



## Curriculum Vitae







### Contact Address

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### Short Bio

Dr. Alfredo Núñez is an Associate Professor at Delft University of Technology, specializing in intelligent railway infrastructures. His expertise lies in intelligent transportation systems, railway engineering, and computational intelligence, with over 150 journal and conference publications (see [Publication List](#)). The Dutch Research Council, ProRail, and European projects such as IAM4RAIL, In2Track3, and NeTIRail-INFRA have supported his research. As a recognised leader in his field, Dr. Núñez has played key roles in various EU projects and served as an associate editor and guest editor for leading journals, including *IEEE Transactions on Intelligent Transportation Systems*, *Applied Soft Computing*, and *Intelligent Transportation Infrastructure*. He has also contributed to major transportation conferences as a member of the local organization committee (IEEE-ITSC 2013, TRISTAN IX, CM2018) and as a speaker, delivering over 50 conference and workshop presentations. Dr. Núñez has mentored numerous PhD researchers and MSc and EngD students, with some of them receiving prestigious awards, such as the European Rail Research Advisory Council PhD thesis award, the PWI Young Achiever Award, two in the list of best conference papers and one best journal paper award in 2024. He is also dedicated to education, developing online professional courses, and contributing to redesigning courses and MSc programs. At TU Delft, he belongs to the teaching teams of Dynamica en Modelvorming, Transportation Infrastructures, Road and Railway Engineering, Transportation Infrastructures under Extreme Conditions, Emerging Technologies for Transportation Infrastructure, and Structural Health Monitoring. Additionally, he is actively involved in academic and industry collaborations, serving as a member of the 4TU Built Environment's Domain Acceleration Team for Infrastructure, the CiTG Faculty ED&I team, and cluster leader of task in railway infrastructure for ERJU FP3.

### Educational & Work Record

- Aug. 2021-present:** Full-time Associate Professor (UHD), **TU Delft** , Section of Railway Engineering, Department of Engineering Structures, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands. Topic: **Intelligent railway infrastructure**. Keywords: Railway engineering, computational intelligence (neural networks, fuzzy logic, and evolutionary computation), structural health monitoring, maintenance of engineering structures, control of railway systems, asset management of transportation infrastructures, big data, and optimization.
- Nov. 2018-Jul. 2021:** Full-time Assistant Professor (UD), **TU Delft** , Section of Railway Engineering, Department of Engineering Structures, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands. Topic: **Data-based maintenance for railway infrastructure**. Keywords: Decision support in railway systems, big data-based and AI-based maintenance decision-making for railway infrastructure.
- Feb. 2016-Oct. 2018:** Full-time Assistant Professor (permanent, researcher/docent), **TU Delft** , Section of Railway Engineering, Department of Engineering Structures, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands. Topic: **Structural condition monitoring and maintenance of railways**.
- Feb. 2013-Jan. 2016:** Full-time researcher, **TU Delft** , Section of Railway Engineering, CiTG Faculty, Delft University of Technology, Delft, The Netherlands. Topic: **Rail systems and monitoring**. Supervisor: Prof. Zili Li.
- Feb. 2010-Jan. 2013:** Full-time postdoctoral researcher, **TU Delft** , Delft Center for Systems and Control, 3mE Faculty, Delft University of Technology, Delft, The Netherlands. Topic: Hierarchical and distributed model-based predictive control for urban and freeway traffic control. Supervisor: Prof. Bart De Schutter.
- Mar. 2006-Dec. 2009:** Doctorate researcher and lecturer, **UChile-fcfm** , Laboratorio de Control Avanzado II, Electrical Engineering Department, Universidad de Chile, Santiago, Chile. On December 11, 2009, I was awarded the first PhD degree in Electrical Engineering of the university. Thesis: Design of hybrid predictive control strategies for optimizing operational processes in dynamic transport systems. Grade: Congratulations from the examination committee (the highest distinction). Thesis advisor: Prof. Doris Sáez. Thesis co-advisor: Prof. Cristian Cortés.



- Aug. 2007-Dec. 2008:** Part-time instructor at the Faculty of Engineering, Universidad Mayor , Santiago, Chile. In August 2008, the following award was conferred: Outstanding Instructor - Electrical Engineering.
- Mar. 2000-Dec. 2005:** BSc. and MSc. student, **UChile-fcfm** , in electrical engineering at Universidad de Chile. Specialization: Systems and Control. Bachelor in Engineering Science, Electrical Engineering, conferred on August 15, 2005. Master in Engineering and Science, Electrical Engineering (Systems and Control), and the title of Civil Electrical Engineer were conferred on May 25, 2007. Thesis: Hybrid predictive control strategies, with applications in a dynamic vehicle routing process (in Spanish). Grade: Highest distinction, grade 7.0/7.0 in both MSc degree and engineer title. Thesis advisor: Dr. Doris Sáez. Thesis co-advisor: Dr. Cristian Cortés.

### **Editorial Work in Journals**

- Sep. 2025- Sep. 2026:** Guest editor special issue CM2025 journal Wear, Elsevier.
- Jan. 2025- present:** Associate Editor of the journal Intelligent Transportation Infrastructure, Oxford Academic.
- Mar. 2024- present:** Associate Editor of the journal Applied Soft Computing, Elsevier.
- Sep. 2022- Sep. 2023:** Guest editor special issue CM2022 journal Wear, Elsevier.
- Jan. 2023- Mar. 2024:** Guest editor special issue journal Control Engineering Practice, Elsevier.
- May. 2022- Dec. 2024:** Editorial Board Member of the journal Intelligent Transportation Infrastructure, Oxford University Press.
- Apr. 2019- present:** Associate Editor of the journal IEEE Transactions on Intelligent Transportation Systems, IEEE Intelligent Transportation Systems Society, IEEE.
- Sep. 2018- Sep. 2019:** Guest editor special issue CM2018 journal Wear, Elsevier.
- Jul. 2018- Mar. 2024:** Editorial Board member of the journal Applied Soft Computing, Elsevier.

### **Recognitions**

#### **Personal Recognition**

- Jan. 2025, Associate Editor of the journal Intelligent Transportation Infrastructure, Oxford Academic.
- Oct. 2024, IUS promovendi, substantiated nomination by Dean Stefan Aarninkhof, Delft University of Technology.
- May 2024, Associate Editor of the journal Applied Soft Computing - Elsevier.
- May 2022, Editorial Board Member for the journal Intelligent Transportation Infrastructure - Oxford.
- Apr. 2019, Associate Editor of the IEEE Transactions on Intelligent Transportation Systems - IEEE.
- Jul. 2018, Editorial Board Member for the journal Applied Soft Computing -Elsevier.
- Senior Member of the IEEE Society, Aug. 2014. This is a recognition of engineers, scientists, and educators who have been in professional practice for at least ten years and have shown significant performance over a period of at least five years.
- Received recognition as outstanding contributions in reviewing from IEEE Transactions on Instrumentation and Measurements, Applied Soft Computing, Transportation Research Part A: Policy and Practice, Expert Systems with Applications, Infrared Physics and Technology, Engineering Applications of Artificial Intelligence, and Measurement.
- In December 2009, I obtained a doctoral degree in Electrical Engineering with congratulations from the examination committee, the highest distinction at the University of Chile.
- In Aug. 2008, I received the Outstanding Lecturer award for my classes at the Faculty of Engineering of Universidad Mayor. The distinction was conferred on my excellent evaluation from students and faculty authorities.
- Doctorate studies funded by the national grants for doctoral studies of the Chilean Government Agency for Science and Technology (CONICYT). My applications were submitted to a national competition (Chile) with candidates and doctorate students from all areas of knowledge. I obtained three travel grants and a short-stay grant from CONICYT to attend the IEEE World Congress on Computational Intelligence in Canada, the IFORS conference in South Africa, the 17th IFAC World Congress in South Korea, and a six-month stay at the University of Ljubljana, Slovenia.
- IEEE travel grant: Outstanding Student Paper, IEEE WCCI 2006, Vancouver, Canada.

#### **Recognition of team members**

- In April 2025, the paper of the PhD researcher Marko Kapetanovic entitled "An Intermittent Partial Electrification Network Design Problem for the Introduction of Battery-Electric Regional Trains" was selected in the group of best papers at the 11th International Conference on Railway Operations Modelling and Analysis (RailDresden 2025). Coauthors: Nikola Besinovic, Alfredo Núñez, Niels van Oort and Rob Goverde.
- In Dec. 2024, Taniya Kapoor was awarded the prestigious Eric and Wendy Schmidt AI in Science Postdoctoral Fellowship at Oxford. This highly competitive program supports outstanding researchers applying AI to advance STEM fields. The fellowship provides funding, mentorship, and specialized training to accelerate scientific innovation through AI-driven research.
- As of November/December 2024, the journal paper "Junwen Chen, Zhigang Liu, Hongrui Wang, Alfredo Núñez, and Zhiwei Han, Automatic defect detection of fasteners on the catenary support device using deep convolutional neural network, IEEE Transactions on Instrumentation and Measurement 67(2):257-269, 2018" is in the highly cited list, the top 1% of the field Engineering, Data from Essential Science Indicators (ISI-Web of Science).



- In Nov. 2024, Wessel Roodenburg received a Master Thesis Award for excellence in Pavement and Railway Engineering, TUDelft. The award honors his dedication and hard work in specialising in Pavement and Railway Engineering.
- In June 2024, the paper Artificial intelligence in railway infrastructure: current research, challenges, and future opportunities received the Best Paper in 2023 Award of the journal Intelligent Transportation Infrastructure—Oxford. Wassamon Phusakulkajorn led the paper, which received contributions from partners ProRail, DB, and TUDelft for the IAM4RAIL Project.
- In May 2024, Yuanchen Zeng received the PhD thesis award from the European Rail Research Advisory Council (ERRAC) and Shift2Rail Joint Undertaking. Promotor: Zili Li. Daily Supervisor: Alfredo Núñez.
- In Aug. 2024, Marko Kapetanovic was a finalist for the IEEE ITSS Best Dissertation Award, which recognizes doctoral dissertations contributing outstanding in-depth, interdisciplinary technical contributions to theory and practice to ITS.
- In Dec. 2023, Karim El Laham received the PWI Young Achiever's Award, which recognizes the achievements of our young people working in the rail industry (The PWI - The Institution for Rail Infrastructure Engineering) for his PDEng thesis on sky, track, and substructure sensing for tamping decisions.
- In May 2023, the paper of the PhD researcher Marko Kapetanovic entitled "Vehicle-to-Grid Concept for Hydrogen Fuel Cell Hybrid-Electric Regional Trains" was selected in the group of best papers at the 10th International Conference on Railway Operations Modelling and Analysis (RailBelgrade 2023). Coauthors: Alfredo Núñez, Niels van Oort and Rob Goverde.
- In Dec. 2021, Hongrui Wang received the PhD thesis award from the European Rail Research Advisory Council (ERRAC) and Shift2Rail Joint Undertaking. Promotor: Rolf Dollevoet. Daily Supervisor: Alfredo Núñez.
- In Dec. 2021, the paper of Marko Kapetanovic "Analysis of hydrogen-powered propulsion system alternatives for diesel-electric multiple unit regional trains" was selected in the group of best papers at the 9th International Conference on Railway Operations Modelling and Analysis (RailBeijing 2021). Coauthors: Alfredo Núñez, Niels van Oort and Rob Goverde.
- As of July/August 2020, the journal paper "Junwen Chen, Zhigang Liu, Hongrui Wang, Alfredo Núñez, and Zhiwei Han, Automatic defect detection of fasteners on the catenary support device using deep convolutional neural network, IEEE Transactions on Instrumentation and Measurement 67(2):257-269, 2018" is in the highly cited list, the top 1% of the field Engineering, Data from Essential Science Indicators (ISI-Web of Science).
- In early 2015, Franka Veltman was awarded an ACM-W scholarship for attending the 2015 IEEE Symposium Series on Computational Intelligence in South Africa. The award supports female undergraduate and graduate students by giving them exposure to computing research that can inspire them to continue on to the next level of their academic or industry careers.
- In Dec. 2014, Maider Oregui was awarded the Young Researcher Award of the International Union of Railways UIC to recognise young engineers and researchers who have made significant contributions in rail research and innovation.
- In Oct. 2013, Maria Molodova won the Best Student Paper award for the paper "Monitoring the Railway Infrastructure: Detection of Surface Defects using Wavelets" at the 16th International IEEE Annual Conference on Intelligent Transportation Systems ITSC'13, The Hague, The Netherlands, 6-9 October 2013. Coauthors Zili Li, Alfredo Núñez, and Rolf Dollevoet.

### Visiting Research Scholar

- Jun. 2025:** Visiting research scholar, Southwest Jiaotong University 🇨🇳, Chengdu, China, School of Electrical Engineering. Host: Prof. Qing He.
- Dec. 2024- Jan. 2025:** Visiting research scholar, University of Chile 🇨🇱, Chile, Electrical Engineering Department. Host: Prof. Doris Sáez Huechapan.
- Jul. 2024:** Visiting research scholar, University of Ljubljana 🇸🇮, Slovenia, Laboratory of Modelling, Simulation and Control. Host: Prof. Igor Škrjanc.
- Mar. 2024:** Visiting research scholar, University of Maryland 🇺🇸, Maryland, USA, A. James Clark School of Engineering, Department of Civil and Environmental Engineering. Host: Prof. Nii Attah-Okine.
- Mar. 2023:** Visiting research scholar, University of Maryland 🇺🇸, Maryland, USA, A. James Clark School of Engineering, Department of Civil and Environmental Engineering. Host: Prof. Nii Attah-Okine.
- Feb. 2023:** Visiting research scholar, University of Seville 🇪🇸, Seville, Spain, Ingeniería de Sistemas y Automatica. Host: Prof. José Ramón Domínguez Frejo.
- Nov. 2018- Jan. 2019:** Visiting research scholar, University of California 🇺🇸, Berkeley, USA, Institute of Transportation Studies. Sponsoring/advising faculty member: Prof. Zuo-Jun Max Shen. Host: Prof. Alexandre Bayen.
- Jul. 2017:** Visiting research scholar, The Hong Kong Polytechnic University 🇭🇰, Hong Kong, China, Department of Civil and Environmental Engineering. Host: Prof. Ni Yiqing.
- Jul. 2017:** Visiting research scholar, Southwest Jiaotong University 🇨🇳, Chengdu, China, School of Electrical Engineering. Host: Prof. Zhigang Liu.
- Mar. 2015:** Visiting research scholar, Universidad Nacional de Colombia 🇨🇴, Medellin, Colombia, School of Mechatronics, Faculty of Engineering. Host: Prof. Jairo Espinosa.
- Aug. 2013:** Visiting research scholar, Universidad Nacional de Colombia 🇨🇴, Medellin, Colombia, School of Mechatronics, Faculty of Engineering. Host: Prof. Jairo Espinosa.



- May 2013- Jun. 2013:** Visiting research scholar, University of Chile 🇨🇱, Chile, Electrical Engineering Department. Host: Prof. Doris Sáez Hueichapan.
- Nov. 2012- Dec. 2012:** Visiting research scholar, Technical University of Catalunya 🇪🇸, Barcelona, Spain, Automatic Control Department. Host: Prof. Carlos Ocampo-Martinez.
- Apr. 2011- May 2011:** Visiting research scholar, University of Pavia 🇮🇹, Pavia, Italy, Identification and Control of Dynamic Systems Laboratory. Host: Prof. Antonella Ferrara.
- May 2010:** Visiting research scholar, University of Ljubljana 🇸🇯, Slovenia, Laboratory of Modelling, Simulation and Control. Host: Prof. Igor Škrjanc.
- Dec. 2008- Jun. 2009:** Visiting Ph.D. researcher, University of Ljubljana 🇸🇯, Slovenia, Laboratory of Modelling, Simulation and Control. Host: Prof. Igor Škrjanc.
- Jul. 2006:** Visiting Ph.D. researcher, University of California 🇺🇸, Irvine, California, USA, Institute of Transportation Studies. Host: Prof. Jay Jayakrishnan.

## Projects

### **Projects granted as principal investigator at TUDelft**

- IAM4Rail FP3-ERJU project "Holistic and Integrated Asset Management for Europe's RAIL System". Duration: Dec. 2022 – Dec. 2026. Keywords: Railway asset management, demonstration of monitoring technology, integration of new technologies into maintenance plans, intelligent railways. TUDelft is a third party linked to ProRail in this project. Total project costs: 106.900.000,00€. Grant amount ProRail+TUDelft: 4,200,000€ (approx). TUDelft project leader: Dr. Alfredo Núñez. Role: Coordination, supervision, and research. Cluster D leader, comprising the work packages related to railway infrastructure management and monitoring.
- In2Track3 project. Duration: Jan. 2021 – Jan. 2024. Keywords: Railway Infrastructure, demonstration of monitoring technology, intelligent railways. TUDelft is a third party linked to ProRail in this project. Total project value: 27,475,805.00€. Grant amount TUDelft: 627,999.00€. TUDelft project leader: Dr. Alfredo Núñez. Role: Researched and coordinated the inputs from TUDelft, task 3.4 leader about simulations and railway track monitoring.
- Project sponsored by the Thailand Government. Duration: Oct. 2020 – Sep. 2024. Keywords: Artificial intelligence, deep neural networks, railway track measurement. Total amount: 120,620.00€. TUDelft project leader: Dr. Alfredo Núñez. Role: Daily supervisor of a Ph.D. researcher.
- ProRail project "Analysis of ProRail-FMECAs towards big-data asset management". Duration: Nov. 2019 – Nov. 2020. Keywords: FMECA, catenary system. Total amount: 204,250€. TUDelft project leaders: Dr. Alfredo Núñez and Dr. Hongrui Wang. Role: Lead researcher.
- ProRail project "Research with ProRail Datalab". Duration: Nov. 2018 – May 2019. Keywords: Big Data, sensor fusion, massive railway data. Total amount: 121,000€. TUDelft project leader: Dr. Alfredo Núñez. Role: Lead researcher.
- Project sponsored by the Thailand Government. Duration: Sep. 2018 – Sep. 2022. Keywords: Railway track measurement, track stiffness, acceleration signals. Total amount: 167,160.00€. TUDelft project leader: Dr. Alfredo Núñez. Role: Daily supervisor of a Ph.D. researcher.
- Needs Tailored Interoperable Railway (NeTIRail-INFRA), Call H2020-MG-2014 Two Stages, Topic MG-2.1-2014 - I<sup>2</sup>I – Intelligent Infrastructure. Duration: 36 Months, Jun. 2015 - Jun. 2018. Keywords: Rail, track, overhead power supply, smart technology, societal impact, economics, decision support tools. Total grant amount: 5,453,657.00€. Grant amount TUDelft: 598,151.25€ plus 128,748.48€ (additional demonstration campaign). TUDelft project leader: Dr. Alfredo Núñez. Role: Researched and coordinated the inputs from TUDelft, WP4 leader, railway measurements, and new technologies.
- ProRail project "Testen in the baan ExploRail". Duration: Dec. 2015 – Dec. 2020. Keywords: hammer test, geometry measurements, ultrasonic and eddy current, sampling of rail tracks, test on the project PRIME test rig, on-train DrTrack measurement. Amount: 114,950.00€. TUDelft project leader: Dr. Alfredo Núñez. Role: Lead researcher.
- ProRail project "Risk analysis of Railway Assets, a counter of answers for questions from Arcadis and ProRail". Duration: May 2014 - Jun. 2015. Keywords: Rail, track, risk. TUDelft project leader: Dr. Alfredo Núñez. Total amount TUDelft: 27,300€. Role: Lead researcher.

### **Project granted as co-applicant**

- MaDe4Rail FP7-ERJU project "Exploring non-traditional and emerging maglev-derived systems". Duration: Jul. 2013 – Sep. 2024. Total project costs: 1.749.096,08€, Grant amount TUDelft: 154.873,00€. TUDelft project leader: Prof. Rolf Dollevoet. Role: Project acquisition.
- Pods4Rail FP7-ERJU project "Concept development of a system for pods and pod-carriers to be used as moving infrastructures mainly for rail, but as well for road and ropeways". Duration: Sep. 2023 – Mar. 2026. Total project costs: 2.999.983,10€, Grant amount TUDelft: 414.565,75€. TUDelft project leader: Dr. Mahnam Saeednia. Role: Project acquisition.
- Innovative & future-proof road asset condition monitoring systems (INFRACOMS). Duration: Two years. Funded by CEDR Transnational road research program. Grant amount TUDelft: 111.467,08€. TUDelft project leaders: Yuguang Yang (Concrete Structures-CEG) and Anupam Kumar (Pavement Engineering-CEG). Role: Co-applicant and co-supervisor of a postdoc researcher.





- Improving the sustainability of regional railway services. Duration: Jul. 2018 – Jun. 2022. Funded by Arriva Personenvervoer Nederland B.V. Confidential agreements. TUDelft project leader: Niels van Oort (T&P-CITG). Role: Co-promotor Ph.D. researcher.

### **Participant in other research projects (not applicant)**

- Expert participant in the UIC project Harmotrack. The goal of this project is to publish a new international standard for track quality diagnosis using acceleration data as well as an International Railway Solution (IRS). Role: International expert, May 2021 – Feb. 2024.
- Projects in partnership with ProRail and NWO PYRAMIDS, Admire, and DrTrack. Keywords: Rail monitoring technology, track maintenance, and railway asset management. Grant amount: 662,596.00€ (PYRAMIDS), 472,520.00€ (Admire), 535,871.00€ (DrTrack). Role: Researcher, supervisor, and support of management activities, Feb. 2013 – Feb. 2016.
- Traffic Modeling and Control for an Urban Network in Medellín-Colombia, COLCIENCIAS, Project 111856934640, Colombian Government research funding. Role: Associate researcher, Mar. 2013 – Mar. 2015.
- Highly complex and networked control systems (HYCON2), EU Network of Excellence. Role: Postdoc and support of management activities, Sept. 2010- Jan. 2013.
- Hierarchical and distributed model predictive control of large-scale systems (HD-MPC), European seventh framework STREP project. Role: Postdoc, support of management activities, Feb. 2010 - Sept. 2011.
- Real-time intelligent control for integrated transit systems, Proyecto Anillo de Investigación Científica y Tecnológica (CONICYT). Role: Ph.D. researcher. Mar. 2007- Mar. 2009.
- Design of predictive control strategies based on hybrid fuzzy modeling, Project FONDECYT 1061156. Role: Ph.D. researcher. Mar. 2006 – Mar. 2008.
- Real-time optimization of public transport operations, Project FONDECYT 1061261. Role: Ph.D. researcher. Mar. 2006 – Mar. 2008.
- Analysis, design, and evaluation of a high coverage personalized public transport: Application to the city of Santiago-Chile, Project FONDECYT 1030700. Role: Master researcher. Mar. 2005 – Mar. 2006.
- Hybrid Predictive Control for Systems with continuous and quantized variables, Project FONDECYT 1040698. Role: Master researcher. Mar. 2004 – Mar. 2006.

### **Teaching Activities at TUDelft**

#### **Organizational activities related to education**

- Jan. 2022 – Aug. 2023: Member of the design team of the elective courses Transportation Infrastructures under Extreme Conditions and Emerging Technologies for Transportation Infrastructure.
- Jan. 2022 – Oct. 2023: Member of the design team of the crossover Structural Health Monitoring and crossover Noise and Vibration.
- Jun. 2021 – Apr. 2023: Member of the design team of the B-modules Transportation Infrastructures (Structural Engineering track) and Road and Railway Engineering (Traffic and Transport Engineering track).
- Feb. 2021 – Oct. 2022: Member of the design team of the lectures about railway infrastructure for the course Base: Traffic and Transport Engineering (Traffic and Transport Engineering track).
- Feb. 2021 – Feb. 2023: Member of the design team of the module MUDE for uncertainty quantification and unsupervised learning.
- Nov. 2020 – Oct. 2024: Member of the teaching and redesign team of the BSc course Dynamica en Modelvorming (CTB1210).
- Nov. 2020 – May 2021: Representative of the Section of Railway Engineering in the development of Modules B for the new MSc program at the faculty of Civil Engineering: Modules B6 in SE (together with Dr. Xueyan Liu) and Module B4 in TTE (together with Dr. Anupam Kumar).
- Apr. 2020 – Jun. 2020: I provided input and suggestions in the chapter about the educational contribution of the new Delft Rail Institute. My participation was in the early stage of the proposal's development. The framework is to embed campus-wide opportunities for both courses and MSc projects on Rail research topics.
- Jun. 2016 – Dec. 2018: Design, development, and implementation of online Professional Education course "Rail: Performance over time" in the platform edX course. Role: Responsible for the design of the weekly planning and activities, coordinating efforts and requests for specific inputs to colleagues, final implementation, and continuous course improvement. Other academic participants: Dr. Valeri Markine was in charge of developing weekly interviews with experts from the field; Prof. Rolf Dollevoet was in charge of the funding and liaison with edX; Prof. Zili provided various inputs and feedback.
- Jun. 2016 – Dec. 2018: Design, development, and implementation of MOOC and Professional Education courses on "Railway Engineering". The series of classes was implemented on the edX platform. Role: Provided inputs on the design and supported the first implementation run of the professional education courses: "Rail: Track and Train Interaction," "Rail: Real-Time Operations," and "Railway Engineering: Capstone Project". I provided inputs on the design and supported the first run of the MOOC "Railway Engineering: An Integral Approach". I led the development of the course "Rail: Performance Over Time".
- Jan. 2016 – Oct. 2017: Annotation of Railway Systems. This initiative was developed with colleagues from the Section of Railway Engineering and the Department of Transport and Planning. Role: Participate in the design and development of the annotation rail. Development of an overview of similar programs worldwide. Design one new course (Railway Asset Management) and update the content of one course (Capita Selecta). We developed constructive alignment and worked closely with colleagues and experts in education. We then implemented consistent websites in Blackboard and then



transitioned to Brightspace, which included the content, pre-post lecture activities, and all the content of the courses. Since then, I have been the teacher responsible for those two courses.

**Instructor.** Faculty of Civil Engineering and Geosciences and campus-wide.

- Dynamica en Modelvorming (CTB1210), 2025/2026 – 1<sup>st</sup> quarter, 2024/2025 – 2<sup>nd</sup> quarter, 2023/2024 – 2<sup>nd</sup> quarter, 2022/2023 – 2<sup>nd</sup> quarter, 2021/2022 – 2<sup>nd</sup> quarter. BSc Civil Engineering.
- Transportation Infrastructures (CIEM5260), 2024/2025 – 4<sup>th</sup> quarter, 2023/2024 – 4<sup>th</sup> quarter, 2022/2023 – 4<sup>th</sup> quarter. MSc Civil Engineering - Structural Engineering track.
- Road and Railway Engineering (CIEM6240), 2024/2025 – 4<sup>th</sup> quarter, 2023/2024 – 4<sup>th</sup> quarter, 2022/2023 – 4<sup>th</sup> quarter. MSc Civil Engineering - Traffic and Transport Engineering track.
- Transportation Infrastructures under Extreme Conditions (CIEM5311), 2025/2026 – 1<sup>st</sup> quarter, 2025/2024 – 1<sup>st</sup> quarter, 2024/2023 – 1<sup>st</sup> quarter. MSc Civil Engineering - Elective.
- Emerging Technologies for Transportation Infrastructure (CIEM5312), 2025/2026 – 1<sup>st</sup> quarter, 2025/2024 – 1<sup>st</sup> quarter, 2024/2023 – 1<sup>st</sup> quarter. MSc Civil Engineering - Elective.
- Monitoring of Structural Health and Geohazards (CEGM2008), 2025/2026 – 1<sup>st</sup> quarter, 2025/2024 – 1<sup>st</sup> quarter, 2024/2023 – 1<sup>st</sup> quarter. MSc Civil Engineering.
- Noise and Vibration Generation Propagation and Effect on Humans and Environment (CEGM2004), 2025/2024 – 1<sup>st</sup> quarter, 2024/2023 – 1<sup>st</sup> quarter. MSc Civil Engineering - Elective.
- Modelling, Uncertainty and Data for Engineers MUDE (CEGM1000), Week 1.8 Uncertainty quantification and Week 2.4 Unsupervised learning, MUDE Project Railway Stiffness, 2022/2023 – 1<sup>st</sup> and 2<sup>nd</sup> quarter. MSc Civil Engineering – Core.
- Fundamentals of Artificial Intelligence Programme IFEEMCS520100, 2024/2025 – 1<sup>st</sup> quarter, 2023/2024 – 1<sup>st</sup> quarter, 2022/2023 – 1<sup>st</sup> quarter.
- Applied machine learning (CS4305TU), 2021/2022 1<sup>st</sup> quarter, 2020/2021 1<sup>st</sup> quarter. Responsible lecturer: Dr. Myrthe Tielman. Elective for various MSc campus-wide.
- Asset Management for Designers (CEE5003), PDEng program, 2021/2022 1<sup>st</sup> quarter, 2020/2021 3<sup>rd</sup> quarter, 2019/2020 3<sup>rd</sup> quarter. Responsible lecturer: Dr. Martine van den Boomen. PDEng program in Civil Engineering.
- Knowledge-based control (SC4081), 2017/2018 3<sup>rd</sup> quarter. Responsible lecturer: Prof. Jens Kober. Elective course for MSc Systems and Control and MSc Electrical Engineering.

**Responsible Instructor.** Faculties of Civil Engineering and Geosciences and 3mE.

- Railway asset management (CIE5875), 2022/2023 1<sup>st</sup> quarter, 2021/2022 1<sup>st</sup> quarter, 2020/2021 1<sup>st</sup> quarter, 2019/2020 1<sup>st</sup> quarter, 2019/2020 3<sup>rd</sup> quarter, 2018/2019 2<sup>nd</sup> quarter, 2017/2018 2<sup>nd</sup> quarter. Co-lecturers: Jurjen Hendriks (2019, 2017), Dr. Hongrui Wang (2022, 2021, 2019, 2018), and Dr. Ali Jamshidi (2018, 2017). Elective course for the new Annotation Rail embedded in different MSc programs, MSc Civil Engineering track Structural Engineering, MSc Civil Engineering track Transport and Planning, MSc Civil Engineering flexible track, MSc Transport, Infrastructure and Logistic.
- Capita Selecta Road and Railway (CIE5871), 2022/2023 4<sup>th</sup> quarter, 2021/2022 4<sup>th</sup> quarter, 2020/2021 4<sup>th</sup> quarter, 2019/2020 2<sup>nd</sup> quarter, 2018/2019 2<sup>nd</sup> quarter, 2017/2018 2<sup>nd</sup> quarter. Co-lecturers: Hongrui Wang (2021) and invited lectures from the railway industry. Elective course for the new Annotation Rail embedded in different MSc programs, MSc Civil Engineering track Structural Engineering, MSc Civil Engineering track Transport and Planning, MSc Civil Engineering flexible track, MSc Transport, Infrastructure and Logistic.
- Knowledge-based control (SC4081), 2016/2017 3<sup>rd</sup> quarter, 2015/2016 3<sup>rd</sup> quarter, 2014/2015 3<sup>rd</sup> quarter. Co-lecturers: Prof. Hans Hellendoorn, and Prof. Jens Kober. Elective course for MSc Systems and Control and MSc Electrical Engineering.

**Instructor, developer, and supporter of online education.** Online courses for professional education and MOOC, campus-wide.

- Rail: Performance over time (role: instructor and developer), 2021- 1<sup>st</sup> quarter, 2020- 1<sup>st</sup> quarter, 2019- 1<sup>st</sup> quarter. Co-lecturers: Prof. Rolf Dollevoet, Jurjen Hendriks, Dr. Martin Hiensch, Prof. Zili Li, Dr. Valeri Markine, Jan Moraal, Prof. Emile van der Heide, Dr. Eelco Schrik, Dr. Hongrui Wang, Dr. Zhen Yang.
- Rail: Capstone project (role: instructor and developer), 2020- 4<sup>th</sup> quarter, 2019- 4<sup>th</sup> quarter. Co-lecturers: Prof. Rolf Dollevoet, Dr. Valeri Markine, Dr. Zhen Yang.
- MOOC Railway Engineering (role: supporter), 2019- 1<sup>st</sup> quarter. Responsible lecturer: Prof. Rolf Dollevoet.

**Teaching assistant.** 3mE Faculty.

- Optimization in Systems and Control (SC4091), 2011/2012 1<sup>st</sup> quarter. Support the development of numerical examples and exercises for students. Lecturer: Prof. Bart De Schutter and Prof. Ton van den Boom. Programs MSc Systems and Control and MSc Electrical Engineering.
- Modeling and Nonlinear Systems Theory (SC4092), 2012/2013 2<sup>nd</sup> quarter, 2011/2012 2<sup>nd</sup> quarter. Lectures on the stability of nonlinear systems, case study with implementation in MATLAB, and support in the educational activities. Lecturer: Prof. Dimitri Jeltsema. Programs MSc Systems and Control and MSc Electrical Engineering.

## Teaching Activities in Chile

**Responsible Instructor,** Engineering Faculty, Universidad Mayor, Santiago, Chile.

- Algebra II, 2007-2<sup>nd</sup> semester, 2008-1<sup>st</sup> and 2<sup>nd</sup> semester.



- Automatic Control, 2008-1<sup>st</sup> and 2<sup>nd</sup> semester.
- Calculus III, 2007-2<sup>nd</sup> semester, 2008-1<sup>st</sup> and 2<sup>nd</sup> semester.
- Calculus IV, 2007-2<sup>nd</sup> semester.

**Teaching assistant** (exercise sessions). Faculty of Physical Sciences and Mathematics, Universidad de Chile, Santiago, Chile. Electrical Engineering Department (DIE), Civil Engineering Department (DIC) and Mathematical Engineering Department (DIM).

- Intelligent Control for Dynamic Transport Systems (EL761-CI63F), 2007-2, 2008-2. Lecturer: Prof. Cristián Cortes and Prof. Doris Sáez. (DIE and DIC).
- Optimization in Control, Identification and Estimation (EM728), 2007-2, 2008-2. Lecturer: Prof. Guillermo Gonzalez. (DIE).
- System Identification (EM717), 2007-1, 2008-1. Lecturer: Prof. Guillermo Gonzalez. (DIE).
- Advanced Control Systems (EL650), 2006-1, 2007-1. Lecturer: Prof. Doris Sáez. (DIE).
- Intelligent Control Systems (EM727), 2007-2. Lecturer: Prof. Doris Sáez. (DIE).
- Control Systems (EL42D), 2005-1, 2005-2, 2006-1. Lecturer: Prof. Doris Sáez. (DIE).
- Differential Equations (MA26A), 2002-1, 2003-1. 2004-1, 2005-1, 2006-1, 2007-1, 2008-1. Lecturer: Prof. Raúl Manasevich. (DIM).
- Mathematics II, 2003-3, 2004-4. (Escuela de Verano para estudiantes de Enseñanza Media). Lecturer: (2003) Dr. P. Romagnoli, (2004) Dr. H. Ramirez. (DIM).

**Assistant** (supervising and evaluating homework and exams), Faculty of Physical Sciences and Mathematics, Universidad de Chile, Santiago, Chile.

- Control Systems, EL42D, 2004-1, 2004-2. (DIE). Lecturer: Prof. D. Sáez.
- Optimization in Automatic Control, EL63E, 2006-2. (DIE). Lecturer: Prof. G. González.
- Electro-mechanical Machines Laboratory EL56A, 2006-2. (DIE). Lecturer: Dr. J. Romo.
- Calculus MA22A, 2003-2. (DIM). Lecturer: Dr. M. Leseigneur.
- Numerical Calculus MA33A, 2002-2. (DIM). Lecturer: Dr. M.L. Varas.
- Calculus and Algebra MA11A y MA12A, 2002-2. (DIM). Lecturer: Twelve different lecturers.
- Mathematics II, 2002-3. Lecturer: Dr. M.L. Varas.

**Assistant** (supervising and evaluating exams), Engineering Faculty, Pontificia Universidad Católica, Santiago, Chile.

- Automatic Control Systems Design, IEE3633, 2006-2. Lecturer: Prof. G. González.

**Assistant** (supervising and evaluating homework and exams), Engineering Faculty, Universidad de los Andes, Santiago, Chile.

- Advanced Control, 2008-2. Lecturer: Prof. G. González.
- Automatic Control, 2008-1. Lecturer: Prof. G. González.

**Volunteer**, Centro Abierto Hugo Lea Plaza, for socially at-risk children, Lo Prado, Santiago.

- Exercise lessons in Mathematics, Art, and English. Supervisor: Dr. Nora Faúndez.

## **Supervision of Researchers and Thesis Projects**

### **Supervisor of Postdocs**

- Wassamon Phusakulkajorn, July 2024 – April 2025, "Artificial intelligence methodologies for engineering structures". Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Dr. Alfredo Núñez and Dr. Hongrui Wang. Last known position: National Science and Technology Development Agency, Thailand.
- Siwarak Unsiwilai, June 2024 – May 2025, "Condition assessment of railway track embankments". Postdoc researcher Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Prof. Zili Li and Dr. Alfredo Núñez. Last known position: Faculty member at the Chulalongkorn University - Thailand.
- Taniya Kapoor, June 2024 – August 2025, "Advanced physics-informed machine learning and applications". Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Dr. Hongrui Wang and Dr. Alfredo Núñez. Last known position: Postdoc AI fellow, University of Oxford.
- Xinxin Yu, August 2023 – June 2024, "Multibody dynamics and traction control for friction monitoring in railway systems". Postdoc researcher, IAM4RAIL project, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisor: Prof. Zili Li. Supervisor on IAM4RAIL related topics: Dr. Alfredo Núñez. Last known position: Assistant Professor, Tampere University, Pirkanmaa, Finland.
- Yuanchen Zeng, August 2023 – July 2026, "Vehicle-mounted laser Doppler vibrometer technologies". Postdoc researcher IAM4RAIL Project, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Prof. Zili Li and Dr. Alfredo Núñez. Last known position: Postdoc researcher at TUDelft.
- Pan Zhang, September 2021 – August 2024, "Railway track and system dynamics". Postdoc researcher. Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Prof. Zili Li and Dr. Alfredo Núñez. Last known position: Postdoc researcher at TUDelft.
- Hongrui Wang, August 2019 – November 2020, "Big Data and AI methods for railway catenary asset management". Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisor: Prof. Rolf Dollevoet. Daily Supervisor: Alfredo Núñez. Last known position: Assistant Professor, Department of Engineering Structures, Delft University of Technology.



- Ali Jamshidi, February 2018 – July 2018, "Multi-objective design for rail maintenance optimization". Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Prof. Rolf Dollevoet and Prof. Zili Li. Daily Supervisor: Alfredo Núñez. Last known position: Lead Development Engineer at Praedico.
- Dr. Maider Oregui, August 2015 – March 2016, "Needs tailored interoperable railway". Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Dr. Zili Li and Dr. Alfredo Núñez. Last known position: Structural Calculations Engineer, CAF. *Maider was awarded the Young Researcher Award of the International Union of Railways UIC to recognize young engineers and researchers who have made significant contributions in rail research and innovation ([link UIC](#)).*
- Dr. Maria Molodova, January 2013 – December 2015, "Axle box acceleration modeling and validation". Part-time Postdoc researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Dr. Zili Li and Dr. Alfredo Núñez. Last known position: Director, OkazoLab Ltd. *Maria won the Dutch Institute World Class Maintenance Innovation Research Award for her PhD thesis. Maria also won the best student paper award at the 16th International IEEE Conference on Intelligent Transportation Systems ([link Delta](#)).*

### Supervisor of Ph.D. researchers

- Marco Andres Auza Sanchez, June 2024 – today, "Digital and AI-driven process solutions for sustainable concrete". PhD researcher, DETOCS EU-project, Section of Resources and Recycling, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands. Daily Supervisor and co-promotor: Dr. Yongli Wu. Promotor: Dr. Alfredo Núñez.
- Nikhil Manakshya, November 2023 – today, "Real-time assessment and control of electric locomotives for traction and braking". PhD researcher, IAM4RAIL project, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Promotors: Prof. Zili Li and Dr. Alfredo Núñez. Daily Supervisor: Dr. Hongrui Wang.
- Reza Riahi Samani, August 2023 – today, "Data-driven prediction and decision-making for maintenance of railway tracks". PhD researcher, IAM4RAIL project, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Promotor and Daily Supervisor: Prof. Bart De Schutter. Promotor: Dr. Alfredo Núñez.
- Taniya Kapoor, November 2021 – May 2024, "Physics-informed machine learning: from methods to beam structures". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: October 2024. Promotor: Prof. Rolf Dollevoet. Co-promotors: Dr. Hongrui Wang (daily supervisor) and Dr. Alfredo Núñez. Last known position: Postdoc AI fellow, University of Oxford.
- Wassamon Phusakulkajorn, October 2020 – June 2024, "AI Solutions for maintenance decision support in railway infrastructure". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: March 2024. Promotor: Prof. Zili Li. Co-promotor: Dr. Alfredo Núñez. Last known position: National Science and Technology Development Agency, Thailand. *Wassamon received the best paper award for her publication in the journal Intelligent Transportation Infrastructure - Oxford editorial.*
- Yuanchen Zeng, February 2020 – August 2023, "Monitoring dynamic properties of railway tracks using train-borne vibrometer measurement". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: December 2023. Promotor: Prof. Zili Li. Co-promotor: Dr. Alfredo Núñez. Last known position: Postdoc researcher at TUDelft. *Yuanchen received the best PhD Thesis award from the European Rail Research Advisory Council (ERRAC) and ERJU.*
- Jianfeng Fu, October 2018 – August 2022, "Failure prevention and restoration in power systems". Ph.D. researcher, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense date: September 2022. Promotor: Prof. Bart De Schutter. Co-promotor: Dr. Alfredo Núñez. Last known position: Assistant Professor at Dalian Maritime University, China.
- Siwarak Unsiwilai, September 2018 – May 2024, "Railway track support condition assessment: from onboard measurement to maintenance decision support". Ph.D. researcher Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: November 2024. Promotor: Prof. Zili Li. Co-promotor: Dr. Alfredo Núñez. Last known position: Faculty member at the Chulalongkorn University - Thailand.
- Marko Kapetanovic, July 2018 – September 2022, "Improving the sustainability of regional railway services". Ph.D. researcher, Transport and Planning, Delft University of Technology, Delft, The Netherlands. Defense date: October 2022. Promotor: Prof. Rob Goverde. Co-promotor: Dr. Niels van Oort. Daily Supervisor: Dr. Alfredo Núñez. Last known position: Full-time Postdoc researcher at TUDelft. *In Dec. 2021, the paper "Analysis of hydrogen-powered propulsion system alternatives for diesel-electric multiple unit regional trains" was selected in the group of best papers at the 9th International Conference on Railway Operations Modelling and Analysis (RailBeijing 2021). In May 2023, the paper "Vehicle-to-Grid Concept for Hydrogen Fuel Cell Hybrid-Electric Regional Trains" was selected in the group of best papers at the 10th International Conference on Railway Operations Modelling and Analysis (RailBelgrade 2023).*
- Tim Vernaillen, July 2018 – today (part-time), "Rail wear and rolling contact fatigue". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Promotors: Prof. Rolf Dollevoet, Prof. Zili Li, and Dr. Alfredo Núñez. Last known position: Track Maintenance Civil Engineer at Infrabel, Belgium.
- Jurjen Hendriks, February 2018 – today (part-time), "Structural health monitoring of railway systems". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Promotors: Prof. Rolf Dollevoet and Dr. Alfredo Núñez.
- Hongrui Wang, December 2016 – December 2019, "Data-based dynamic condition assessment of railway catenaries". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: December 2019. Promotor: Prof. Rolf Dollevoet. Co-Promotor: Alfredo Núñez. Last known position: Assistant Professor at TUDelft, The Netherlands. *In Dec. 2021, Hongrui Wang received the PhD thesis award from the European Rail Research Advisory Council*





(ERRAC) and Shift2Rail Joint Undertaking. As of July/August 2020, the journal paper "Junwen Chen, Zhigang Liu, Hongrui Wang, Alfredo Núñez, and Zhiwei Han, Automatic defect detection of fasteners on the catenary support device using deep convolutional neural network, *IEEE Transactions on Instrumentation and Measurement* 67(2):257-269, 2018" is in the highly cited list, the top 1% of the field *Engineering, Data from Essential Science Indicators (ISI-Web of Science)*.

- Pan Zhang, September 2016 – August 2021, "Mechanisms and mitigation of short pitch rail corrugation". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: December 2022. Promotor: Prof. Zili Li (daily supervisor). Co-promotor: Dr. Alfredo Núñez. Last known position: Postdoc researcher at TUDelft.
- Luis Gabriel Marin Collazos, March 2014 – December 2018, "Hierarchical energy management system based on fuzzy prediction intervals for operation and coordination of microgrids". Ph.D. researcher, Electrical Engineering Department, University of Chile, Santiago, Chile. Defense date: December 2018. Promotor: Prof. Doris Saez Hueichapan. Co-Promotors: Prof. Mark Sumner and Dr. Alfredo Núñez. Last known position: Professor at Pontificia Universidad Javeriana, Bogotá – Colombia.
- Ali Jamshidi, January 2014 – January 2018, "Intelligent rail maintenance decision support system using KPIs". Ph.D. researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: September 2019. Promotors: Prof. Rolf Dollevoet and Prof. Zili Li. Co-Promotor: Alfredo Núñez. Last known position: Lead Development Engineer at Praedico.
- Zulkifli Hidayat, January 2011 – January 2015, "Identification of finite dimensional spatiotemporal systems". Ph.D. researcher, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense date: April 2025. Promotors: Prof. Robert Babuška and Prof. Bart De Schutter. Co-Promotor: Dr. Alfredo Núñez. Last known position: Academic from the Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Indonesia.

### Supervisor of PDEng researchers

- Bojan Bogojević, September 2023 – today, "Robust rail surface defect detection based on axle box accelerations of in-service passenger trains". Engineering Doctorate researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Chair: Prof. Rolf Dollevoet. Supervisors: Alfredo Núñez and Theo Kruse (ProRail). Committee: Prof. Rob Goverde, Ellard Groenewegen, Ilse Oonk.
- Karim El Laham, September 2021 – September 2023, "A big data methodology for tamping decisions using sensors from sky, railway track and substructure". Professional doctorate, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: September 2023. Chair: Prof. Zili Li. Supervisors: Dr. Valeri Markine, Dr. Alfredo Núñez and Dr. Neda Sepasian (Fugro). Thesis committee: Prof. Zoran Kapelan, Ellard Groenewegen, and Ilse Oonk. *Karim received the Institution for Rail Infrastructure Engineering PWI Young Achiever's Award, which recognises the achievements of young people working in the rail industry.*
- Paul Le Lan, February 2018 – February 2020, "Rail surface defect treatment decision support". Professional doctorate, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Defense date: February 2020. Supervisors: Dr. Alfredo Núñez and Dr. Maarten van Riel (BAM). Advisor: Dr. Zhen Yang. Thesis committee: Prof. Pieter van Gelder, Prof. Zili Li, Ellard Groenewegen, and Ilse Oonk.

### Supervisor MSc students

- Tijmen Hoedjes, "Unsupervised analysis of tramway infrastructure degradation in transition zones using InSAR". MSc Civil Engineering, Track Traffic and Transport Engineering, Delft University of Technology, Delft, The Netherlands. Supervisor: Alfredo Núñez (daily supervisor). Committee: Anupam Kumar (TUDelft), Noa Peteroff (GVB), and Michel Huijsmans (GVB). Defense: May 6, 2025.
- Jose Stradi, "A digital twin approach for cross-border maintenance operations". MSc Civil Engineering, Track Traffic and Transport Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Rolf Dollevoet (Chair) and Alfredo Núñez (daily supervisor). Committee: Mahnam Saeednia, Arjen Zoeteman (ProRail), and Tim Vernailen (Infrabel). Defense: August 29, 2024.
- Wessel Roodenburg, "Rail infrastructure quality monitoring through smartphone accelerometer measurements". MSc Civil Engineering, Track Traffic and Transport Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Zili Li (Chair) and Alfredo Núñez (daily supervisor). Committee: Anupam Kumar, Yuanchen Zeng, Jurjen Hendriks, Arjen Zoeteman (ProRail). Defense: July 30, 2024.
- Siew Chee Wong, "Assessing the resilience of railway organisation for unexpected external events". MSc thesis, Department of Transportation and Planning, Delft University of Technology, Delft, The Netherlands. Supervisors: Niels van Oort (Chair), Alfredo Núñez, Hongrui Wang (Daily Supervisor). Defense: November 13, 2023.
- Brian Kwee, "A heuristic method for the distribution of freight wagons on a rail yard taking into account dangerous goods". MSc thesis, Master track Transport & Planning, Delft University of Technology, Delft, The Netherlands. Committee chair: Prof. Rob Goverde. Daily supervisor: Dr. Alfredo Núñez and Bogdan Godziejewski (Mott MacDonald). Defense: May 12, 2022.
- Noa Peteroff, "Rail wear in curves at the tramway of Amsterdam". MSc thesis, Civil Engineering, Track: Structural Engineering - Road and Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervisors: Prof. Zili Li (chair), Dr. Alfredo Núñez, and Janneke Tax (GVB-Amsterdam). Committee members: Dr. Yuguang Yang and Michel Huijsmans (GVB-Amsterdam). Defense: December 23, 2021.
- Jeremy Aarts, "Simultaneous multi-robot task scheduling and path planning – An integrated approach to task scheduling and path planning for mobile robots in production environments" (cum laude). Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Supervisor: Prof. Bart De Schutter.



Daily supervisors: Alfredo Núñez and Bas van der Oest. In cooperation with Prodrive Technologies. Defense: November 13, 2018.

- Arif Nurhidayat, "Deep learning for monitoring the health condition of railway crossings". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense: January 24, 2018. Supervisor: Prof. Bart De Schutter. Daily supervisors: Alfredo Núñez and Anthonie Boogaard.
- Muhammad Faris, "Distributed optimization for railway track maintenance operations planning". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense: January 18, 2018. Supervisor: Prof. Bart De Schutter. Daily supervisors: Alfredo Núñez, Zhou Su, Ali Jamshidi.
- Suzan van Ginkel, "Multi-objective project portfolio optimization - Application in railway infrastructure networks". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense: November 27, 2017. Supervisor: Prof. Bart De Schutter. Daily supervisor: Alfredo Núñez. In cooperation with ORTEC.
- Wei Xie, "Decision support for the maintenance regarding tram wheel-rail interface based on multi-source data analysis". MSc thesis, Transport, Infrastructure & Logistics Master Program, Delft University of Technology, Delft, The Netherlands. Defense: October 19, 2017. Supervisor: Prof. Zili Li. Daily supervisors: Alfredo Núñez and Ron Maas (Sensornet). In cooperation with Sensornet.
- Franka Veltman, "Hybrid human in the loop model predictive control for polder management, case study Ommoord". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands. Defense: October 24, 2016. Supervisor: Prof. Bart De Schutter. Daily supervisor: Alfredo Núñez. *Franka was awarded an ACM-W scholarship for attendance at the 2015 IEEE Symposium Series on Computational Intelligence in South Africa.*
- Rick Schalk, "Data analytics for RCF damages on the Dutch HSL track". MSc thesis, Construction, Management, and Engineering Master Program, Delft University of Technology, Delft, The Netherlands. Defense: September 23, 2016. Supervisors: Prof. Rogier Wolfert and Dr. Arjen Zoeteman. Daily Supervisors: Alfredo Núñez and Aad Hertogs (Infraspeed).
- Marco Rinaldi, "Identificazione di modelli e controllo predittivo di traffico autostradale (in Italian)". Thesis for the Master's Degree of Science in Information Technology Engineering - Control Systems Engineering, Università degli Studi di Pavia, Pavia, Italy, Oct. 2011. Supervisor: Prof. Antonella Ferrara. Co-supervisors: Dr. Luca Capisani and Dr. Alfredo Núñez. Last known position: Assistant Professor (tenure tracker) at TUDelft, CEG Faculty, Department of Transport and Planning.

#### **Supervisor of BSc students**

- Terrence Dahoe, "Estimation of railway track parameters using evolutionary algorithms". BSc student, Faculty of Civil Engineering and Geosciences, Delft University of Technology. Committee: Dr. Alfredo Núñez (daily supervisor), Dr. Chen Shen, and Prof. Zili Li. Defense: July 2021.
- Ruggero Fabbiano, "Distributed model predictive control for a traffic system using METANET model (in Italian)". Thesis Bachelor's Degree of Science in Information Technology Engineering - Control Systems Engineering, Università degli Studi di Pavia, Pavia, Italy, Oct. 2011. Supervisor: Prof. Antonella Ferrara. Co-supervisors: Dr. Luca Capisani and Dr. Alfredo Núñez. Last known position: Full-time Ph.D. student at INRIA, Grenoble, France.
- Alberto Hurtado, "Análisis e implementación de sistemas de posicionamiento basados en tecnología celular". Thesis Electronic Civil Engineering, Universidad Mayor, Santiago, Chile, Jul. 2009.
- Sergio Corte, "Diseño de un sistema de distribución centralizado de productos voluminosos a domicilio". Thesis Electronic Civil Engineering, Universidad Mayor, Santiago, Chile, Apr. 2008.

#### **Supervisor of visiting researchers and researchers**

- Yuan Lei, "Physics-informed neural networks for engineering structures". PhD researcher, The Hong Kong Polytechnic University. Supervisor: Prof. Yi-Qing Ni. Visit period: June 2023 to December 2023.
- Junping Zhong, "Fault diagnosis for the catenary components in high-speed railway based on computer vision". Ph.D. researcher, Southwest Jiaotong University, Chengdu, China. Supervisor: Prof. Zhigang Liu. Visit period: October 2019 to October 2020.
- Wenqiang Liu, "Fault detection and diagnosis theory of electrified railway catenary and track". Ph.D. researcher, Southwest Jiaotong University, Chengdu, China. Supervisor: Prof. Zhigang Liu. Visit period: September 2017 to February 2019.
- Martin Butijn, topic: Data-based analysis of embankment instability. Professional doctorate researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervised from February 2020 to June 2021.
- Siamak Hajizadeh, topic: Large-scale rail image processing for detection and classification. Researcher, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands. Supervised from July 2016 to November 2017.

#### **Participation in Committee Defenses**

##### **Participation in PhD committees**

- Liangyu Tay, "Adaptive artificial intelligence traffic network management system for urban cities". Doctor of Philosophy, Monash University Malaysia, March 2025.
- Yue Shang, "Design optimization for railway transition zones". Ph.D. Thesis Section of Integral Design & Management, Delft University of Technology, Delft, The Netherlands, June 2024.



- Yang Jin, "Characterization and mitigation of speckle noise in laser Doppler vibrometer on moving platforms (LDVom)". Ph.D. Thesis Section of Railway Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, October 2023.
- Jeroen Wegdam, "Guidance of wheelsets through degraded switches and crossings". Qualification Exam for Doctoral degree (go-no-go meeting), Section of Railway Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, September 2023.
- Robin Kuok Cheong Chan, "Investigation into Urban Traffic Mobility in Malaysia for Intelligent Transportation System". Doctor of Philosophy, Monash University Malaysia, September 2023.
- Rohan Kulkarni, "Onboard condition monitoring of vehicle-track dynamic interaction using machine learning: Enabling the railway industry's digital transformation". Doctoral Thesis in Vehicle and Maritime Engineering, Rail Vehicles Division, Engineering Mechanics Department, KTH Royal Institute of Technology, Stockholm, Sweden, June 2023.
- Mohammad Javad Berangi, "Development of physics-informed artificial intelligence models for porous asphalt lifetime prediction". Qualification Exam for Doctoral degree (go-no-go meeting), Section of Pavement Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, Mar. 2023.
- Saranga Wagasing Arachchige, "Environmental Cost Indicator of Rolling Resistance (ECIRR): Monitoring & Modelling". Qualification Exam for Doctoral degree (go-no-go meeting), Section of Pavement Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, Mar. 2023.
- Ricky Sutopo, "An adaptive framework for optimized passenger flow in urban public transportation networks using deep learning". Doctor of Philosophy, Monash University Malaysia, February 2023.
- Jie Gao, "Matching mechanisms for two-sided shared mobility systems". Doctor of Philosophy, Information Systems Engineering, University of Concordia, Montreal, Canada, Dec. 2021.
- Meysam Naeimi, "An investigation into the formation of squats in rails: modelling, characterization and testing", Ph.D. Thesis Section of Railway Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, Oct. 2020.
- Jenny Lorena Diaz Castañeda, "Advanced energy management/control strategies for smart manufacturing systems". Ph.D. on Automatic, Robotic and Vision, Universitat Politècnica de Catalunya, Barcelona, Spain, Mar. 2020.
- Xiangyun Deng, "Finite element solution of rolling contact and analysis of squats formation". Ph.D. Thesis Section of Railway Engineering, Department of Engineering Structures, Delft University of Technology, Delft, The Netherlands, Jul. 2019.
- Rui Li, "Phase-based planning for railway infrastructure projects". Ph.D. Thesis Department of Management Engineering, Management Science, Technical University of Denmark, Copenhagen, Denmark, Sep. 2017.
- Juan Pablo Ruiz Rosero, "Modelo para la simulación de rutas en sistemas de transporte público mediante computación paralela en entornos IoT". Qualification exam for the Ph.D. Thesis in Telematics Engineering, Universidad del Cauca, Popayán, Colombia, Dec. 2016.
- Alejandro Márquez Ruiz, "Hierarchical robust real time optimization with zone control". Ph.D. Thesis Department of Processes and Energy, Universidad Nacional de Colombia, Medellín, Colombia, Mar. 2015.
- Carolina Ponce, "Design of fuzzy predictive control strategies for the integration of combined-cycle power plants together with solar thermal energy (in Spanish)". Qualification exam for the Ph.D. Thesis in Electrical Engineering, Universidad de Chile, Santiago, Chile, Jan. 2012.
- Fernando Terroso Sáenz, "Design of a context-aware system for the intra-vehicle environment". Ph.D. Thesis Department of Information and Communications Engineering, University of Murcia, Murcia, Spain, Jun. 2013.

#### Committee member MSc defenses

- Rajat Shakya, "Vibration-based Bayesian model updating for high-rise buildings". Master Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 2025 - ongoing. Committee: Eliz-Mari Lourens (Supervisor), Alfredo Núñez, and Alexander Bronkhorst (TNO).
- Raoul Bhairo, "Micromechanical modelling of asphalt concrete mixtures with RAP modified binders". Master Civil Engineering, track: Construction Materials, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 2025 - ongoing. Committee: Kumar Anupam (Supervisor), Cor Kasbergen, Alfredo Núñez, Robbert Naus (Dura Vermeer), and Hong Zhang (RWS).
- Gorby Gorby Wisaksono, "Spatial-temporal data lakes for predicting porous asphalt lifetime". Master Civil Engineering, track: Traffic and Transport Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 2025 - ongoing. Committee: Anupam Kumar (Supervisor), Alfredo Núñez, and Mohammadjavad Berangi.
- Hang Gao, "A numerical study on ABA-based wheel condition monitoring". Master Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, Feb. 2025 - ongoing. Committee: Zhen Yang (Supervisor), Alfredo Núñez, and Anupam Kumar.
- Craig Maxwell, "Model predictive fuzzy controller for search and rescue path planning of multi agent systems". Master of Science, Aerospace Engineering, Faculty of Aerospace Engineering, Delft University of Technology, Delft, The Netherlands, January 2025. Committee: Anahita Jamshidnejad (mentor), Erik-Jan Van Kampen, Mirko Baglioni, and Alfredo Núñez.
- Nabil El Bouayadi, "Geometric non-linear beam analysis using physics-informed neural networks". Master of Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, November 2024. Committee: Eliz-Mari Lourens (chair), Hongrui Wang (supervisor), and Alfredo Núñez Vicencio (supervisor).
- Edward de Groot, "Exploring communicative agents in structural engineering – a conceptual design process using Text2Structures for AI-Driven communication". Master of Civil Engineering, track: Engineering Structures, Faculty of Civil



Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, November 2024. Committee: Alfredo Núñez (chair), Daniel Hall (Supervisor), Ranjith Kuttantharappel (Supervisor).

- Juan Camargo, "Development of a physics-informed AI framework for pavement performance predictions". Master of Civil Engineering, track: Traffic and Transportation, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, August 2024. Committee: Anupam Kumar (chair), Mohammadjavad Berangi, and Alfredo Núñez Vicencio.
- Bernardo Mota Lontra, "Machine learning study on performance prediction of asphalt mixtures under Dutch conditions". Master of Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, December 2022. Committee: Anupam Kumar (chair), Sandra Erkens, Mahesh Moenielal (company supervisor), and Alfredo Núñez.
- Alvaro Endo Lavado, "Sistema de gestión de agua y energía para invernaderos de comunidades rurales indígenas". MSc Thesis Civil Electrical Engineering, Electrical Engineering Department, University of Chile, Santiago, Chile, September 2022. Committee: Doris Sáez Hueichapán (mentor), Alfredo Núñez Vicencio.
- Schelte Sixma van Heemstra, "Intelligent railway level crossings - Reducing incidents on level crossings through a smart surveillance system". Master of Science in Transport, Infrastructure & Logistics, Delft University of Technology, Delft, The Netherlands. Defense: 12 July 2022. Committee: Bert van Wee (Chair), Jan Annema, Alfredo Núñez, Ronald Zutter (Mott MacDonald) and Sander Willer (Mott MacDonald). In cooperation with Mott Macdonald.
- Christos Lathourakis, "Optimal maintenance of deteriorating systems integrating deep reinforcement learning and Bayesian inference". Master of Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, July 2022. Committee: Alice Cicirello (chair), Charalampos Andriotis (daily supervisor), and Alfredo Núñez Vicencio.
- Michel van Aggelen, "Optimal condition-based maintenance of asphalt concrete pavements". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, January 2022. Committee: Bart De Schutter (chair), Ton van der Boom, Alfredo Núñez Vicencio and Anupam Kumar.
- Marijn Leeuwenberg, "Traffic routing under dynamic network topologies". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, January 2022. Committee: Bart De Schutter (chair), Mernout Burger (daily supervisor), and Alfredo Núñez Vicencio.
- Qinkun Sun, "Identification of deformation stages for specimens under tensile test based on acoustic emission techniques". Master of Civil Engineering, track: Structural Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, November 2021. Committee: Milan Veljkovic (chair), Roger Groves, Alice Cicirello, Alfredo Núñez Vicencio, and Cheng Lu.
- Tomas Ascensao, "Adaptive fuzzy logic control applied to socially assistive drones – A case study". Master of Science, Aerospace Engineering, Faculty of Aerospace Engineering, Delft University of Technology, The Netherlands, November 2021. Committee: Anahita Jamshidnejad (daily supervisor), Rene van Paassen (chair), and Alfredo Núñez Vicencio.
- Jorge Trimarchi, "Rolling weight deflectometer for stiffer pavements: combining machine learning and field data". Master of Civil Engineering, track: Road and Railway Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology Delft, Delft, The Netherlands, August 2021. Committee: Kumar Anupam (daily supervisor), Sandra Erkens (chair), Cor Kasbergen, Alfredo Núñez Vicencio, and Alessandro Marradi (Universita di Pisa).
- Tomas Ceha, "Hierarchical model predictive control in building climate systems for passive energy sources". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, June 2021. Committee: Bart De Schutter (chair), Luigi Antonio de Araujo Passos (daily supervisor), Regina Bokel, and Alfredo Núñez Vicencio.
- Jan Koune, "Bayesian identification for steel bridge". Master of Civil Engineering, track: Offshore Engineering, Faculty of Civil Engineering and Geosciences, Delft University of Technology, July 2021. Committee: Alice Cicirello (chair and daily supervisor), Bernt Leira (NTNU), Arpad Rozsas (TNO), and Alfredo Núñez Vicencio.
- Hessel Prins, "Rail line detection based photogrammetry". Master of Civil Engineering, track: Geoscience and Remote Sensing, Faculty of Civil Engineering and Geosciences, Delft University of Technology Delft, Delft, The Netherlands, March 2021. Committee: Roderik Lindenbergh (chair and daily supervisor), Liangliang Nan, Alfredo Núñez Vicencio, and Robert Voûte (CGI).
- Annie Papalexou, "Deep learning-based classification of 3D point clouds of railway environments". Master of Civil Engineering, track: Geoscience and Remote Sensing, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands, March 2021. Committee: Roderik Lindenbergh (chair and daily supervisor), Franziska Glassmeier, Alfredo Núñez Vicencio, and Robert Voûte (CGI).
- Joost Jeschke, "Parametrized model predictive control in urban traffic networks: towards real-time implementation". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, October 2020. Committee: Bart De Schutter (chair and daily supervisor), Azita Dabiri, Andreas Heygi, and Alfredo Núñez Vicencio.
- Lukas Steenstra, "PDDL-based task planning of survey missions for autonomous underwater vehicles". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, September 2019. Committee: Joris Sijs (mentor), Bart De Schutter, Neil Yorke-Smith, Alfredo Núñez Vicencio, and Rutger Hommes.
- Julian Freiherr von der Goltz, "Classification of damages on aircraft inspection images using convolutional neural networks". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Aug. 2019. Committee: Wei Pan (mentor), Jens Kober, Ewoud Pool, Alfredo Núñez Vicencio.





- Folkert Ritsma, "Advanced set bounding methods for fault detection". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands Jun. 2019. Committee: Riccardo Ferrari (mentor), Zaid Al-Ars (mentor), Jan-Willem van Wingerden, Alfredo Núñez Vicencio.
- Sander Willer, "Tram-train: When is it a suitable mode? Development of a model to determine the applicability of tram-train". MSc Thesis Civil Engineering, specialization Transport and Planning, Delft University of Technology, Delft, The Netherlands, Jan. 2019. Committee: Niels van Oort (mentor), Rob Goverde, Alfredo Núñez Vicencio, Bogdan Godziejewski (mentor).
- Konstantinos Kokkalis, "LMI-based stability analysis for learning control". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Aug. 2018. Committee: Sebastian Trimpe (mentor), Jens Kober (mentor), Hans Hellendoorn, Alfredo Núñez Vicencio, Wei Pan.
- Martin de Vette, "Model predictive control approaches for urban traffic networks: A comparison between optimization algorithms". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Dec. 2017. Committee: A. Jamshidnejad (mentor), B. De Schutter (mentor), Alfredo Núñez Vicencio.
- Steven Deen, "Autonomous coverage path planning for AUVs considering location uncertainty". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Sep. 2017. Committee: J. Sijs (mentor), B. de Schutter, J. Alonso-Mora, Alfredo Núñez Vicencio, J. Fransman.
- Patricio Santis, "Diseño de estrategias de control predictivo multi-objetivo para un filtro activo en paralelo trifásico de tres hilos". MSc and BSc Thesis Civil Electrical Engineering, Electrical Engineering Department, University of Chile, Santiago, Chile, June 2016. Committee: Doris Sáez Hueichapán (mentor), Roberto Cárdenas Dobson (mentor), Rodrigo Moreno Vieyra, Alfredo Núñez Vicencio, Marcelo Perez Leiva.
- Lex Blenkers, "Railway disruption management". MSc Thesis Systems and Control, Delft University of Technology, Delft, The Netherlands, Dec. 2015. Committee: Van den Boom (mentor), Bart De Schutter, Alfredo Núñez Vicencio.
- Xueli Jia, "Deep learning for actor-critic reinforcement learning". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Oct. 2015. Committee: Robert Babuska (mentor), Hans Hellendoorn, Alfredo Núñez Vicencio.
- Wouter Verbeek, "Condition monitoring for track circuits: A multiple-model approach". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Sep. 2015. Committee: K.A.J. Verbert, (mentor), B. De Schutter (mentor), S. Wahls, Alfredo Núñez Vicencio.
- Reinier Doelman, "Observability and controllability for a computational fluid dynamics model of a greenhouse atmosphere". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Jul. 2014. Committee: Robert Babuska (mentor), P. Booij (mentor), Bart De Schutter, Alfredo Núñez Vicencio.
- Jos van den Haspel, "Distributed control of refrigerators for the smart grid". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Dec. 2013. Committee: Bart De Schutter, Alfredo Núñez Vicencio.
- Giorgos Stathopoulos, "Fast online-optimization based control and estimation using operator splitting". Master of Science in Systems and Control, Delft Center for Systems and Control, Delft University of Technology, Delft, The Netherlands, Jul. 2011. Committee: T. Keviczky (mentor), Alfredo Núñez Vicencio.
- Aroen Soekroella, "Separation of freeway traffic flows by dynamic lane assignment". MSc Thesis Civil Engineering, Delft University of Technology, Delft, The Netherlands, Apr. 2011. Committee: S.P. Hoogendoorn (mentor), A. Hegyi, H. Taale, R.H. Kraaijeveld, A.A. Núñez Vicencio, P.B.L. Wiggenraad.

#### **Committee member BSc defenses**

- Daan Bouman, "The detection of track deterioration through dynamic testing – A comparison between hammer impact and axle box acceleration testing". BSc thesis, Faculty of Civil Engineering and Geosciences, Delft University of Technology, May 2023. Committee: Zhen Yang (daily supervisor), Alfredo Núñez Vicencio, Pan Zhang.
- Robert Bosch, "Damage detection to bridge through vehicle-bridge interaction". BSc thesis, Faculty of Civil Engineering and Geosciences, Delft University of Technology, June 2022. Committee: Zili Li, Chen Shen (daily supervisor) and Alfredo Núñez Vicencio.
- Jesper Bryan, "The detection of track deterioration with the hammer test". BSc thesis, Faculty of Civil Engineering and Geosciences, Delft University of Technology, October 2021. Committee: Zhen Yang (daily supervisor) and Alfredo Núñez Vicencio.
- Jinse Schoorl, "Soil influence on track quality – Quantifying the influence of soil on track condition". BSc student, Faculty of Civil Engineering and Geosciences, Delft University of Technology, June 2021. Committee: Valeri Markine (daily supervisor), Karim El Laham (Fugro), and Alfredo Núñez.
- José Guajardo, "Sincronizador de equipos electrónicos para tráfico mediante GPS". Thesis Electronic Engineering, Universidad Mayor, Santiago, Chile, Dec. 2008.
- Felipe Zamora, "Estudio de soluciones open source para comunicaciones sobre redes IP en el banco BBVA Chile". Thesis Electronic Civil Engineering, Universidad Mayor, Santiago, Chile, Dec. 2008.
- José Jeldes, "Análisis, desarrollo e implementación de aplicaciones innovadoras para la central telefónica Asterisk". Thesis Electronic Engineering, Universidad Mayor, Santiago, Chile, Jul. 2008.

#### **Invited Lectures and Presentations at Conferences**



### Keynote and invited lectures

- December 10, 2024, "Advancements in onboard monitoring for AI-based prescriptive maintenance of rail infrastructure". Invited lecture at the Department of Electrical Engineering, University of Chile, Santiago, Chile.
- November 26, 2024, "Collaboration and stakeholder engagement". Presentation as panel member in the Midterm event of the EU Project IAM4RAIL, Paris, France.
- July 30, 2024, "Introduction to AI in railway infrastructure and onboard monitoring using laser Doppler vibrometer". Invited lecture at the Laboratory of Control Systems and Cybernetics, University of Ljubljana, Ljubljana, Slovenia.
- June 6, 2024, "Structural condition monitoring and maintenance of railways". Keynote in the panel Gnosis for maintenance: From diagnosis to prognosis and health-aware control, together with Mayank Jha (University of Lorraine, France), Vincenc Puig (UPC, Spain) and Jing Jiang (UWO, Canada), IFAC SAFEPROCESS 2024, Ferrara, Italy.
- March 8, 2024 "Monitor railway track dynamics using train-borne laser Doppler vibrometer (LDV)", Cyber and Digital Rail Workshop, University of Maryland, USA.
- March 7, 2024, "Railway Infrastructure: Monitoring, Maintenance, Digital Twin, AI", Short Course on Cyber and Digital Rail, University of Maryland, USA.
- September 22, 2023, "Axle box acceleration measurements for railway condition monitoring". Webinar of the EU Project In2Track3, panelist presenting the work by A. Núñez, Z. Li, R. Dollevoet, J. Moraal, J. Hendriks, W. Phusakulkajorn, A. Zoeteman, and M. Asplund, Hybrid-Sweden.
- March 10, 2023, "Elements of Intelligent Railway Infrastructure". CEE Guest Speaker Seminar Series, University of Maryland, College Park, USA.
- February 8, 2023, "Intelligent Railway Infrastructure: asset management and sensing". Invited lecture at the University of Seville, Seville, Spain.
- February 7, 2023, "Intelligent Railway Infrastructure: Maintenance". Invited lecture at the University of Seville, Seville, Spain.
- August 30, 2022, "Intelligent Railway Infrastructure: Current developments and future trends". Guest speaker together with Wassamon Phusakulkajorn in the Mega Trends in Future Mobility Symposium (MTEC-NSTDA), The 11<sup>th</sup> International Conference on Materials Science and Technology, 29-31 August 2022, Thailand.
- June 23, 2022, "Elements of Intelligent Railway Infrastructure". Guest speaker at the First International Forum of Young Scholars in Intelligent Transportation Infrastructure, Online presentation. Organized by Prof. Qing He, Southwest Jiaotong University, China, and Prof. Yiqing Ni, Hong Kong Polytechnic University, Hong Kong.
- April 28, 2022: "Asset Management and Intelligent Railway Infrastructure". Guest speaker at the Railway Colloquium, Delft University of Technology, The Netherlands.
- April 14, 2022: "Intelligent Railway Infrastructure". Guest speaker at the Data Science and Analytics Technical Meeting of TTCI, USA.
- November 23-25, 2021: "Elements of Intelligent Railway Infrastructures". Guest speaker at the ENUCOMPI & SINFO 2021 symposium, Federal University of Piau, Picos, Brasil.
- July 11, 2021: "Intelligent monitoring of infrastructures". Guest speaker at Workshop 5 Smart Pavement – vehicle monitoring, tools and techniques for functional pavement- at the International Symposium on Frontiers of Road and Airport Engineering 2021 (IFRAE-Delft2021), Delft, The Netherlands.
- December 16, 2020: "Multi-objective optimisation for rail maintenance in a regional railway network". Invited lecture at the Big Data in Railroad Maintenance 2020, Delaware, USA.
- December 12, 2019: "Rail maintenance support in a regional railway network". Workshop Computational Intelligence for Control and Process Monitoring and Applications, Department of Electrical Engineering, University of Chile, Santiago, Chile.
- May 20, 2019: "Automatic detection of rail surface defects using video image: A case study in the Dutch railways". Presentation at the Lecture Series of the Monitoring Community, Department of Engineering Structures, Delft, The Netherlands.
- June 28, 2018: "Big Data in railway infrastructure". Plenary speaker at the KIVI International Board event about Big Data, Eindhoven, The Netherlands.
- July 18, 2017: "Big data: some examples and challenges in railway systems". Colloquium at the Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong.
- July 14, 2017: "Big data in railway engineering: examples and challenges". Colloquium at the School of Electrical Engineering, Southwest Jiaotong University, Chengdu, China.
- March 31, 2017: "Rail condition monitoring in The Netherlands: A Big Data problem". Seminario ISCI, Universidad de Chile, Chile.
- March 16, 2017: "Big data in railway maintenance planning". InnoRail meeting, Rail Center, Amersfoort, The Netherlands.
- December 15, 2016: "Automatic detection of rail surface defects using vibration and video image: A case study in the Dutch railways", Conference Big Data in Railroad Maintenance Planning 2016, University of Delaware, Newark, DE, USA.

### Presentations at conferences, symposiums, workshops, and international project meetings

- December 11-13, 2024, "Activities in Mapuche Rural School - Encryption", participating in activities, Temuco, Chile.
- November 26-28, 2024, "IAM4RAIL Midterm event" and "IAM4RAIL TMT and SC", project IAM4RAIL, Paris, France.
- November 12-13, 2024, "IAM4RAIL WP9 Progress and Status", project meeting IAM4RAIL, Paris, France.
- September 26, 2024, "Direct monitoring of in-situ rail fastener vibrations from a moving train with laser Doppler vibrometer", poster presentation at 27th IEEE International Conference on Intelligent Transportation Systems, ITSC2024, 24-27 September, 2024, Edmonton, Canada. Work by Y. Zeng, A. Núñez, A. Zoeteman, R. Dollevoet, and Z. Li.
- September 4-5, 2024, "IAM4RAIL TMT/SC", project meeting IAM4RAIL, Genova, Italy.
- June 10-11, 2024, "WP9 Railway Infrastructure: Progress", project meeting IAM4RAIL, Lulea, Sweden.



- March 13-14, 2024, "SC and TMT Meetings IAM4RAIL", project meeting IAM4RAIL, Rome, Italy.
- January 22-23, 2024, "WP9 Progress Meeting", hosted by DB, Munich, Germany.
- November 28-29, 2023, "In2Track3 Final Event", hosted by Trafikverket, Stockholm, Sweden.
- October 19-20, 2023, "TMT Meeting". IAM4RAIL meeting, San Sebastian, Spain.
- September 25-26, 2023, "WP9 Inframangers Meeting". IAM4RAIL meeting with inframangers, Munich, Germany.
- September 20, 2023, "Seminar about fiber optics and maintenance theory for real-life implementation". The seminar was organised in the framework of FP3-IAM4RAIL and FP4-Earth4Rail, Amersfoort, The Netherlands.
- September 19, 2023, "Joint WP8 and WP9 meeting IAM4RAIL". IAM4RAIL Meeting, Amersfoort, The Netherlands.
- September 6-7, 2023, "Kickoff meeting Pods4Rail". DLR, Stuttgart, Germany.
- March 7-8, 2023: "A digital twin architecture for a dynamic catalog of rail surface defects". Cyber Resilience and Quantum Computing in Railway Engineering and Operations, College Park, Maryland, USA. Work by W. Phusakulkajorn, J. Hendriks, J. Moraal, A. Núñez, and Z. Li.
- June 15, 2022: "RCF detection including planned measurement campaigns", I2T3 Consortium Project Meeting, Goteburg, Sweden, June 15-16, 2022.
- March 16, 2022: "In2Track3 Demonstrator Preparation in Sweden", Lulea, Sweden, March 16-18, 2022.
- October 29, 2019: "Virtual reality and convolutional neural networks for railway catenary support components monitoring". IEEE 22th IEEE International Conference on Intelligent Transportation Systems, Auckland, New Zealand, October 27-30, 2019.
- July 11, 2018: "A condition-based maintenance methodology for rails in regional railway networks using evolutionary multi-objective optimization: Case study line Braşov to Zărneşti in Romania". IEEE World Congress on Computational Intelligence, IEEE WCCI 2018, 2018 Congress on Evolutionary Computation (IEEE CEC 2018), Rio de Janeiro, Brazil.
- June 6, 2018: "Decision support tool based on multi-source data analysis for the tram wheel-rail interface". 15th IFAC Symposium on Control in Transportation Systems (CTS 2018), Savona, Italy.
- June 6, 2018: "Multi-objective performance evaluation of the detection of catenary support components using DCNNs". 15th IFAC Symposium on Control in Transportation Systems (CTS 2018), Savona, Italy.
- May 31, 2018: "Axle box acceleration measurements in Romania". WP4 training workshop NeTIRail-INFRA Project, Paris, France.
- May 24, 2018: "Corrugation". Final Conference NeTIRail-INFRA Project, Ljubljana, Slovenia.
- May 24, 2018: "Axle box acceleration measurements in Romania: Faurei test ring and line Bartolomeu-Zărneşti". Final Conference NeTIRail-INFRA Project, Ljubljana, Slovenia.
- February 22, 2018: "Big data, examples, and challenges in railway systems". Technical workshop meeting at ProRail, Utrecht, The Netherlands.
- February 16, 2018: "Rail maintenance operations in regional railways – case study line Brasov to Zarnesti in Romania". Poster presentation at the 2nd Conference IN.NL 2018, Network of Chilean researchers in The Netherlands, Wageningen, The Netherlands.
- February 7, 2018: "WP4 Monitoring technologies: progress". NeTIRail-INFRA Project meeting, Freiburg, Germany.
- November 15, 2017: "PYRAMIDS project". Explorail program final conference, Amersfoort, The Netherlands.
- July 11, 2017: "A 3D finite element solution of coupled vehicle-track contact frictional rolling on short pitch corrugation". First International Conference on Rail Transportation (ICRT2017), Chengdu, China.
- July 11, 2017: "Train induced vibrations in crossings: correlation between wayside and train-borne measurements". First International Conference on Rail Transportation (ICRT2017), Chengdu, China.
- July 10, 2017: "Influencing factors for condition-based maintenance in railway tracks using a knowledge-based approach". First International Conference on Rail Transportation (ICRT2017), Chengdu, China.
- June 22, 2017: "Big data, examples and challenges in railway systems". Railway Colloquium, Section of Railway Engineering, Delft University of Technology, Delft, The Netherlands.
- June 7, 2017: "WP4 Monitoring technologies". NeTIRail-INFRA Project meeting, Delft, The Netherlands.
- March 13, 2017: "WP4 update". NeTIRail-INFRA Project meeting, Leeds, United Kingdom.
- February 10, 2017: "Section of railway engineering and case study on rail defects". 1<sup>st</sup> meeting IN.NL, Network of Chilean researchers in The Netherlands, Delft, The Netherlands.
- November 4, 2016: "ABA for detection of RCF: towards a demonstration for the NeTIRail-INFRA case study lines". Midterm Conference NeTIRail-INFRA Project, Brussels, Belgium.
- July 12, 2016: "WP4, measurements and planning, overall status". NeTIRail-INFRA Project meeting, Istanbul, Turkey.
- April 5, 2016: "Key performance indicators using an interval-based fuzzy prediction modeling to treat squats in railway infrastructures". Third International Conference on Railway Technology: Research, Development and Maintenance, RAILWAYS2016, Cagliari, Sardinia, Italy.
- March 23, 2016: "WP4: Monitoring and smart technology". End-user workshop NeTIRail-INFRA Project, UIC headquarters, Paris, France.
- March 22, 2016: "WP4, measurements, planning, overall status.". NeTIRail-INFRA Project meeting, UIC headquarters, Paris, France.
- October 29, 2015: "WP4 update". NeTIRail-INFRA Project meeting, Bucharest, Romania.
- June 15, 2016: "TUDelft Section of Railway Engineering and WP4 Monitoring and Smart Technologies". NeTIRail-INFRA Project kick-off meeting, Sheffield, United Kingdom.
- March 24, 2015: "Fuzzy maintenance decision support for treating squats in railway infrastructures". Joint Rail Conference 2015, JRC2015, San Jose CA, USA.



- March 24, 2015: "Automated detection of corrugation: Preliminary results in the Dutch network using axle box acceleration measurements". Joint Rail Conference 2015, JRC2015, San Jose CA, USA.
- Mar. 13, 2015: "Control predictivo hibrido para tráfico en autopistas usando paneles de velocidad variable discretos". 2nd International Workshop on Traffic and Transportation, Medellin, Colombia.
- Mar. 12, 2015: "Métodos tratables de control predictivo robusto para control de tráfico en autopistas". 2nd International Workshop on Traffic and Transportation, Medellin, Colombia.
- October 27, 2014: "Facilitating maintenance decisions on the Dutch railways using Big Data: The ABA case study". 2014 IEEE BigData Conference, Workshop on Large Data Analytics in Transportation and Railway Infrastructure, Washington DC., USA.
- April 8, 2014: "Automated monitoring system for insulated joints: preliminary results using axle box acceleration measurements". Second International Conference on Railway Technology: Research, Development and Maintenance, RAILWAYS2014, Ajaccio, Corsica, France.
- August 16, 2013: "Distributed fuzzy interval identification for traffic". International Workshop on Traffic and Transportation, Medellin, Colombia.
- August 15, 2013: "Modeling and control of a dynamic vehicle routing problem". International Workshop on Traffic and Transportation, Medellin, Colombia.
- August 14, 2013: "Fundamentals of control systems for dynamic traffic and transportation problems". International Workshop on Traffic and Transportation, Medellin, Colombia.
- December 12, 2012: "Distributed fuzzy confidence interval for traffic measurements". The 51st IEEE Conference on Decision and Control, CDC'12, Maui, Hawaii, USA.
- October 18, 2012: "Novel multi-objective based switching topology for HD-MPC controllers applied to a Hydro Power Valley". HYCON2-WP3 project meeting, Valladolid, Spain.
- September 26, 2012: "Multi-objective model predictive control for transportation". Lunch colloquium for the Delft Center for Systems and Control, Delft, The Netherlands.
- August 29, 2012: "Computational intelligence methods for traffic: Traffic monitoring using distributed interval fuzzy models and ant colony for dynamic traffic routing". Workshop on Large-Scale Complex Control Systems, 1st International Conference on Systems and Computer Science, Villeneuve d'Ascq, France. Work by Z. Cong, A. Núñez, B. De Schutter, and R. Babuška.
- July 9 and July 10, 2012: "Game theory based distributed MPC for traffic control", "Distributed Identification of Fuzzy Interval Models for traffic measurements". HYCON2-WP5 project meeting, Savona, Italy.
- June 28, 2012: "Distributed identification of the Cell Transmission traffic model: A case study". The American Control Conference 2012, ACC'2012, Montreal, Canada.
- September 2, 2011: "A new method for hybrid-fuzzy identification". 18th IFAC World Congress, Milan, Italy.
- February 7, 2011: "Integration of macroscopic traffic flow and microscopic emission models". HYCON2-WP5, Seville, Spain.
- January 25, 2011: "Multi-objective model predictive control applied to a dial-a-ride system". 90th Annual Meeting of the Transportation Research Board, Washington DC, USA.
- November 17, 2010: "Research on traffic management and control at the Delft Center for Systems and Control". HYCON2-WP5 project meeting, Grenoble, France.
- September 20, 2010: "Hierarchical multi-objective model predictive control applied to a dynamic pickup and delivery problem". 13th International IEEE Annual Conference on Intelligent Transportation Systems, Madeira Island, Portugal.
- September 2, 2010: "Design of a hierarchical model-based predictive controller for an integrated public transport system". HD-MPC project meeting, Delft, The Netherlands, 2-3 Sept. 2010.
- June 1, 2010: "Multiobjective-fuzzy optimization for hierarchical model predictive control". HD-MPC project meeting, Seville, Spain, 1-2 Jun. 2010.
- September 15, 2009: "Modeling based on Neural Networks, Takagi-Sugeno models and Particle filter". Seminar for the Center for Analysis and Modeling of Security (CEAMOS) group, Santiago, Chile. (together with D. Muñoz and F. Tobar).
- December 10, 2009: "Multi-objective predictive control applied to a dial-a-ride system". Transportation and Logistics Workshop, Reñaca, Chile, 8-11 Dec. 2009.
- August 26, 2008: "Hybrid predictive control for real-time optimization of public transport systems' operations". Bus Rapid Transit International Workshop, Santiago, Chile. Work by D. Sáez, C. Cortes, A. Núñez, M. Riquelme, F. Milla, and G. Otarola.
- July 8, 2008: "Hybrid predictive control for the vehicle dynamic routing problem based on evolutionary multi-objective optimization (EMO)". 17th IFAC World Congress, Seoul, South Korea.
- 2 May, 2007: "Estrategias de control predictivo para transporte público". Workshop ICHIO, Santiago, Chile. Work by C.E. Cortés, D. Sáez, A. Núñez, E. Sáez, M. Riquelme, F. Milla, A. Pillajo, and A. Tirachini.
- Mar. 26, 2007: Invited lecture "Estrategias en Tiempo Real para optimizar Operaciones de Transporte Público y Despacho de Vehículos: un enfoque de Control Predictivo". Presentation for the Course "Predictive Control" prof. Aldo Cipriano, Universidad Católica de Chile, Santiago.
- November 23-24, 2006: "Estrategias en tiempo real para optimizar operaciones de transporte público y despacho de vehículos: un enfoque de control automático (in Spanish)". V Congreso ITS, Santiago, Chile. Work by C.E. Cortés, D. Sáez, A. Núñez, E. Sáez, and A. Tirachini.
- August 7, 2006: "Hybrid adaptive predictive control for the multi-vehicle dynamic pick up and delivery problem based on genetic algorithms and fuzzy clustering". Double Workshop on Transport and Sustainable Cities, 7-11 July 2006, Santiago, Chile.
- July 7, 2006: "Hybrid predictive control for a dynamic pickup and delivery problem". Colloquium for the Institute of Transportation Studies group, University of California, Irvine, USA.





## **Other Academic Activities**

### **Member of Editorial Team, Organization Committee and International Program Committee**

- Member of the international committee of IEEE WCCI 2026, 21-26 June 2026 in Maastricht, The Netherlands.
- Member of the Technical Program Committee, Associate Editor, 2025 IEEE 28th International Conference on Intelligent Transportation Systems (ITSC 2025), Gold Coast, Australia, November 18-21, 2025.
- Associate Editor journal Intelligent Transportation Infrastructure, Oxford University Press. Period: January 2025 – today.
- Member of the international committee of the Sixth International Conference on Railway Technology: Research, Development and Maintenance, Prague, Czech Republic, September 1-5, 2024.
- Associate Editor journal Applied Soft Computing, Elsevier. Period: March 2024 – today.
- Guest editor, special issue "Advanced supervision, maintenance, and optimization for Intelligent Transportation Systems", journal Control Engineering Practice, August 2022 - October 2023. Editors: Prof. Zhigang Liu (Southwest Jiaotong University, China), Dr. Hongtian Chen (University of Alberta, Canada), Dr. Alfredo Núñez (TUDelft, The Netherlands), Prof. Yishen Lv (Chinese Academy of Sciences, China), and Prof. Lingxi Li (Indiana University-Purdue University, USA).
- Member of the Editorial Board of the journal Intelligent Transportation Infrastructure, Oxford University Press. Period: May 2022 to December 2024.
- Guest editor, special issue "Advances in monitoring of transportation infrastructures", journal Materials (MDPI), April 2021 – April 2022. Editors: Dr. Kumar Anupam, Dr. Alfredo Núñez, Dr. Katerina Varveri, and Dr. Zhen Yang.
- Member of the local organizing committee and a scientific conference committee member of the 2nd Conference on Circularity in the Built Environment (CiBEn), Delft, The Netherlands, November 24-26, 2021.
- Member of the international program committee of the 16th IFAC Symposium on Control in Transportation Systems, CTS2021, Lille, France, June 8-10, 2021.
- Guest editor, special issue "Monitoring and maintenance systems for railway infrastructure", journal Applied Sciences (MDPI), January 2020 – March 2021.
- Member of the international program committee of the 21st IFAC World Congress, IFAC2020, Berlin, Germany, July 12-17, 2020.
- Member of the editorial board of the journal IEEE Transactions on Intelligent Transportation Systems, IEEE. Period: From April 2019 up to date.
- Member of the international program committee of the 5th International Conference on Vehicle Technology and Intelligent Transport Systems, VEHITS2019, Crete, Greece, May 3-5, 2019.
- Guest editor for the special issue in the journal Wear of selected papers from the 11th International Conference on Contact Mechanics and Wear of Rail/Wheel Systems (CM2018). Guest editors: Zili Li (Delft University of Technology, the Netherlands), Mats Berg (Royal Institute of Technology, Sweden), David Fletcher (University of Sheffield, UK), Paul Meehan (University of Queensland, Australia), and Alfredo Núñez (Delft University of Technology, the Netherlands).
- Member of the organizing committee of the 11th International Conference on Contact Mechanics and Wear of Rail/Wheel Systems CM2018, Delft, The Netherlands, September 24-27, 2018.
- Member of the international program committee of the joint conference Fourth International Conference on Railway Technology: Research, Development and Maintenance, RW2018, and Eight International Symposium on Speed-up and Sustainable Technology for Railway and Maglev Systems, STECH2018, Barcelona, Spain, September 3-7, 2018.
- Member of the editorial board of the journal Applied Soft Computing, Elsevier. Period: July 2018 – March 2024.
- Member of the international program committee of the 15<sup>th</sup> IFAC Symposium on Control in Transportation Systems, CTS2018, Savona, Italy, June 6-8, 2018.
- Member of the international program committee of the Joint Conference MOVICI-MOYCOT 2018, Medellin, Colombia, April, 2018.
- Member of the international program committee of the 3rd International Conference on Vehicle Technology and Intelligent Transport Systems, VEHITS2017, Porto, Portugal, April 23-24, 2017.
- Member of the organization committee of the Ninth Triennial Symposium on Transportation Analysis, TRISTAN IX, Palm Beach, Aruba, June 13-17, 2016.
- Member of the international program committee of the 14<sup>th</sup> Symposium on Control in Transportation Systems, IFAC-CTS2016, Istanbul, Turkey, May 18-20, 2016.
- Member of the international program committee of the IEEE International Conference on Networking, Sensing and Control, IEEE ICNSC'16, Mexico City, Mexico, April 28-30, 2016.
- Member of the international program committee of the 2<sup>nd</sup> International Conference on Vehicle Technology and Intelligent Transport Systems, VEHITS2016, Rome, Italy, April 23-24, 2016.
- Member of the international program committee of the Third International Conference on Railway Technology: Research, Development and Maintenance, RW2016, Cagliari, Sardinia, Italy, April 5-8, 2016.
- Member of the international program committee of the Second International Conference on Railway Technology: Research, Development and Maintenance, RW2014, Ajaccio, Corsica, France, April 8-11, 2014.
- Member of the international program committee of the IEEE International Conference on Networking, Sensing and Control, IEEE ICNSC'14, Miami, Florida, USA, April 7-9, 2014.
- Special Session Chair of the International IEEE Conference on Intelligent Transportation Systems, IEEE-ITSC 2013, Steinberger Kurhaus Hotel, The Hague, The Netherlands, October 7-9, 2013.



- Member of the international program committee of the Eighth Triennial Symposium on Transportation Analysis, TRISTAN VII, San Pedro de Atacama, Chile, June 9-14, 2013.
- Organizer, HYCON2 Project Meeting/Workshop on WP5-Traffic, TU Delft, Delft, October 20, 2011.
- Co-organizer and program co-chair, "Industrial Workshop on Hierarchical and Distributed MPC". Leuven, Belgium, June 24 2011. Together with Moritz Diehl and Carlo Savorgnan (Katholieke Universiteit Leuven, Belgium).
- Technical support of a special issue for the Journal of Dynamics and Differential Equations, organized by Prof. Raúl Manasevich. I also supported the organization of the Pan-American Advanced Studies Institute (PASI) on Differential Equations and Nonlinear Analysis, which took place in Santiago, Chile, from January 10–21, 2005.

### Special Session Organization

- Special session "Smart technologies, digital twins and artificial intelligence for railway asset management," The Sixth International Conference on Railway Technology: Research, Development and Maintenance, Prague, Czech Republic, September 1-5, 2024. Together with Dr. Hongrui Wang (TUDelft, The Netherlands), Dr. Burchard Ripke (DB, Germany), Prof. Zhigang Liu (Southwest Jiaotong University, China), and Isidro Durazo (University of Cranfield, UK).
- Special session "Physics-Informed neural networks: Advancements and applications," IEEE World Conference on Computational Intelligence, Yokohama, Japan, July 1-7, 2024. Together with Dr. Hongrui Wang (TUDelft, The Netherlands).
- Special session "Condition detection and evaluation, system control and protection, data mining of railway track-vehicle-grid systems," International Conference on Sensing, Measurement & Data Analytics in the era of Artificial Intelligence, Xi'an, China, October 15-17, 2020. Together with Prof. Zhigang Liu (Southwest Jiaotong University, China).
- Chair of session about monitoring of wheel/rail systems at the 11th International Conference on Contact Mechanics and Wear of Rail/Wheel Systems CM2018, Delft, The Netherlands, September 24-27, 2018.
- Special session and Track Editor for the topic "Decision and Control in Railways," 15th IFAC Symposium on Control in Transportation Systems, University of Genova, Savona Campus, Italy, June 6-8, 2018.
- Chair, co-organizer special session on "Automatized Monitoring and Maintenance Systems for Railway Infrastructures," Third International Conference on Railway Technology: Research, Development and Maintenance, RW2016, Cagliari, Sardinia, Italy, April 5-8, 2016. Together with Dr. Zili Li and Prof. Bart De Schutter (Delft University of Technology, The Netherlands).
- Chair, co-organizer special session on "Automated Monitoring and Maintenance Systems for Railway Infrastructures," Second International Conference on Railway Technology: Research, Development and Maintenance, RW2014, Ajaccio, Corsica, France, April 8-11, 2014. Together with Dr. Zili Li and Prof. Bart De Schutter (Delft University of Technology, The Netherlands).
- Chair, co-organizer special session on "Traffic Flow Modeling, Identification and Control," 51st IEEE Conference on Decision and Control 2012, Maui, Hawaii, USA, December 10-13, 2012. Together with Domenico Bianchi (Università dell'Aquila, Italy) and Antonella Ferrara (Università degli studi di Pavia, Italy).
- Chair, co-organizer special session on "Traffic Modeling and Control," American Control Conference 2012, Montreal, Canada, June 29 2012. Together with Bart De Schutter (Delft University of Technology, The Netherlands).
- Co-chair, co-organizer, of two special sessions on Hierarchical and Distributed Model Predictive Control, "I. Fundamentals" and "II. Applications," 18th IFAC World Congress, Milano, Italy, 2011. Together with Bart De Schutter (Delft University of Technology, The Netherlands).
- Chair of tutorial "Data Mining and virtual sensors," VI IEEE Latin-America Summer School on Computational Intelligence, EVIC-2009, Santiago, Chile, December 15-18, 2009. Together with Marcos Orchard (Universidad de Chile, Chile).

### Others

#### Member of Teams

- October 2024 – present: Member of the Domain Acceleration Team (DAT) Infrastructure. DAT Infrastructure is one of the six DAT's of 4TU Building Environment, collaborating with the five Built Environment faculties of the four Technical Universities (TUD, TU/e, UTwente, WUR).
- July 2022 – present: Member of the Equity, Diversity, and Inclusion (ED&I) team of the Faculty of Civil Engineering and Geosciences. The ED&I committee gives solicited and unsolicited advice to the Faculty's managerial bodies.
- Mar. 2004 – present: IEEE Senior Member, Benelux Section, Computational Intelligence Society (CIS), and Intelligent Transportation Systems Society (ITSS).
- Mar. 2010 – present: Member IFAC Technical Committee TC7.4 Transportation Systems.

#### Professional courses

- "DVP—Bouwsteen: Ik kies voor... Aanspreken" by Railcenter to obtain a Safety Pass for fieldwork in the Dutch railway infrastructure, July 2024.
- "Coaching Traject" by Aletta Wubben, Delft, The Netherlands, nine sessions during 2024.
- "Empathic Communication" by Matthew Rich-Tolsma, Delft, The Netherlands, October 28, November 16 and 28, 2022.
- Hertz Training for Scientists course "Leadership Programme for Associate Professors" by Annemart Berendse, Delft, The Netherlands, November 1, November 22, December 6 and December 13, 2022.
- Teaching qualification UTQ, Delft University of Technology. Courses: "Development of Teaching and Active Learning" December 2016, "Teach" March 2018, "Supervise" June 2018, and "Assess" July 2018. Final certificate April 2019.
- Leeuwendaal course "Personal development program" by Itamar Sharon and Maryse van Boxel, Delft, The Netherlands, March 6-8, April 13, May 16, 2017.



- MIT Professional Education, Digital Programs, course "Tackling the challenges of big data," online course, May 5 - June 16, 2015.
- MIT Professional Education - Short Programs, course "Machine learning for big data and text processing," by Prof. Tommi Jaakkola and Prof. Regina Barzilay, MIT campus, Cambridge, MA, USA, June 8-12, 2015.
- 9<sup>th</sup> Short Course 2010, "Dynamic traffic flow modeling and control," by Prof. Markos Papageorgiou, Technical University of Crete, July 19-23, 2010, Chania, Greece.

**Languages:** Spanish (native), English (high level, C1-III\* high), and Dutch (middle level, A2-B1).

**Reviewer:** Reviewer of various journals and conferences in railways, transportation, and control systems. Reviewer of one book (Springer), book chapters, and projects, including the ETH Mobility Initiative (ETH, Swiss Federal Railways, Siemens LTD, and AMAG Group), ARIS public call for research projects in Slovenia (Slovenian research and innovation agency ARIS), ARRS evaluation of research programs on core funding grants (Slovenian Research Agency ARRS), Chilean Fondecyt research projects (Chilean science ministry) and MTR Research Funding scheme Hong Kong (MTR Academy, Hong Kong).