



**Operational Program European Social Fund - Regione Liguria 2014-2020
ASSE 3 "Education and training"**



**UNIVERSITÀ DEGLI STUDI
DI GENOVA**

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EXCERPT OF INFORMATION SHEET Bioengineering and Robotics	
GENERAL INFORMATION	
STRUCTURE OF THE TRAINING PROJECT	
DURATION AND ORGANIZATION OF THE COURSE	<p>The course starts officially on 1 of November 2018 and lasts three years. 1. At the end of each year, doctoral students shall present the Teaching Body with a detailed written account of the activities carried out. The Teaching Body may ask for the account to be discussed according to procedures it has established</p> <p>Coordinator of the course: Prof. Giorgio Cannata; E-mail address: cannata@dist.unige.it. Department coordinating for research: Department of Informatics, Bioengineering, Robotics and Systems Engineering (Dipartimento di Informatica, Bioingegneria, Robotica e Ingegneria dei Sistemi - DIBRIS).</p>
TRAINING PROJECT	<p>The following 3 projects/scholarships are activated:</p> <p>Curriculum BIOENGINEERING AND BIOELECTRONICS (CODE 7286):</p> <p><u>Project/scholarship No. 1: Scientific and technological bases for the recovery of motor skills through enhancement and reorganization of sensory information</u></p> <p><i>Months abroad: 6.</i></p> <p><i>In cooperation with:</i></p> <ul style="list-style-type: none"> - Movendo Technology s.r.l - Marquette University - Polo Ligure Scienze della Vita <p><i>Project/scholarship details:</i></p> <p>This project is based on the hypotheses that (1) in neurological diseases, in addition to motor dysfunction, somatosensory deficits induce specific and identifiable motor and neural alterations influencing the ability to perform daily living activities, and that (2) targeting motor and somatosensory deficits with highly personalized rehabilitative interventions enhances the recovery process and improves the living conditions of</p>

people suffering from these diseases.

The work has the following specific objectives (SO):

- (SO1) To develop and test new technological solutions to determine and quantify motor and sensory deficits and the corresponding neuromuscular activation patterns together with their impact on daily life tasks. The expected outcome is a set of indicators for the subject's abilities that can be used as input parameters for the control of assistive or rehabilitation devices;
- (SO2) to develop and test new low-cost sensory stimulation technologies that enable training or enhancement (i.e. 'sensory enhancement or substitution') of somatosensory abilities at home and in clinical setting. The expected deliverables are different versions of these technological aids that aim at specific somatosensory modalities and can be used in rehabilitative settings;
- (SO3) to define and test adaptive and highly personalized rehabilitation protocols using the results of the objectives (SO1) and (SO2). The expected outcome is the identification of rehabilitative pathways that while following international guidelines can also be customized according to each patient's disability and improvement with the aim of promoting the recovery of motor and sensory performance. If successful, this research will generate knowledge and low-cost technologies to implement effective paradigms of somatosensory and motor training in people suffering for neurological diseases at home and in the clinic. Furthermore, this research will broaden our knowledge about the impact of sensory deficits on motor skills and on the possibility of recovering them.

Project/scholarship No.2: Standardized platform for the management of the cardiological patient in dialogue between the hospital ward and the territory

Months abroad: 6.

In cooperation with:

- EL.CO. s.r.l.
- Healthropy s.r.l.
- Ethical GmbH
- Polo Ligure Scienze della Vita

Project/scholarship details:

Chronic diseases are a relevant problem for public health and for the social environment for the great amount of resources that are needed for a correct treatment. The increase of average age in Italy and in other western countries makes this problem even more important as stated by both World Health Organization and Italian Health Ministry.

In this context, all the bodies involved in the treatment of chronically ill patients should efficiently interact: the hospital is a highly specialized Health hub, but it should coordinates with ambulatory services and with primary care.

The overall aim of this proposed research is to design and to develop and innovative platform that could support all local organizations in the treatment of cardiologic chronic patient. Moreover, the platform would also support the involved medical doctors also in the research work.

Specific objectives of this research will be:

- Definition of all possible sources of the clinical data that could be useful in the treatment of this type of patients.
- Design and development of a smart user interface that will allow all type of end users (medical doctors, care givers ...) an efficient management of the great amount of clinical data.
- Implementation of standardized and automatic data transfer from clinical environments toward research systems; all aspects of security and

	<p>privacy of these data should be considered.</p> <ul style="list-style-type: none"> • The whole platform should be compliant with the most advanced specific standards involved. <p>Curriculum ROBOTICS AND AUTONOMOUS SYSTEMS (CODE 7287): Project/scholarship No.3: Approaches to Human-Robot Interaction for semi-Automated Inspection of Parts in Shop-Floor Scenarios.</p> <p><i>Months abroad: 6.</i></p> <p><i>In cooperation with:</i></p> <ul style="list-style-type: none"> - Applied Tech Systems s.r.l. - Japan Advanced Institute of Science and Technology - Polo SOSIA <p><i>Project/scholarship details:</i></p> <p>According to the Industry 4.0 paradigm, it is expected that many manufacturing processes will undergo a decisive paradigm shift in the upcoming future, and such shift may involve the nature of industrial environments themselves. One of the most relevant ideas put forth in smart factories is to close the gap between production and end user needs, improving the satisfaction of end users via a high level in personalisation and just in time production and delivery. Such a fact will pose serious difficulties to human operators working in shop floor or warehouse environments, in so far as stress and fatigue (and therefore alienation) are concerned, with additional repercussions on job quality and the number of defected goods. Among the guidelines to limit such drawbacks affecting human operators, it has been proposed that collaborative robots work closely with human operators to carry out tasks usually considered stressful, fatigue-prone or difficult. In such a scenario, this project aims at addressing a number of research and technological objectives shared between University of Genoa and Applied Tech Systems srl, a multinational company with a local branch in Genoa, and in particular:</p> <ol style="list-style-type: none"> 1. Automated inspection processes using state of the art machine learning approaches. Solutions addressing this objective will have to maximise a series of Key Performance Indicators, e.g., decreasing the overall inspection time, reducing the number of false positives, limiting the stress and fatigue levels of human operators. 2. Integrate the inspection process with software and control architectures allowing for a natural cooperation between human operators and robots, and supporting collaborative inspection processes. Such integration will have to take into account the availability of wearable devices (e.g., for augmented reality or body tracking) to be used by human operators. These objectives will be met via the analysis, design and a first development of a robot-assisted inspection architecture based on Deep Learning approaches, allowing collaborative robots to learn inspection procedures while interacting with human operators. Such objectives entail a series of challenges as far as physical and cognitive aspects of the cooperation are concerned. Beside a number of basic considerations related to the safety of human operators, other key aspects include robot-based perception, human activity recognition, the definition of cooperation models appropriate to meet certain target performance levels in the cooperation process, action planning and execution strategies for robots while their workspace is shared with humans, just to name a few.
PhD FUNDING	<p>The annual gross amount of the grant, including social security expenses to be paid by the recipient, is € 16,500.00.</p> <p>The amount of the doctoral grant shall be increased by 50% for an overall period of not more than 18 months, if the graduate student is authorized to by the teaching body to carry out research abroad</p>

	Starting from the first year, each graduate student will have, besides the grant, a budget for research activities in Italy and abroad which will not be less than 10% of the grant
ADMISSION REQUIREMENTS	
COURSE ADMISSION	Admission is subject to the passing of the selection tests and is conditioned by the positive outcome of the medical examinations, where required, that are carried out in health facilities and aimed at ascertaining the suitability for the specific task in accordance with D. Lgs. No. 81/08.
REQUIRED QUALIFICATION	Degree which has been conferred according to the rules and regulations in force prior to the reform of didactic freedom in universities, or a specialist/II level degree or an equivalent foreign academic qualification

SELECTION PROCESS	
SELECTION COMMITTEE	The committees are made up of at least 3 university professors for each course; they may be integrated by not more than 2 experts, who may also be foreign nationals, from public and private research institutions and structures.
ADMISSION TEST VENUE	Department of Informatics, Bioengineering, Robotics and Systems Engineering (Dipartimento di Informatica, Bioingegneria, Robotica e Ingegneria dei Sistemi - DIBRIS).
TYPE OF ADMISSION TEST	<ul style="list-style-type: none"> • Comparative assessment of the qualifications/publications. • Written test (research project). • The interview consists in the discussion of the written test (research project) and the description of the candidate's research area of interest, also on the basis of previous activities stated in his/her scientific-professional curriculum <p>The tests are focused on confirming the candidates' aptitude for scientific research.</p>
METHODS FOR INVITING THE CANDIDATES AND COMMUNICATING THE OUTCOMES OF THE TESTS	<p>The examination schedule is as follows:</p> <ul style="list-style-type: none"> • Evaluation of qualifications, curriculum and written test (research project): 23.7.2018, 10 am. • Interview: 23.7.2018, 2 pm at Department of Informatics, Bioengineering, Robotics and Systems Engineering (Dipartimento di Informatica, Bioingegneria, Robotica e Ingegneria dei Sistemi - DIBRIS), meeting room, 3rd floor, pavillon No. E, Via Opera Pia 13, Genova. <p>Candidates can use video conference mode; and, for identification purposes, the candidate must show the original document of which he has deposited a certified copy at the time of application.</p> <p>The list of those admitted to the interview will be affixed at the Department of Computer Science, Bioengineering, Robotics and Systems Engineering (DIBRIS)</p> <p>The final lists shall be announced on 10th August 2018, and will appear solely on:</p> <ul style="list-style-type: none"> • the noticeboard of the relevant research Departments/facilities for the research courses; • the noticeboard of the University; • on the Internet address https://unige.it/usg/it/dottorati-di-ricerca <p>No information whatsoever shall be posted to candidates' domicile.</p>

WRITTEN TEST	<p>The research project (10 pages maximum) has to be attached to the online application form, and it must concern one or more research Projects/grants highlighted in the section 'ORGANISATION'.</p> <p>The research project will be evaluated as practical test for the selection, together with the evaluation of the qualifications and the scientific-professional curriculum, in order to identify the candidate's aptitude for scientific research in terms of originality, feasibility, clarity in the definition of objectives, methods and expected results.</p>
INTERVIEW	<p>The interview consists in the discussion of the written test (research project) and the description of the candidate's research area of interest, also on the basis of previous activities stated in his/her scientific-professional curriculum</p> <p>During the interview, the candidate shall also prove his/her proficiency in the following foreign language: English,</p> <p>Non-Italian candidates will also have to prove knowledge of the Italian language.</p>
PERCENTAGE VALUES OF TO EACH TEST	<p>To each candidate can be assigned a maximum of 150 points, divided as follows:</p> <ul style="list-style-type: none"> - comparative assessment of the qualifications/publications: max score 30/30, pass mark 20/30. - Written test (research project):max score 60/60, pass mark 40/60. - Interview: max score 60/60, pass mark 40/60. <p>The final ranking will be drawn up by adding the scores assigned in comparative assessment, written test and interview.</p> <p>Candidates will be selected in compliance with the principles of equal opportunities.</p>
ADDITIONAL CRITERIA FOR ADMISSION TO THE COURSE	<p>In the case of equal grades, the evaluation of candidates' incomes prevails for the assignation of grants, as per D.P.C.M. 9 April 2001</p>

PROJECT CO-FINANCED BY THE EUROPEAN UNION
Regional Operational Program for Liguria - European Social Fund 2014-2020

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