## 2019 12th International Workshop on Robot Motion and Control (RoMoCo 2019)

Poznan, Poland 8 – 10 July 2019



IEEE Catalog Number: CFP19ROM-POD ISBN: 978-1-7281-2976-1

## Copyright $\odot$ 2019 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number: CFP19ROM-POD ISBN (Print-On-Demand): 978-1-7281-2976-1 ISBN (Online): 978-1-7281-2975-4

ISSN: 2575-5536

## Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



## **Table of Contents**

MoPL Plenary I, Prof. Eduardo Bayro-Corrochano (Plenary Sessions)	
Chair: Kozłowski, Krzysztof R.	Poznan University of Technology
09:15-10:15	MoPL.1
Robot Modeling and Control Using the Motor Algebra Frame	ework, pp. 1-8.
Bayro-Corrochano, Eduardo	CINVESTAV, Unidad Guadalajara
MoA1	CW8
Theoretical Control Aspects of Nonlinear Systems (Regular Ses	,
Chair: Chaumette, Francois	Inria Rennes-Bretagne Atlantique
11:15-11:40	MoA1.1
On Stabilization of Nonlinear Systems with Drift by Time-Va	
Zuyev, Alexander	Max Planck Institute for Dynamics of Complex Technical Systems
Grushkovskaya, Victoria	Julius Maximilian University of Würzburg
11:40-12:05	MoA1.2
15-20.	ems with Application to Rendezvous Multiple Mobile Robots, pp.
Skeik, Ola	University of Manchester
Hu, Junyan	University of Manchester
Arvin, Farshad	University of Manchester
Lanzon, Alexander	The University of Manchester
12:05-12:30	MoA1.3
SDRE-Based Suboptimal Controller for Manipulator Control,	
Stepień, Sławomir	Poznan University of Technology
Superczyńska, Paulina	Poznan University of Technology
Lindenau, Oskar Wałęsa, Marcin	Poznan University of Technology Poznan University of Technology, Institute of Automatic Control
Ma A 2	CIMO
MoA2 Control of Flying and Underwater Vehicles (Regular Sessions) Chair Pataiozak Adam	Wroclaw University of Technology
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam	Wroclaw University of Technology
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam 11:15-11:40	Wroclaw University of Technology MoA2.1
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam 11:15-11:40 Numerical Test of Underwater Vehicle Dynamics Using Velo	Wroclaw University of Technology MoA2.1 pcity Controller, pp. 26-31.
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw	Wroclaw University of Technology  MoA2.1  pocity Controller, pp. 26-31.  Poznan University of Technology
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05	Wroclaw University of Technology  MoA2.1  pointy Controller, pp. 26-31.  Poznan University of Technology  MoA2.2
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Ground	Wroclaw University of Technology MoA2.1  pointy Controller, pp. 26-31.  Poznan University of Technology MoA2.2  und Effect, pp. 32-37.
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Group Mirghasemi, Seyed Alireza	Wroclaw University of Technology  MoA2.1  poity Controller, pp. 26-31.  Poznan University of Technology  MoA2.2  and Effect, pp. 32-37.  University of Ottawa
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan	Wroclaw University of Technology MoA2.1 Poznan University of Technology MoA2.2  MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy	Wroclaw University of Technology  MoA2.1  Poznan University of Technology  MoA2.2  MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa  University of Ottawa  Carleton University
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30	Wroclaw University of Technology  MoA2.1  Poznan University of Technology  MoA2.2  MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa  University of Ottawa  Carleton University  MoA2.3
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  Known Regions, pp. 38-43.
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  MoA2.2  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Poli
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Poli Intel Labs
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velo Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Polir Intel Labs Inte
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velot Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Grout Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Julio Bayro-Corrochano, Eduardo	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43.  Centro De Investigación Y Estudios Avanzados Del Instituto Poli Intel Labs Inte
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velot Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Grounding Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Julio Bayro-Corrochano, Eduardo	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43.  Centro De Investigación Y Estudios Avanzados Del Instituto Polit Intel Labs Inte
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velot Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Groud Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Julio Bayro-Corrochano, Eduardo  MoB1  Force Control (Regular Sessions)	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Poli Intel Labs Inte CINVESTAV, Unidad Guadalajara
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velotherman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Grounding Harman, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Juliother Bayro-Corrochano, Eduardo  MoB1  Force Control (Regular Sessions) Chair: Michałek, Maciej, Marcin	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  Ind Effect, pp. 32-37.  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Polir Intel Labs Inte CINVESTAV, Unidad Guadalajara  CW8
Control of Flying and Underwater Vehicles (Regular Sessions)  Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velotherman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Grounding Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Juliother Bayro-Corrochano, Eduardo  MoB1  Force Control (Regular Sessions) Chair: Michałek, Maciej, Marcin  13:30-13:55	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  MoA2.2  MoA2.2  MoA2.3  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Polit Intel Labs Intel CINVESTAV, Unidad Guadalajara  CW8  Poznan University of Technology (PUT)  MoB1.1
Control of Flying and Underwater Vehicles (Regular Sessions) Chair: Ratajczak, Adam  11:15-11:40  Numerical Test of Underwater Vehicle Dynamics Using Velot Herman, Przemyslaw  11:40-12:05  Quadcopter Fractional Order Controller Accounting for Grounding Mirghasemi, Seyed Alireza Necsulescu, Dan Sasiadek, Jerzy  12:05-12:30  Indoor Navigation Based on Model Switching in Overlapped Macias-Garcia, Edgar Cruz Vargas, Jesus Adan Zamora-Esquivel, Juliote Bayro-Corrochano, Eduardo  MoB1  Force Control (Regular Sessions)	Wroclaw University of Technology MoA2.1  Poznan University of Technology MoA2.2  MoA2.2  MoA2.2  MoA2.3  University of Ottawa University of Ottawa Carleton University MoA2.3  I Known Regions, pp. 38-43. Centro De Investigación Y Estudios Avanzados Del Instituto Polit Intel Labs Intel CINVESTAV, Unidad Guadalajara  CW8  Poznan University of Technology (PUT)  MoB1.1

13:55-14:20	MoB1.2
Adjustability for Grasping Force of Patients with Autism by iWakka: A	
Nomura, Masakazu	Nagoya Institute of Technology
Kucharek, Natalia Agnieszka	Lodz University of Technology
Zubrycki, Igor	Lodz University of Technology
Granosik, Grzegorz	Lodz University of Technology
Morita, Yoshifumi	Nagoya Institute of Technology
14:20-14:45	MoB1.3
Experimental Verification of Force Interactions for RobinHand Prototy	
Mucha, Łukasz	Foundation for Cardiac Surgery Developmen
Lis, Krzysztof	Silesian University of Technology
Krawczyk, Dariusz	Foundation of Cardiac Surgery Developmen
MoC1	CW8
Control and Motion Planning of Walking Robots (Regular Sessions)	
Chair: Galicki, Mirosław	University of Zielona Gora, 65-516 Zielona Gora, Szafrana 4,
15:15-15:40	MoC1.1
Comparative Study of Muscles Effort During Gait Phases for Multi-Mu	scle Humanoids, pp. 62-67.
Zielińska, Teresa	Warsaw University of Technology
Wang, Jikun	Warsaw University of Technology
Ge, Weimin So	hool of Mechanical Engineering, Tianjin University of Technolo
Lyu, Linwei	Tianjin University of Technology
15:40-16:05	MoC1.2
A Novel Locomotion Controller Based on Coordination between Leg a 68-73.	nd Spine for a Quadruped Salamander-Like Robot, pp.
Zhang, Xueyou	Nankai University
Fang, Yongchun	Nankai University
Zhu, Wei	Nankai University
Zhu, Wei GUO, Xian	•
	Nankai University
GUO, Xian  MoD1  Human Movement (Regular Sessions)	Nankai University
GUO, Xian  MoD1	Nankai University
GUO, Xian  MoD1  Human Movement (Regular Sessions)	Nankai University  CW8  Poznan University of Technology
GUO, Xian  MoD1  Human Movement (Regular Sessions)  Chair: Herman, Przemysław	Nankai University  CW8  Poznan University of Technology  MoD1.1
GUO, Xian  MoD1  Human Movement (Regular Sessions)  Chair: Herman, Przemysław  16:05-16:30	Nankai University  CW8  Poznan University of Technology  MoD1.1
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L	Poznan University of Technology  MoD1.1  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology  Poznan University of Technology  Poznan University of Technology  Poznan University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology  Poznan University of Technology  Poznan University of Technology  Poznan University of Technology  Nagoya Institute of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology  Poznan University of Technology  Poznan University of Technology  Poznan University of Technology  Nagoya Institute of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology  Poznan University of Technology  Poznan University of Technology  Poznan University of Technology  Nagoya Institute of Technology  Nagoya Institute of Technology  MoD1.2
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55 Activities Prediction Using Structured Data Base, pp. 80-85.	Nankai University Nankai University Nankai University  CW8  Poznan University of Technology MoD1.1  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa	Poznan University of Technology  MoD1.1  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30 Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55 Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions)	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology CW8
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz	Poznan University of Technology  MoD1.*  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology MoD1.2  Warsaw University of Technology Warsaw University of Technology CW8
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-L Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91.	Poznan University of Technology  MoD1.1  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology WoD1.2  Warsaw University of Technology Warsaw University of Technology CW8  Poznan University of Technology MoE1.1
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Leatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91. Dudek, Wojciech	Poznan University of Technology  MoD1.*  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology WoD1.*  Warsaw University of Technology Warsaw University of Technology  Poznan University of Technology  MoE1.*  Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Leatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91. Dudek, Wojciech Węgierek, Maciej	Poznan University of Technology  MoD1.*  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology WoD1.2  Warsaw University of Technology Warsaw University of Technology  MoE1.1  Warsaw University of Technology Warsaw University of Technology Warsaw University of Technology Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91. Dudek, Wojciech Węgierek, Maciej Karwowski, Jarosław	Poznan University of Technology  MoD1.1  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology  MoE1.1  Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91. Dudek, Wojciech Węgierek, Maciej Karwowski, Jarosław Szynkiewicz, Wojciech	Poznan University of Technology  MoD1.1  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology MoE1.1  Warsaw University of Technology
MoD1 Human Movement (Regular Sessions) Chair: Herman, Przemysław 16:05-16:30  Kinematic Simulator of E-Knee Robo That Reproduces Human Knee-Hatano, Goro Kozłowski, Krzysztof R. Sauer, Piotr Morita, Yoshifumi 16:30-16:55  Activities Prediction Using Structured Data Base, pp. 80-85. Dutta, Vibekananda Zielińska, Teresa  MoE1 Navigation and Control of Mobile Robots I (Regular Sessions) Chair: Pazderski, Dariusz 16:55-17:20  Task Harmonisation for a Single-Task Robot Controller, pp. 86-91. Dudek, Wojciech Węgierek, Maciej Karwowski, Jarosław	Poznan University of Technology  MoD1.1  Point Movement, pp. 74-79.  Nagoya Institute of Technology Poznan University of Technology Poznan University of Technology Nagoya Institute of Technology Nagoya Institute of Technology Warsaw University of Technology Warsaw University of Technology  Poznan University of Technology  MoE1.1  Warsaw University of Technology Warsaw University of Technology Warsaw University of Technology

Schmidt, Michael Otto-Von-Guericke-University Magdeburg Töpfer, Daniel Volkswagen AG Group Research Schmidt, Stephan Otto-Von-Guericke University Magdeburg 17:45-18:10 MoE1.3 Object Detection and Mapping During European Robotic Competitions - Lesson Learned, pp. 98-103. NASK Majek, Karol Będkowski, Janusz Institute of Mathematical Machines Institute of Mathematical Machines Pełka, Michał Ratajczak, Jakub NASK Masłowski, Andrzej Warsaw University of Technology, Warsaw, Poland 18:10-18:35 MoE1.4 Accuracy Comparison of Navigation Local Planners on ROS-Based Mobile Robot, pp. 104-111. Cybulski, Bartlomiej Lodz University of Technology Wegierska, Agnieszka Lodz University of Technology Granosik, Grzegorz Lodz University of Technology CW8 Navigation and Control of Mobile Robots II (Regular Sessions) Chair: Granosik, Grzegorz Lodz University of Technology 11:15-11:40 TuA1.1 Point-To-Surfel-Distance (PSD-) Based 6D Localization Algorithm for Rough Terrain Exploration Using Laser Scanner in GPS-Denied Scenarios, pp. 112-117. Niewola, Adam Technical University of Lodz Podsędkowski, Leszek Lodz University of Technology, Institute of Machine Tools and Pr Niedźwiedzki, Jakub Lodz University of Technology 11:40-12:05 TuA1.2 Collision-Free Navigation of N-Trailer Vehicles with Motion Constraints, pp. 118-123. Universidad Técnica Federico Santa María Guevara, Leonardo Torres-Torriti, Miquel Pontificia Universidad Catolica De Chile Auat Cheein, Fernando Universidad Tecnica Federico Santa Maria TuA1.3 Interval-Based Solutions for Reliable and Safe Navigation of Intelligent Autonomous Vehicles, pp. 124-130. Ben Lakhal, Nadhir Mansour Institut Pascal, UCA/SIGMA-UMR CNRS 6602, Clermont Auvergne Institut Pascal, UMR CNRS 6602 Adouane. Lounis LATIS Lab, National Engineering School of Sousse (ENISo), Univer Nasri. Othman Ben Hadj Slama, Jaleleddine LATIS Lab, National Engineering School of Sousse (ENISo), Univer TuA2 CW9 Trajectory Tracking of Mobile Robots (Regular Sessions) Chair: Vonasek, Vojtech Czech Technical University in Prague 11:15-11:40 TuA2.1 IstiABot, an Open Source Mobile Robot for Education and Research, pp. 131-136. Guyonneau, Rémy University of Angers, LARIS Mercier, Franck University of Angers 11:40-12:05 TuA2.2

Optimal Trajectory Tracking Control of Omni-Directional Mobile Robots, pp. 137-142.

Galicki, Mirosław
University of Zielona Gora, 65-516 Zielona Gora, Szafrana 4,
Banaszkiewicz, Marek
Space Research Centre

12:05-12:30 TuA2.3

On Time-Delayed Feedback Trajectory Tracking Control of a Mobile Robot with Omni-Wheels, pp. 143-147.

Andreev, Aleksandr Ulyanovsk State University
Peregudova, Olga Ulyanovsk State University
Ulyanovsk State University

TuB1 CW8
Rescue and Inspection Robotics (Regular Sessions)

12:30-12:55	TuB1.
	tructive Inspection Robot in Water Main Pipe, pp. 148-153.
Bae, Jongho	Kiro(korea Institute of Robot Convergence
An, jaekyu	Kiro(korea Institute of Robot Convergence
Chung, Goobong	Korea Institute of Robot and Convergence
12:55-13:20	TuB1.:
	ing Reinforcement Learning with Proximal Policy Optimization, pp.
Totani, Mifu	Nagoya Institute of Technolog
Sato, Noritaka	Nagoya Institute of Technolog
Morita, Yoshifumi	Nagoya Institute of Technolog
13:20-13:45	TuB1.
Control Method for Rollover Recovery of Rescue Robot Cl Force, pp. 160-165.	onsidering Normalized Energy Stability Margin and Manipulating
Sato, Noritaka	Nagoya Institute of Technolog
kitani, makoto	Nagoya Institute of Technolog
Morita, Yoshifumi	Nagoya Institute of Technolog
TuB2	CWs
Space Robotics (Regular Sessions)  Chair: Kyriakopoulos, Kostas	National Technical Univ. of Athens
12:30-12:55	TuB2.
Lagrangian Jacobian Motion Planning with Application to	
Ratajczak, Joanna	Wroclaw University of Technolog
Tchon, Krzysztof	Wrocław University of Technolog
12:55-13:20	TuB2.
Trajectory Reproduction Algorithm in Application to an O	n-Orbit Docking Maneuver with Tumbling Target, pp. 172-177.
Ratajczak, Adam	Wroclaw University of Technology
Ratajczak, Joanna	Wroclaw University of Technolog
13:20-13:45	TuB2.
Tracking of Numerically Defined Trajectory by Free-Float	ring 3D Satellite, pp. 178-183.
Domski, Wojciech Grzegorz	Wrocław University of Science and Technology
Mazur, Alicja	Wrocław University of Technolog
WeA1	CW8
Sensor Based Control of Mobile Robots (Regular Sessions) Chair: Ophir, Dan	Ariel Universit
08:30-08:55	WeA1.
	Like Mobile Robots Equipped with a Camera of an Uncertain Depth
Scale Factor, pp. 184-190.	D 11: " (T 1 1 (D))
Scale Factor, pp. 184-190. Michałek, Maciej, Marcin	Poznan University of Technology (PUT
Scale Factor, pp. 184-190. Michałek, Maciej, Marcin Wang, Runhua	
Michałek, Maciej, Marcin	Nankai Universit
Michałek, Maciej, Marcin Wang, Runhua	Nankai Universit Nankai University
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo 08:55-09:20	Nankai Universit Nankai University WeA1.
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo 08:55-09:20	Nankai Universit Nankai University WeA1. ition Module, pp. 191-196.
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo 08:55-09:20 Control System Shell of Mobile Robot with Voice Recogni	Nankai University Nankai University WeA1.  ition Module, pp. 191-196.  Silesian University of Technolog
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo  08:55-09:20  Control System Shell of Mobile Robot with Voice Recognit Skrzypek, Andrzej	Nankai University Nankai University WeA1.  ition Module, pp. 191-196. Silesian University of Technolog Silesian University of Technolog
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo  08:55-09:20  Control System Shell of Mobile Robot with Voice Recognii Skrzypek, Andrzej Panfil, Wawrzyniec	Nankai University Nankai University WeA1.2  ition Module, pp. 191-196.  Silesian University of Technology Silesian University of Technology Silesian University of Technology
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo  08:55-09:20  Control System Shell of Mobile Robot with Voice Recogni Skrzypek, Andrzej Panfil, Wawrzyniec Kosior, Mateusz Andrzej	Nankai University Nankai University WeA1.:  ition Module, pp. 191-196.  Silesian University of Technology Silesian University of Technology Silesian University of Technology Silesian University of Technology
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo  08:55-09:20  Control System Shell of Mobile Robot with Voice Recognic Skrzypek, Andrzej Panfil, Wawrzyniec Kosior, Mateusz Andrzej Przystałka, Piotr  09:20-09:45  A Novel 3D Laser Scanner Design for Variable Density Sci	Nankai University Nankai University WeA1.: ition Module, pp. 191-196. Silesian University of Technology
Michałek, Maciej, Marcin Wang, Runhua Zhang, Xuebo 08:55-09:20  Control System Shell of Mobile Robot with Voice Recognii Skrzypek, Andrzej Panfil, Wawrzyniec Kosior, Mateusz Andrzej Przystałka, Piotr	Silesian University of Technology Silesian University of Technology Silesian University of Technology Silesian University of Technology WeA1.

Chair: LaValle, Steven M	University of Oulu
10:40-11:05	WeB1.1
Path Tracking by the Nonholonomic Mobile Man	<i>ipulator</i> , pp. 203-208.
Cholewiński, Mateusz	Chair of Cybernetics and Robotics, Electronics Faculty, Wroclaw
Mazur, Alicja	Wroclaw University of Technology
11:05-11:30	WeB1.2
Multi-Sensor Extrinsic Calibration with the Adar	<i>n Optimizer</i> , pp. 209-214.
Piasek, Joanna	Poznan University of Technology, Poland
Staszak, Rafal	Poznan University of Technology
Piaskowski, Karol	Poznan University of Technology
Belter, Dominik	Poznan University of Technology
11:30-11:55	WeB1.3
FABRIC: Framework for Agent-Based Robot Co.	ntrol Systems, pp. 215-222.
Seredyński, Dawid	Warsaw University of Technology
Winiarski, Tomasz	Warsaw Universitu of Technology
Zieliński, Cezary	Institute of Control and Computation Engineering, Warsaw Univers
WeC1	CW8
Computational Aspects of Robotics (Regular Sessi	ons)
Chair: Masłowski, Andrzej	Warsaw University of Technology, Warsaw, Poland
14:30-14:55	WeC1.1
Planning TS Trajectory Using MLAT in O(n Log I	V), pp. 223-230.
Ophir, Dan	Ariel University
Davidovitch, Ahiya	Department of Mathematics Ariel University
14:55-15:20	WeC1.2
Computation of Approximate Solutions for Guid	ed Sampling-Based Motion Planning of 3D Objects, pp. 231-238.
Vonasek, Vojtech	Czech Technical University in Prague
Pěnička, Robert	Czech Technical University in Prague
15:20-15:45	WeC1.3
Sensor Lattices: Structures for Comparing Info	rmation Feedback, pp. 239-246.
LaValle, Steven M	University of Oulu
WeD1	CW8
Sensory Feedback in Robotics (Regular Sessions)	
Chair: Bayro-Corrochano, Eduardo	CINVESTAV, Unidad Guadalajara
15:45-16:10	WeD1.1
	ielectric Electro-Active Polymer Actuator, pp. 247-251.
Kołota, Jakub	Poznan University of Technology
Bernat, Jakub	Politechnika Poznańska
16:10-16:35	WeD1.2
Design and Evaluation of a Factorization-Based	Grasp Myoelectric Control Founded on Synergies, pp. 252-257.
Meattini, Roberto	University of Bologna
De Gregorio, Daniele	Alma Mater Studiorum University of Bologna
Palli, Gianluca	University of Bologna
Melchiorri, Claudio	University of Bologna
16:35-17:00	WeD1.3
RSQ Motion - a Prototype of the Motion Analysi	s System in the Joints, pp. 258-262.
Sauer, Piotr	Poznan University of Technology
Lubiatowski, Bartłomiej	RSQ Technologies LLC
Chorodeński, Szymon	RSQ Technologies LLC
Breninek, Bartosz	RSQ Technologies
Gruszczyński, Kacper	RSQ Technologies