



Medical Robotics Week, 07. - 11.06.2021

University of Basel

- ✓ MESROB 2021: 07.-09.06.2021
- ✓ AUTOMED 2021: 08.-09.06.2021
- ✓ Conference Workshops: 10.-11.06.2021 - #MRW2021


Tentative Program

Monday, 07.06.2021	
Theme: Medical robotics	
09:00 – 09:10	Welcome remarks & Conference structure Conference organizer <i>Georg Rauter</i>
09:10 – 09:15	Welcome remarks IFTOMM president <i>Andrés Kecskeméthy</i>
09:15 – 09:20	Welcome remarks Head Department of Health Canton Basel City: <i>Lukas Engelberger</i>
09:20 – 09:25	Opening of scientific program <i>Vice President for Research of the University of Basel: Torsten Schwede</i>
09:25 – 09:30	Topic: The spirit of MESROB <i>Founder of MESROB: Doina Pisla</i>
09:30 – 10:05	Topic: Surgical robotics Plenary talk: Embedding AI in robotic surgery, <i>Elena De Momi</i>
10:05 – 10:20	Virtual coffee break / Virtual lab visits / E-Poster exhibition
10:20 – 10:50	Robot-assisted cochlea-implants Plenary talk: <i>Stefan Weber</i>
10:50 – 11:20	Robot-assisted laserosteotomy Plenary talk: <i>Cyrill Bärtscher & Hans-Florian Zeilhofer</i>
11:20 – 12:20	Demo session: MIRACLE Project PhD students of the MIRACLE Project
	 <p>Project MIRACLE Minimally Invasive Robot-Assisted Computer-guided Laserosteotomy</p>
12:20 – 13:30	Lunch break / Virtual lab visits / E-Poster exhibition
13:30 – 13:35	Welcome remarks Conference co-organizer <i>Azhar Zam</i>
13:35 – 14:00	Topic: Robots at the heart of clinical interventions Plenary talk: High-precision robots as medical & surgical assistants, <i>Jean-Marc Collet</i>
	

14:00 – 14:30	Topic: Surgical robotics Keynote: Robotics for Retinal Regenerative Therapy Delivery, <i>Christos Bergeles</i>	Topic: Medical lasers and optics Keynote: Pulsed laser tissue ablation: Mechanisms, and optimization strategies for precision and efficacy, <i>Alfred Vogel</i>
14:30 – 15:45	Technical session 1: Minimally invasive surgery and biomedical devices Design, Static and Performance Analysis of a Parallel Robot for Head Stabilisation in Vitreoretinal Surgery, <i>Hans Natalius</i> Design Evaluation of a Stabilized, Walking Endoscope Tip, <i>Manuela Eugster</i> Tendon force control evaluation for an endoscope with series elastic actuation, <i>Lorin Fasel</i> Lab Experiences on Impact Biomechanics of Human Head, <i>Jose Luis Rueda Arreguín</i> Universal Mechanical Interface for Surgical Telemanipulation using Conventional Instruments, <i>Max B. Schäfer</i>	Technical session 2: Optical systems and novel methods in medicine Simulation of Echellogram Using Zemax OpticStudio and Matlab for LIBS, <i>Hamed Abbasi</i> Robot- and Laser-Assisted Bio-Sample Preparation: Development of an Integrated, Intuitive System, <i>Cédric Duverney</i> Impact of ear occlusion on in-ear sounds generated by intra-oral behaviors, <i>Mohammad Khair</i> Towards Robotic Surgery for Cartilage Replacement: A Review on Cartilage Defects, <i>Philipp Krenn</i> Laser-induced breakdown spectroscopy combined with artificial neural network for pre- carbonization detection in laserosteotomy, <i>Ferda Canbaz</i>
15:45 – 16:00	Virtual coffee break / Virtual lab visits / E-Poster exhibition	
16:00 -17:00	Technical session 3: Human-robot interaction in surgery, nursing, and industrial applications Learned Task Space Control to Reduce the Effort in Controlling Redundant Surgical Robots, <i>Murali Karnam</i> Development and Evaluation of a Force-Sensitive Flexure-Based Microgripper Concept, <i>Cédric Duverney</i> Investigating the First Robotic Nurses: Humanoid Robot Nightingale and Partners for COVID-19 Preventive Design, <i>Esyin Chew</i>	Technical session 4: Surgical planning, navigation, registration, and sensor fusion Introducing a Modular Framework for Human Tracking with Inhomogeneous Sensor Systems, <i>Nils Mandischer</i> Augmented reality based surgical navigation of the periacetabular osteotomy of Ganz - A pilot cadaveric study, <i>Florentin Liebmann</i> Multimodal Risk-Map for Navigation Planning in Neurosurgical Interventions, <i>Christian Kunz</i> Volume Rendering-based Patient Registration for Extended Reality, <i>Marek Źelechowski</i>
	Meeting of the MESROB Scientific Committee (via private Zoom-link)	

Tuesday, 08.06.2021	
Theme: Rehabilitation robotics / Assistive devices	
09:00 – 09:05	Welcome remarks Conference co-organizer <i>Robert Riener</i>
09:05 – 09:40	From Robot-Aided Rehabilitation to Wearable Exosuits: towards a symbiotic assistive technology Plenary talk: <i>Lorenzo Masia</i>
09:40 – 10:15	Lower limb rehabilitation robotics. Sitting position and exoskeleton devices Plenary talk: <i>Mohamed Bouri</i>
10:15 – 10:30	Virtual coffee break / Virtual lab visits / E-Poster exhibition
10:30 – 11:55	CYBATHLON Session
10:30 – 10:32	Welcome to the CYBATHLON session Conference co-organizer <i>Robert Riener</i>
10:32 – 10:47	Introduction talk: CYBATHLON and user-centred design Plenary talk: <i>Lukas Jaeger</i>
10:47 – 11:02	Survey on user-centred design at the CYBATHLON: First insights Plenary talk: <i>Jan Meyer</i>
11:02 – 11:07	Q&A session
11:07 – 11:31	Team insights, SoftHand Pro Plenary demo & talk: <i>Maria Fossati</i>
11:31 – 11:54	Team insights, VariLeg enhanced Plenary talk: <i>Silvia Rohner</i>
11:54 – 11:55	Closing remarks CYBATHLON session Conference co-organizer: <i>Robert Riener</i>
11:55 – 12:30	Topic: Rehabilitation robotics Plenary talk: <i>TBA</i>
12:30 – 13:30	Lunch break / Virtual lab visits / E-Poster exhibition
13:30 – 13:35	Welcome remarks Conference co-organizer <i>Giuseppe Carbone</i>
13:35 – 14:00	Developing IEC 62304 - Compliant Embedded Software for Medical Devices Plenary talk: <i>Visa Suomi</i>
14:00 – 15:30	IISART special session:
	Technical session 5:



	<p>Medical robot autonomy levels: what standards? Organizer: <i>Thierry Keller</i></p> <p>Keynote: Hadassah Drukarch Keynote: Eduard Fosch-Villaronga Keynote: Jan Veneman</p> 	<p>Exoskeletons and gait-related rehabilitation Design and motion analysis of an exoskeleton robot for assisting human locomotion, <i>Geonea Ionut Daniel</i> A Cable-Robot System for Promoting Healthy Postural Stability and Lower-Limb Biomechanics in Gait Rehabilitation, <i>Carl Nelson</i> Observer based sliding mode control for a knee exoskeleton, <i>Yujie Su</i> A compliant parallel manipulator for rehabilitation of the trunk after stroke, <i>Daniel Díaz-Caneja</i> Development of a New Knee Endoprosthesis and Finite Element Analysis of Contact Stresses, <i>Daniela Tarnita</i> Design and motion simulation of a new exoskeleton leg mechanism, <i>Geonea Ionut Daniel</i></p>
<p>15:30 – 15:45</p>	<p>Virtual coffee break / Virtual lab visits / E-Poster exhibition</p>	
<p>15:45 – 17:15</p>	<p>Technical session 6: Lower limb rehabilitation and innovative rehabilitation approaches Ankle rehabilitation of stroke survivors using Kuka LBR iiwa, <i>Doina Pisla</i> Nonlinear dynamic analysis of human sit-to-stand movement with application to the robotic structures, <i>Daniela Tarnita</i> Development of an automatic perturbator for dynamic posturographic analysis, <i>Carlo Ferraresi</i> Daily Life Activities Analysis for Rehabilitation Purposes, <i>Ferdaws Ennaiem</i> Designing a Robotized System for Rehabilitation Taking Into Account Anthropological Data of Patients, <i>Artem Voloshin</i> Serious Games Strategies with Cable-Driven Robots for Rehabilitation Tasks, <i>Thiago Alves</i></p>	<p>Technical session 7: Upper limb rehabilitation Design of a novel robot for upper limb rehabilitation, <i>Giuseppe Carbone</i> Novel design of the ParReEx-elbow parallel robot for the rehabilitation of brachial monoparesis, <i>Bogdan Gherman</i> Trunk Flexion-Extension in Healthy Subjects: Preliminary Analysis of Movement Profiles, <i>Federica Rangi</i> Design Optimization and Dynamic Control of a 3-d.o.f. Planar Cable-Driven Parallel Robot for Upper Limb Rehabilitation, <i>Ferdaws Ennaiem</i> First clinical evaluation of a spherical robotic system for shoulder rehabilitation, <i>Doina Pisla</i> Use of Pneumatic Artificial Muscles in a Passive Upper Body Exoskeleton, <i>Carlo Ferraresi</i></p>

Wednesday, 09.06.2021	
Theme: Service robots / Haptics	
09:00 – 09:05	Welcome remarks Conference co-organizer <i>Philippe Cattin</i>
09:05 – 09:10	Award ceremony for “Life Time Achievement”: Doina Pisla
09:10 – 09:35	Title: TBA Plenary talk: <i>Manfred Husty</i>
09:35 – 09:40	Award ceremony for senior scientists: Mohamed Bouri
09:40 – 10:05	Title: TBA Plenary talk: <i>Hannes Bleuler</i>
10:05 – 10:20	Virtual coffee break / Virtual lab visits / E-Poster exhibition
10:20 – 11:05	A Thirty Year Perspective on Medical Robotics: Yesterday, Today, and Tomorrow Plenary talk: <i>Russ Taylor</i>
11:05 – 11:10	Introduction to Poster Session Conference organizer Georg Rauter
11:10 – 11:35	Poster Session
11:35 – 11:55	Award ceremony for best papers (research, application, students, posters): Award committee: Carlo Ferraresi, Domen Novak, Med Amine Laribi, Giuseppe Carbone, Georg Rauter
11:55 – 12:05	Closing remarks Conference organizer <i>Georg Rauter</i>
12:05	End of conference

Thursday, 10.06.2021	
Industrial track Workshop 1 (2 days): (Please click here for the details) Practical industry workshop for TwinCat3 (Beckhoff) and Matlab/Simulink (Mathworks) – Day 1	
09:00 – 09:20	Welcome & Introduction to real-time systems

	Instructors: Georg Rauter, PhD (BIROMED-Lab, Department of Biomedical Engineering, University of Basel, Basel, Switzerland)
09:20 – 09:40	Reading schematics of control cabinets Instructors: Georg Rauter, PhD
09:40 – 10:00	Software installation and programming platform Instructor: Georg Rauter, PhD
10:00 – 10:40	First steps in Matlab/Simulink Instructor: Vasco Lenzi (The MathWorks GmbH, Bern, Switzerland)
10:40 – 11:00	Coffee Break
11:00 – 12:40	My first Matlab/Simulink program in TwinCat3 Instructor: Georg Rauter, PhD
12:40 – 14:00	Lunch Break
14:00 – 15:40	Safety in TwinCAT 3 Instructor: Georg Rauter, PhD
15:40 – 16:00	Coffee break
16:00 – 17:40	Implementing a servo motor in Matlab/Simulink for TwinCat3 Instructor: Georg Rauter, PhD
17:40	End of workshop day 1: Apéro riche at the terrace next to the river Rhine

Scientific track

Workshop 2 (1 day): [\(Please click here for the details\)](#)

3D-Motion- tracking systems with and without markers & IMUs

09:00 – 10:40	<p>Optical tracking systems with and without markers & IMUs</p> <p>Instructor: Thomas Seel, PhD (Technical University of Berlin, Berlin, Germany)</p> <p>Coordination: Beat Göpfert (Department of Biomedical Engineering, University of Basel, Basel, Switzerland)</p>
10:40 – 11:00	<p>Coffee break</p>
11:00 – 12:40	<p>Theoretical session: 3D-Motion Tracking with marker, markerless and IMU- Systems</p> <p>Instructors: Simi Reality Motion Systems, Qualisys AB Coordination: B. Göpfert</p>
12:40 – 14:00	<p>Lunch Break</p>
14:00 – 15:40	<p>Hands-on session in 3D-Motion Tracking with systems of Simi Reality Motion Systems and Qualisys AB</p> <p>Coordination: B. Göpfert</p>
15:40 – 16:40	<p>Coffee Break</p>
16:00 – 17:40	<p>Hands-on session in 3D-Motion Tracking with systems of Simi Reality Motion Systems and Qualisys AB</p> <p>Coordination: B. Göpfert</p>
17:40	<p>End of workshop day 1: Apéro riche at the terrace next to the river Rhine</p>

Friday, 11.06.2021

Industrial track

Workshop 1 (2 days): [\(Please click here for the details\)](#)

Practical industry workshop for TwinCat3 (Beckhoff AG) and Matlab/Simulink (Mathworks) – Day 2

09:00 – 10:40	<p>Development of a state machine for a servo motor in Matlab/Simulink for TwinCat3</p> <p>Instructor: Georg Rauter, PhD</p>
10:40 – 11:00	<p>Coffee break</p>
11:00 – 12:40	<p>Implementation of basic controllers in Matlab/Simulink for control of a servo motor in TwinCAT3</p> <p>Instructor: Georg Rauter, PhD</p>
12:40 – 14:00	<p>Lunch Break</p>
14:00 – 15:40	<p>TwinCat3 Vision</p> <p>Instructor: Tobias Bachmann (Technical Support / Application, Beckhoff Switzerland AG, Schaffhausen, Switzerland)</p>
15:40 – 16:00	<p>Coffee Break</p>
16:00 – 17:20	<p>Demonstration of visual servoing using Matlab/Simulink</p> <p>Instructor: Vasco Lenzi</p>
17:20 – 17:35	<p>Demonstration of visual servoing using Matlab/Simulink in TwinCAT3 Vision</p> <p>Instructor: Georg Rauter, PhD</p>
17:35 – 17:40	<p>Wrap up and Conclusions</p> <p>Instructor: Georg Rauter, PhD</p>

17:40	End of workshop day 2
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Scientific track Workshop 3 (1 day): (Please click here for the details) Robotics in Nursing	
09:00 – 09:05	Welcome & Introduction Presenter: Oliver Mautner, PhD, RN (University Department of Geriatric Medicine Felix Platter, Basel)
09:05 – 09:45	Geriatric care in times of the 4th industrial revolution: Are robots the future? Presenter: Thekla Brunkert, PhD (University Department of Geriatric Medicine Felix Platter, Basel & Institute of Nursing Science, Department Public Health, Faculty of Medicine, University of Basel, Switzerland)
09:45 – 10:15	Practical applications of robotics in nursing in Swiss health care and beyond Presenter: Sandra Engberg, PhD, RN (School of Nursing, University of Pittsburgh, USA)
10:15 – 10:30	Coffee break
10:30 – 11:00	Ethics of social assistive robots Presenter: Tijs Vanmeulebroucke, PhD (Centre for Biomedical Ethics and Law KU Leuven, Belgium)
11:00 – 11:20	Legal aspects of robotics in nursing Presenter: Elliott Ash, PhD (Center for Law and Economics, ETH Zürich, Switzerland)
11:20 – 11:40	Is there a business case for robotics in nursing?

	<p>Presenter: Alexander Thys, MD (Haute Ecole de Commerce, Paris, France & L.E.K. Consulting London Office, UK)</p>
11:40 – 11:50	Coffee break
11:50 – 11:55	<p>Case studies robots and group discussion Introduction of goals and methods</p> <p>Moderation: Sandra Engberg, PhD, RN</p>
11:55 – 12:25	<p>Social Assistive Robot https://www.youtube.com/watch?v=Qt98NIE_SRo</p> <p>Group discussion</p> <p>Presenters: Oliver Mautner, PhD, RN & Thekla Brunkert, PhD</p>
12:25 – 12:55	<p>Gait Rehabilitation Robot: the FLOAT https://reha-stim.com/de/the-float/</p> <p>Presenter: Marc Bolliger, PhD (Spinal Cord Injury Center, University Hospital Balgrist, Zurich, Switzerland)</p>
12:55 – 13:00	<p>Conclusions</p> <p>Presenter: Thekla Brunkert, PhD</p>
13:00	End of workshop 3