

8TH INTERNATIONAL SYMPOSIUM ON ROBOTICS MECHATRONICS,
DJERBA, TUNISIA, APRIL 17-19, 2024



THE 8TH INTERNATIONAL SYMPOSIUM ON ROBOTICS MECHATRONICS

DJERBA, TUNISIA, APRIL 17-19, 2024

PROGRAMME
PRACTICAL INFORMATION

ISRMP2024

Djerba, Tunisia.

CONFERENCE INFORMATION

The eighth International Symposium on Robotics Mechatronics, ISRM 2024, constitutes the continuation of the ISRM symposium tradition, which was held for the first time in Hanoi Vietnam (2009), the second time in Shanghai China (2011), the third time in Singapore (2013), the fourth time in Poitiers, France (2015), the fifth time in Sydney Australia (2017), the sixth time in Taipei Taiwan (2019) and the seventh time in Qingdao China (2021).

IFTToMM ISRM 2024 aims to bring together researchers, industrials and students involved in a broad range of disciplines related to Robotics and Mechatronics, in an intimate and stimulating environment in order to disseminate their results and exchange about collaborations, trends and challenges.

CONFERENCE CO-CHAIRMEN

Lotfi Romdhane (Tunisia/UAE)
Saïd Zegloul (France)
Abdelfattah Mlika (Tunisia)
Med Amine Laribi (France)

INTERNATIONAL SCIENTIFIC COMMITTEE

Tobias Bruchmann (Germany)
Giuseppe Carbone (Italy, Chair)
I-Ming Chen (Singapore)
Nguyen Phong Dien (Vietnam)
Gu Fang (Australia)
Feng Gao (China)
Chin-Hsing Kuo (Australia/Taiwan)
Med Amine Laribi (France)
Lotfi Romdhane (Tunisia/UAE)
Jorge Solis (Sweden)
Terrence Essomba (Taiwan)
Yukio Takeda (Japan)
Richard Yang (Australia)
Teresa Zielinska (Poland)

ADVISORY COMMITTEE

Philippe Bidaud (France)
Jean-Pierre Merlet (France)
Grigore Gogu (France)
Philippe Wenger (France)

LOCAL ORGANISING COMMITTEE

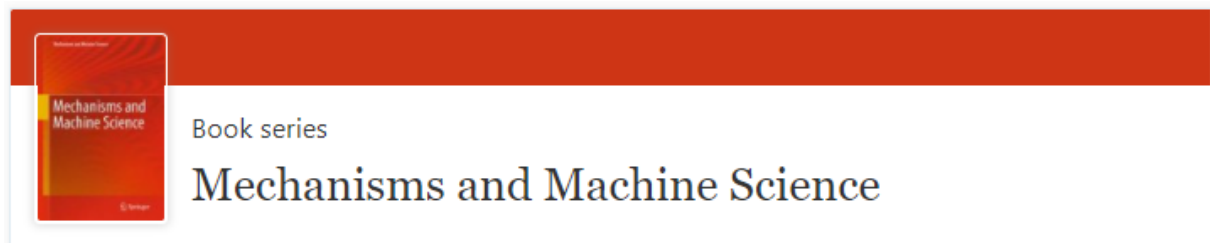
Abdelbadiâ Chaker (Tunisia)
Sami Bennour (Tunisia)
Housseem Saâfi (Tunisia)
Houssein Lamine (Tunisia)
Ajmi Houdi (Tunisia)
Badreddine Kribi (Tunisia)
Souha Baklouti (Tunisia)
Azza Tayari (Tunisia)
Kais Ghrairi (Tunisia)
Juan Sandoval (France)
Marc Arsicault (France)

REGISTRATION DESK

A registration desk will be available during the Symposium at the hall of the Yadis Djerba Thalasso & Golf Hotel.

PROCEEDINGS

The proceedings book is included in the registration fee. The proceedings will be published in the Springer book: **Robotics and Mechatronics - Proceedings of ISRM 2024.**



CONFERENCE BADGE

All registrants for ISRM2024 and Technical staff members will receive a conference badge.

Everybody is asked to wear this badge at all sessions and social events.

WIRELESS NETWORK

Wi-Fi network access will be available during the conference.

COFFEE BREAKS AND LUNCHES

- Coffee breaks and lunches be served respectively at the hotel bar and restaurant.
- The welcome reception will be organized at the hotel bar.
- The Gala Dinner will be organized at the restaurant ElFrida Casino Djerba on Thursday April 18, transportation for all the participants will be by a bus departing at 20h30 from the hotel.

ORAL PRESENTATIONS

In preparing your presentations, the authors should take into account the following points:

- Presentations must be delivered in English, the official language of ISRM2024.
- Presenters will be given a maximum of 15 minutes for the presentation plus 3 minutes for questions and answers and 2 minutes for transition to the next speaker.
- Oral presentation must be given as a PowerPoint or a PDF. All graphics and text must be in English.
- Presenters should provide their presentation before the start of their session.
- An LCD projector, PC and microphone will be provided in the conference sessions.

CONFERENCE SCHEDULE AND PROCEEDING

The ISRM 2024 schedule and the proceeding are available at:





ISRMP 2024, PROGRAM OVERVIEW

The 8th IFToMM International Symposium on Robotics & Mechatronics - ISRMP2024

Program

Hour	Wednesday	Thursday	Friday
	17/04/2024	18/04/2024	19/04/2024
9:00		Keynote Lecture: <u>Sunil K. Agrawal</u>	S7: Parallel Manipulators 2 ID: 18 - 22 - 25
10:00		Coffee-break	
10:00		S3: Medical robotics 1 ID: 1 - 11 - 12 - 20 - 23 - 39	S8: Medical robotics 2 ID: 40 - 28 - 30 - 33 - 34 - 24
10:20		Meeting of the ISRMP ISC	Lunch
12:40	Opening		
14:00	Keynote Lecture: <u>Giuseppe Carbone</u>	S4: Modeling and Analysis 1 ID: 7 - 9 - 10 - 16	Closing session
	S1: Mechanism and Mechatronics Devices ID: 35 - 26 - 6 - 5	S5: Parallel Manipulators 1 ID: 8 - 14 - 15	Social event
16:05	Coffee-break	Coffee-break <--- Group Photo --->	
16:20	S2: Advanced Robotics ID: 3 - 4 - 17 - 29 - 31	S6: Modeling and Analysis 2 ID: 19 - 27 - 32 - 36	
18:00	Welcome Reception	Gala dinner & Awards	

ISRM 2024, DETAILED PROGRAM

WEDNESDAY 17.04.2024

14:00 – 14:45 ■ KEYNOTE LECTURE:

CHAired BY: LOTFI ROMDHANE AND MED AMINE LARIBI

SERVICE ROBOTICS: CHALLENGES AND DESIGN EXAMPLES

GIUSEPPE CARBONE

14:45 – 16:05 ■ SESSION 1: MECHANISM AND MECHATRONICS DEVICES

CHAired BY: TETSURO MIYAZAKI AND MED AMINE LARIBI

- 35 **NEURAL NETWORK-BASED CONTROL OF A TENDON-DRIVEN SOFT SLENDER MANIPULATOR**
GUILLAUME SAMAIN, JEROME SZEWCZYK AND FAIZ BENAMAR
- 26 **A THREE-DIMENSIONAL MODEL FOR DYNAMIC INTERACTION IN WHEEL-RAIL CONTACT**
HELMi MAHMOUDI AND AJMI HOUIDI
- 6 **DEVELOPMENT OF A NOVEL RECONFIGURABLE OMNIDIRECTIONAL ROBOT FOR PRECISION AGRICULTURE IN GREENHOUSES**
GIUSEPPE QUAGLIA, GIOVANNI COLUCCI, ANDREA BOTTA AND LUIGI TAGALIAVINI
- 5 **A VARIABLE-STIFFNESS JOINT BASED ON ELECTROMAGNETIC FORCE ATTRACTION: MODELING AND DESIGN**
LUIS D. FILOMENO AMADOR, EDUARDO CASTILLO CASTANEDA, GIUSEPPE CARBONE AND MED AMINE LARIBI

16:20 – 18:00 ■ SESSION 2: ADVANCED ROBOTICS

CHAired BY: BURKHARD CORVES AND ABDELBADIA CHAKER

- 3 **A MODELING APPROACH TO STUDY THE DYNAMIC BEHAVIOR OF BICYCLE**
SAFA OTHMEN, AYMEN KHADHR AND AJMI HOUIDI
- 4 **DEVELOPMENT OF SECOND PROTOTYPE OF MAGNETORHEOLOGICAL FLUID ACTUATOR FOR FINE HAPTIC INTERFACES**
TAKEHITO KIKUCHI, ASAKA IKEDA, RINO MATSUSHITA, ASAHI HIGASHIGUCHI AND ISAO ABE
- 17 **FROM GESTURES TO BEHAVIORS: AN EMPIRICAL STUDY ON BEHAVIOR-DRIVEN DEVELOPMENT SCENARIOS TO SUPPORT END-USER**
JOSE PABLO DE LA ROSA, JORGE SOLIS, KOYU NAKAMORI, GUSTAVO ALFONSO GARCIA RICARDEZ, JOHAN HÅKANSSON, ANDERS STENGAARD SØRENSEN AND THIAGO ROCHA SILVA
- 29 **END-TO-END LICENSE PLATE RECOGNITION SYSTEM WITH OPTIMIZED INFERENCE ON MOBILE SECURITY ROBOTS**
AMIR ISMAIL, MAROUA MEHRI, ANIS SAHBANI AND NAJOUA ESSOUKRI BEN AMARA
- 31 **STATEMENT OF A COMPREHENSIVE SET OF KINETOSTATICALLY INTRINSIC PROPERTIES TO ADIMENSIONALIZE THE JACOBIAN MATRIX**
FABIEN COURREGES

THURSDAY 18.04.2024

9:00 – 10:00 ■ KEYNOTE LECTURE:

CHAired BY: ABDELFAH MLIKA AND ABDELBADIA CHAKER

REHABILITATION ROBOTICS AND IMPROVING EVERYDAY HUMAN FUNCTIONS

SUNIL K. AGRAWAL

10:40 – 12:40 ■ SESSION 3: MEDICAL ROBOTICS 1

CHAired BY: JUAN SANDOVAL AND SAMI BENNOUR

- 1 **DESIGN AND ANALYSIS OF A COST-EFFECTIVE HAPTIC DEVICE FOR SONOGRAPHY TRAINING**
MYKHAILO RIABTSEV, MED AMINE LARIBI, JEAN-MICHEL GUILHEM, VICTOR PETUYA, MÓNICA URIZAR, MARC ARSICAULT AND SAID ZEGHLOUL
- 11 **A ROBUSTNESS STUDY OF AN EXOSKELETON-UPPER LIMB SYSTEM CONTROLLED BY A MODEL FREE ADAPTIVE TERMINAL SLIDING MODE WITH GRAVITY COMPENSATION**
SANA BEMBLI, NAHLA KHRAIEF HADDAD, SAFYA BELGHITH

- 12 **COMPARISON OF DIFFERENT PHYSIOLOGICAL MODELS FOR ESTIMATING MUSCLE FORCES BASED ON INVERSE-DYNAMICS**
OLFA JEMAA, DAVID DANAY, LOTFI ROMDHANE, SAMI BENNOUR
- 20 **EXPERIMENTAL EVALUATION AND NUMERICAL SIMULATION IN A LOWER LIMB EXOSKELETON**
DANIELA TARNITA, IONUT GEONEA, ILIE DUMITRU, A. PETCU AND D.-N. TARNITA
- 23 **KINEMATIC AND DYNAMIC ANALYSIS OF A NEW PROTOTYPE EXOSKELETON FOR HUMAN LOWER LIMB REHABILITATION**
IONUT GEONEA, LAURENTIU RACILA, ILIE DUMITRU, LAURA GRIGORIE, ALINA ROMANESCU, SORIN ROSCA AND DANIELA TARNITA
- 39 **DESIGN AND IMPLEMENTATION OF A DIGITAL TWIN FOR A MULTI-ROBOT SURGICAL PLATFORM**
AMIR TRABELSI, JUAN SANDOVAL, ABDELFAH MLIKA, SAMIR LAHOUAR AND MED AMINE LARIBI

14:00 – 15:20 ■ SESSION 4: MODELING AND ANALYSIS 1

CHAIRER BY: AIDA CHEBBI AND HOUSSEM SAAFI

- 7 **MODELING AND ANALYSIS OF PERISTALTIC LOCOMOTION IN SOFT ROBOTS: FOCUSING ON THE INTERACTION AND IMPORTANCE OF FRICTION**
DIEGO E. MARTINEZ-SANCHEZ, X. YAMILE SANDOVAL-CASTRO, EDUARDO CASTILLO CASTANEDA, JOSÉ DOLORES OSCAR BARCEINAS- SANCHEZ AND MED AMINE LARIBI
- 9 **COMPARATIVE STUDY OF MODIFIED DYNAMIC A-STAR PROGRAMMING AND A-STAR FOR MOBILE ROBOT PATH PLANNING**
NESSRINE KHLIF, NAHLA KHRAIEF AND SAFYA BELGHITH
- 10 **CLASSIFICATION OF AUTOMATION SOLUTIONS FOR THE HANDLING IN THE FIELD OF LOADING AND UNLOADING OF SINGLE PARCELS**
ERIK MÖLLMANN, MICHAEL BÜHREN AND TOBIAS BRUCKMANN
- 16 **VISION-BASED MATERIAL INSPECTION FOR THE OPTIMIZATION OF ROBOTIZED CONSTRUCTION**
CHRISTOPH JEZIOREK, MICHELA CAMILETTI, MAX HUVERS, ALEXANDER MALKWITZ, TOBIAS BRUCKMANN AND AILEEN PFEIL

15:20 – 16:20 ■ SESSION 5: PARALLEL MANIPULATORS 1

CHAIRER BY: SOPHIE CHARLOTTE KEUNECKE AND HOUSSEIN LAMINE

- 8 **DEFINING OF A WORKSPACE OF THE 3-PRPS TYPE TRIPOD**
ZHUMADIL BAIGUNCHEKOV, MED AMINE LARIBI, GIUSEPPE CARBONE, RUSTEM KAIYROV AND ABZAL KASSINOV
- 14 **DESIGN OF PLANAR CABLE-DRIVEN ROBOT WITH A FULL ROTATION**
HOUSSEIN LAMINE, HOUSSEM SAAFI, SAMI BENNOUR, ABDELFAH MLIKA AND LOTFI ROMDHANE
- 15 **FORWARD KINEMATIC MODEL RESOLUTION OF A NEW SPHERICAL PARALLEL MANIPULATOR**
CHAIMA LAHDIRI, HOUSSEM SAAFI, ABDELFAH MLIKA AND MED AMINE LARIBI

16:20 – 18:00 ■ SESSION 6: MODELING AND ANALYSIS 2

CHAIRER BY: TOBIAS BRUCKMANN AND SAMI BENNOUR

- 19 **RAPID AND PRECISE METHOD FOR OBJECT DETECTION AND LOCALIZATION BASED ON PRIMITIVE GEOMETRICAL FORMS**
HONG PHUOC NGUYEN NGUYEN, SOPHIE CHARLOTTE KEUNECKE, BURKHARD CORVES, SIGRID BRELL-COKCAN AND MATHIAS HÜSING
- 27 **MECHANISM DESIGN AND INVERSE KINEMATICS OF A 6-DOF HYBRID ROBOT WITH TWO PARALLEL MODULES**
KIRILL MUKHIN, ANTON ANTONOV AND ALEXEY FOMIN
- 32 **IMPLEMENTATION OF MESHLESS METHOD: APPLICATION TO COMPOSITE MATERIALS**
RIHEME SARRAJ AND TAREK HASSINE
- 36 **A GEOMETRIC APPROACH FOR THE IK OF 6R ROBOTS WITH NON-SPHERICAL WRIST**
MANEL ABBES AND GÉRARD POISSON

FRIDAY 19.04.2024

9:00 – 10:00 ■ SESSION 7: PARALLEL MANIPULATORS 2

CHAIRER BY: MYKHAILO RIABTSEV AND AJMI HOUIDI

- 18 **A NEW METHOD OF SOLVING THE FORWARD KINEMATIC MODEL OF A PLANAR FIVE-BAR MECHANISM**
HOUSSEM SAAFI, HOUSSEIN LAMINE AND ABDELFAH MLIKA
- 22 **USE OF DEPTH CAMERA FOR MOTION TRACKING OF CABLE-DRIVEN PARALLEL ROBOT INTENDED FOR FUNCTIONAL REHABILITATION**
KAISS GHRAIRI, HOUSSEIN LAMINE, ABDELBADIA CHAKER AND SAMI BENNOUR

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- 25 MODELING AND EXPERIMENTAL VALIDATION OF A 3 DOF CABLE-DRIVEN PARALLEL ROBOT**
HADHEMI BEN BRAHIM, KAISS GHRAIRI, BADREDDINE KRIBI, HOUSSEIN LAMINE, MED AMINE LARIBI AND SAMI BENNOUR

10:20 – 12:20 ■ SESSION 8: MEDICAL ROBOTICS 2

CHAIRER BY: GIUSEPPE QUAGLIA AND MED AMINE LARIBI

- 40 A MACHINE LEARNING APPROACH FOR RUNNING GRADE CLASSIFICATION USING IMUs DATA**
ABDELBADIA CHAKER, HANIN ATIGA, SETH DONAHUE, RACHEL ROBINSON, AIDA CHEBBI, SAMI BENNOUR, MIKE HAHN
- 28 A NOVEL APPROACH FOR UPPER LIMBS JOINT ANGLE MEASUREMENT USING WEARABLE IMU SENSORS**
SOUHA BAKLOUTI, TAYSIR REZGUI, ABDELBADIA CHAKER, SAFA MEFTEH, KHALIL BEN MANSOUR, ANIS SAHBANI AND SAMI BENNOUR
- 30 STUDY ON FORCE CONTROL OF PNEUMATICALLY DRIVEN ARM MOTION ASSIST SUIT**
YOSHIHIDE TOMITA, TETSURO MIYAZAKI, MAINA SOGABE AND KENJI KAWASHIMA
- 33 DESIGN IMPROVEMENT OF A PARALLEL ROBOT FOR LOWER LIMB REHABILITATION**
DOINA PISLA, PAUL TUCAN, NICOLETA TOHANEAN, IOSIF BIRLESCU, CRISTIAN ABRUDAN, HORSIA ALIN, BOGDAN GHERMAN, ADRIAN PISLA, JOSÉ MACHADO, CALIN VAIDA
- 34 A NOVEL METHOD TO IDENTIFY RIGHT AND LEFT IMPACT DURING RUNNING USING A SINGLE SACRUM-MOUNTED IMU**
AIDA CHEBBI, RACHEL ROBINSON, SETH DONAHUE, MIKE HAHN
- 24 PREDICTING STEP LENGTH FROM HEEL ACCELERATION: A MACHINE LEARNING APPROACH**
AZZA TAYARI, HAMZA GBADA, TAYSIR REZGUI AND SAMI BENNOUR

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