



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

Research Area n. 1 - Computer Science and Engineering

PARTENARIATO PNRR Research Field: CYBERSECURITY IN RAILWAY SYSTEMS AND NETWORKS

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

This research project is in the framework of
CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE
CUP D43C22001180001
Decreto di Concessione D.D. 1033 del 17/06/2022

The cybersecurity of railway systems has become increasingly crucial in recent years due to the growing reliance on technology and automation in the railway industry. As rail networks continue to expand and incorporate more complex technology, they are becoming more vulnerable to cyber attacks that can disrupt operations, compromise sensitive information, and even pose safety risks. The protection of railway systems against cyber threats is therefore essential for ensuring the stability, reliability, and security of these critical infrastructure systems.

Methods and techniques that will be developed and used to carry out the research

The PhD candidate will study the current and future threat model of innovative and connected railway systems and other mobility and cyber-physical systems contexts. Security analysis of the protocols and systems will be performed, implementing both offensive and defensive security techniques. The candidate will make use of machine learning techniques to detect attacks, and will



	design prevention approaches to the detected attacks, resorting to software and hardware security techniques depending on the needs recognized in the threat modeling process.
Educational objectives	The PhD student will study the security aspects of railway systems and gain an understanding of the threat modeling process for cyber physical systems. Through this program, they will also acquire specialized knowledge of the protocols and designs utilized in railway systems, and in the technologies utilized to protect them.
Job opportunities	The need for PhD students with expertise in Cyber Physical Systems (CPS) security is increasing rapidly due to the evolving nature of the field and the growing importance of cybersecurity in critical infrastructure systems, including the railway industry. The demand for professionals with advanced knowledge in this area is expected to continue to grow, especially for those with domain-specific knowledge. Since the research is part of the "CENTRO NAZIONALE DELLA MOBILITA' SOSTENIBILE" (Missione 4 Componente 2 Investimento 1.4 PNRR), the PhD student will have the chance to interact and cooperate with the partners of the consortium, which includes leading Italian industrial and academic players of the sector.
Composition of the research group	1 Full Professors 0 Associated Professors 3 Assistant Professors 5 PhD Students
Name of the research directors	Stefano Zanero

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

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

EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student

5.707,13 Euro

TEACHING ASSISTANTSHIP: (availability of funding in recognition of supporting 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: individual use

DESK AVAILABILITY: individual use

D. D. 3138 del 16/12/2021 rettificato con D.D. 3175 del 18/12/2021 "Avviso pubblico per presentazione Proposte di intervento per il Potenziamento di strutture di ricerca e creazione di "campioni nazionali" di R&S su alcune Key Enabling Technologies da finanziare nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 Investimento 1.4 "Potenziamento strutture di ricerca e creazione di "campioni nazionali di R&S" su alcune Key Enabling Technologies" finanziato dall'Unione europea - NextGenerationEU"