



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, Izabela Noll</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> Laser-induced breakdown spectroscopy combined with artificial neural network for pre- carbonization detection in laserosteotomy, <i>Ferda Canbaz</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> Robot- and Laser-Assisted Bio-Sample Preparation: Development of an Integrated, Intuitive System, <i>Cédric Duverney</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>Maximilian Gerst</i> Volume Rendering-based Patient Registration for Extended Reality, <i>Marek Źelechowski</i>
17:00 – 18:30	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
11:31 – 11:54	Team insights, VariLeg enhanced
11:54 – 11:55	Closing remarks CYBATHLON session Conference co-organizer: <i>Robert Riener</i>
11:55 – 12:30	Robot-assisted rehabilitation: approaches for minimally-supervised therapy of hand function Plenary talk: <i>Olivier Lambercy</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: Thierry Keller</p> <p>14:00 - 14:10 Introduction, Thierry Keller 14:10 - 14:40 Degree of Autonomy - Observations from the Standardization Engine Room, Jan Veneman 14:40 - 15:10 The Autonomy Levels for Healthcare Robots, Eduard Fosch-Villaronga, Hadassah Drukarch 15:10 - 15:30 Moderated General Discussion about Medical Robot Autonomy Levels (e.g. in Rehabilitation Robotics) and Relation between Risk Management concepts and Degree of Autonomy, Thierry Keller</p>	<p>Exoskeletons and gait-related rehabilitation Design and motion analysis of an exoskeleton robot for assisting human locomotion, Geonea Ionut Daniel A Cable-Robot System for Promoting Healthy Postural Stability and Lower-Limb Biomechanics in Gait Rehabilitation, Carl Nelson Observer based sliding mode control for a knee exoskeleton, Yujie Su A compliant parallel manipulator for rehabilitation of the trunk after stroke, Daniel Díaz-Caneja Development of a New Knee Endoprosthesis and Finite Element Analysis of Contact Stresses, Daniela Tarnita Design and motion simulation of a new exoskeleton leg mechanism, Geonea Ionut Daniel</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, Doina Pisla Nonlinear dynamic analysis of human sit-to-stand movement with application to the robotic structures, Daniela Tarnita Development of an automatic perturbator for dynamic posturographic analysis, Carlo Ferraresi Designing a Robotized System for Rehabilitation Taking Into Account Anthropological Data of Patients, Artem Voloshin Serious Games Strategies with Cable-Driven Robots for Rehabilitation Tasks, Thiago Alves Daily Life Activities Analysis for Rehabilitation Purposes, Ferdaws Ennaiem</p>	<p>Technical session 7: Upper limb rehabilitation Design of a novel robot for upper limb rehabilitation, Giuseppe Carbone Novel design of the ParReEx-elbow parallel robot for the rehabilitation of brachial monoparesis, Bogdan Gherman Trunk Flexion-Extension in Healthy Subjects: Preliminary Analysis of Movement Profiles, Federica Ragni Design Optimization and Dynamic Control of a 3-d.o.f. Planar Cable-Driven Parallel Robot for Upper Limb Rehabilitation, Ferdaws Ennaiem First clinical evaluation of a spherical robotic system for shoulder rehabilitation, Doina Pisla Use of Pneumatic Artificial Muscles in a Passive Upper Body Exoskeleton, Carlo Ferraresi</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” of Manfred Husty Announced by: <i>Doina Pisla</i>
09:10 – 09:35	Kinematics of some Medical Robots Plenary talk: <i>Manfred Husty</i>
09:35 – 09:40	Award ceremony for “Life Time Achievement” of Hannes Bleuler Announced by: <i>Mohamed Bouri</i>
09:40 – 10:05	Haptics, Human factors, Ergonomy, Shisa Kanko 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 <i>Georg Rauter</i>
11:10 – 11:35	Poster Session
11:35 – 11:55	Award ceremony for best papers (research, application, students, posters): Award committee: <i>Carlo Ferraresi, Domen Novak, Med Amine Laribi, Giuseppe Carbone, Georg Rauter</i>
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	<p>Welcome & Introduction to workshop & Short introduction of all participants</p> <p>Instructor: Georg Rauter (BIROMED-Lab, Department of Biomedical Engineering, University of Basel, Basel, Switzerland)</p>
09:20 – 09:50	<p>Introduction to real-time systems</p> <p>Instructor: Tobias Bachmann (Technical Support / Application, Beckhoff Switzerland AG, Schaffhausen, Switzerland)</p>
09:50 – 10:00	<p>Software installation and programming platform</p> <p>Instructor: Georg Rauter</p>
10:00 – 10:30	<p>Reading schematics of control cabinets</p> <p>Instructor: Georg Rauter</p>
10:30 – 10:45	<p>Coffee Break</p>
10:45 – 11:30	<p>First steps in Matlab/Simulink</p> <p>Instructor: Vasco Lenzi (The MathWorks GmbH, Bern, Switzerland)</p>
11:30 – 12:40	<p>My first Matlab/Simulink program in TwinCat3</p> <p>Instructor: Georg Rauter</p>
12:40 – 14:00	<p>Lunch Break</p>
14:00 – 15:40	<p>Safety in TwinCAT 3</p> <p>Instructor: Georg Rauter</p>
15:40 – 16:00	<p>Coffee break</p>

16:00 – 17:30	Implementing a servo motor in Matlab/Simulink for TwinCat3 Instructor: Georg Rauter
17:30 – 17:40	Wrap-up, feedback, question round Instructor: Georg Rauter

Thursday, 10.06.2021	
Scientific track Workshop 2 (1 day): 3D-Motion- tracking systems with and without markers & IMUs	
09:00 – 10:40	Enabling AI-driven Health Technologies by Kinematic Inference in IMU Networks Instructor: Prof. Thomas Seel, Friedrich-Alexander-Universität, Erlangen-Nürnberg (Germany) Coordination: Beat Göpfert, ,Department of Biomedical Engineering, University of Basel, Basel, (Switzerland)
10:40 – 10:50	Coffee break
10:50 – 12:50	Theoretical session: 3D-Motion Tracking with marker, markerless and IMU- Systems Instructors: Dr. Mathias Bankay, Qualisys AB, Göteborg (Sweden), Dr. Nils Betzler, Qualisys AB, Göteborg (Sweden), Thomas Hock, Simi Reality Motion Systems, Munich (Germany)
12:50 – 13:00	Q&A and closing remarks
13:00	End of workshop

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>Matlab/Simulink state flow programming</p> <p>Instructor: Vasco Lenzi</p>
10:40 – 11:00	<p>Coffee break</p>
11:00 – 12:40	<p>Development of a state machine for a servo motor in Matlab/Simulink for TwinCat3</p> <p>Instructor: Georg Rauter</p>
12:40 – 14:00	<p>Lunch Break</p>
14:00-14:40	<p>Implementation of basic controllers in Matlab/Simulink for control of a servo motor in TwinCAT3</p> <p>Instructor: Georg Rauter</p>
14:40 – 15:40	<p>TwinCat3 Vision: Installation and first steps</p> <p>Instructor: Tobias Bachmann (Technical Support / Application, Beckhoff Switzerland AG, Schaffhausen, Switzerland)</p>
15:40 – 16:00	<p>Coffee Break</p>
16:00 – 17:30	<p>TwinCat3 Vision: Integration and first applications. Showing visual servoing for high-level closed-loop control</p> <p>Instructor: Tobias Bachmann (Technical Support / Application, Beckhoff Switzerland AG, Schaffhausen, Switzerland)</p>

17:30 – 17:40	<p>Wrap-up, feedback, question round</p> <p>Instructor: Vasco Lenzi, Tobias Bachmann, Georg Rauter</p>
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<p>Scientific track</p> <p>Workshop 3 (1 day): (Please click here for the details)</p> <p>Robotics in Nursing</p>	
09:00 – 09:05	<p>Welcome & Introduction</p> <p>Presenter: Oliver Mautner, PhD, RN (University Department of Geriatric Medicine Felix Platter, Basel)</p>
09:05 – 09:45	<p>Geriatric care in times of the 4th industrial revolution: Are robots the future?</p> <p>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)</p>
09:45 – 10:15	<p>Practical applications of robotics in nursing in Swiss health care and beyond</p> <p>Presenter: Sandra Engberg, PhD, RN (School of Nursing, University of Pittsburgh, USA)</p>
10:15 – 10:30	<p>Coffee break</p>
10:30 – 11:00	<p>Ethics of social assistive robots</p> <p>Presenter: Tijds Vanmeulebroucke, PhD (Centre for Biomedical Ethics and Law KU Leuven, Belgium)</p>
11:00 – 11:20	<p>Legal aspects of robotics in nursing</p> <p>Presenter: Elliott Ash, PhD (Center for Law and Economics, ETH Zürich, Switzerland)</p>

11:20 – 11:40	<p>Is there a business case for robotics in nursing?</p> <p>Presenter: Alexander Thys, MD (Haute Ecole de Commerce, Paris, France & L.E.K. Consulting London Office, UK)</p>
11:40 – 11:50	<p>Coffee break</p>
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	<p>End of workshop 3</p>