VI. Workshop Details

	TIME	Workshop 1 Room 517	Workshop 2 Room 522	Workshop 3 Room 519	Workshop 4 Room 515	Workshop 5 Room 513
	9:30 - 11:45	Recent Advances in Medical Microrobotics: Toward Diagnosis and Therapeutics in Practice	From in-clinic rehabilitation to home assistance: wearable robotics in the continuum of care			Closing the Loop on Upper-Limb Assistive Device Design, Sensing, Control, & Clinical Practice
	11:45 - 13:00	Lunch				
Aug. 21 (Sun.)	13:00 - 15:15	Recent Advances in Medical Microrobotics: Toward Diagnosis and Therapeutics in Practice	From in-clinic rehabilitation to home assistance: wearable robotics in the continuum of care	Advancing Hand Wearable Robotics through novel design, actuation, sensing, and control algorithm	Guiding Physical Therapy Using Computational Modelling Techniques	Closing the Loop on Upper-Limb Assistive Device Design, Sensing, Control, & Clinical Practice
	15:15 - 15:30	Coffee Break				
	15:30 - 17:45	Recent Advances in Medical Microrobotics: Toward Diagnosis and Therapeutics in Practice		Advancing Hand Wearable Robotics through novel design, actuation, sensing, and control algorithm	Guiding Physical Therapy Using Computational Modelling Techniques	

August 21 - 24, 2022 Seoul National University, Korea BioRob 2022

1. Workshop 1

August 21st (Sunday) 09:30-17:45 / Room 517

Title	Recent Advances in Medical Microrobotics: Toward Diagnosis and Therapeutics in Practice		
Keywords	Micro/Nano Robots; Micro, Nano, and Biomimetic Systems; Medical Robots and Systems		
Organizers	Jong-Oh Park, Chang-Sei Kim, Eunpyo Choi		
Abstract	The workshop provides the overview and the advanced technology of medical microrobot - ranging from cell-scale to millimeter scale. The traditional microrobotics mechanism and its practical application medical diagnostics and therapeutics will be delivered to the attendances. Three main topics includes a targeted therapeutic agents delivery for oncology, a magnetically driven catheterization for cardiovascular therapeutics, and a capsule endoscopy for intestinal diagnostics. The workshop will bring a significantly advanced microrobotics technology and motivation to relative bio-robotics researchers with diversity robot technology toward clinical application.		

List	List of Talks				
1	9:30-9:35 (5 min)	Workshop organizers	Opening Remarks		
Oral	Session I : Medi	cal Microrobot for Tumor Embolization (11	15 min)		
1	9:35-10:00 (25 min)	Eunpyo Choi, Ph.D. Chonnam National University	System Integration for Tumor Embolization		
2	10:00-10:30 (30 min)	Kim Tien Nguyen, Ph.D. Korea Institute of Medical Microrobotics	Fixed Electromagnetic Actuation Module for Tumor Embolization		
3	10:30-11:00 (30 min)	Gwangjun Go, Ph.D. Korea Institute of Medical Microrobotics	Carrier Module for Tumor Embolization		
4	11:00-11:30 (30 min)	Jungwon Yoon, Ph.D. GIST	Micro-scale Localization Module for Tumor Embolization		
Lun	ch (11:30 - 13:00)				
Oral	Session II : Med	lical Microrobot for Stomach Diagnosis (90) min)		
1	13:00-13:30 (30 min)	Jayoung Kim, Ph.D. Korea Institute of Medical Microrobotics	System Integration for Stomach Diagnosis		
2	13:30-14:00 (30 min)	Byung-woo Cho Korea Institute of Medical Microrobotics	MR Visualization Module for Stomach Diagnosis		
3	14:00-14:30 (30 min)	Sukho Park, Ph.D. DGIST	Microbe gathering & delivering Module for Stomach Diagnosis		
Brea	ak (14:30 - 14:40	(10 min))			
Oral	Session III : Me	dical Microrobot for Bradyarrhythmia (90 n	nin)		
1	14:40-15:10 (30 min)	Byungjeon Kang, Ph.D. Chonnam National University	System Integration for Bradyarrhythmia		
2	15:10-15:40 (30 min)	Hoang Manh Cuong., Ph.D Korea Institute of Medical Microrobotics	Meso-scale Localization Module for Bradyarrhythmia		
3	15:40-16:10 (30 min)	Hyoungho Ko, Ph.D. Chungnam National University	Heartbeat Regulating Module for Bradyarrhythmia		
Brea	Break (16:10 - 16:20 (10 min))				
Pos	Poster Session : Microrobots for Medical Application (16:20 - 17:20 (60 min))				

2. Workshop 2

August 21st (Sunday) 09:30-15:15 / Room 522

Title	From in-clinic rehabilitation to home assistance: wearable robotics in the continuum of care
Organizers	 Dr. Emilio Trigili, The BioRobotics Institute, Scuola Superiore Sant'Anna, Pontedera (PI), Italy. Email: emilio.trigili@santannapisa.it Prof. Arturo Forner-Cordero, Head of the Biomechatronics Lab, Mechatronics Dept. Escola Politécnica da Universidade de Sao Paulo (Brasil). Visiting Professor (CAPES) at The BioRobotics Institute, Scuola Superiore Sant'Anna, Pontedera (PI), Italy. Email: aforner@usp.br Dr. Simona Crea, The BioRobotics Institute, Scuola Superiore Sant'Anna, Pontedera (PI), Italy. Email: simona.crea@santannapisa.it Prof. Nicola Vitiello, The BioRobotics Institute, Scuola Superiore Sant'Anna, Pontedera (PI), Italy. Email: nicola.vitiello@santannapisa.it
Abstract	The high incidence of age-associated chronic diseases, including stroke, is causing a huge demand for physical and cognitive rehabilitation. The access to rehabilitation services has been restricted further after the COVID-19 pandemic, and a continuum of care from the hospitalization to the home assistance is not always guaranteed. Robotic technologies as wearable robots and virtual/augmented reality (AR/VR) system represent innovative solutions for movement assistance, monitoring and treatment, to support patients across different stages of recovery. The objective of this workshop is to discuss the current trends and challenges of integrating such technologies into the rehabilitation continuum of care. A multi- disciplinary group of experts and academic researchers will provide an overview of the latest advancements regarding the development of wearable robots and AR/VR systems for rehabilitation and home assistance, the use of robotics for quantitative clinical assessment, neuromechanical models and mechanisms of neuroplasticity in robot-aided rehabilitation. After the presentations, a round table will be opened to synthetize current views and suggest future directions to guide the development of the next- generation devices to serve the continuum of care spectrum, focusing on their translation to the healthcare industry and real-world applications.

List	of Talks	
1	09:30-09:40 (10 min)	Introduction
First	Slot (125 min)	
1	9:40-10:20 (40 min)	Michelle J. Johnson (online) Fabrizio Sergi (online)
2	10:20-10:30 (10 min)	Short Break
3	10:30-11:10 (40 min)	Hermano Igo Krebs (online) Marcia O'Malley (online)
4	11:10-11:45 (35 min)	Round Table #1
Lunc	ch (11:45 – 13:00)	
Seco	ond Slot (135 min)	
1	13:00-14:00 (60 min)	Robert Riener (in person) Lorenzo Masia (in person) Ang Wei Tech (online)
2	14:00-14:10 (10 min)	Short Break
3	14:10-14:50 (40 min)	Sandra Hirche (online) Laura Marchal-Crespo (online)
4	14:50-15:15 (25 min)	Round Table #2

August 21 - 24, 2022 Seoul National University, Korea BioRob 2022

3. Workshop 3

August 21st (Sunday) 13:00-17:45 / Room 519

Title	Advancing Hand Wearable Robotics through novel design, actuation, sensing, and control algorithm
Organizers	Kyu-jin Cho, Lambercy Olivier, and Byungchul Kim
Abstract	Despite impressive advances in the design of hand wearable robots over the past 10 years, most hand wearable robot studies have concentrated on simply grasping and releasing objects. It seems evident to be a difference between a human hand and the hand wearable robots in the number of actuators and sensors; the hand wearable robots have only limited functions due to the restriction of the actuators and sensors. This is challenged by the trade-off between robot simplicity and functional benefit, as well as by difficulties in designing the high-level controllers (e.g., intention detection, grasp strategy, estimating human state, in-hand manipulation). This workshop aims to bring together engineers to discuss these topics, demo recent developments and identify ways to develop the next generation of hand wearable robots.

List	List of Talks				
First	First Slot (130 min)				
1	12:50-13:00 (10 min)	Workshop organizers	Opening Remarks		
2	13:00–13:30 (30 min)	Donghyun Kim, Ph.D. Samsung Research	Hand Rehabilitation via a High-DOF Soft Wearable Robot		
3	13:30-14:00 (30 min)	Natalie Tanczak, Ph.D Researcher Olivier Lambercy, Senior Researcher ETH Zurich	Tenoexo - a wearable soft hand exoskeleton for therapy and assistance		
4	14:00-14:30 (30 min)	Hannah Stuart, Assistant Professor University of California at Berkeley	Grasp Assistance at the Intersection of Body-powered and Robotic Exoskeletons		
5	14:30–15:00 (30 min)	Daekyum Kim, Postdoc Researcher Harvard	Intention detection methods for soft wearable hand robots		
Coffe	Coffee Break (15:00-15:30)				
Seco	Second Slot (130 min)				
1	15:30-16:00 (30 min)	Seokhwan Jeong, Assistant Professor Sogang University	Toward Advancing Hand functionality for Robotic Prosthetic Hands and Soft Hand Exoskeletons		
2	16:00-16:30 (30 min)	Carlos Cifuentes, Associate Professor University of the West of England	Presentation about Prosthetic Hand and Hand Exoskeleton (TBD)		
3	16:30-17:00 (30 min)	Byungchul Kim, Postdoc Researcher Seoul National University	Building Simple Yet Competent Soft-Rigid Hybrid Hand Wearable Robots		
4	17:00–17:30 (30 min)	Yongseok Lee, Ph. D. Samsung Research	Haptic glove		
5	17:30–17:40 (10 min)	Workshop organizers	Closing		

4. Workshop 4

August 21st (Sunday) 13:00-17:45 / Room 515

Title	Guiding Physical Therapy Using Computational Modelling Techniques
Organizers	 Dr. Tomislav Bacek, Research Fellow, University of Melbourne, Australia, Email: tomislav.bacek@unimelb.edu.au Prof. Denny Oetomo, University of Melbourne, Australia, Email: doetomo@unimelb.edu.au Prof. Dana Kulic, Monash University, Australia, Email: dana.kulic@monash.edu
Abstract	The advancements in robotic and sensing technologies, data science, and computer-simulated environments, and the ever-growing knowledge in physical therapy (PT) of movement impairments have opened an enormous potential for personalised, effective, and collaborative gait rehabilitation. However, the available technologies are yet to be exploited to their full potential and close the gap between the research environment and clinical practice. This workshop will bring together renowned speakers from the relevant fields of physiotherapy, machine learning, human movement, computational modelling, and biomechanics to present state-of-art in technology-assisted physical therapy and provide insights into current challenges and future trends.

List	List of Talks				
First	First Slot (135 min)				
1	13:00-13:10 (10 min)	Workshop organizers	Opening Remarks		
2	13:10-13:35 (25 min)	Prof. Marcus Pandy , University of Melbourne, Melbourne, Australia	Motion and Joint Function in Human Gait		
3	13:35-14:00 (25 min)	Prof. Gavin Williams , FACP, University of Melbourne and Epworth Hospital, Melbourne, Australia	Robot-Assisted Gait Therapy - What is Missing from a Clinical Perspective?		
4	14:00-14:25 (25 min)	Dr. Tomislav Bacek , Research Fellow, University of Melbourne, Melbourne, Australia	Understanding Human Gait Signature - Preliminary Results of a Large Biomechanical Study		
5	14:25-14:50 (25 min)	Dr. Antoine Falisse , Research Fellow, Stanford University, CA, USA	Predictive Simulations and Their Role in Understanding Neuromechanics of Gait		
6	14:50-15:15 (25 min)	Scott Starkey , PhD student, Centre for Health, Exercise, and Sports Medicine, University of Melbourne, Australia	Electromyogram- and Magnetic Resonance Imaging-informed Neuromusculoskeletal Modelling in the Context of Clinical Rehabilitation		
Seco	nd Slot (135 m	in)			
1	15:30-15:55 (25 min)	Prof. Massimo Sartori , University of Twente, Enschede, The Netherlands	Neuromusculoskeletal Modelling-Based Control of Exoskeletons		
2	15:55-16:20 (25 min)	Prof. Heike Vallery , TU Delft, Delft, The Netherlands	Body-Weight Support and its Influence on Neuromuscular Modelling and Gait Neurorehabilitation		
3	16:20-16:45 (25 min)	Dr. Fabian Horst , Research Fellow, Johannes Gutenberg-University Mainz, Mainz, Germany	Using Machine Learning Techniques to Explain and Characterise Human Gait Patterns		
4	16:45-17:10 (25 min)	Prof. Laura Marchal-Crespo , TU Delft, Delft, The Netherlands	Error Augmentation, Motivation, and Haptic Intervention During Motor Learning		
5	17:10-17:45 (35 min)	PANEL DISCUSSION			

August 21 - 24, 2022 Seoul National University, Korea BioRob 2022

5. Workshop 5

August 21st (Sunday) 09:30-15:15 / Room 513

Title	Closing the Loop on Upper-Limb Assistive Device Design, Sensing, Control, & Clinical Practice
Organizers	 Laura A. Hallock, University of Pennsylvania Cara M. Nunez, Harvard University & Cornell University Robert D. Howe, Harvard University
Abstract	Developing effective assistive devices that can be used in a clinical setting is a multidisciplinary effort requiring expertise in not only robotic design, sensing, controls, and human-machine interaction, but also knowledge of the needs of medical and patient communities. At the same time, researchers must inherently specialize in these domains, and often the communication lines between these communities are limited, causing the development of suboptimal tools and devices for the intended use case or target population. This workshop aims to bring these communities together to a) engage in an open discussion of successful endeavors in bridging this development-application gap, and best practices for doing so, and b) present ongoing work in assistive device tooling and clinical needs definition to enable new connections and partnerships across disciplines. By bringing together experts in device design, sensing, and control, as well as clinicians and practitioners well-placed to understand immediate clinical needs, and providing a venue to discuss both early-stage and established work, we aim to provide attendees with a broad sense of ongoing challenges and state-of-the-art methods in upper-limb assistance and rehabilitation, as well as the opportunity to expand the use of technologies currently under development in new and impactful application domains.

List of Talks		
Session 1: Talks & Panel Discussion		
09:30 KST/20:30 EST	Greetings, introduction to workshop and logistics	
09:35 KST/20:35 EST	Invited Speakers	
09:35 KST/20:35 EST	Conor Walsh, PhD , Harvard University uniting design, biomechanics, engineering, and business communities to build and deploy soft exosuits	
09:50 KST/20:50 EST	Marcia O'Malley, PhD, Rice University user-centric EMG- and FES-based design and control of upper limb exoskeletons	
10:05 KST/21:05 EST	Michelle Johnson, PhD , University of Pennsylvania development and deployment of therapeutic robots for diverse pathologies and populations	
10:20 KST/21:20 EST	Andrew McPherson, UC Berkeley building effective assistive devices and assistive tech organizations as an engineer, leader, and user	
10:35 KST/21:35 EST	David Lin, MD, Massachusetts General Hospital clinical and neurological perspectives on upper extremity rehabilitation robotics in stroke	
10:50 KST/21:50 EST	Kristin Nuckols, OTD, MOT, OTR/L, Co-Founder, Imago Rehab rehabilitation in the startup space	
11:05 KST/22:05 EST	Break	
11:15 KST/22:15 EST	Panel discussion with invited speakers	
Session 2: Posters, Demos, & Networking		
13:00 KST/00:00 EST	Welcome back, introduction to lightning talk/poster logistics	
13:05 KST/00:05 EST	Lightning Talks	
13:35 KST/00:35 EST	Break, poster & demo set-up	
13:40 KST/00:40 EST	Poster/demo session, general networking & discussion	