



PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 39th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

PNRR 118 PA Research Field: BIM FOR PUBLIC ADMINISTRATION CIVIL
INFRASTRUCTURE MANAGEMENT

Monthly net income of PhDscholarship (max 36 months)

€ 1195.5

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 research project aims at defining, selecting and proposing the most effective geomatic-based strategies for the inspection, control, monitoring and management of civil infrastructures. In a broader perspective, the final goal is to contribute to decision-making processes for preventing risks of collapses and improve the maintenance operation management. A widespread program of knowledge of the updated state of the asset is a key point and according to this perspective, the proposed research project also aims at defining a systematic approach for storing and managing all the information derived from measurements and surveys carried out, in order to guarantee a reliable data repository dedicated to all the main building components and structural elements. Digital models of the asset as in the recent Building Information Modeling approach will act as common data environment for a multi-purpose platform capable of handling both the geometrical and non-geometrical components of the outputs of the surveys and investigations. With such approach, the implementation of algorithms for automatic risk assessment and classification and early warning systems can be based on the coordinated data fully describing the health status of the infrastructure. The project is aligned with the declared



	<p>the infrastructure. The project is aligned with the declared objectives of the PNRR 2021-2027 regarding SAFETY FOR SOCIAL SYSTEMS and in particular in the research theme 5.3.1 Safety of Structures, Infrastructure and Networks.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The doctoral project aims to integrate traditional geomatic techniques with BIM methodologies in the field of civil infrastructures management. On the basis of the analysis of the state of the art of current practice, the study will evaluate and develop possible alternative geomatic techniques. To the well-known photogrammetry and laser-scan techniques, the adoption of mobile LiDAR sensors onboard drones will be assessed, as well. The information system layering will be designed according to the national laws and different level of details of both geometry and non-graphical data will be identified and defined according to a prioritization of the information following the current practice of asset identification, inspection and risk classification. Digital twins of the asset will be realized with authoring software packages following the defined LOD classification and visual programming languages will be used for data management, processing and coordination with common-use spreadsheet viewers/manipulators to make wider the number of possible users in real life applications. The whole proposed workflow and methods and tools will be tested on a selected case study to verify issues, challenges and benefits brought by the developed platform.</p>
<p>Educational objectives</p>	<p>The main objective is to form a professional figure able to design management procedures and methods for civil infrastructures control and security. This taking advantage of and integrating the main modern geomatic techniques, including all the relevant statistical tools for data analysis, in addition to the more modern techniques for digitizing the built environment. The PhD student will also profit of internal know-how transfer and of the continuous exchange with the experienced senior members of the academic research group. Moreover, the PhD student will have the opportunity of collaborating with experts that are involved in management and control activities of civil</p>



	infrastructures of the Provincia di Piacenza.
Job opportunities	Road and railway managers; public authorities managing infrastructures; private companies offering services for geospatial based management of infrastructures and constructions; insurance.
Composition of the research group	2 Full Professors 0 Associated Professors 2 Assistant Professors 2 PhD Students
Name of the research directors	Prof. Livio Pinto

Contacts	
livio.pinto@polimi.it phone +390223996525 https://www.dica.polimi.it/persona/?uid=129483	

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	597.75 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Provincia di Piacenza www.provincia.pc.it
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Prof. Hugo Rodrigues - Civil Engineering Department & RISCO - University of Aveiro - Campus Universitário de Santiago - 3810-193 Aveiro, Portugal
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research:</p> <p>1. Provincia di Piacenza</p> <p>2. Provincia di Brescia</p>



3. Regione Lombardia
4. TECNE
5. ASPI

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): approximately 1660,00 euros per PhD candidate per year, on average.

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

Computer availability and desk availability: individual assignment for the entire career.