

2023 IEEE International Workshop on Sport, Technology and Research (STAR 2023)

**Cavalese - Trento, Italy
14-16 September 2023**



**IEEE Catalog Number: CFP23BS1-POD
ISBN: 979-8-3503-1606-3**

**Copyright © 2023 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:	CFP23BS1-POD
ISBN (Print-On-Demand):	979-8-3503-1606-3
ISBN (Online):	979-8-3503-1605-6

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

CURRAN ASSOCIATES INC.
proceedings
.com

WORKSHOP PROGRAM

Thursday, September 14

Session 1

Room: Palace Museum Magnifica Comunità di Fiemme

- 1 **A Wireless Body Sensor Network for Cardio-Respiratory Monitoring During Cycling**
Alessandra Angelucci, Federica Camuncoli, Federica Dotti, Filippo Bertozzi, Manuela Galli, Marco Tarabini and Andrea Aliverti (Politecnico di Milano, Italy)
 - 5 **GPS Devices for Match Analysis in Soccer**
Roberto Modena (CeRiSM, University of Verona & Molde University College, Italy); Barbara Pellegrini (University of Verona, Italy); Francesca Salaorni (CeRiSM, University of Verona, Italy); Lorenzo Bortolan and Federico Schena (University of Verona, Italy)
 - 8 **Olympic Weightlifters' Performance Assessment Module Using Computer Vision**
Pragathi R, Saravanan Manoharan and Anish Monsley Kirupakaran (Indian Institute of Technology Madras, India); Ranganathan Srinivasan (Indian Institute of Technology Madras, India); Ravi Hegde (IIT Gandhinagar, India); Babji Srinivasan (Indian Institute of Technology Madras, India)
 - 13 **A Case Study for the Automatic Supervision of Body-Weight Exercises: The Squat**
Paolo Aliprandi, Letizia Girardi, Giulia Martinelli, Francesco G.B. De Natale, Niccolò Bisagno and Nicola Conci (University of Trento, Italy)
-

Session 2

Room: Palace Museum Magnifica Comunità di Fiemme

- 17 **Coordination Between Respiration and Motion During Running by a Wearable System**
Cristian Bracco, Silvia De Nadai and Camilla Minella (LIFE Italia Srl, Italy); Andrea Aliverti (Politecnico di Milano, Italy)
 - 25 **Diaphragmatic Breathing for Fencing: Is It Worth It?**
Antonella LoMauro (Politecnico di Milano, Italy); Andrea Vivian (Federazione Italiana Scherma, Italy)
 - 32 **Validation of an IMU-Based Smart Suit for Running Kinematics and Pole Vault Take-Off Analysis**
Bianca Falcone, Francesco De Grazia and Silvia De Nadai (LIFE Italia Srl, Italy); Andrea Aliverti (Politecnico di Milano, Italy)
 - 39 **Video-Based Jump Height Estimation in Athletic Performance Testing**
Ivan Lokas, Matea Vasilj, Sven Skender, Vlatko Vučetić and Hrvoje Mihaldinec (Croatia); Hrvoje Džapo (University of Zagreb, Croatia)
-

Friday, September 15

Session 3

Room: Palace Museum Magnifica Comunità di Fiemme

- 45 **Assessing Sport-Related Physical Fitness in Young Alpine Ski Racers: A Proposed Framework for Longitudinal Testing**
Filippo Bertozzi (Politecnico di Milano, Italy); Dino Tenderini (Sci Club Lecco ASD, Italy); Federica Camuncoli, Greta Simoni, Manuela Galli and Marco Tarabini (Politecnico di Milano, Italy)

- 49 **Concurrent Validity of the Human Pose Estimation Model "MediaPipe Pose" and the XSENS Inertial Measuring System for Knee Flexion and Extension Analysis During Hurling Sport Motion**
Chloe Leddy, Richard Bolger, Paul Byrne, Sharon Kinsella and Lilibeth Zambrano (South East Technological University, Ireland)
- 53 **Continuous Glucose Monitoring in Ultra Trail Running During Performance and Recovery**
Magda D'Astuto (Dip. Emergenza, Rianimazione, Anestesia Ospedale Sant'Anna di Como San Fermo della Battaglia Como, I, Italy); Andrea Aliverti (Politecnico di Milano, Italy)
- 57 **Enhanced Composite Design Through Incorporation of Tribological Considerations in Micromechanical Models**
Seyedkamal Jalali and Nicola Pugno (University of Trento, Italy)
- 64 **Biomarkers of Peripheral Fatigue in Subjects With Vascular and Neurological Motor Disabilities During an Incremental Treadmill Test Using Near-Infrared Spectroscopy**
Natascia Rinaldo, Lorenzo Caruso and Giovanni Piva (University of Ferrara, Italy); Anna Crepaldi (Istituto Maimonides de Investigation Biomedica, Italy); Alba Pasini (University of Ferrara, Italy); Andrea Baroni (Università di Ferrara, Italy); Sofia Straudi, Fabio Manfredini, Giovanni Grazzi and Nicola Lamberti (University of Ferrara, Italy)
-

Session 4

Room: Palace Museum Magnifica Comunità di Fiemme

- 70 **Wearable Platform for Tennis Players Performance Monitoring: A Proof of Concept**
Alessio Serrani (Politecnico di Milano & Kalpa Srl, Italy); Andrea Aliverti, Cristiano Bortolotti, Huan Xu and Antonio Coviello (Politecnico di Milano, Italy); Giacomo Villa (Politecnico di Milano & Euleria Health, Italy); Raffaele Giannattasio and Chiara Lambranzi (Politecnico di Milano, Italy); Hananeh Esmailbeigi (University of Illinois at Chicago & University of Illinois at Chicago (UIC), USA)
- 77 **Academic Career Assistance Services for Student-Athletes in South Tyrol: A Study Protocol**
Giampaolo Santi and Attilio Carraro (Free University of Bozen-Bolzano, Italy)
- 81 **A DAQ System Suited for Olympic Sprint Canoeing Performances Monitoring**
Giuseppe Annino (Tor Vergata University of Rome, Italy); Paolo Boatto (APLAB, Italy); Vincenzo Bonaiuto (Tor Vergata University of Rome, Italy); Francesca Campoli (Sport Engineering Lab - University of Rome Tor Vergata, Italy); Lucio Caprioli (Sports Engineering Lab Dept Industrial Engineering Tor Vergata University of Rome Rome, Italy); Saeid Edriss (University of Rome Tor Vergata, Italy); Nunzio Lanotte (San Raffaele Rome Open University, Italy); Elvira Padua (Department of Human Science and Promotion of Quality of Life San Raffaele Open University Rome); Emilio Panichi (Sport Engineering Lab - University of Rome Tor Vergata, Italy); Cristian Romagnoli (Department of Human Science and Promotion of Quality of Life San Raffaele Open University Rome)
- 85 **Event Management Evolution Through Non-Fungible Token**
Davide Calderone (University of Bologna, Italy)
- 90 **Meta-Trainer: An Augmented Reality Trainer for Home Fitness With Real-Time Feedback**
Lorenzo Orlandi, Giulia Martinelli, Niccolò Bisagno, Nicola Conci, Francesco Laiti and Davide Lobba (University of Trento, Italy)
-

Saturday, September 15

Session 5

Room: Palacongressi di Cavalese

- 94 **An Introduction of Explainable Artificial Intelligence to Winter Sports Performance Analysis**
Lawrence Araa Odong and Paolo Bouquet (University of Trento, Italy)

98 Assessing Sports Performances Using an Artificial Intelligence-Driven System

Giuseppe Annino and Vincenzo Bonaiuto (Tor Vergata University of Rome, Italy); Francesca Campoli (Sport Engineering Lab - University of Rome Tor Vergata, Italy); Lucio Caprioli (Sport Engineering Lab - Dept Industrial Engineering - University of Rome Tor Vergata); Saeid Edriss (University of Rome Tor Vergata, Italy); Elvira Padua (San Raffaele Rome Open University, Italy); Emilio Panichi (Sport Engineering Lab - University of Rome Tor Vergata, Italy); Cristian Romagnoli (University of Bologna, Italy); Naomi Romagnoli (Italian Roller Sports Federation, Italy); Andrea Zanela (ENEA, Italy)

104 Development of a Low-Cost System for Analytical Performance Analysis in Alpine Skiing

Lorenzo Bortolan, Aldo Savoldelli, Federico Schena and Chiara Zoppirolli (University of Verona, Italy); Roberto Modena (CeRiSM, University of Verona & Molde University College, Italy); Barbara Pellegrini (University of Verona, Italy)

Session 6

Room: Palacongressi di Cavalese

110 Wearable Sensor for Boxer Performance Improvement

Antonio Affanni, Roberto Rinaldo and Pamela Zontone (University of Udine, Italy)

116 Application of Supervised Learning Techniques for Sports and Daily Activities Identification Using Accelerometer Data

Pamela Zontone, Antonio Affanni, Davide Pin and Roberto Rinaldo (University of Udine, Italy)

122 Biocircuit®: An Innovative Adaptive Circuit Training for Outpatients With Cardiovascular Disease. Methodological Approach

Sabrina Masotti (University of Ferrara, Italy)

126 Time Synchronization in Wireless IMU Sensors for Accurate Gait Analysis During Running

Nina Verdel (University of Ljubljana & Jozef Stefan Institute, Slovenia); Miha Mohorčič (Jozef Stefan Institute, Slovenia); Miha Drobnič and Matej Supej (University of Ljubljana, Slovenia); Matjaž Depolli (Jozef Stefan Institute, Slovenia)