



International Summer School **Wearable Sensors in Sport**

Department of Movement, Human and Health Sciences,
University of Rome "Foro Italico", Italy

14-16 June 2021



Introduction

In the digital era, the use of wearable sensors is pervading the field of sport. Sports sensors are often driven by market forces rather than by user needs. Coaches and athletes may experience problems in understanding what to measure, why and how. A large amount of data is collected from daily activities and training sessions, often without informing training practice successfully. In this scenario, it is vital to train young researchers and professionals to face the challenges offered by the digital era. The International Summer School on Wearable Sensors in Sport is aimed to meet this need. The School provides a **series of functional tools for your professional career in the sports field**. We will start with a state-of-the-art understanding of what is going on in the field of sports monitoring with wearable sensors, from the perspectives of different stakeholders. Then we will bring you **step by step into the rationale, technicalities (sensors and electronics) and analysis (real-time data processing) of cardiac, respiratory, movement and power monitoring in the field of sport**. Finally, an overview of how different sports disciplines (wheelchair sports, endurance sports and team sports) may benefit from an informed use of wearable technologies will be provided. Practical examples on how professional soccer teams are exploiting massive amounts of data to optimize training will also be discussed, shedding light on **how the digital era is changing elite sports**. We are very grateful to all the experts from academia, sports industry and professional teams that will contribute to making this School unique, boosting your career in the sports field and increasing our awareness about the need to establish fruitful synergies with experts from different fields.

Welcome from the school chairs

Andrea Nicolo

Elena Bergamini

Foro Italico

The **University of Rome “Foro Italico”** is the only Italian and one of the few European vocational universities entirely devoted to sport and exercise science. Despite being a relatively small institution, the University enjoys a relevant international status, thanks to its history, facilities, the quality of its teaching and continuing-education activities, the strong emphasis on research and scientific achievement, as well as the consistent strategy of internationalization. The University has a significant presence in international organizations such as the International Federation of Sport Medicine, the European College of Sport Sciences, the American College of Sports Medicine and the European Network of Sport Sciences and Employment.





14 June 2021

Andrea Nicolò and Elena Bergamini	Opening and presentation of the technical sponsors	9:00	9:30
State of the art on the use of wearable sensors in sport: the stakeholders' perspective			
Mounir Zok	Sports industry: technology, innovation, and digitalization	9:30	10:30
Marco Cardinale	The sport scientist perspective on the use of wearable sensors	10:30	11:30
	Coffee break	11:30	11:50
Mathieu Lacombe	Monitoring the training status of soccer players with wearable sensors	11:50	12:50
	Session recap and closing remarks	12:50	13:10
	Lunch break	13:10	14:00
	Introduction to the didactic sessions	14:00	14:15
Cardiac monitoring in sport			
Ferdinando Iellamo	The importance of cardiac monitoring in sport	14:15	15:15
Daniilo Pani	ECG sensors: past, present and future	15:15	16:15
	Coffee break	16:15	16:35
Laura Burattini	Automatic processing of cardiac signals in sport	16:35	18:05
	Session recap and closing remarks	18:05	18:30

15 June 2021

Respiratory monitoring in sport

Andrea Nicolò	The importance of respiratory monitoring in sport	9:00	10:00
Carlo Massaroni	Sensors and techniques for respiratory monitoring	10:00	11:00
Coffee break		11:00	11:20
Daniela Lo Presti	How to process respiratory signals in sport	11:20	12:50
Session recap and closing remarks		12:50	13:10
Lunch break		13:10	14:00

Movement monitoring in sport

Valentina Camomilla	The importance of movement monitoring in sport	14:00	15:00
Andrea Cereatti	Wearable sensors for movement monitoring	15:00	16:00
Coffee break		16:00	16:30
Elena Bergamini	How to process movement-related signals	16:30	18:00
Session recap and closing remarks		18:00	18:30

16 June 2021

Energetics and power monitoring in sport

Gaspare Pavei	The importance of monitoring work and power in sport	9:00	10:00
Mirko Marcolini	GPS technology and its use in sport	10:00	11:00
	Coffee break	11:00	11:20
Andrea Zignoli	How to process power data in sport	11:20	12:50
	Session recap and closing remarks	12:50	13:10
	Lunch break	13:10	14:00

Future perspectives and challenges in the use of wearable sensors in different sports

Rienk Van der Slikke	The use of wearables in wheelchair sports performance measurement	14:00	15:00
Louis Passfield	The quantification of training load in endurance sports	15:00	16:00
	Coffee break	16:00	16:20
Sudarshan Gopaladesikan	Big data analytics in human performance	16:20	17:20
Andrea Nicolò and Elena Bergamini	Closing remarks and acknowledgements	17:20	18:00

Costs

Non-member - 150€

Member - 120€

Student non-member - 110€

Student member - 80€

Members are those who are affiliated to the following scientific societies:

- IEEE – Institute of Electrical and Electronics Engineers
- SIAMOC – Società Italiana di Analisi del Movimento in Clinica
- GNB – Gruppo Nazionale di Bioingegneria
- SISMES – Società Italiana Scienze Motorie e Sportive
- Student/staff of Erasmus+ Partner Universities of the University of Rome “Foro Italico” (check partners on University of Rome “Foro Italico” official website)

Sponsors



School Chairs

Andrea Nicolò



Andrea Nicolò received his BSc (2009), MSc (2011) and Ph.D. in Sports, Exercise and Ergonomics (2015) from the University of Rome "Foro Italico". He is currently a post-doc researcher at the University of Rome "Foro Italico". His research focuses on endurance physiology and performance, with special attention to the mechanisms and practical applications underlying the control of breathing during exercise. He has worked for different research projects funded by major national and international sports companies, with the aim of developing new exercise tests and training metrics, and of validating training devices and algorithms. Since December 2018, he is the Chair of the "Sports Sensors" technical committee of the Italy Chapter of the IEEE Sensors Council.

Elena Bergamini holds a joint Ph.D. in Biongeineering and Biomécanique et Ingénierie pour la Santé at the University of Bologna and Arts et Métiers ParisTech. Currently she is Assistant Professor at the University of Rome "Foro Italico". Her research concerns the development and application of methodologies based on the use of wearable technologies and allowing for the quantification of persons' motor function in ecological contexts. Academic editor for PlosOne, Frontiers in Bioengineering and Biotechnology – Biomechanics, and Frontiers in Sports and Active Living. Secretary of the Directory Board of Italian Society of Movement Analysis in Clinics (SIAMOC) and Chair of the Sensors for Biomechanics Technical Committee within the Italy Chapter of the IEEE Sensors Council.

Elena Bergamini



Speakers



Mounir
Zok



Marco
Cardinale



Mathieu
Lacome



Ferdinando
Iellamo



Danilo
Pani



Laura
Burattini



Carlo
Massaroni



Daniela
Lo Presti

Speakers



Valentina
Camomilla



Andrea
Cereatti



Gaspare
Pavei



Mirko
Marcolini



Andrea
Zignoli



Rienk
Van der Slikke



Louis
Passfield



Sudarshan
Gopaladesikan

Award

To be eligible for the awards, a candidate must be under 35 years old.

Procedures

A set of results obtained from data collected in the sports context using sensors presented during the School will be provided to all candidates. The candidates must write an abstract (following a provided template) based on this set of results.



Prizes

1st prize – 400 €

2nd prize – 250 €

3rd prize – 180 €

4th prize – 130 €

5th prize – 130 €

6th prize – 130 €

7th prize – 130 €

8th prize – 130 €

Important dates

June 16, 2021 – the organizing committee will provide details on how to apply for the award and write the abstract.

June 21, 2021 (24:00 CET) – deadline for abstract submission.

July 2, 2021 – the names of the award winners will be published on the Summer School website.

Organizing committee

Emiliano Schena - Università Campus Bio-Medico di Roma

Massimo Sacchetti - University of Rome “Foro Italico”

Giuseppe Vannozzi - University of Rome “Foro Italico”

Federico Mari - University of Rome “Foro Italico”

Carlo Massaroni - Università Campus Bio-Medico di Roma

Gaspere Pavei - University of Milan

Juri Taborri - Tuscia University

Informations

Host: Teleconference via Microsoft Teams

Location: University of Rome “Foro Italico”

Duration: 3 days for a total of 24 hours

Language: English

For more info, application and keep up to date, scan the **QR code** below using your smartphone camera or reach the website <https://site.ieee.org/italy-sensors/>.

The deadline for subscription is June 6th.





Enjoy the school!