



19th International Symposium on  
**ADVANCES IN ROBOT KINEMATICS**  
LJUBLJANA, JUNE 30 – JULY 4, 2024

FINAL PROGRAMME

ORGANIZED BY  
JOŽEF STEFAN INSTITUTE  
CANKARJEV DOM and  
SRIP ToP

UNDER PATRONAGE OF  
IFTToMM and  
SLOVENIAN ACADEMY OF ENGINEERING



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## VENUE

Cankarjev dom Club – Entrance Erjavčeva cesta, Ljubljana, Slovenia

## REGISTRATION DESK

Sunday, June 30, 2024 17:00-20:00

Monday, July 1, 2024 8:00-18:00

(registration will also be possible on other days for latecomers)

## CO-CHAIRS

Jadran Lenarčič and Manfred Husty

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## WEBSITE



<https://ark2024.org>

SUNDAY, JUNE 30, 2024

19:00-21:00

WELCOME RECEPTION

Location: Cankarjev dom (Entrance – Erjavčeva cesta)



## MONDAY, JULY 1, 2024

- 09:15-9:30      OPENING
- SESSION 1
- 09:30-09:50      Ferdinand Freudenstein's spatial kinematics  
*P. Larochele*
- 09:50-10:10      The inverse kinematics of cable-driven parallel robot with more than 6 sagging cables  
Part 1: From ideal to sagging cables  
*J.-P. Merlet*
- 10:10-10:30      The inverse kinematics of cable-driven parallel robot with more than 6 sagging cables  
Part 2: Using neural networks  
*J.-P. Merlet*
- 10:30-10:50      A screw theory-based method for approximate static balancing of a RSSR-SS mechanism  
*N.N. Romero, J.-S. Zhao, S. Yurievich Misyurin, R.S. Vieira, D. Martins*
- 10:50-11:20      COFFEE BREAK
- 11:20-11:40      Kinematics and workspace of a spatial 3-DoF manipulator with anti-parallelogram joints  
*V. Muralidharan, C. Chevallereau, P. Wenger*
- 11:40-12:00      On a software joint velocity limitation of a spherical parallel manipulator with coaxial  
input shafts  
*A. Le, F. Rouillier, D. Chablat, G. Rance, A. Quadrat*
- 12:00-12:20      Analysis of planar network mechanisms using the diagonal intersection point  
*I. Macia Roger, A. Perez Gracia*
- 12:20-15:00      LUNCH BREAK
- 12:50-14:30      Steering and Scientific Committee Meeting  
Location Restaurant Hotel Cubo (Slovenska cesta 15, Ljubljana)
- SESSION 2
- 15:00-15:20      A new 3-DoF spherical motion master-slave mechanism  
*V. Parenti-Castelli, M. Fava, M. Conconi, N. Sancisi*
- 15:20-15:40      Preliminary analysis and simulation of a compact variable stiffness wrist  
*G. Milazzo, M.G. Catalano, A. Bicchi, G. Grioli*
- 15:40-16:00      The evolving role of robot kinematics in bio-nanotechnology  
*K. Kazerounian, H. Ilies*
- 16:00-16:20      Kinematic modelling of a Stewart-Gough platform with modified Cardan joints  
*M. Bem, S. Reberšek, I. Kovač, A. Ude*
- 16:20-16:50      COFFEE BREAK
- 16:50-17:10      A generalization of the Bresse properties in higher-order kinematics  
*D. Condurache*
- 17:10-17:30      Inherently balanced spherical pantograph mechanisms  
*K.T.Y. Durieux, V. Van der Wijk*
- 17:30-17:50      Finding the common tangents to four spheres via dimensionality reduction  
*J.M. Porta, F. Thomas*
- 20:30-22:00      DINNER HOSTED BY THE MAYOR OF LJUBLJANA  
Location: Cultural Centre Rog (Trubarjeva cesta 72, Ljubljana)



## TUESDAY, JULY 2, 2024

### SESSION 3

- 09:30-09:50 A Schoenflies motion generator actuated by four in-parallel sliding joints with a single mobile platform featuring half-circle rotation  
*G. Wu, H. Shen*
- 09:50-10:10 Compound cable-driven parallel robot for a larger wrench-feasible workspace  
*C. Chevallereau, P. Wenger, S. Caro*
- 10:10-10:30 Hierarchy control of dual-arm concentric tube continuum robots with different redundancy resolution techniques  
*T. Alsaka, P. Cinquin, M.T. Chikhaoui*
- 10:30-10:50 Actuated in-operation-reconfiguration of a cable-driven parallel robot with a gradient descent approximation technique  
*J. Clar, F. Trautwein, T. Reichenbach, A. Verl, M. Neubauer*
- 10:50-11:20 COFFEE BREAK
- 11:20-11:40 Design and control of a climbing robot for warehouse automation  
*E. Galbally Herrero, M. Jorda, S. Rudolf, G. Kaczowski, C. Loubser, S. Ozog, M. Jothiravi, D. Schabb, G. Berger, C. Actor, A.J. Ferrick, A. Esses, G. Thable, D. Stevens, C. Lara, M. Shemyakin, A. Baitalmal, C. Walti*
- 11:40-12:00 Closed-form derivation of the gain-type singularity surface of the 3-RRS parallel manipulator  
*A. Kolte, B. Patra, S. Bandyopadhyay*
- 12:00-12:20 Synthesizing the transmission properties of a five-bar linkage by shaping workspace bounds  
*S. Ramesh, M. Plecnik*
- 12:30-14:00 COLD LUNCH AT CONFERENCE SITE
- 13:30-20:30 VISIT TO NOORDUNG CENTRE AND TO ŽIČKA KARTUZIJA (trip by bus)  
Meeting point (at 13:15): at the conference site, (Cankarjev dom, Erjavčeva cesta)
- 20:30-22:00 DINNER AFTER THE TRIP – The final stop of the bus  
Location: Restaurant Slamič (Kersnikova ulica 1, Ljubljana)



## WEDNESDAY, JULY 3, 2024

### SESSION 4

- 09:30-09:50 Kinematic analysis of a parallel robot for minimally invasive surgery  
*C. Vaida, B. Gherman, I. Birlescu, P. Tucan, A.-V. Pusca, G. Rus, D. Chablat, D. Pislă*
- 09:50-10:10 An average-distance minimizing motion sweep for planar bounded objects  
*Q. Ge, H. Liu*
- 10:10-10:30 Kinetic-geometric three-position synthesis of a balanced 4R four-bar linkage  
*V. Van der Wijk*
- 10:30-10:50 Angular velocity and acceleration extrema: Implications for force analysis in planar 4R mechanisms  
*M.J.D. Hayes, T.T.O. Hninn, R.A. Irani*
- 10:50-11:20 COFFEE BREAK
- 11:20-11:40 On kinematics of lower mobility planar parallel continuum robots  
*O. Altuzarra, M. Urizar, K. Bilbao, A. Hernández*
- 11:40-12:00 Rational linkages: From poses to 3D-printed prototypes  
*D. Huczala, J. Siegele, D.A. Thimm, M. Pfurner, H.-P. Schröcker*
- 12:00-12:20 Use of force-controlled compliance-eigenvector power-iterations for finding an instantaneous knee axis: Mockup study for a fixed hinge  
*A. Hoffmann, M. Ghiassi, A. Kecskeméthy*
- 12:20-15:00 LUNCH BREAK
- 13:30-14:30 Meeting of the IFToMM Technical Committee, Location: Conference site

### INVITED TALK by O. Khatib

- 15:00-15:20 OceanOne<sup>k</sup> | The Archaeologist of the Abyss

### SESSION 5

- 15:20-15:40 Analytically informed inverse kinematics solution at singularities  
*A. Mueller*
- 15:40-16:00 Diversifying construction units and types of 1-DOF multi-loop plane-symmetric overconstrained spatial mechanisms  
*X. Kong, Y. Li*
- 16:00-16:20 Dual quaternion quintic blends: C2-continuous, time-optimized interpolation with unit dual quaternion pose representation  
*J. Temminghoff, M. Huptych, J. Wiartalla, M. Schmitz, B. Corves, M. Hüsing*
- 16:20-16:50 COFFEE BREAK
- 16:50-17:10 Motion types of 2-DOF hybrid kinematic chains  
*A. Antonov*
- 17:10-17:30 A new compact paired-parallel architecture for haptic transparency  
*M. Vulliez, O. Khatib*
- 17:30-17:50 Development of a redirection system for collision avoidance of “Quad-SCARA” robot platform based on buffered Voronoi cell  
*X. Sun, K. Shibayama, K. Ishida, K. Makino, H. Terada*
- 17:50-18:10 Influence of joint offsets on the elbow null space motions of the 7-DOF Franka robot  
*S. Tittel*
- 20:00-22:00 CONFERENCE DINNER  
Location: Restaurant Švicarija (Tivoli Pod turnom 4, Ljubljana)  
Meeting point (at 19:30): Moderna galerija (Cankarjeva 15, Ljubljana)



## THURSDAY, JULY 4, 2024

### SESSION 6

- 09:30-09:50 Kinematic and static analyses of a 3-DoF spatial tensegrity mechanism  
*K. Muñoz, M. Porez, P. Wenger*
- 09:50-10:10 Hybrid-control-based workspace analysis of overconstrained cable-driven parallel robots  
*E. Idà, F. Zoffoli, M. Carricato*
- 10:10-10:30 On the product of subgroups as persistent submanifolds  
*V. Di Paola, J. Selig, D. Zlatanov*
- 10:30-10:50 From axial C-hedra to general P-nets  
*G. Nawratil*
- 10:50-11:20 COFFEE BREAK
- 11:20-11:40 A novel 4-DoF 3UPU-2UPU-RRR parallel manipulator with full rotational capability based on redundancy  
*H. Simas, R. Simoni, L. Meneghini*
- 11:40-12:00 Computational efficient mechanisms  
*S. Bai*
- 12:00-12:20 A variable-DOF single-loop 7R spatial mechanism that has no 1-DOF 7R motion mode  
*X. Kong*
- 12:20-15:00 LUNCH BREAK

### SESSION 7

- 15:00-15:20 Mobile Delta robot for green asparagus harvesting  
*S. Šljapah, J. Gimpelj, M. Munih, M. Mihelj*
- 15:20-15:40 Human-robot interactive framework with remote center of motion and virtual fixtures for minimally invasive robotic surgery  
*C. Pecorella, C. Iacono, B. Siciliano, F. Ficuciello*
- 15:40-16:00 Kinematic design of a novel finger exoskeleton mechanism for rehabilitation exercises  
*G. Kiper, E. İnanç*
- 16:00-16:20 Fixed Points in Distance Recurrence Formulas  
*F. Thomas*
- 16:20-16:50 COFFEE BREAK
- 16:50-17:10 A minimally autonomous robot walker  
*J. Li, C. Liu, J.M. McCarthy*
- 17:10-17:30 Geometric design of spatial mechanisms for interaction with the environment  
*N. Robson, S. Hernandez*
- 17:30-17:50 Kinetostatic analysis for 6RUS parallel continuum robot using Cosserat rod theory  
*V. Rodrigues, B. Yu, C. Stoeffler, S Kumar*
- 18:30-21:00 PIVO (BEER) PARTY AND FAREWELL  
Location: Pivnica Union (Celovška cesta 22, Ljubljana)