy)
Alessandra Paffi (Sapienza University of Rome, Italy)
Antonio Pallotti (University of Rome Tor Vergata & Technoscience, Italy)

11:30-12:50

RS19: Physiological measurements

Chairs: *Emma Paola Angelini (Politecnico di Torino, Italy), Voicu Groza (University of Ottawa, Canada)*

11:30 Modulated ECG: Utilization of the Time-Variant Coupling in Capacitive ECG

Durmus Umutcan Uguz (RWTH Aachen University, Germany)

Steffen Leonhardt (RWTH Aachen, Germany)

Christoph Hoog Antink (RWTH Aachen University & Chair for Medical Information Technology, Germany)

11:50 Virtual Reality Archery to quantify the development of Head-Trunk Coordination, Visuomotor transformation And Egocentric Spatial Representation

Davide Esposito (Università di Genova & Istituto Italiano di Tecnologia, Italy)

Alice Bollini (Istituto Italiano di Tecnologia, Italy)

Monica Gori (Italian Institute of Technology, Italy)

12:10 The capabilities of bioelectrical impedance body composition monitors in determining metabolic parameters during body shaping

Natalia Igorevna Khramtsova (E. A. Vagner Perm State Medical University, Russia)

Sergei Aleksandrovich Plaksin (E. A. Vagner Perm State Medical University, Russia)

Danil Ponomarev (E. A. Vagner Perm State Medical University, Russia)

Artem Sotskov (E. A. Vagner Perm State Medical University, Russia)

12:30 Optimization of Blood Microfluidic Co-Flow Devices for Dual Measurement

Amit Nayak (University of Ottawa, Canada)

Curtis Armstrong (University of Ottawa, Canada)

Catherine Mavriplis (University of Ottawa, Canada)

Marianne Fenech (University of Ottawa, Canada)

11:30-12:50

SS1- II: Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology

Chairs: *Valentina Agostini (Politecnico di Torino, Italy), Cristiano De Marchis (Università degli Studi Roma Tre, Italy)*

11:30 Gait Analysis using Wearable E-Textile Sock: an Experimental Study of Test-Retest Reliability

Federica Amitrano (University of Naples Federico II, Italy)

Armando Coccia (University of Naples Federico II, Italy)

Leandro Donisi (University of Naples Federico II, Italy)

Gaetano Pagano (ICS Maugeri SB of Bari, Italy)

Giuseppe Cesarelli (University of Naples Federico II, Italy)

Giovanni D'Addio (S. Maugeri Foundation, Rehabilitation Institute of Telese, Italy)

11:50 An Optimal Procedure for Stride Length Estimation Using Foot-Mounted Magneto-Inertial Measurement Units

Rachele Rossanigo (University of Sassari, Italy)

Marco Caruso (Politecnico di Torino, Italy)

Francesca Salis (University of Sassari, Italy)

Stefano Bertuletti (University of Sassari, Italy)

Ugo Della Croce (University of Sassari, Italy)

Andrea Cereatti (Politecnico di Torino, Italy)

12:10 Classification-Based Screening of Phlebopathic Patients using Smart Socks

Emanuele D'Angelantonio (Università degli Studi di Roma Tre, Italy)

Leandro Lucangeli (Università degli Studi di Roma "Foro Italico" & Technoscience - Parco Scientifico e Tecnologico Pontino, Italy)

Valentina Camomilla (University of Rome Foro Italico, Italy)

Federico Mari (University of Rome "Foro Italico", Italy)

Guido Mascia (University of Rome "Foro Italico", Italy)

Antonio Pallotti (University of Rome Tor Vergata & Technoscience, Italy)

12:30 PARKIBIP Feedback Wearable Rehabilitation Device: Market Analysis and Enhancements

Valentina B. Pasker (University Pompeu Fabra, Spain)

Carlos Huerta (Universidad de la República, Uruguay)

Samuel Sainz (Universidad de la República, Uruguay)

Dario Santos (Universidad de la República, Uruguay)

Franco Simini (Universidad de la Republica, Uruguay)

13:00-14:00

Break

14:00-15:20

RS 16: Image processing- A

Chairs: *David Casillas-Perez (Rey Juan Carlos University, Spain), Annamária R. Várkonyi-Kóczy (Óbuda University, Hungary)*

14:00 Ensembling CNNs for dermoscopic analysis of suspicious skin lesions

Yali Nie (Mid Sweden University, Sweden)
Matteo Ferro (University of Salerno, Italy)
Paolo Sommella (University of Salerno, Italy)
Marco Carratù (University of Salerno, Italy)
Sara Cacciapuoti (University Federico II of Naples, Italy)
Giuseppe Di Leo (University of Salerno, Italy)
Jan Lundgren (Mid Sweden University, Sweden)
Gabriella Fabbrocini (University Federico II of Naples, Italy)

14:20 Application of Hybrid Network of UNet and Feature Pyramid Network in Spine Segmentation

Xingxing Liu (University of Iowa, USA)
Wenxiang Deng (University of Iowa, USA)
Yang Liu (103 South Capitol Street & University of Iowa, USA)

14:40 Deep Convolutional Feature-Based Fluorescence-to-Color Image Registration

Xingxing Liu (University of Iowa, USA)
Tri Quang (The University of Iowa, USA)
Wenxiang Deng (University of Iowa, USA)
Yang Liu (103 South Capitol Street & University of Iowa, USA)

15:00 Densely Connected Convolutional Networks (DenseNet) for Diagnosing Coronavirus Disease (COVID-19) from Chest X-ray Imaging

Hamed Tabrizchi (John von Neumann Faculty of Informatics Obuda University, Hungary)
Amir Mosavi (John von Neumann Faculty of Informatics Obuda University, Hungary)
Zoltan Vamossy (Obuda University, Hungary)
Annamária R. Várkonyi-Kóczy (Óbuda University, Hungary)

14:00-15:20

RS20: Processing of biomedical signals - C

Chairs: *Paolo Chiariotti (Politecnico di Milano, Italy), Sreeraman Rajan (Carleton University, Canada)*

14:00 BLE-based approach for detecting daily routine changes

Ana Jiménez Martín (University of Alcalá, Spain)
Ismael Miranda David Gualda (King Juan Carlos University, Spain)
Sara García de Villa (University of Alcalá, Spain)
Sergio Lluva Plaza (University of Alcalá, Spain)
J. Jesús García (University of Alcalá, Spain)

14:20 Efficient Compressive Sensing of Biomedical Signals Using A Permuted Kronecker-based Sparse Measurement Matrix

Parichehreh Firoozi (Carleton University, Canada)
Sreeraman Rajan (Carleton University, Canada)
Ioannis Lambadaris (Carleton University, Canada)

14:40 Comparison of OpenPose and HyperPose artificial intelligence models for analysis of hand-held smartphone videos

Frederick Zhang (University of Ottawa, Canada)
Pascale Juneau (University of Ottawa, Canada)
Connor McGuirk (University of Ottawa, Canada)
Albert Tu (University of Ottawa, Canada)
Kevin Cheung (University of Ottawa, Canada)
Natalie Baddour (University of Ottawa, Canada)
Edward Lemaire (University of Ottawa, Canada)

15:00 Automatic processing protocol to evaluate the impact of functional network damage and reorganization on cognitive functions after stroke

Lenka Svobodová (Czech Technical University in Prague, Czech Republic)
Radek Janca (Czech Technical University in Prague & Faculty of Electrical Engineering, Czech Republic)
Premysl Jiruska (Institute of Physiology, Academy of Sciences of Czech Republic, Prague, Czech Republic)

14:00-15:20

SS1- III: Advanced measurement techniques and methodologies for the quantitative assessment of gait function in health and pathology

Chairs: *Valentina Agostini (Politecnico di Torino, Italy), Paola Saccomandi (Politecnico di Milano, Italy)*

14:00 Prediction of stride duration by neural-network interpretation of surface EMG signals

Francesco Di Nardo (Università Politecnica delle Marche, Italy)
Christian Morbidoni (Università degli Studi G. D'Annunzio, Italy)
Alessandro Cucchiarelli (Polytechnic University of Marche, Italy)
Sandro Fioretti (Università Politecnica delle Marche, Italy)

14:20 Characterization of EMG time-frequency content during Parkinson walking: a pilot study

Marco Romanato (University of Padova, Italy)
Annachiara Strazza (Università Politecnica delle Marche, Italy)
Weronika Piatkowska (Università degli Studi di Padova, Italy)
Fabiola Spolaor (University of Padova, Italy)
Sandro Fioretti (Università Politecnica delle Marche, Italy)
Daniele Volpe (Villa Margherita, S. Stefano, Italy)
Zimi Sawacha (Università degli Studi di Padova, Italy)
Francesco Di Nardo (Università Politecnica delle Marche, Italy)

14:00-15:20

SS4- I: The measurement and assessment of well-being during the Covid-19 pandemic: Implications in neurosciences, psychology and psychiatry

Chairs: *Mirian Agus (University of Cagliari, Italy), Pier Marconi (Sapienza - University of Rome & Artemis Neurosciences StP, Italy), Eraldo Francesco Nicotra (University of Cagliari, Italy)*

14:40 Data-driven Development of Digital Health Applications on the Example of Dementia Screening

Markus Schinle (FZI Research Center for Information Technology, Germany)
Christina Erlen (FZI Research Center for Information Technology, Germany)
Timon Schneider (FZI Research Center for Information Technology, Germany)
Joana Plewnia (FZI Research Center for Information Technology, Germany)
Wilhelm Stork (Karlsruhe Institute of Technology, Germany)

15:00 Web-Based Monitoring of the Psychological Distress facing Covid-19 in relation to Quality of Life and Social Adjustment in young adults

Pier Marconi (Sapienza - University of Rome & Artemis Neurosciences StP, Italy)
Mirian Agus (University of Cagliari, Italy)
Maria Lidia Mascia (University of Cagliari, Italy)
Rosamaria Scognamiglio (Artemis Neurosciences StP, Italy)
Pierluca Bandinelli (P.O. San Filippo Neri, SPDC Rome, Italy)
Maria Pietronilla Penna (University of Cagliari, Italy)

15:30-16:50

RS17: Image processing - B

Chairs: *Maria Eugenia Caligiuri (University Magna Graecia of Catanzaro, Italy), Octavian Adrian Postolache (Instituto de Telecomunicações, Lisboa/IT & Instituto Universitario de Lisboa, ISCTE-IUL, Portugal)*

15:30 Single-pulse measurement electronics for accurate dosimetry in X-ray radiation therapy

Sara Pettinato (Università degli Studi Niccolò Cusano, Italy)
Riccardo Olivieri (Azienda Ospedaliera "San Giovanni - Addolorata", Italy)
Stefano Salvatori (Università degli Studi Niccolò Cusano, Italy)

15:50 Intraoperative Optical Imaging with Distance-Aware RGB-Fluorescence Image Registration

Maziyar Askari (University of Iowa, USA)
Wei Chen (Cleveland Clinic, USA)
Francis Papay (Cleveland Clinic, USA)
Yang Liu (103 South Capitol Street & University of Iowa, USA)

16:10 Image Quality Assessment for Endoscopy Applications

Nishitha R (IIT Madras, India)
Amalan S (Healthcare Technology Innovation Center, IIT Madras, India)
Shubham Sharma (Healthcare Technology Innovation Center, IIT Madras, India)
Ajay Gurralla (IIT Madras, India)
Preejith Sp (HTIC-IITMadras, India)
Jayaraj Joseph (Indian Institute of Technology Madras, India)
Mohanaskar Sivaprakasam (IIT Madras, India)

15:30-16:50

RS21: Mechanical measurement and Instrumentation for Biomedical applications

Chairs: *Mohanaskar Sivaprakasam (IIT Madras, India), Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)*

15:30 Dynamic Shear and Normal Forces on Patient Skin in Sling Lift Transfers

Steven Cramp (Carleton University, Canada)

Bruce Wallace (AGE-WELL NIH SAM3 & Carleton University, Canada)

15:50 Characterizing On-Road Vibrations in Ontario's Neonatal Patient Transport

Fadwa Darwaish (Carleton University, Canada)

Stephanie Redpath (Children's Hospital of Eastern Ontario, Canada)

Kim Greenwood (Children's Hospital of Eastern Ontario, Canada)

Cheryl Aubertin (Children's Hospital of Eastern Ontario, Canada)

Andrew AM Ibey (Children's Hospital of Eastern Ontario & Carleton University, Canada)

Adrian D.C. Chan (Carleton University, Canada)

James R Green (Carleton University, Canada)

Robert Langlois (Carleton University, Canada)

16:10 Development of a device to impose mediolateral whole-body vibration while walking

Martin Grigera Naón (Politecnico di Milano, Italy)

Stefano Marelli (Politecnico di Milano, Italy)

Alex P. Moorhead (Politecnico di Milano, Italy)

Bortolino Saggin (Politecnico di Milano, Italy)

Giovanni Moschioni (Politecnico di Milano, Italy)

Marco Tarabini (Politecnico di Milano, Italy)

15:30-16:50

SS4- II: The measurement and assessment of well-being during the Covid-19 pandemic: Implications in neurosciences, psychology and psychiatry

Chairs: *Giorgio Marchese (National Research Council, Italy), Maria Pietronilla Penna (University of Cagliari, Italy)*

15:30 The use of cognitive training with tDCS for the reduction of impulsiveness and improvement of executive functions: a case study

Natale Salvatore Bonfiglio (University of Bologna, Italy)

Roberta Renati (University of Pavia, Italy)

Patrone Ludovica (University of Pavia, Italy)

Dolores Rollo (University of Parma, Italy)

Maria Pietronilla Penna (University of Cagliari, Italy)

15:50 The use of cognitive training and tDCS for the treatment of an high potential subject: a case study

Roberta Renati (University of Pavia, Italy)

Natale Salvatore Bonfiglio (University of Bologna, Italy)

Patrone Ludovica (University of Pavia, Italy)

Dolores Rollo (University of Parma, Italy)

Maria Pietronilla Penna (University of Cagliari, Italy)

16:10 Pattern of errors in Raven's Colored Progressive Matrices and their use in the clinical assessment of intelligence

Donatella Petretto (University of Cagliari, Italy)

Paola Grassi (University of Cagliari, Italy)

Carmelo Masala (University of Cagliari, Italy)

Eraldo Francesco Nicotra (University of Cagliari, Italy)

16:30 Psychometric scales in clinical psychopharmacology trials: mathematical and statistical evaluations

Eraldo Francesco Nicotra (University of Cagliari, Italy)

Daniele Lecca (University of Cagliari, Italy)

Giorgio Marchese (National Research Council, Italy)

17:00-18:00

Closing Remarks/Awards Ceremony

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