



CLAWAR

September 12 - 14, 2022



PONTA DELGADA, PT

Technical Program



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UNIVERSIDADE
DOS AÇORES

Welcome to CLAWAR 2022

It is our pleasure to welcome you all to the CLAWAR2022 conference, held in Ponta Delgada, Portugal during 12 – 14 September 2022. CLAWAR2022 is the 25th edition of the International Conference series on Climbing and Walking Robots and the Support Technologies for Mobile Machines and brings new developments and new research findings in robotics technologies within the framework of “robotics for natural settings”. The technical programme of the conference includes four keynote presentations, given by well-known scientists in their fields of research, and 51 original articles with cutting-edge scientific findings in a wide range of topics related to the rapidly evolving areas of robotics. We hope that CLAWAR2022 will enable delegates to exchange research ideas and to establish collaborative networks for advancement of science and knowledge discovery in the field of robotics and associated technologies, for a sustainable future.

The CLAWAR2022 proceedings are published by Springer in their book series in “Lecture Notes in Networks and Systems”, which is indexed in Web of Science, dblp, and SCOPUS. It is believed that this book will serve as a source of inspiration and further innovation in research and development in the rapidly growing area of mobile service robotics.

We would like to thank members of the International Scientific Committee and National Organising Committee of CLAWAR 2022 for their efforts in reviewing the submitted articles, and for their support in the planning and organisation of the conference.

José Cascalho & M. Osman Tokhi
General Co-Chairs, CLAWAR2022

CLAWAR 2022 Conference Organization

General Co-Chairs

José Cascalho, University of the Azores, Portugal
M. Osman Tokhi, London South Bank University, United Kingdom

International Scientific Committee Co-Chairs

Armando Mendes, University of the Azores, Portugal
Manuel F. Silva, ISEP & INESC TEC, Portugal

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Matthias Funk, University of the Azores, Portugal
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Ana Rodrigues, University of the Azores, Portugal
Diana Freitas, University of the Azores, Portugal
Francisco Pedro, Rabo do Peixe School, Portugal
Paulo Medeiros, University of the Azores, Portugal
Alberto Ramos, Group of Robotics and Artificial Intelligence, University of the Azores, Portugal
Manuel Domingos Almeida, Rabo do Peixe School, Portugal

Publications

José Cascalho, University of the Azores, Portugal
M. Osman Tokhi, London South Bank University, United Kingdom
Manuel F. Silva, ISEP & INESC TEC, Portugal
Armando Mendes, University of the Azores, Portugal
Khaled M. Goher, University of Lincoln, UK
Matthias Funk, University of the Azores, Portugal

Special/Workshop Sessions Co-Chairs

Khaled M. Goher, University of Lincoln, United Kingdom
Matthias Funk, University of the Azores, Portugal

Local Arrangements Chair

Armando Mendes, University of the Azores, Portugal

Vulcano Robotics Competition

José Cascalho, University of the Azores, Portugal
Francisco Pedro, University of the Azores, Portugal
André Behr, University of the Azores, Portugal
Michael Funk, University of Porto, Portugal
Manuel Domingos Almeida, Rabo do Peixe School, Portugal

Social Program

José Cascalho, University of the Azores, Portugal
Ana Rodrigues, University of the Azores, Portugal
Armando Mendes, University of the Azores, Portugal

Sponsorship

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International Scientific Committee

| | | | |
|----------------------|-------------|-----------------------|-------------------|
| Ahmad, S. | – Malaysia | Li, G. | – UK |
| Alkan, B. | – UK | Manoonpong, P. | – Thailand |
| Almeshal, A. | – Kuwait | Marques, L. | – Portugal |
| Amar, F. B. | – France | Massoud, R. | – Syria |
| Armada, M. | – Spain | Meija Rincon, L. | – Brazil |
| Banfield, I. | – Panama | Mohamed, Z. | – Malaysia |
| Belter, D. | – Poland | Molfino, R. | – Italy |
| Berns, K. | – Germany | Mondal, S. | – UK |
| Birla, R. P. | – India | Monje, C. A. | – Spain |
| Bonsignorio, F. | – Italy | Montes, H. | – Panama |
| Bridge, B. | – UK | Moon, S. | – Korea |
| Briskin, E. | – Russia | Muscato, G. | – Italy |
| Burlacu, A. | – Romania | Nakamura, T. | – Japan |
| Chevallereau, C. | – France | Okui, M. | – Japan |
| Chrysostomou, D. | – Denmark | Papadopoulos, E. | – Greece |
| Chugi, D. | – Japan | Paraforos, D. | – Germany |
| Costa, M. T. | – Portugal | Park, H. S. | – Korea |
| Darus, I. M. | – Malaysia | Petry, M. | – Brazil |
| Dias, A. | – Portugal | Qian, F. | – USA |
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| Doroftei, I. | – Romania | Ribeiro, M. | – Portugal |
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| Ermolov, I. | – Russia | Rodríguez Lera, F. J. | – France |
| Faina, A. | – Denmark | Rodriguez, H. | – Panama |
| Farias, P. | – Brazil | Sathyan, A. | – USA |
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| Ferreira, P. | – Portugal | Semini, C. | – Italy |
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| Gallegos Garrido, G. | – UK | Silva, M. | – Portugal |
| Garcia, D. | – Panama | Singla, E. | – India |
| Goher, K. M. | – UK | Skrzypczynski, P. | – Poland |
| Grand, C. | – France | Tokhi, M. O. | – UK |
| Guedes, P. | – Portugal | Visser, A. | – The Netherlands |
| Hassan, M. K. | – Malaysia | Wu, J. | – China |
| Hwang, K.-S. | – Taiwan | Xie, M. | – Singapore |
| Ion, I. | – Romania | Yigit, A. | – Kuwait |
| Jamali, A. | – Malaysia | Yokota, S. | – Japan |
| Kaur, A. P. | – UK | Zaier, R. | – Oman |
| Kottege, N. | – Australia | Zhao, Z. | – UK |
| Lefeber, D. | – Belgium | Zielinska, T. | – Poland |
| Leon-Rodriguez, H. | – Colombia | | |

CLAWAR 2022 Technical Programme

Monday 12 September 2022

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|----------------------------------|-------------------------|
| Time: 08:30 – 10:00 (UTC) | |
| 08:30-09:00 | Conference Registration |
| 09:00-10:00 | Opening Session |

| Keynote Address – 1 Session Chair: Bryan Bridge | | | |
|--|----------|-----------|--|
| Time: 10:00 – 11:00 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 10:00-11:00 | KS1 | | KEY STEPS TOWARD DEVELOPMENT OF HUMANOID ROBOTS <i>Xie Ming</i> |

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| 11:00-11:30 | Coffee break |
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| Session – S1: Sensing, Positioning and Localization Session Chair: Armando Mendes | | | |
|--|----------|-----------|---|
| Time: 11:30 – 12:30 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 11:30-11:45 | #3 | | FAST PROTOTYPING OF A LOW-COST THREE-DIMENSIONAL FORCE SENSOR FOR THE SIX-LEGGED WALKING ROBOT LAURON <i>Carsten Plasberg, Sven Sauerbaum, Arne Roennau, and Rüdiger Dillmann</i> |
| 11:45-12:00 | #12 | | POSITION ESTIMATOR FOR A FOLLOW LINE ROBOT: COMPARISON OF LEAST SQUARES AND MACHINE LEARNING APPROACHES <i>Diogo Matos, João Mendes, José Lima, Ana I. Pereira, António Valente, Salviano Soares, Pedro Costa, and Paulo Costa</i> |
| 12:00-12:15 | #40 | | REMOTE VDB-MAPPING: A LEVEL-BASED DATA REDUCTION FRAMEWORK FOR DISTRIBUTED MAPPING <i>Marvin Grosse Besselmann, Arne Rönna, and Rüdiger Dillmann</i> |

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| 12:15-12:30 | #48 | | EXPERIMENT OF SOCIAL ROBOT COLLABORATION (SRC): VISION-BASED OBJECT SEGMENTATION, LOCALIZATION AND SEGREGATION IN A PUBLIC INTERACTION EVENT <i>B. Kaushik and Abhra Roy Chowdhury</i> |
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Session – S2: Robots in Education and Educational Robotics
Session Chair: Paulo Medeiros

Time: 12:30– 13:30 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 12:30-12:45 | #10 | | MACHINE LEARNING APPLICATION WITH AI-ROBOTICS TOOL - WHAT WE LEARNED FROM PILOT STUDIES <i>Amy Eguchi</i> |
| 12:45-13:00 | #19 | | PERFORMING A PLANETARY EXPLORATION MISSION FROM THE CLASSROOM <i>Elsa Maria Alfonso Sanchez, Anestis Mavridis, Monica Talevi, and Hugo Maree</i> |
| 13:00-13:15 | #21 | | LEARNING HANDS-ON ELECTRONICS FROM HOME: A SIMULATOR FOR FRITZING <i>Andres Faiña</i> |
| 13:15-13:30 | #54 | | CLIMBING A VOLCANO: A NEW ROBOTIC COMPETITION <i>Matthias G. Funk, José Cascalho, Francisco Pedro, André Behr, Paulo Medeiros, and Armando B. Mendes</i> |

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| 13:30-14:30 | Lunch | | |
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Keynote Address – 2
Session Chair: Ana Margarida Rodrigues

Time: 14:30 – 15:30 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|--|
| 14:30-15:30 | KS2 | | IT’S ALIVE! FROM BIOINSPIRED TO BIOHYBRID ROBOTS <i>Victoria Webster-Wood</i> |

Session – S3: Biologically-Inspired Systems and Solutions
Session Chair: Victoria Webster-Wood

Time: 15:30 – 17:00 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|--|
| 15:30-15:45 | #6 | | POWER TO THE SPRINGS: PASSIVE ELEMENTS ARE SUFFICIENT TO DRIVE PUSH-OFF IN HUMAN WALKING <i>Alexandra Buchmann, Bernadett Kiss, Alexander Badri-Spröwitz, and Daniel Renjewski</i> |
| 15:45-16:00 | #18 | | GRASPING CHARACTERISTICS OF FLEXIBLE PROPULSION UNIT USING BRAID MECHANISM FOR LUNAR EXPLORATION ROBOT <i>Chikage Fujikawa, Ryosuke Tokoi, Wataru Toyama, Manabu Okui, Tsuji Tomoaki, Taro Nakamura, and Takashi Kubota</i> |
| 16:00-16:15 | #26 | | BIO-INSPIRED IMPRECISE IMPEDANCE CONTROL OF MUSCLE-DRIVEN ROBOTIC LIMBS <i>Patrick Vonwirth and Karsten Berns</i> |
| 16:15-16:30 | #29 | | TEGOTAE-BASED CONTROL FOR NON-ANIMAL-LIKE LOCOMOTION: A CASE STUDY WITH TRIDENT SNAKE <i>Shura Suzuki and Masato Ishikawa</i> |
| 16:30-16:45 | #30 | | SOFT GRIPPER WITH ADJUSTABLE MICROSPINES FOR ADHERING TO TREE BRANCHES <i>Steffen Kirchgeorg, Bram Benist, and Stefano Mintchev</i> |
| 16:45-17:00 | #33 | | EXPLOITING FRICTION ANISOTROPY FOR SOFT ROBOT LOCOMOTION <i>Naris Asawalertsak, Stanislav N. Gorb, Alexander Kovalev, Jonas Jørgensen, and Poramate Manoonpong</i> |

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| 17:00-17:30 | Coffee break |
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Session – S4: Legged Locomotion
Session Chair: Joana Figueiredo

Time: 17:30 – 18:45 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 17:30-17:45 | #2 | | BRIDGING THE REALITY GAP VIA PROGRESSIVE BAYESIAN OPTIMISATION <i>Chen Yu and Andre Rosendo</i> |
| 17:45-18:00 | #5 | | A REVIEW OF CURRENT APPROACHES TO CONFIGURATION DETECTION IN MODULAR LEGGED ROBOTS <i>Timothee Buettner, Olivia Schwertfeger, Arne Roennau, and Ruediger Dillmann</i> |
| 18:00-18:15 | #24 | | DESIGN AND MIXED-REALITY TELEOPERATION OF A QUADRUPED-MANIPULATOR ROBOT FOR SAR TASKS <i>Christyan Cruz Ulloa, David Domínguez, Antonio Barrientos, and Jaime del Cerro</i> |
| 18:15-18:30 | #38 | | ON THE KINEMATIC CHARACTERISTICS OF WALKING MECHANISMS OF MOBILE ROBOTS WITH WALKING PROPULSION DEVICES <i>E. S. Briskin, N. G. Sharonov, L. D. Smirnaya, and K. S. Artemyev</i> |
| 18:30-18:45 | #41 | | LEARNING ENERGY-EFFICIENT TROTting FOR LEGGED ROBOTS <i>Athanasios Mastrogeorgiou, Aristotelis Papatheodorou, Konstantinos Koutsoukis, and Evangelos Papadopoulos</i> |

Tuesday 13 September 2022

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| Time: 08:30 – 09:00 (UTC) | |
| 08:30-09:00 | Conference Registration |

| Keynote Address – 3 | | | |
|-----------------------------------|----------|-----------|---|
| Session Chair: Osman Tokhi | | | |
| Time: 09:00 – 10:00 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 09:00-10:00 | KS3 | | DEVELOPING BIOMEDICAL DEVICES <i>Cristina P Santos</i> |

| Session – S5: Wearable Technology for Rehabilitation and Daily Assistance at Home and Work I | | | |
|---|----------|-----------|--|
| Session Chair: Cristina Santos | | | |
| Time: 10:00 – 11:00 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 10:00-10:15 | #13 | | WEARABLE VIRTUAL REALITY TOOL FOR BALANCE TRAINING: THE DESIGN AND VALIDATION ON HEALTHY <i>Diana Rito, Cristiana Pinheiro, Joana Figueiredo, and Cristina P. Santos</i> |
| 10:15-10:30 | #15 | | EFFECT ON JUMPING HEIGHT BY CHANGING JUMPING POWERED EXOSKELETON ATTACHMENT POSITION FOR AUGMENTATION OF HUMAN INSTANTANEOUS MOVEMENTS <i>Yusuke Ishii, Fumio Ito, Shunichi Kurumaya, and Taro Nakamura</i> |
| 10:30-10:45 | #17 | | EVALUATION OF SUPPORT DEVICE FOR MANUAL HANDLING OF GAS CYLINDERS <i>Kiyotaka Oba, Manabu Okui, Rie Nishihama, and Taro Nakamura</i> |
| 10:45-11:00 | #32 | | REHABILITATION DEVICE FOR LOWER LIMBS THROUGH VIRTUAL TRAINING AND ELECTRICAL ACUPUNCTURE STIMULATION <i>Pavel Venev, Ivanka Veneva, Georgi Katsarov, and Dimitar Chakarov</i> |

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| 11:00-11:30 | Coffee break |
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Session – S6: Wearable Technology for Rehabilitation and Daily Assistance at Home and Work II

Session Chair: Joana Figueiredo

Time: 11:30 – 12:30 (UTC)

| Time | Paper ID | Proc Page | Presentation |
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| 11:30-11:45 | #36 | | WEARABLE LOWER LIMB NEUROPROSTHESIS: SYSTEM ARCHITECTURE AND CONTROL TUNING <i>Simão P. Carvalho, Joana Figueiredo, and Cristina P. Santos</i> |
| 11:45-12:00 | #37 | | COMPARATIVE ANALYSIS OF WALKING IN THE LOWER LIMBS' EXOSKELETON WITH VARIOUS STRATEGIES FOR CONSTRUCTING THE ANKLE JOINT' TRAJECTORIES <i>Sergey Jatsun, Andrei Malchikov, Andrey Yatsun, and Andres Santiago Martinez Leon</i> |
| 12:00-12:15 | #44 | | ADAPTIVE NAVIGATION CONTROL OF AN ACTIVE SMART WALKER <i>Andrea Borgese, Dario C. Guastella, Giuseppe Sutera, Alessia Biondo, and Giovanni Muscato</i> |
| 12:15-12:30 | #57 | | HUMAN MODELS SIMULATING THE PHYSICAL CONDITIONS OF THE ELDERLY INDIVIDUAL AND STANDING ASSISTANCE METHOD BASED ON THESE MODELS <i>Daisuke Chugo, Yuya Miyazaki, Satoshi Muramatsu, Sho Yokota, Jin-Hua She, and Hiroshi Hashimoto</i> |

Session – S7: Simulation in Robotics Applications

Session Chair: Armando Mendes

Time: 12:30 – 13:30 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 12:30-12:45 | #22 | | MODELLING OF A VIBRATION ROBOT USING LOCALIZATION GROUND TRUTH ASSISTED BY ARUCO MARKERS <i>Diogo Matos, José Lima, Ronnier Rohrich, André Oliveira, António Valente, Pedro Costa, and Paulo Costa</i> |
| 12:45-13:00 | #27 | | MODELLING AND SIMULATION OF ROBOTIC LUGGAGE TRANSPORT AT OPO AIRPORT <i>Miguel Pereira, Manuel F. Silva, and André Siqueira</i> |
| 13:00-13:15 | #31 | | SIMULATION AND DIGITAL TWIN OF A ROBOTIC SANITIZING PROCESS OF ENVIRONMENTS AT RISK DURING THE PANDEMIC <i>Francesco Cepolina and Elvezia Maria Cepolina</i> |

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| 13:15-13:30 | #34 | | COMMON INFORMATION MODEL FOR MODULES OF SERVICE ROBOTS <i>Mi-Sook Kim and Hong Seong Park</i> |
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| 13:30-14:30 | Lunch | | |
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Session – S8: Hybrid Legged-Wheeled Locomotion Robots
Session Chair: Vitor Pinto

Time: 14:30 – 16:00 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 14:30-14:45 | #4 | | A SURVEY OF WHEELED-LEGGED ROBOTS <i>Marko Bjelonic, Victor Klemm, Joonho Lee, and Marco Hutter</i> |
| 14:45-15:00 | #9 | | PERFORMANCE EVALUATION OF AN INNOVATIVE SUSPENSION SYSTEM FOR OBSTACLE CROSSING <i>Denis N'chot, Jean-Christophe Fauroux, Lama Al Bassit, Roland Lenain, and Philippe Vaslin</i> |
| 15:00-15:15 | #11 | | AUTONOMOUS WHEELED LOCOMOTION ON IRREGULAR TERRAIN WITH TACTILE SENSING <i>Hiroki Tomioka, Masahiro Ikeda, Keung Or, Ryuma Niiyama, and Yasuo Kuniyoshi</i> |
| 15:15-15:30 | #23 | | CONTROL OF WHEELED-LEGGED QUADRUPEDS USING DEEP REINFORCEMENT LEARNING <i>Joonho Lee, Marko Bjelonic, and Marco Hutter</i> |
| 15:30-15:45 | #25 | | DESIGN OPTIMIZATION OF A FOUR-BAR LEG LINKAGE FOR A LEGGED-WHEELED BALANCING ROBOT <i>Victor Klemm, Dominik Mannhart, and Roland Siegwart</i> |
| 15:45-16:00 | #55 | | HYBRID LEGGED-WHEELED ROBOTIC PLATFORMS: SURVEY ON EXISTING SOLUTIONS <i>João Moreira, Inês N. Soares, José Lima, Vítor H. Pinto, and Paulo Costa</i> |

Session – S9: Planning and Control I
Session Chair: Teresa Zielinska

Time: 16:00 – 17:00 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 16:00-16:15 | #1 | | THE MEASURE OF MOTION SIMILARITY FOR ROBOTICS APPLICATION <i>Teresa Zielinska and Gabriel R. Rivera Coba</i> |
| 16:15-16:30 | #7 | | DESIGN OF A MINIMALISTIC TORQUE ACTUATED VARIABLE ROLLING SLIP LEG FOR ROBUST LOCOMOTION <i>Noah Paul, Adar Gaathon, and Amir Degani</i> |
| 16:30-16:45 | #14 | | DIRECT CENTROIDAL CONTROL FOR BALANCED HUMANOID LOCOMOTION <i>Grzegorz Ficht and Sven Behnke</i> |
| 16:45-17:00 | #20 | | DECENTRALIZED CONTROL MECHANISMS FOR TRUNK, HEAD, AND TAIL-LIMB COORDINATION IN QUADRUPED RUNNING <i>Shura Suzuki, Yuya Asaoka, Atsushi Norita, Akira Fukuhara, Masato Ishikawa, and Akio Ishi</i> |

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| 17:00-17:30 | Coffee break |
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Session – S10: Robotics and AI for Automated Infrastructure Inspection and Intervention
Session Chair: Bryan Bridge

Time: 17:30– 18:15 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|--|
| 17:30-17:45 | #16 | | CONFIRMATION OF VARIABLE DIAMETER TRM OPERATION <i>Yuta Naruse, Kazuki Takaya, Fumio Ito, Jun'ichi Watanabe, and Taro Nakamura</i> |
| 17:45-18:00 | #28 | | APPLICATION OF RADIO FREQUENCY IDENTIFICATION UNDERWATER WITH MAGNETIC FLUX LEAKAGE TESTING TECHNIQUE <i>Nagu Sathappan, Mohammad Osman Tokhi, Aman Kaur, Gholamhossein Shirkoohi, Zhanfang Zhao, and Fang Duan</i> |

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| 18:00-18:15 | #46 | <p>ROBOTIC DEPLOYMENT OF STABILIZED SHEAROGRAPHY UNIT FOR WIND TURBINE BLADE INSPECTION</p> <p><i>Vitor Marques and Tariq Pervez Sattar</i></p> |
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| 20:30-22:30 | <p>Dinner Banquet – Grand Hotel Açores Atlântico Address: Av. Infante Dom Henrique 113, 9500-150 Ponta Delgada</p> | |
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Wednesday 14 September 2022

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| Time: 08:30 – 09:00 (UTC) | |
| 08:30-09:00 | Conference Registration |

| Keynote Address – 4 Session Chair: Giovanni Muscato | | | |
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| Time: 09:00 – 10:00 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 09:00-10:00 | KS4 | | HETEROGENEOUS TEAMS OF UGVs AND UAVS FOR MULTIPURPOSE OPERATIONS <i>Pedro U Lima</i> |

| Session – S11: Planning and Control II Session Chair: José Cascalho | | | |
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| Time: 10:00 – 11:00 (UTC) | | | |
| Time | Paper ID | Proc Page | Presentation |
| 10:00-10:15 | #42 | | ADAPTATION OF A DECENTRALIZED CONTROLLER TO CURVE WALKING IN A HEXAPOD ROBOT <i>Janneke Simmering, Luca Hermes, Axel Schneider, and Malte Schilling</i> |
| 10:15-10:30 | #47 | | CPG-BASED GAIT GENERATOR FOR A QUADRUPED ROBOT WITH SIDEWALK AND TURNING OPERATIONS <i>Vladimir Danilov and Sekou Diane</i> |
| 10:30-10:45 | #49 | | SEMI-AUTONOMOUS WALKING CONTROL OF A HEXAPOD ROBOT BASED ON CONTACT POINT PLANNING AND FOLLOW-THE-CONTACT-POINT GAIT CONTROL <i>Kosei Tanada, Shinkichi Inagaki, Yuki Murata, Ryota Kato, and Tatsuya Suzuki</i> |
| 10:45-11:00 | #50 | | OMNIDIRECTIONAL MOTION CONTROL METHOD OF QUADRUPED ROBOT BASED ON 3D-CPG OSCILLATOR GROUP <i>Bo Tao, Dongchao Yang, Geng Huang, Zecui Zeng, Chen Chen, and Teng Li</i> |

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| 11:00-11:30 | Coffee break |
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Session – S12: Planning and Control III
Session Chair: José Lima

Time: 11:30 – 12:30 (UTC)

| Time | Paper ID | Proc Page | Presentation |
|-------------|----------|-----------|---|
| 11:30-11:45 | #51 | | EVALUATION OF THE WORK PERFORMANCE OF A PADDY FIELD WEEDING ROBOT USING DISTURBANCE OBSERVER <i>Seiya Moro, Hiroaki Uchida, and Kanta Kato</i> |
| 11:45-12:00 | #53 | | APPLICATION OF GENETIC ALGORITHM FOR VECTOR FIELD GUIDANCE OPTIMIZATION IN A UAV COLLECTIVE CIRCUMNAVIGATION SCENARIO <i>Tagir Muslimov</i> |
| 12:00-12:15 | #56 | | ON THE TRAVELLING SALESMAN PROBLEM WITH NEIGHBORHOODS IN A POLYGONAL WORLD <i>Miroslav Kulich, Jan Vidašič, and Jan Mikula</i> |

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| 12:30-13:00 | Closing Session |
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| 13:00-14:00 | Lunch |
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| 14:30-19:30 | Social Event – Trip to Furnas |
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Thursday 15 September 2022

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| 08:30-11:30 | Vulcano Competition |
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University Map

Entrance A – Rua da Mãe de Deus

Entrance B – Rua de São Gonçalo

Conference Venue at Regional Civil Engineering Laboratory (Laboratório Regional de Engenharia Civil - LREC) (building with ☆) - R. de São Gonçalo 101, Ponta Delgada



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| ☆ REGIONAL CIVIL ENGINEERING LABORATORY | 5 SCHOOL OF BUSINESS AND ECONOMICS | 10 LIBRARY |
| 1 SCIENTIFIC COMPLEX | 6 SCHOOL OF SOCIAL SCIENCES AND HUMANITIES | 11 AMPHITHEATER VIII |
| 2 AMPHITHEATERS | 7 SOCIAL SERVICE (BAR & SNACK-BAR) | 12 ACADEMIC ASSOCIATION |
| 3 RECTORY | 8 SCHOOL OF TECHNOLOGIES | 13 SCHOOL OF HEALTH |
| 4 CLASSROOMS | 9 AMPHITHEATER VII | 14 ADMINISTRATIVE BUILDING |
| | | 15 SPORTS FACILITIES |