



MINISTERUL EDUCAȚIEI



8th International Workshop on New Trends in Medical and Service Robotics

MESROB 2023

June 7-10, 2023
Craiova, Romania



Organized by
University of Craiova, Faculty of Mechanics

Under the Patronage of

**IFTOMM - International Federation for the Promotion of
Mechanism and Machine Science**

TC Biomechanical Engineering

TC Robotics and Mechatronics

Sponsored by:

Ministry of Education

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Daniela TARNITA, University of Craiova, Romania

Conference Co-Chairs:

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Topics

- Design of medical devices
- Kinematics and Dynamics for medical robotics
- Exoskeletons and prostheses
- Anthropomorphic hands
- Therapeutic robots and rehabilitation
- Cognitive robots
- Humanoid & Service robots
- Assistive robots and elderly assistance
- Surgical robots
- Human-robot interfaces
- Haptic devices
- Biomechanics

Local Organising Committee

Daniela Tarnita
Nicolae Dumitru
Ilie Dumitru
Ionut Geonea
Cristian Copilusi
Lucian Gruionu
Adrian Rosca
Gabriela Marinache
Calin Vaida

Conference schedule

Tuesday, 6th of June, 2023	
Welcome Party, University House	19.30-22.00
Wednesday, 7th of June, 2023	
Registration, Hall “Mihai I of Romania”, University of Craiova	08.30 - 09.30
Opening ceremony	09.30 - 10.00
The ceremony of awarding the title of Doctor Honoris Causa to Giuseppe Carbone, Hall “Mihai I of Romania”, University of Craiova	10.00 - 11.00
Coffee break	11.00 – 11.30
<u>Keynote presentation:</u> <i>Recent Advances in Robotic Surgery for Cancer Treatment</i>	11.30 - 12.10
Doina Pisla, Technical University of Cluj-Napoca, Romania	
<u>Keynote presentation:</u> <i>Challenges in Mechanism Design for Robotic Systems as Medical Devices in Motion Assistance</i>	12.10 - 12.50
Marco Ceccarelli, University of Rome Tor Vergata, Italy	
<u>Keynote presentation:</u> <i>Enabling Technology for Safe Robot-assisted Retinal Surgery</i>	12.50 - 13.30
Iulian Iordachita, Johns Hopkins University, Baltimore, USA	
Lunch The University House	14.00 - 15.30

Technical sections The University House		
SECTION I. SURGICAL ROBOTICS		
Chairmen: Giuseppe Carbone and Daniela Tarnita		15.30-17.00
1.	SOFT ROBOT ASSISTANCE FOR TUMOR BIOPSY AND ABLATION IN MAGNETIC RESONANCE IMAGING	15.30-15.45
	<i>Kira Schlockermann, Jan Peters, Bennet Hensen, J. Joaquin Löning C., Frank Wacker, Annika Raatz</i>	
2.	WORKSPACE-AWARE PLANNING OF A SURGICAL ROBOT MOUNTING IN VIRTUAL REALITY	15.45-16.00
	<i>Murali Karnam, Marek Zelechowski, Philippe Cattin, Georg Rauter, Nicolas Gerig</i>	
3.	STRUCTURAL STUDY OF A ROBOTIC SYSTEM FOR SILS SURGERY	16.00-16.15
	<i>Doina Pisla, Nicolae Crisan, Ionut Ulinici, Bogdan Gherman, Corina Radu, Paul Tucan, Calin Vaida</i>	
4.	DESIGN AND FUNCTIONAL ANALYSIS OF A NEW PARALLEL MODULAR ROBOTIC SYSTEM FOR SINGLE INCISION LAPAROSCOPIC SURGERY	16.15-16.30
	<i>Doina Pisla, Iulia Andras, Alexandru-Vasile PUSCA, Corina Radu, Bogdan Gherman, Nicolae Crisan, Calin Vaida, Paul Tucan, Nadim Al Hajjar</i>	
5.	DESIGN AND DEVELOPMENT OF A 6-DEGREE-OF-FREEDOM ROBOTIC DEVICE FOR COCHLEAR IMPLANTATION SURGERY	16.30-16.45
	<i>Xiangyu An, Mingfeng Wang</i>	
6.	FUZZY LOGIC SYSTEMS: FROM WISDOM OF AGE MENTORING PLATFORM TO MEDICAL ROBOTS	16.45-17.00
	<i>Gabriela Rus, Bogdan Gherman, Laurentiu Nae, Calin Vaida, Adrian Pisla, Eduard Oprea, Doina PISLA, Tiberiu Alexandru Antal</i>	
Cofee break		17.00-17.30

SECTION II. DESIGN OF MEDICAL DEVICES		
Chairmen: Marco Ceccarelli and Damien Chablat		17.30-19.15
1.	GRIP-TYPE PSEUDO FORCE DISPLAY WITH NORMAL AND TANGENTIAL SKIN STIMULATION	17.30-17.45
	<i>Mayuka Kojima, Shunsuke Yoshimoto, Akio Yamamoto</i>	
2.	DESIGN OF A SURGICAL STAPLER FOR LAPAROSCOPIC COLECTOMY	17.45-18.00
	<i>Dhruva Khanzode, Ranjan Jha, Alexandra Thomieres, Emilie Duchalais, Damien Chablat</i>	
3.	AN EXPERIMENTAL CHARACTERIZATION OF RIBOLUTION RIB FRACTURE FIXATOR	18.00-18.15
	<i>Marco Ceccarelli, Vincenzo Ambrogi, Matteo Russo, Elaisa Consalvo</i>	
4.	PRE-CLINICAL STUDY OF A CUSTOMIZED REHABILITATION DEVICE PROTOTYPE FOR PATIENTS WITH IMMOBILITY SYNDROME	18.15-18.30
	<i>Tomás Ribeiro, Luís Roseiro, Marco Silva, Frederico Santos, Rafael Bernardes, Remy Cardoso, Vítor Parola, Hugo Neves, Arménio Cruz, William Xavier, Ruben Durães, Cândida Malça</i>	
5.	A STEP TOWARDS OBTAINING AN INNOVATIVE SMARTBATH FOR SHOWER IN BED OF DISABLED AND ELDER'S PEOPLE	18.30-18.45
	<i>Karolina Bezerra, José Machado, Vítor Carvalho, Demétrio Matos, Filomena Soares</i>	
6.	LAB EXPERIENCES FOR A DRIVER MONITORING SYSTEM	18.45-19.00
	<i>María Garrosa, Marco Ceccarelli, Matteo Russo, Daniele Cafolla</i>	
7.	WIRE ACTUATION MECHANISM FOR WRIST EXOSKELETON	19.00-19.15
	<i>Narcis-Gratian Craciun, Erwin-Christian Lovasz</i>	
Dinner, The University House		20.00

Thursday, 8th of June, 2023		
SECTION III. EXOSKELETONS AND PROSTHESES		
III.1. Exoskeletons and prostheses		09.00-10.15
Chairmen: Shaoping Bay and Jose Machado		
1.	DESIGN AND GAIT CONTROL OF AN ACTIVE LOWER LIMB EXOSKELETON FOR WALKING ASSISTANCE	09.00-09.15
	<i>Lingzhou Yu, Harun Leto, André d'Elbreil, Shaoping Bai</i>	
2.	PRELIMINARY DESIGN OF A NOVEL ULRD UPPER LIMB REHABILITATION DEVICE	09.15-09.30
	<i>Luis D. Filomeno Amador, Eduardo Castillo, Giuseppe Carbone</i>	
3.	DEVELOPMENT OF A PASSIVE ANKLE-FOOT EXOSKELETON FOR VARIABLE FORCE RESISTANCE TRAINING	09.30-9.45
	<i>Avinash S Pramod, Poongavanam Palani, Santhakumar Mohan, Asokan Thondiyath</i>	
4.	DESIGN AND PERFORMANCE ANALYSIS OF ANKLE JOINT EXOSKELETON	09.45-10.00
	<i>Nursultan Zhetenbayev, Marco Ceccarelli, Gani Balbayev</i>	
5.	A LEG EXOSKELETON MECHANISM FOR HUMAN WALKING ASSISTANCE	10.00-10.15
	<i>Cristian Copilusi, Marco Ceccarelli, Sorin Dumitru, Alexandru Margine, Ionut Geonea</i>	
III.2. Exoskeletons and prostheses		10.15-11.15
Chairmen: Annina Brunner and Nicolae Dumitru		
1.	DYNAMIC ANALYSIS AND STRUCTURAL OPTIMIZATION OF A NEW EXOSKELETON PROTOTYPE FOR LOWER LIMB REHABILITATION	10.15-10.30
	<i>Ionut Geonea, Cristian Copilusi, Alexandru Margine, Sorin Dumitru, Adrian Sorin Rosca, Daniela Tarnita</i>	

2.	DEVELOPMENTS IN THE DESIGN OF AN ANKLE REHABILITATION PLATFORM	10.30-10.45
	<i>Ioan DOROFTEI, Cristina-Magda CAZACU</i>	
3.	EFFECT OF A PASSIVE SHOULDER SUPPORT EXOSKELETON ON FATIGUE DURING WORKING WITH ARMS OVER SHOULDER LEVEL	10.45-11.00
	<i>Annina Brunner, Rachel van Sluijs, Volker Bartenbach, Dario Bee, Melanie Kos, Lijin Aryananda, Olivier Lambercy</i>	
4.	VIRTUAL PROTOTYPING OF A LEG EXOSKELETON FOR HUMAN PERSONS WITH NEUROMOTOR DEFICIENCIES	11.00-11.15
	<i>Sorin Dumitru, Cristian Copilusi, Ionut Geonea, Leonard Gherghe-Ciurezu, Nicolae Dumitru</i>	
<i>Cofee break</i>		11.15-11.45
SECTION IV. BIOMECHANICS		11.45-13.45
IV.1 Biomechanics		11.45-12.45
Chairmen: Amine Laribi and Ionut Geonea		
1.	EXPERIMENTAL TESTING PROCEDURE FOR VALIDATING A PASSIVE UPPER LIMB EXOSKELETON	11.45-12.00
	<i>Jhon Freddy Rodriguez Leon, Francesco Lago, Francesco Lamonaca, Juan Alejandro Flores Campos, Giuseppe Carbone</i>	
2.	A NEW BIO-INSPIRED JOINT WITH VARIABLE STIFFNESS	12.00-12.15
	<i>Philippe Wenger, Anick Abourachid, Christine Chevallereau</i>	
3.	PARAMETRIC IDENTIFICATION OF POSTURAL CONTROL MODELS IN HUMANS CHALLENGED BY IMPULSE-CONTROLLED PERTURBATIONS	12.15-12.30
	<i>Carlo De Benedictis, Maria Paterna, Andrea Berettoni, Carlo Ferraresi</i>	

4.	NONLINEAR DYNAMICS USED TO STUDY THE INFLUENCE OF TREADMILL SPEED AND INCLINE ON THE HUMAN HIP STABILITY	12.30-12.45
	<i>Daniela Tarnita, Ionut Geonea, Marius Georgescu, Dan Marghitu, Gabriela Marinache, Danut-Nicolae Tarnita</i>	
IV.2. Biomechanics		12.45-13.45
Chairmen: Georg Rauter and Erwin Lowasz		
1.	NUMERICAL ANALYSIS OF A TESTBED USED FOR LIVER TISSUE OF BIOMECHANICAL BEHAVIOR	12.45-13.00
	<i>Arturo Yishai Prieto-Vázquez, Luis Ángel Guerrero-Hernández, Erick Gómez-Apo, Christopher René Torres-San Miguel</i>	
2.	EXPERIMENTAL EVALUATION OF RESPIRATION IN PATIENTS UNDERGOING THORACIC SURGERY	13.00-13.15
	<i>Marco Ceccarelli, Vincenzo Ambrogi, Matteo Russo, Manuel d'Onofrio, Cristiano Casciani</i>	
3.	DYNAMIC FUNCTIONAL STABILITY ANALYSIS OF GAIT AFTER ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION	13.15-13.30
	<i>Mihnea Marin, Dorin Popescu, Alin Horia Burileanu, Ligia Rusu</i>	
4.	THE USE OF ACCELEROMETERS TO TRACK CHANGES IN COBB ANGLES DURING SCOLIOSIS REHABILITATION EXERCISES	13.30-13.45
	<i>Ana-Maria Vutan, Corina Gruescu, Carmen Sticlaru, Erwin-Christian Lovasz</i>	
Lunch & Meeting of the Steering Committee		13.45-15.00
SECTION V. KINEMATICS AND DYNAMICS FOR MEDICAL ROBOTICS		15.00-17.00
V.1. Kinematics and dynamics for medical robotics		15.00-16.00
Chairmen: Philippe Wenger and Bogdan Gherman		
1.	FORWARD KINEMATIC MODEL RESOLUTION OF A HYBRID HAPTIC DEVICE USING AN INERTIAL MEASUREMENT UNIT	15.00-15.15

	<i>Majdi Meskini, Housseem Saafi, Abdelfattah Mlika, Marc Arsicault, Juan Sandoval, Amine Laribi</i>	
2.	INFLUENCE ON THE VISUAL FEEDBACK ON SEVERAL BALANCE ASSESSMENT INDICATORS MEASURED IN A BALANCE REHABILITATION MACHINE <i>Ruben Valenzuela Montes, Javier Corral, Mikel Diez, Fran Campa, Saioa Herrero Villalibre, Erik Macho, Charles Pinto</i>	15.15-15.30
3.	KINEMATIC AND DYNAMIC ANALYSIS OF A NEW MECHANISM FOR ASSISTING HUMAN LOCOMOTION <i>Ionut Geonea, Nicolae Dumitru, Marco Ceccarelli, Daniela Tarnita</i>	15.30-15.45
4.	THE FRAMEWORK FOR MOBILE ROBOT TASK PLANNING BASED ON THE OPTIMAL MANUFACTURING SCHEDULE <i>Aleksandar Jokic, Milica Petrović, Zoran Miljković</i>	15.45-16.00
V.2. Kinematics and dynamics for medical robotics Chairmen: Nicolas Gerig and Mingfeng Wang		16.00-17.00
1.	PERIODIC ACTUATIONS OF TWO-LINK PLANAR ROBOT ARM WITH REVOLUTE AND PRISMATIC JOINTS <i>Jing Zhao, Daniela Tarnita, Dan B. Marghitu</i>	16.00-16.15
2.	MECHANISM DESIGN AND INVERSE KINEMATICS OF A 5-DOF MEDICAL ASSISTIVE MANIPULATOR <i>Anton Antonov, Alexey Fomin</i>	16.15-16.30
3.	DESIGN AND OPERATION OF A ROBOTIZED BED FOR BEDRIDDEN COVID PATIENTS <i>Marco Ceccarelli, Matteo Russo, Daniele Cafolla, Jorge Enrique Araque Isidro, Betsy D. M. Chaparro-Rico</i>	16.30-16.45
4.	DESIGN OF A MEDICAL ROBOT WITH FOLDING MECHANISM USED FOR DISINFECTION IN THE HARD-TO-REACH AREAS	16.45-17.00

	<i>Elida-Gabriela Tulcan, Carmen Sticlaru, Erwin-Christian Lovasz</i>	
Gala Dinner The Art Museum of Craiova		18.30-21.00
Friday, 9th of June, 2023		
SECTION VI. ANTROPOMORPHIC HANDS		
Chairmen: Candida Malca and Cristian Copilusi		09.30-10.30
1.	PATIENT TAILORED HAND EXOSKELETONS - A 3D-PRINTABLE CONCEPT FOR FORCE TRANSMISSION AND FEEDBACK <i>Mateus Enzenberg, Simon Winkler, Yeongmi Kim</i>	09.30-09.45
2.	TREE-LIKE FRACTAL STRUCTURES MODELING AND THEIR APPLICATION IN 3D PRINTED BONES <i>Anca Stanciu Birlescu, Nicolae Balc</i>	09.45-10.00
3.	BASICS OF HAND PROSTHESIS DESIGN <i>Isabela Todirite, Frent Radu Gabriela Corina, Mihaiela Iliescu</i>	10.00-10.15
4.	RAPID PROTOTYPING TECHNIQUES FOR INNOVATIVE HAND PROSTHESIS <i>Lucian Matei, Emilia Furdu Lunguț, Corina Radu (Frent), Maria Magdalena Roșu, Luige Vlădăreanu, Mihaiela Iliescu</i>	10.15-10.30
Award Ceremony and Closing Ceremony The University House		10.30-11.30
Lunch The University House		12.00-13.00
Social Programme Boat trip & Dinner on the Danube		13.00-22.00