POLITECNICO DI MILANO

PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 3 - Systems and Control

PNRR_352 Research Field: DEVELOPMENT OF A STRUCTURED FRAMEWORK FOR REQUIREMENT SPECIFICATION, VALIDATION AND VERIFICATION, SUPPORTING FLIGHT CONTROL SYSTEMS DESIGN

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 objective of this project is to define a structured requirement specification, validation and verification framework to support the development of rotorcraft Flight Control Systems (FCS) in line with certification regulation and applicable standards. To achieve this objective, the following steps are planned: - FCS requirement analysis from Certification regulation and standards, - definition of requirement specification and validation methodology to guarantee completeness and correctness - definition of a verification process to guarantee full coverage and optimization of test cases, - definition of a requirement management environment, able to support re-usability of requirement artifacts
Methods and techniques that will be developed and used to carry out the research	The research will be carried out under the joint supervision of Prof. Maria Prandini and Prof. Matteo Pradella, who have expertise in control design and formal verification methods for the specification and validation of critical systems. The courses offered within the Ph.D. program will be particularly useful given the interdisciplinary nature of the project, involving requirement engineering, formal verification and control design. A period abroad will provide further expertise on

	requirement engineering. Performance of methods and tools will be assessed on realistic case studies thanks to the collaboration with Leonardo Helicopters.
Educational objectives	The doctoral program offers advanced training in the research topics related to the proposed PhD project that are currently explored by the scientific community in academy and industry. The stage at Leonardo Helicopters will allow the PhD candidate to acquire skills on how to target the research to be actually adopted in industry.
Job opportunities	PhD graduates with expertise on requirement specification, validation and verification supporting a design process in industry can find job opportunities both in Italy and abroad, given the worldwide relevance of these skills.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Maria Prandini / Prof. Matteo Pradella

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	700.0 €
By number of months	6

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National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Leonardo Helicopters Division - settore: aerospace - link: https://helicopters.leonardo.com/it/home
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Technische Universität Wien - Settore: research and educational institution in the field of technology and natural sciences - Link: https://www.tuwien.at/
By number of months abroad	6

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

Attinenza alla tematiche, alle missioni/componenti prescelte del bando PNRR v. D.M. 352, art.6

The project is in line with the M1C2 mission ¿Digitalizzazione, innovazione e competitività del sistema produttivo¿. It aims at digitalizing activities that are currently performed ¿manually¿ by human operators by introducing a structured methodology and automated tools for supporting the design of flight control systems through requirements specification and validation, and for their verification guaranteeing full coverage and optimization of test cases. The project will be conducted in close collaboration with Leonardo Helicopters, which will be fundamental in providing guidance on practical aspects and guaranteeing that the project achievements will indeed innovate the aerospace industry and make it competitive at an international level.

Impresa, presso cui si svolgerà l'attività esterna

Leonardo Helicopters Division
sector: aerospace
description of the activity: The activity performed by the PhD student at Leonardo Helicopters will focus on the assessment on a pilot FCS development program, with the aim to collect information from the users, implementing the process on selected use cases and conditions and evaluating the KPIs. This phase covers also iterations over the proposed process and specification to take advantage of the assessment results and improve the KPIs. The goal of this phase is to carry out a representative assessment of the proposed process and requirement specification, along with their possible refinement.

previous collaborations:
- DAER/LHD research contracts, Master theses
- DEIB/LHD Ph.D., research contracts

Ente, università, azienda, centro di ricerca presso cui si svolgerà il periodo di studio e ricerca all'estero.

Technische Universität Wien
Sector: research and educational institution in the field of technology and natural sciences
description of the activity: The PhD student will work under the supervision of Prof. Ezio Bartocci

and will be trained on computational tools and techniques that support the automated analysis of complex computational systems.

All information regarding educational activities, personal funding, regulations and obligations of Ph.D. candidates are available on the web site https://dottoratoit.deib.polimi.it/