RUSSO Caterina

1st year PhD Student in Mechanical Engineer

Supervisor: SOMA' Aurelio

Fellowship: Borsa di Ateneo

Company collaboration: Gabel s.r.l

Main topic of my activity:

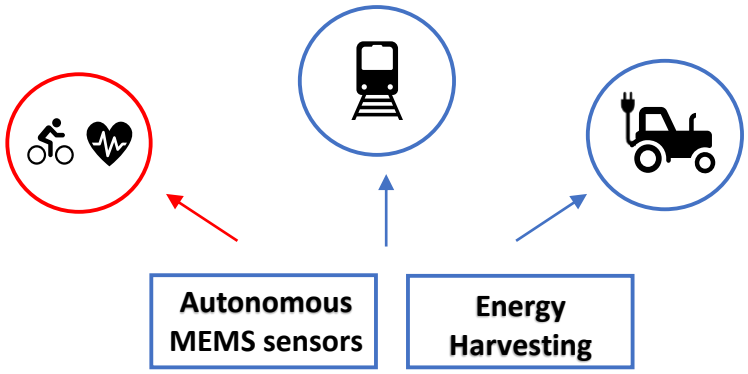
Study and application of AIOT "Autonomous Internet of Thing" applications for human and mechanical system monitoring

Starting point (state of art)

Study of MEMS /Energy Harvester state of the art

First year applications field:

- Sport activity
  - Healthcare
  - Performance

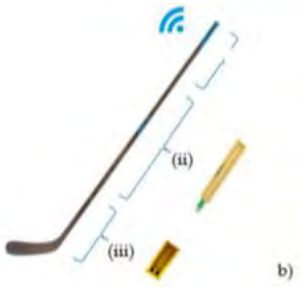


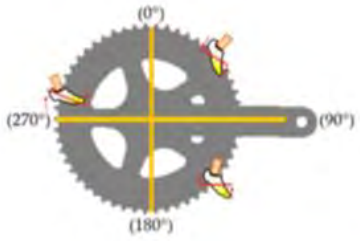
Characteristics of sport MEMS monitoring systems

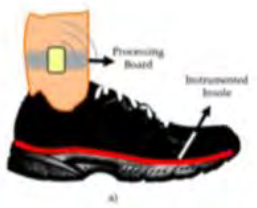
Injury preventions

Quantify skill level and expertise

Characterizing movements



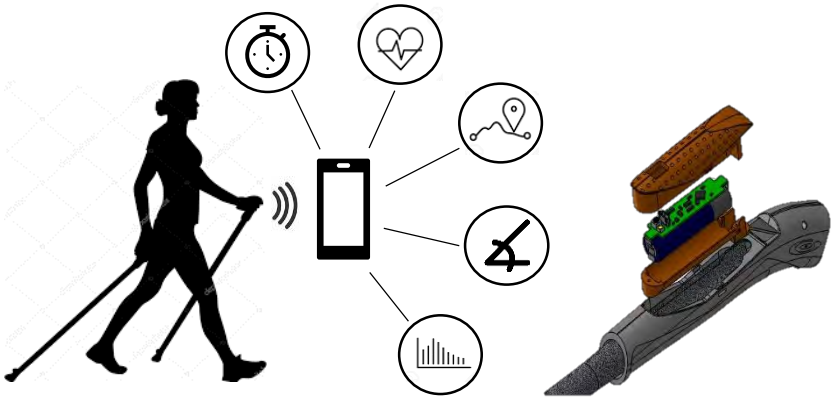




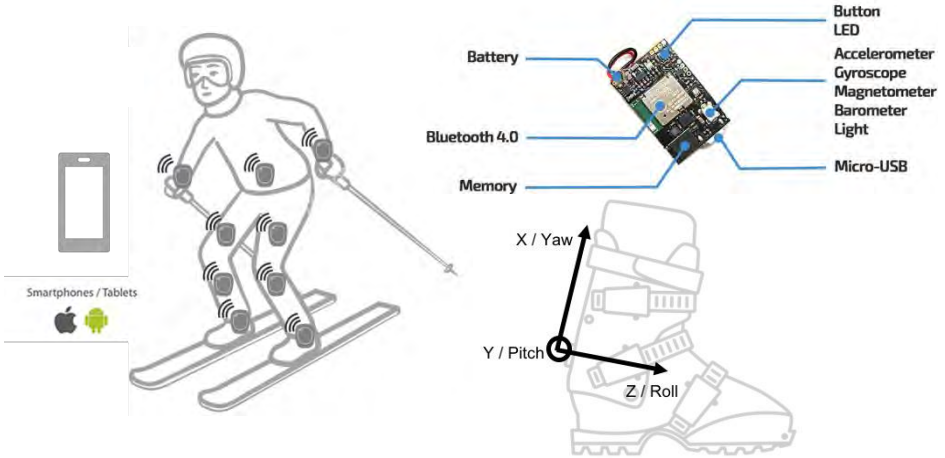
The foreseen approach

Case of study:

Nordic Walking



Alpine Skiing

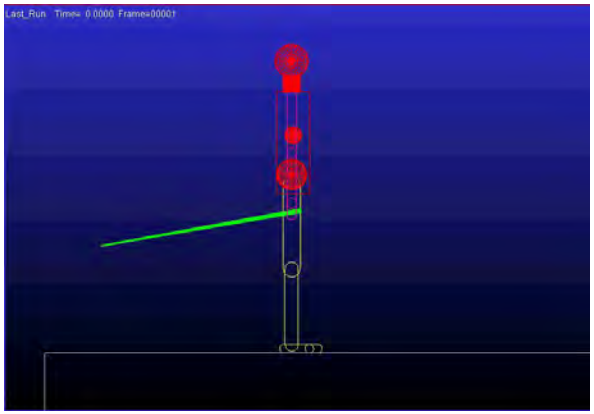


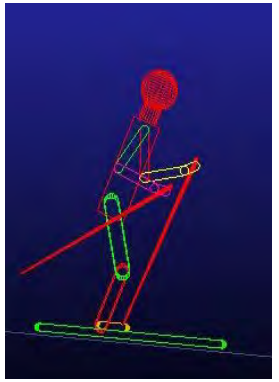
- Fully integrated monitoring system (inside the hand's pole)
- **Develop** a dedicated software to analyze the data

- Set of prototypes of MEMS IMU sensors on different body segment
- **Develop** a synchronized algorithm compute the curves, the angle of body segment during curve, the slope…

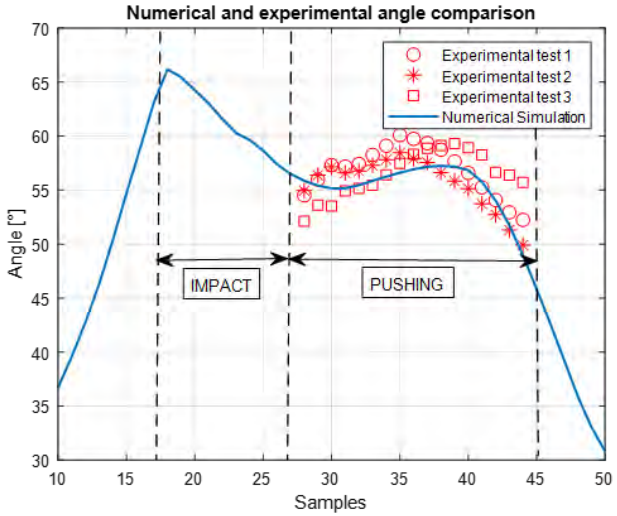
The early results obtained or expected

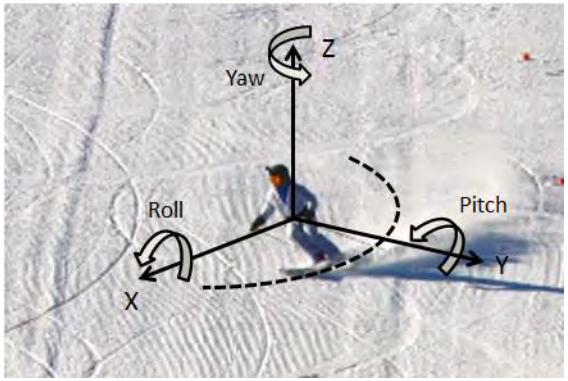
Both the systems are supported by a numerical simulation realized with a Multibody Software. This help to better understand the gesture and compare the results with the experimental one.

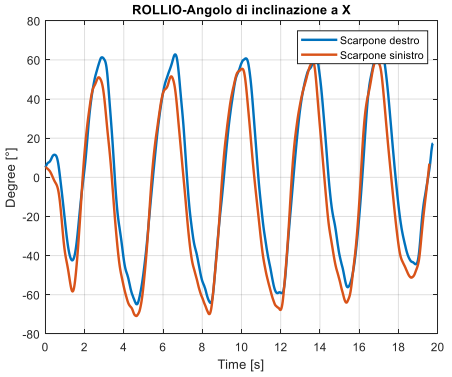




Some of the results obtained:

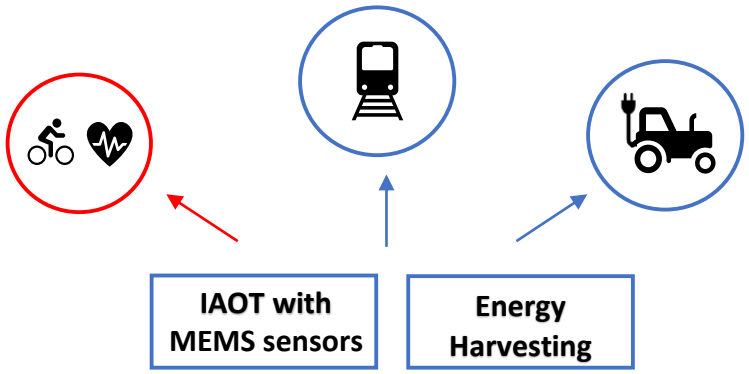




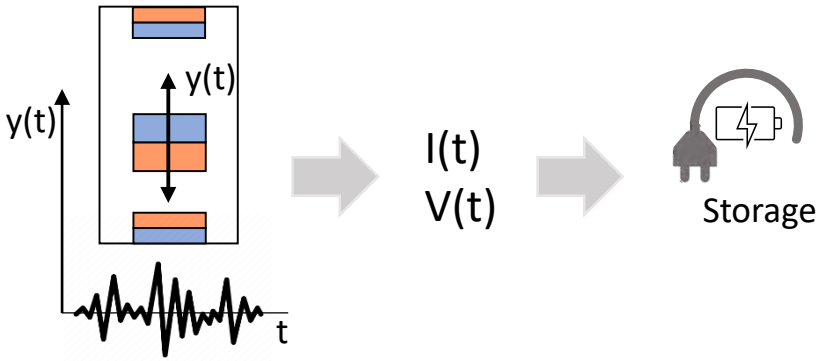


Russo C, Mocera F, Somà A., Nordic walking multibody analysis and experimental identification Proceedings of the Institution of Mechanical Engineers, *Part P: Journal of Sports Engineering and Technology*, 2020

The work plan foreseen for the continuation



Energy harvesting



- Study od the source of vibrations and his characterization (amplitude, directions,…) to obtain the maximum energy to storage
- Numerical model and experimental identification of the parameters
- Realization of a MTB model to study the total dynamic of the systems
- Prototype experimental analysis

Thanks for the attention

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