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RoManSy 2022

International Centre for Mechanical Sciences

**ROBOT DESIGN, DYNAMICS
AND CONTROL**

24th CISM-IFTToMM SYMPOSIUM



GENERAL INFORMATION

Information about registration, travel and accommodation is available at
<https://romansy2022.cism.it/> and www.cism.it

VENUE

CISM - International Centre for Mechanical Sciences
Palazzo del Torso - Piazza Garibaldi 18 - 33100 Udine (Italy)

CONTACT

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International Federation for the Promotion of Mechanisms and Machine Science

RoManSy 2022 - 50 Year Edition

Final Announcement and Programme

July 4 - 7, 2022
Udine, Italy

PROGRAMME AT A GLANCE

	Monday July 4	Tuesday July 5	Wednesday July 6	Thursday July 7
08.30 - 09.00	Registration			
09.00 - 09.15	Opening	Keynote Lecture # 1	Keynote Lecture # 2	Keynote Lecture # 3
09.15 - 10.00	"The Beginnings"			
10.00 - 10.15	Session I	Session V	Session VII	Session XI
10.00 - 10.25	Paper # 1	Paper # 13	Paper # 19	Paper # 29
10.25 - 10.50	Paper # 2	Paper # 14	Paper # 20	Paper # 30
10.50 - 11.15	Paper # 3	Paper # 15	Paper # 21	Paper # 31
11.15 - 11.45	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11.45 - 13.00	Session II	Session VI	Session VIII	Session XII
11.45 - 12.10	Paper # 4	Paper # 16	Paper # 22	Paper # 32
12.10 - 12.35	Paper # 5	Paper # 17	Paper # 23	Paper # 33
12.35 - 13.00	Paper # 6	Paper # 18	Paper # 24	Paper # 34*
				Closing
13.00 - 15.00	Lunch	Lunch	Lunch	
13.00 - 15.00		Romansy AB and ISC meeting		
15.00 - 16.45	Session III		Session IX	
15.00 - 15.25	Paper # 7	Historical walk in Udine	Open round "The Future"	
15.25 - 15.50	Paper # 8			
15.50 - 16.15	Paper # 9		Paper # 25	
16.15 - 16.45	Coffee Break		Coffee Break	
16.45 - 18.00	Session IV		Session X	
16.45 - 17.10	Paper # 10		Paper # 26	
17.10 - 17.35	Paper # 11	Return to hotel	Paper # 27	
17.35 - 18.00	Paper # 12		Paper # 28	
18.00	Welcome aperitif	Bus to banquet		
19.00 - 21.00		Banquet		
23.30		Return to hotel		

(*) Late paper

SCIENTIFIC PROGRAMME

Monday, July 4, 2022

08.30 - 09.00 *On-site registration and on-line connection check*

09.00 - 09.15 **Opening**

Chairs: Andrés Kecskeméthy, Vincenzo Parenti-Castelli

09.15 - 10.00 “The beginnings”

Chairs: Andrés Kecskeméthy, Vincenzo Parenti-Castelli

Session I Chair: Oussama Khatib

Wearable, Humanoid and Surgery Robotics (i)

10:00 - 10:25 | Paper # 1

Development of wearable assist robot for twist and leaning motion

K. Makino, H. Terada, Y. Dobashi, M. Karaki and X. Sun

10:25-10:50 | Paper # 2

Preliminary mechanical design of a wearable parallel-serial hybrid robot for wrist and forearm rehabilitation with consideration of joint misalignment compensation

Y. Liu, A. Botta, G. Quaglia and Y. Takeda

10:50-11:15 | Paper # 3

Simple method for humanoid robot posture design

T. Zielińska, O. Kahraman

11:15-11:45 *Coffee break*

Session II Chair: Andreas Müller

Wearable, Humanoid and Surgery Robotics (ii)

11:45-12:10 | Paper # 4

Wearable exoskeletons for hand assistance: Concept and design of a thumb module with hybrid architecture

C. Brogi, N. Secciani, L. Bartalucci, M. Pagliai, B. Allotta, A. Ridolfi and A. Rindi

12:10-12:35 | Paper # 5

Dynamic modeling of a human-inspired robot based on a Newton-Euler approach

F. Gonçalves, T. Ribeiro, A. F. Ribeiro, G. Lopes and P. Flores

12:35-13:00 | Paper # 6

New hand exoskeletons for four long finger rehabilitation

A. Vuocolo, L. Cao, A. Petinari, N. Sancisi, Y. Takeda and V. Parenti-Castelli

13:00-15:00 *Lunch*

Session III Chair: Paulo Flores

Wearable, Humanoid and Surgery Robotics (iii)

15:00-15:25 | Paper # 7

Model-based control for arm support exoskeleton

M. Chumichev and I. Orlov

15:25-15:50 | Paper # 8

Design and characterization of modular soft components for an exoskeleton glove with improved wearability

T. Bagneschi, D. Leonardis, D. Chiaradia and A. Frisoli

15:50-16:15 | Paper # 9

Kinematic modelling of a parallel robot used in single incision laparoscopic surgery

P. Tucan, B. Gherman, I. Andras, C. Vaida and D. Pislá

16:15-16:45 *Coffee break*

Session IV Chair: Henrik Ebel

Sensorics (i)

16:45-17:10 | Paper # 10

An optical curvature sensor for soft robots

M. Grube and R. Seifried

17:10-17:35 | Paper # 11

Methods comparison and proposition of new Quaternion-based approach for extraction of in-plane rotations out of 3D rotations

M. Ghiassi, J. Maibaum and A. Kecskeméthy

17:35-18:00 | Paper # 12

Low-cost gyroscope and accelerometer calibration with free fall pendulum motion: Results and sensitivity

G. Avallone, L. Agostini, M. Conconi, V. Parenti Castelli, R. Vertechy and N. Sancisi

Tuesday, July 5, 2022

09.00-10.00 | Keynote Lecture # 1

On the stability of macro-mini robotic systems for physical human-robot interaction

C. Gosselin

Chair: Philippe Bidaud

Session V

Chair: Volkert van der Wijk

Sensorics (ii)

10.00-10.25 | Paper # 13

A COBOT-IMU hand-guiding system with online collision avoidance in null space

G. Avallone, E. Monari, Y. Chen, L. Agostini, N. Sancisi and R. Vertechy

Path planning and Control of Robots (i)

10.25-10.50 | Paper # 14

Finding formations for the non-prehensile object transportation with differentially-driven mobile robots

H. Ebel, D. N. Fahse, M. Rosenfelder and P. Eberhard

10.50-11.15 | Paper # 15

On-line velocity scaling algorithm for task space trajectories

M. Wojtyra and Ł. Woliński

11.15-11.45 Coffee break

Session VI

Chair: Bernard Roth

Path planning and Control of Robots (ii)

11.45-12.10 | Paper # 16

Path quality improvement of sampling-based planners: An efficient optimization-based approach using analytical gradients

J. Wittmann, C. Klein and D. Rixen

12.10-12.35 | Paper # 17

Hexapod posture control for navigation across complex environments

J. Coelho, B. Dias, G. Lopes, F. Ribeiro and P. Flores

12.35-13.00 | Paper # 18

Control performance improvement in dynamically decoupled manipulators

Y. Lu, Y. Aoustin and V. Arakelian

13.00-23.30 Lunch, Historical walk in Udine and Banquet

Wednesday, July 6, 2022

09.00-10.00 | Keynote Lecture # 2

A method for the automatic design of mechanisms on the example of a four-bar linkage

T. Lueth and F. Irlinger

Chair: Andrés Kecskeméthy

Session VII

Chair: Damien Chablat

Path planning and Control of Robots (iii)

10.00-10.25 | Paper # 19

Reliable time-optimal point to point handling of unmounted objects with industrial robots

H. Gattringer and A. Müller

10.25-10.50 | Paper # 20

Design of a weed-control mobile robot based on electric shock

G. Morara, A. Baldassarri, J. Diepenbruck, T. Bruckmann and M. Carricato

Modeling and Synthesis of Robotic Devices (i)

10.50-11.15 | Paper # 21

Development of joint mechanism that can achieve both active drive and variable joint quasi-stiffness by utilizing 4-bar and 5-bar composite linkage

H. Mineshita, T. Otani, Y. Kuroiwa, M. Sakaguchi, Y.o Kawakami, H. Lim and

A. Takanishi

11.15-11.45 Coffee break

Session VIII

Chair: Giuseppe Carbone

Modeling and Synthesis of Robotic Devices (ii)

11.45-12.10 | Paper # 22

Kinematic synthesis of a tendon-driven 4R planar robotic arm

C. Lanni, G. Figliolini and M. D'Angelo

12.10-12.35 | Paper # 23

Inverse and forward kinematics of a reconfigurable spherical parallel mechanism with a circular rail

P. Laryushkin, A. Antonov, A. Fomin and V. Glazunov

12.35-13.00 | Paper # 24

Novel gripper design for transporting of biosample tubes

A. Voloshkin, L. Rybak, G. Carbone and V. Cherkasov

13:00-15:00 *Lunch*

Session IX Chairs: Andrés Kecskeméthy, Vincenzo Parenti-Castelli

15:00-15:50 Open round “The Future”

Modeling and Synthesis of Robotic Devices (iii)

15:50-16:15 | Paper # 25

Techniques for synthesis of inherently force balanced mechanisms
L. Girgenti and V. van der Wijk

16:15-16:45 *Coffee break*

Session X Chair: Giorgio Figliolini

Modeling and Synthesis of Robotic Devices (iv)

16:45-17:10 | Paper # 26

A preliminary study of factors influencing the stiffness of aerial cable towed systems
V. Di Paola, E. Idà, M. Zoppi and S. Caro

17:10-17:35 | Paper # 27

Design optimization of a 6-DOF cable-driven parallel robot for complex pick-and-place tasks
L. Guagliumi, A. Berti, E. Monti and M. Carricato

17:35-18:00 | Paper # 28

Improved resolution of a forward kinematic model of parallel manipulators using a serial approach
M. Meskini, H. Saafi, A. Mlika, M. Arsicault, S. Zegloul and M. A. Laribi

Thursday, July 7, 2022

09:00-10:00 | Keynote Lecture # 3

Bio-inspired structural intelligence for miniature robots in minimal-invasive surgery
G. Rauter, L. Fasel, M. Eugster and N. Gerig
Chair: Vincenzo Parenti-Castelli

Session XI Chair: Nicola Sancisi

Technological Applications and Teaching Aspects (i)

10:00-10:25 | Paper # 29

Artificial neural network modelling of cable robots
L. Notash

10:25-10:50 | Paper # 30

Design of a robot for the automatic charging of an electric car
D. Chablat, R. Maccacchione and E. Ottaviano

10:50-11:15 | Paper # 31

A new parameter selection method for power skiving tools
E. Olivoni, R. Vertechy and V. Parenti-Castelli

11:15-11:45 *Coffee break*

Session XII Chairs: Andrés Kecskeméthy, Vincenzo Parenti-Castelli

Technological Applications and Teaching Aspects (ii)

11:45-12:10 | Paper # 32

Low cost delta robot for the experimental validation of frame vibration reduction methods
C. Mirz, M. Hüsing, Y. Takeda and B. Corves

12:10-12:35 | Paper # 33

Influence of receiving timing of an online lecture in actual practical mechanical engineering training
K. Makino, Y. Haramiishi, C. Zhang and H. Hashimoto

12:35-13:00 | Paper # 34

Robotic inspection system intended to work in extreme environment
Ł. Ambroziński, M. Giergiel, P. Łabedź, T. Szczepkiewicz and T. Uhl

13:00 Closing

Chairs: Andrés Kecskeméthy, Vincenzo Parenti-Castelli

CISM-IFTToMM Programme Committee

for the 24th RoManSy Symposium

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University of Duisburg-Essen, Germany

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PREVIOUS SYMPOSIA

Conceived in the early seventies by Academician I.I. Artobolevskij and the Prof. L. Sobrero, founder of CISM, twentythree Symposia have been held since 1973.

Ro.Man.Sy.'73, Udine (Italy)

Chairman of the Organising Committee: A.E. Kobrinskij

Ro.Man.Sy.'76, Jadwisin (Poland)

Chairman: B. Roth

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Ro.Man.Sy.'86, Cracow (Poland)

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Ro.Man.Sy.'88, Udine (Italy)

Chairmen: G. Bianchi and A. Morecki

Ro.Man.Sy.'90, Cracow (Poland)

Chairmen: A. Morecki and G. Bianchi

Ro.Man.Sy.'92, Udine (Italy)

Chairmen: G. Bianchi and A. Morecki

Ro.Man.Sy.'94, Gdansk (Poland)

Chairmen: A. Morecki and G. Bianchi

Ro.Man.Sy.'96, Udine (Italy)

Chairmen: G. Bianchi and A. Morecki

Ro.Man.Sy.'98, Paris (France)

Chairmen: G. Bianchi and A. Morecki, local Chairman: J.-C. Guinot

Ro.Man.Sy. 2000, Zakopane (Poland)

Chairmen: A. Morecki and G. Bianchi

Ro.Man.Sy. 2002, Udine (Italy)

Chairmen: G. Bianchi and J.-C. Guinot

Ro.Man.Sy. 2004, Saint-Hubert (Canada)

Chairmen: J. Angeles and J.-C. Piedboeuf

Ro.Man.Sy. 2006, Warsaw (Poland)

Chairman: T. Zielinska

Ro.Man.Sy. 2008, Tokyo (Japan)

Chairman: A. Takanishi

Ro.Man.Sy. 2010, Udine (Italy)

Chairmen: V. Parenti Castelli and W.O. Schiehlen

Ro.Man.Sy. 2012, Paris (France)

Charimen: Ph. Bidaud and O. Khatib

Ro.Man.Sy. 2014, Moscow (Russia)

Charimen: M. Ceccarelli and V. Glazunov

Ro.Man.Sy. 2016, Udine (Italy)

Charimen: V. Parenti Castelli and W. Schiehlen

Ro.Man.Sy. 2018, Rennes (France)

Charimen: V. Arakelyan and P. Wenger

Ro.Man.Sy. 2020, Online

Charimen: G. Venture, J. Solis, Y. Takeda and A. Konno