



PhD in BIOINGEGNERIA / BIOENGINEERING - 40th cycle

THEMATIC Research Field: PROJECT SMART EYEWEAR: AI FOR ACTIVITY TRACKING AND PHYSIO-PATHOLOGIC STATE ASSESSMENT FROM HEAD-MICROMOVEMENTS

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

Through inertial sensors positioned on the head, potentially it would be possible to infer several everyday life activities made by the wearer, by using opportunely trained AI methods, as well as it would be possible to explore the clinical informative value of the acquired signals, thus opening new opportunities for opportunistic patient remote monitoring.

The objectives of this PhD are:

- 1) To define and organize proper experimental protocols to collect the required data, both in laboratory and in real-world context.
- 2) To explore the potential of several AI methods in properly interpreting head inertial signals
- 3) To define and test several application scenarios, including clinical.
- 4) To compare performance in relation to the available computational power and memory, exploring both cloud processing and local firmware.
- 5) To produce scientific publications and present results in an international context

Methods and techniques that will be developed and used to carry out the research

Experiments will be conducted with prototypes provided in the context of this study. Signal processing techniques will be applied at pre-processing stage. AI methods (supervised machine learning, deep learning) will be explored and compared, also considering novel approaches. Effects of model reduction will be studied, and firmware programming applied.



	<p>and firmware programming applied.</p> <p>This research will be conducted in collaboration with EssilorLuxottica, and the activities will be conducted mainly at the EssilorLuxottica Smart Eyewear Lab in Milan, a Joint Research Center between EssilorLuxottica and Politecnico di Milano.</p>
Educational objectives	<p>During the PhD, the candidate will deepen his/her knowledge in the context of inertial signals extracted from smart eyewear and their utilization, as well as on biomedical signal processing and AI methods for activity classification, applied to different scenarios including clinical.</p> <p>https://www.essilorluxottica.com/en/careers/smart-eyewear-lab/</p>
Job opportunities	<p>The candidate will have the opportunity to get access to positions in R&D in companies manufacturing or using wearables or eyewear for health and lifestyle, in companies interested in AI and firmware programming, as well as post-doc opportunities in this field in both Italian and international universities.</p>
Composition of the research group	<p>0 Full Professors 1 Associated Professors 3 Assistant Professors 7 PhD Students</p>
Name of the research directors	Prof. Enrico G. Caiani

Contacts

Prof. Enrico G. Caiani
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Additional support - Financial aid per PhD student per year (gross amount)

Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad

Amount monthly	700.0 €
By number of months	6



Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Educational activity: The student will be encouraged to attend to courses at POLIMI or abroad in International Schools.

Teaching assistantship: There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to evaluate to take part in these activities, within the limits allowed by the regulations.

Computer and desk availability: the student will be allowed to access facilities of the DEIB, and in particular of the EssilorLuxottica Smart Eyewear Lab.