



Measuring Systems for Human Motion and Performance: The Experiences of the University of Brescia

Abstract: Measuring human motion and sport performances requires the combination of different measuring systems, designed for different research fields. This makes the design of a complete measuring system difficult, especially concerning synchronization, data processing, and uncertainty assessment. The interpretation model in these cases is of paramount importance and comprehension of the final aim of the experiment is required to properly design the measuring system.

We will explore different cases from the experience of the Mechanical and Thermal Laboratory of the University of Brescia, focusing on each project peculiarity:

- ESSEDA/Ergometer: development and validation of a reference system to allow comparing different ergometers and verify their compatibility
- COMPETITION LAB/TRAP: measuring system to assess shooters performance with high speed synchronization and a fast way to sort data out using machine learning
- AB/HORIZON: cost, time and performance comparison between different hardware and software motion capture solutions for indoor training
- BULLET/Eurobench: benchmarking exoskeletons performance in locomotion requires synchronization between devices with different standards, and a mechanical model to assess key parameters not directly measurable

Short bio: Matteo Lancini PhD, is Associate Professor in Mechanical and Thermal Measurement (ING-IND/12) at the University of Brescia – Italy. He has obtained a PhD in Applied Mechanics in 2015, with a thesis on Measurement Systems for Robotic Rehabilitation. Before that he worked as chief software developer for different engineering firms.

He is currently the Head of the Mechanical and Thermal Measurement Lab of his department (<http://mmtlab.unibs.it/>), with research and collaboration contracts with relevant local industries, international research centres and other European universities.

He is a member of the International Society of Biomechanics, of the International Society of Biomechanics in Sports and a member of Institute of Electrical and Electronics Engineers. He is also part of the EUROBENCH Consortium, as well as a participant of the COST Action CA16116 – Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions

His current research interests include measurement systems for biomechanical analysis, robotic gait and rehabilitation, as well as the development of opto-mechanical sensors and sensor fusion for biomechanical modelling: the aim of his research is to develop innovative measurement system for the biomechanics field.

