POLITECNICO DI MILANO

PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

THEMATIC Research Field: MAXILLOFACIAL CBCT: FUSION WITH INTRAORAL SCANS OF DENTAL ARCHES

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	Dentistry and Maxillo-Facial Surgery (DMFS) are experiencing huge progress thanks to biomedical-imaging and the consequent interventional planning. The main imaging are: cone-bema-computerized tomography (CBCT), dental arches optical scans (DAOS), and optical facial scans (OFS, mainly by stereo-photogrammetry). The first goal of the PhD research is to automatize a correct fusion of such information and facilitate the annotation of landmarks and the segmentation of the anatomical components. This procedure running in a primary DMFS Dept. (Dipartimento di Scienze Biomediche, Chirurgiche ed Odontoiatriche, UNIMI) should rapidly construct a large data-base (DB) of annotated images, to be fed to artificial intelligence (AI) algorithms, which should further improve the efficacy of both the diagnostic/annotation phase and the consequent interventional planning.
Methods and techniques that will be developed and used to carry out the research	The PhD project will be carried out in strict cooperation with the DMFS Dept., in a continuous interdisciplinary interactions concerning: selected cases, annotation, quality testing, ergonomic evaluation of the procedures, discussion of results. In a first phase, the main focus will be on classical image processing methods concerning: image registration and fusion, error quantification, interfaces for semi-automatic annotation.

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	In a second phase, the focus will shift on the employment of the available DB by means of machine learning (ML) and AI methods, mainly deep learning (DL) for image analysis.
Educational objectives	During his/her PhD, the student will develop advanced biomedical image processing and AI skills, which applicability far overwhelms the application field specific to the PhD research. 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. A PhD in Bioengineering will be trained to layout, draft and carry-on original research, by leading a research group or working in a team. The didactic offer of the PhD in Bioengineering (https://www.phdbioengineering.polimi.it/) will be integrated by schools and workshops specific to the research topic.
Job opportunities	The skills and expertise developed during the PhD Program are suitable for national and international academic institutions, research organizations and high-tech SMEs committed to innovation, fundamental/applied research and technical development both in imaging and AI. Examples: product specialist, application specialist, R&D.
Composition of the research group	2 Full Professors 2 Associated Professors 6 Assistant Professors 3 PhD Students
Name of the research directors	Proff. Giuseppe Baselli - Gianluca Tartaglia

Contacts
giuseppe.baselli@polimi.it gianluca.tartaglia@unimi.it

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)	--

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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
A shared desk and a PC will be given to the student for the time needed to carry out research. A limited budget will be available for travelling and purchases, too.