POLITECNICO DI MILANO

PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 38th cycle

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

PNRR_352 Research Field: GEOMATIC METHODS FOR CONTROL AND SECURITY OF BRIDGE INFRASTRUCTURES

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	The preservation of functionality and the extension of the expected operational phase of infrastructures are key issues in ensuring the sustainable development of our society. The dramatic series of bridge collapses over the last 5 years has highlighted the need for urgent treatment to control and monitor the world's infrastructure heritage. Among all, large part consists of Reinforced Concrete (RC) and Prestressed Concrete (PC) structures. The project is dedicated to proposing and selecting the most effective geomatic inspection, control and monitoring strategies of individual bridges, capable of contributing to decision-making processes, in order to prevent the collapse risk of road bridges and to favor maintenance and rehabilitation processes. The project is in line with the objectives of the PNRR 2021 -2027 regarding SAFETY FOR SOCIAL SYSTEMS and in particular with the research theme 5.3.1 Safety of Structures, Infrastructure and Networks.
Methods and techniques that will be developed and used to carry out the research	The doctoral project aims to integrate traditional geomatic techniques with GIS/BIM methodologies in the field of highway infrastructures monitoring. In particular, based on the analysis of the state of the art of current practises

	concerning survey and inspection procedures of bridges, the study is focused on the development and the evaluation of possible alternative geomatic techniques like, for example, the adoption of LiDAR sensors mounted on drones or drones dedicated to the inspection of hardly accessible environments (culverts, bridge caissons etc.). Simultaneously, a possible concept of modular design for an information system will be evaluated, starting from the information layers identified as priorities and developing the integration of geospatial data in dedicated BIM and GIS environment for the implementation of specific infrastructure models. In order to verify what has been achieved, an example test will be carried out on a product chosen with the industrial partner.
Educational objectives	The main objective is to form a professional figure able to design surveying procedures and methods for bridges control and security. This taking advantage of and integrating the main modern geomatic techniques, including all the relevant statistical tools for data analysis. The PhD student will also profit of TECNE 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 from companies that are involved in surveying and control activities.
Job opportunities	Road and railway managers; private companies offering monitoring and inspection services for constructions; insurance; public authorities managing infrastructures.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 1 PhD Students
Name of the research directors	Prof. Livio Pinto

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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

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	TECNE Autostrade per l'Italia
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	SUPSI - Scuola universitaria professionale della Svizzera Italiana
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research: • TECNE; • ASPI; • Regione Lombardia; • Provincia di Brescia; • Provincia di Piacenza Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): approximately 1902,38 euros per PhD candidate per year, on average. Teaching assistantship (availability of funding in recognition of support to teaching activities by the PhD candidate): there are various forms of financial aid for activities of support to the teaching practice. The PhD candidate 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.