



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 3 - Systems and Control

**PNRR 117 Research Field: INTELLIGENT DECISION SUPPORT SYSTEMS FOR THE
MANAGEMENT OF HIGHWAY TRAFFIC EVENTS**

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 objectives of the Ph.D. program are manifold. Firstly, this research aims to advance the field of transportation management by leveraging AI technologies to develop more efficient, adaptive, and proactive systems for handling traffic incidents, thereby reducing congestion, enhancing road safety, and optimizing resource allocation. Secondly, it seeks to address the growing challenges posed by urbanization and increased traffic on highways, offering sustainable solutions to mitigate the negative environmental and economic impacts of traffic-related issues. Furthermore, this scholarship is motivated by the broader societal benefit of improving the overall quality of transportation, making it safer and more convenient for commuters. Ultimately, the research strives to push the boundaries of AI-driven decision support systems, with the potential to revolutionize the management of highway traffic events and positively influence the future of transportation infrastructure.

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

In the pursuit of this Ph.D. program, a comprehensive array of advanced techniques and methods is anticipated to be employed. Machine learning algorithms, such as deep neural networks and reinforcement learning, will be instrumental in analyzing vast datasets to predict traffic patterns and identify potential disruptions. Real-time data



	<p>streams from sensors, traffic cameras, and GPS devices will be harnessed for precise situational awareness. Furthermore, optimization algorithms, simulation modeling, predictive analytics, and generative AI will be integrated to explore novel approaches for devising proactive strategies in incident management and resource allocation. This program seeks to leverage these cutting-edge technologies, fostering innovation at the intersection of AI and transportation management to address the complex challenges associated with highway traffic events.</p>
Educational objectives	<p>The educational objectives of this Ph.D. scholarship are designed to provide the student with a comprehensive and multidisciplinary knowledge base in the field of Artificial Intelligence-based Intelligent Decision Support Systems for the management of highway traffic events. Firstly, the program aims to equip the student with advanced expertise in AI and machine learning methodologies, enabling her/him to develop innovative solutions for real-time traffic incident prediction, analysis, and response. Secondly, it seeks to cultivate strong research and analytical skills, fostering the ability to conduct original, impactful research in the domain. Furthermore, the program emphasizes a hands-on, practical approach, encouraging the student to work with real-world traffic data and collaborate with the industry partner to address practical challenges. Lastly, it aims to instill effective communication skills, enabling the student to disseminate her/his research findings and contribute to the broader academic and professional communities. By achieving these educational objectives, the program prepares the scholar to become a leader in the field, driving advancements in intelligent transportation systems and making meaningful contributions to the transportation industry and society at large.</p>
Job opportunities	<p>The graduate student is poised to access a wide array of promising job opportunities across various sectors. In the rapidly evolving field of transportation and traffic management, industries such as urban planning, logistics, and smart city initiatives offer positions where expertise in</p>



	<p>AI-based decision support systems is highly sought after. The scholar may find roles as a research scientist, data scientist, or AI engineer, working with government agencies, research institutions, or private companies to develop cutting-edge traffic management solutions. Additionally, consulting firms specializing in transportation and infrastructure may seek their expertise for advisory roles. Furthermore, academia offers opportunities for any student inclined toward teaching and research. This research will equip the graduate with the skills and knowledge required to address complex challenges in the realm of intelligent transportation systems, positioning her/him as a valuable contributor to the ongoing transformation of the transportation industry and the broader advancement of society.</p>
Composition of the research group	0 Full Professors 1 Associated Professors 1 Assistant Professors 4 PhD Students
Name of the research directors	Prof. Simone Formentin

Contacts
Email: simone.formentin@polimi.it Phone: +39.02.2399.3498 Webpage: https://formentin.faculty.polimi.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)	--

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)	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)	TU Eindhoven
By number of months abroad	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.

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.