



PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: TECH4ABILITIES: TECHNOLOGICAL SOLUTIONS TO PROMOTE MEDICAL FITNESS FOR FRAGILE AND DISABLED PEOPLE

Monthly net income of PhDscholarship (max 36 months)

€ 1250.0

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

The goal of this research program is to promote inclusion and sustainability, minimizing barriers to access, thanks to technological solutions.

The specific focus will be on technologies for Medical fitness.

An personalized exercise regime improves both physical and mental health and it is important for all people, including people with disability and fragile people, such as elderly.

However, exercise regime is not always accessible for these categories of subjects. Within this framework, technologies are playing a crucial role to support and favor an exercise regime for fragile people and for people with disabilities.

The project of this PhD is to exploit the use of advanced technological devices, such as upper limb rigid and/or exoskeletons, electric assisted trike integrated with Functional Electrical Stimulation, and robotic platform for training to promote medical.

The effects of training with the support of these devices on the quality of life, on physical and mental well-being and on physiological parameters will be evaluated in pilot studies involving people with disability and / or fragile people.

Usability and user-acceptance will be also evaluated.

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

The PhD student will start from prototypes already available in the laboratories (e.g. an upper limb



	<p>available in the laboratories (e.g. an upper limb exoskeleton for 3D arm exercises, a cable-driven soft exoskeleton for the upper limb, an electric assisted recumbent trike integrated with Functional Electrical Stimulation of lower limb muscles,) and from commercial devices (e.g. Hunova from Movendo Technology, a robotic platform to support postural and balance exercises, NAO humanoid robot) and will adapt these devices for the physical training of people with disabilities and fragile people in supervised (clinics) and unsupervised (e.g. at home, outside, in gyms) settings. Easy-of-use applications will be developed, as well as self-calibration procedure. Focus groups and feasibility studies will be carried out to collect users' options and to evaluate usability and technology acceptance. The most promising devices will be evaluated in longitudinal pilot studies to quantitatively assess their effects on quality of life, on physical and mental well-being and on physiological parameters.</p> <p>The PhD student will be involved in the design of these studies, in the collection of quantitative data and in the data analysis.</p>
Educational objectives	<p>We provide doctoral candidates with high-level scientific training, fostering and refining research and problem-solving abilities by focusing on both theoretical and experimental skills.</p> <p>A PhD in Bioengineering will be able to layout, draft and carry on original research, by leading a research group or working in a team.</p>
Job opportunities	<p>National and international academic and non-academic institutions and organizations, engaged in innovation, research and technical development; high-tech SMEs, government departments.</p>
Composition of the research group	<p>3 Full Professors 1 Associated Professors 2 Assistant Professors 8 PhD Students</p>
Name of the research directors	<p>PROF. EMILIA AMBROSINI</p>



Contacts

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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	625.0 €
By number of months	6

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

Two laboratories will be involved in this project: the Neuroengineering section of the NEARLAB, within the Department of Electronics, Information and Bioengineering of Politecnico di Milano <https://nearlab.polimi.it/> and the interdepartmental laboratory WECOBOT ?Wearable and collaborative robotics laboratory? located at Polo Territoriale di Lecco of Politecnico di Milano <https://www.polo-lecco.polimi.it/ricerca/laboratori-interdipartimentali/we-cobot-lab-wearable-and-collaborative-robotics-laboratory>

The PhD student will collaborate with clinical research partners, such as Fondazione don Gnocchi IRCCS and Villa Beretta NeuroRehabilitation Center.

The PhD student will attend specific PhD courses at Politecnico di Milano according to his/her personal study plan;

He/she will be able to attend summer schools and will have the opportunity to disseminate his/her research results in international conferences;

The PhD student will assist in teaching by giving practical and lab lessons and by tutoring of BSc and MSc students developing their thesis work.

The PhD student will have personal desk in the Politecnico and will be equipped with a personal computer.