

BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

DM 630/221e - Multi-sensor platform and advanced data fusion algorithms for the extraction of mobility parameters in real-life conditions

Funded By	221E S.R.L. [Piva/CF:04694180284] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584]
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Context of the research activity	<p>The use of magneto-inertial sensors allows to monitor a person's health status and activity level in real time. However, this technology has inherent limitations (drift, lack of absolute references and direct force measurements) that limit applicability in the clinical fields. A strategy to overcome these limitations consists in integrating inertial data with measurements provided by auxiliary sensors such as barometers, infrared sensors and FSR pressure pads.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002350004</p>
Objectives	<p>The activities of this research project will focus on the development, optimization and validation of a multi-sensor platform and advanced data fusion algorithms for the extraction of mobility parameters in real-life conditions. In parallel to the design, the technical aspects related to the certification of the system as a biomedical device will also be examined. The research activities include but are not limited to:</p> <ul style="list-style-type: none">- Analysis of the functional requirements for mobility assessment in the health, fitness, sports, sectors;- Review and market analysis of the latest and more performing sensors for mobility assessment;- Development of benchmark and in situ testing procedures for the characterization of the sensors performances;- Analysis and implementation of in situ calibration procedures;- Implementation and optimization of algorithms for digital mobility monitoring in real world conditions;

- Optimization and comparison of data fusion algorithms and filter;
- Firmware optimization and testing;
- Technical and clinical validation of the methods.

Skills and competencies for the development of the activity

HARD SKILLS

Programming: Matlab, Python, C, Assembly, Labview

Software: Office, Matlab, Simulink, Nexus

Hardware: experience in the use of inertial and barometric sensors, pressure insoles, VICON stereophotogrammetry

Engineering skills: biomechanics, movement analysis, biomedical instrumentation

Data Science: signal processing, image processing, sensor fusion algorithm, machine learning, statistical analysis

Languages: English

SOFT SKILLS

Teamwork

Problem-solving

Analytical attitude