



**Integrated Transport  
Research Lab**



# 2025 ANNUAL REPORT

Scaling Research and  
Building the Future

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# Introduction

In 2025, the Integrated Transport Research Lab (ITRL) continued to build momentum into its next phase, strengthening integrated, system-level research and innovation in sustainable road transport. Building on the renewed long-term foundation established with KTH, Scania and Region Stockholm (and with Trafikverket as an adjunct partner) highlighted in last year's report, 2025 has been a year of expanding collaboration and sharpening focus on the system transition challenges ahead.

A major partnership milestone in 2025 is that Scania's affiliation with ITRL formally transitioned to the TRATON GROUP as of 1 July 2025, opening new opportunities to engage across TRATON's brands while keeping Scania in a leading role within the collaboration.

Throughout the year, ITRL has also strengthened its role as a convening

platform for researchers, partners, and public stakeholders. Examples include the ITRL Results Seminar, bringing together ongoing and completed projects across electrification, automation, and system transformation, and the Region Stockholm Day at ITRL, designed to deepen collaboration between regional planning authorities and the academic community and linked to Region Stockholm's 2025 call for research proposals.

In 2025, we saw five PhD students engaged in ITRL successfully defending their thesis.

In parallel, we launched five internally funded seed projects in strategic research areas (more on Page 7)—laying the groundwork for the next wave of innovation. These initiatives reflect ITRL's proactive approach to identifying emerging challenges and acting early to develop solutions with long-term impact.

# Become part of ITRL

ITRL is a collaborative research and innovation environment connecting academia, industry, and public actors to support the transition towards sustainable road transport. Engagement is possible through individual membership or organizational partnership.

## ITRL Membership

Membership is open to faculty, researchers, and students contributing to ITRL's mission. **Senior members** include KTH faculty and researchers. **Affiliated members** include researchers from partner organizations and other universities. **Junior members** include PhD students and postdoctoral researchers. Membership is individual and applications are reviewed by the ITRL Management Group.

[www.itrl.kth.se/about-us/become-a-member](http://www.itrl.kth.se/about-us/become-a-member)

**If your organization wants to collaborate with us, get in touch.**

Jonas Mårtensson—Director [jonas1@kth.se](mailto:jonas1@kth.se)

Andres Laya—Vice Director [laya@kth.se](mailto:laya@kth.se)

## ITRL Partnership Model

In 2025, ITRL implemented a refined partnership model designed to support long-term, system-level impact while remaining flexible to different forms of engagement.

Organizations can engage with ITRL through a three-tier partnership model: **Funding Partners** provide strategic direction and long-term financial commitment, actively shaping the research agenda. **Knowledge Partners** contribute domain expertise, collaborating closely in projects and proposal development. **Advisory Partners**, mainly public authorities, support alignment with societal and policy needs.

# ITRL Development

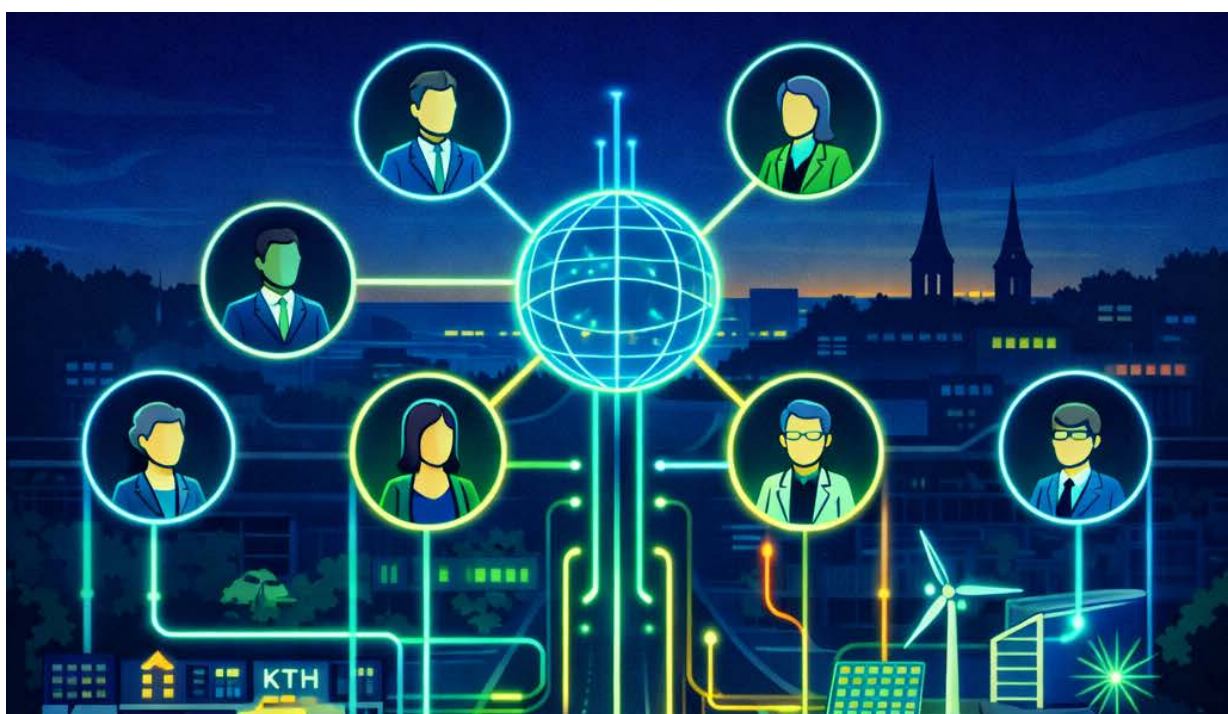
## Key Initiatives 2025

A central development in 2025 was the establishment of the ITRL Research Program Committee. The committee acts as a strategic mechanism for aligning research activities with long-term system transition needs. Two initial working groups were formed: one focusing on heavy road transport electrification, and one dedicated to strengthening European-level collaboration and positioning.

ITRL seed projects continued to play a strategic role. Building on the 2024 initiative, five new pre-studies were granted funding in late 2025.

These projects explore emerging research questions and are expected to mature into larger externally funded initiatives, with reporting and follow-up activities planned for 2026.

ITRL also broadened its collaboration base during 2025. Two new Knowledge Partners joined the center: Linköping University, strengthening academic collaboration beyond KTH, and H&M, contributing perspectives on logistics, supply chains, and sustainability transitions from a global industry actor.



# Featured 2025 Projects

## New projects

### E-charge 2

E-charge 2 aims to accelerate zero-emission long-distance (energy-intensive) truck transport by demonstrating a large-scale electrified logistics ecosystem—vehicles, high-power charging infrastructure, and efficient truck stop solutions—combined with new collaborations, business models, and policy pathways. The project runs 2025 to 2027 with a total cost of 205 MSEK (102 MSEK requested from FFI) and a consortium of 37 partners coordinated by Lindholmen Science Park.

### Sustainable & Integrated Urban Transport Systems Step 3 (HITS 3)

HITS 3 continues the HITS work on scaling solutions for sustainable distribution, secure deliveries, seamless deliveries, and dissemination across geographies. The project uses an agile approach to demonstrate and evaluate multiple logistics solutions in real-world environments. Total budget is approximately 38 MSEK (19 MSEK public funding) and the project is expected to run from 2025 to 2026.

## Pre-studies funded by ITRL

The pre-studies funded by ITRL in 2025 address early-stage, high-potential research questions aligned with ITRL's strategic priorities. They span topics including system-level impacts of electrification, business models for zero-emission freight, digital support for transport system transition, and governance challenges in integrated mobility systems.

These pre-studies are designed to foster cross-disciplinary collaboration, strengthen proposal readiness, and support the development of competitive applications to national and European funding programs.



These are the five ITRL pre-studies funded in 2025:

1. **RAZOR – Cutting Complexity in System Dynamics for Control and Policy Design.** PI: Matthieu Barreau, barreau@kth.se. With participation from KTH and Skogforsk.
2. **Towards a simulation model of the transition to a highly electrified road freight system.** PI: Anna Pernestål, pernestal@kth.se. With participation from KTH and Trafikverket.
3. **Pathways to automated road maintenance: investigating modern vehicles as a sensor to support automated road maintenance.** PI: Martin Törngren, martint@kth.se. With participation from KTH, VTI and Trafikverket.
4. **Remote Operation of Automated Vehicles: Legal, Technical, and Operational Challenges.** PI: Lin Zhao, linzhao@kth.se. With participation from KTH, TRATON and Region Stockholm.
5. **Exploring the provision of digital information through Stakeholder Perspective.** PI: Bhavana Vaddadi, vaddadi@kth.se. With participation from KTH and Trafikverket.



# Impact and publications

## Events

### Scania-KTH Conference

In October 2025, ITRL contributed to the Scania–KTH Research Day, a joint conference bringing together researchers from KTH and industry representatives from Scania and the wider TRATON Group. The event focused on research collaboration across vehicle technology, electrification, automation, and system integration, highlighting ongoing projects and identifying future collaboration opportunities. The conference reinforced ITRL’s role as a bridge between academic research and industrial application at scale.

### Region Stockholm Day at ITRL

The Region Stockholm Day at ITRL, held in April 2025, was designed to deepen collaboration between regional planning authorities and the research community. The event combined presentations, discussions, and matchmaking around Region

Stockholm’s priority areas, including transport system planning, electrification, and data-driven decision support. The day also served as a platform to connect researchers to Region Stockholm’s 2025 research call and to identify future joint initiatives.

### KTH joins CCAM, led by ITRL

During 2025, ITRL took on the role of coordinating KTH’s engagement in the European Partnership on Connected, Cooperative and Automated Mobility (CCAM). Through this role, ITRL strengthens KTH’s strategic participation in European research and innovation activities related to automation, digitalization, and integrated mobility systems. The coordination enhances international visibility, supports proposal development, and positions KTH and ITRL as key contributors to European-level system transformation efforts.

## Publications from ITRL in 2025

ITRL overall noted 19 journal papers, 6 conference papers, 5 PhD theses and 17 student theses. These publications are listed below:

### Journal Papers

1. Andruetto, Claudia et al. A system dynamics perspective on the willingness of freight receivers to pay for city hubs; 2025. In: Cleaner Logistics and Supply Chain, E-ISSN 2772-3909, Vol. 14, article id 100202.
2. Andruetto, Claudia et al. Exploring conditions for economic sustainability of city hubs adoption in urban logistics – a system dynamics approach; 2025. In: International Journal of Sustainable Transportation, ISSN 1556-8318, E-ISSN 1556-8334.
3. Axelsson, Agnes et al. Robots as Hosts in Autonomous Buses: A Field Trial; 2025. In: ACM Transactions on Human-Robot Interaction, E-ISSN 2573-9522, Vol. 15, no. 1, p. 1–42.
4. Azimi Abarghouyi, Seyed Mohammad et al. Hierarchical Federated ADMM; 2025. In: IEEE Networking Letters, ISSN 2576-3156, Vol. 7, no. 1, p. 11–15
5. Bai, Ting et al. A third-party platoon coordination service: Pricing under government subsidies; 2025. In: Asian Journal of Control, ISSN 1561-8625, E-ISSN 1934-6093, Vol. 27, no. 1, p. 13–26.
6. Bai, Ting et al. Distributed Charging Coordination for Electric Trucks Under Limited Facilities and Travel Uncertainties; 2025. In: IEEE Transactions on Intelligent Transportation Systems, ISSN 1524-9050, E-ISSN 1558-0016, Vol. 26, no. 7, p. 10278–10294.
7. Darwish, Rami et al. Contested Spaces: Business Model Tensions and Control Challenges in Industry-Converging Ecosystems; 2025. In: International Journal of Innovation Management, ISSN 1363-9196, E-ISSN 1757-5877, Vol. 29, no. 07n08.
8. Duan, Peihu et al. Robust data-driven Kalman filtering for unknown linear systems using maximum likelihood optimization; 2025. In: Automatica, ISSN 0005-1098, E-ISSN 1873-2836, Vol. 180, article id 112474.
9. Engholm, Albin et al. Impacts of electric and driverless heavy-duty trucks on the future decarbonized freight transport system: Analyzing techno-economic uncertainty using exploratory modeling and analysis; 2025. In: Transportation Research Part A: Policy and Practice, ISSN 0965-8564, E-ISSN 1879-2375, Vol. 199, article id 104576.

10. Engholm, Albin et al. Exploring “Many Objective Robust Decision Making” for managing uncertainty in climate policy analysis for the transport sector; 2025. In: *Transportation Research Interdisciplinary Perspectives*, E-ISSN 2590-1982, Vol. 32, article id 101524.
11. Eriksson, Anders et al. Power demand and queuing at heavy truck semi-public charging points: forestry transport as a case study; 2025. In: *European Transport Research Review*, ISSN 1867-0717, E-ISSN 1866-8887, Vol. 17, no. 1, article id 47.
12. Fidler, Martyna et al. Establishing an external validity of virtual environments in a micro-mobility context; 2025. In: *Transportation*, ISSN 0049-4488, E-ISSN 1572-9435.
13. Guo, Jia et al. Temporal patterns of user acceptance and recommendation of the automated buses; 2025. In: *Travel Behaviour & Society*, ISSN 2214-367X, E-ISSN 2214-3688, Vol. 38, article id 100909.
14. Li, Yuchao et al. Parallel Model Predictive Control for Deterministic Systems; 2025. In: *IEEE Transactions on Automatic Control*, ISSN 0018-9286, E-ISSN 1558-2523.
15. Narri, Vandana; Alanwar, Amr; Mårtensson, Jonas; Pettersson, Henrik; Nordin, Fredrik; Johansson, Karl Henrik. Situational awareness using set-based estimation and vehicular communication: An occluded pedestrian-crossing scenario; 2025. In: *Communications in Transportation Research*, Vol. 5, Article 100190. Elsevier. ISSN 2772-4247.
16. Raoofi, Zeinab et al. System-level impact of electrification on road freight transport efficiency; 2025. In: *npj Sustainable Mobility and Transport*, E-ISSN 3004-8664, Vol. 2, no. 1, article id 42.
17. Raoofi, Zeinab et al. Electric truck adoption and charging development: Policy insights from a dynamic model; 2025. In: *Transportation Research Part D: Transport and Environment*, ISSN 1361-9209, E-ISSN 1879-2340, Vol. 139, article id 104515.
18. Zackrisson, Anton et al. Data-driven analysis of strategic–operational interfaces in freight electrification under deep uncertainty; 2025. In: *Transportation Research Part D: Transport and Environment*, ISSN 1361-9209, E-ISSN 1879-2340, Vol. 139, article id 104524.
19. Zeng, Yikai; Bai, Ting; Mårtensson, Jonas; Wang, Meng. Real-time privacy-preserving coordination for cross-carrier truck platooning; 2025. In: *Control Engineering Practice*, Vol. 164, Article 106452. Pergamon. ISSN 0967-0661.

## Conference Papers

1. Andreolli, Raphael et al. Energy Consumption Evaluation of Emerging and Current Vehicle Fleets in Urban Logistics; 2025. In: *Transport Transitions: Advancing Sustainable and Inclusive Mobility – Proceedings of the 10th TRA Conference 2024*, Cham: Springer, p. 375–381.
2. Arfvidsson, Kaj Munhoz; Hadjiloizou, Loizos; Jiang, Frank J.; Johansson, Karl Henrik; Mårtensson, Jonas. pyspect: An extensible toolbox for automatic construction of temporal logic trees via reachability analysis; 2025. In: *Proceedings of the IEEE 64th Conference on Decision and Control (CDC)*, pp. 6911–6918. IEEE.
3. Bin, Elisa; Fodor, Gábor; Mårtensson, Jonas. Interference-aware joint user association and resource allocation; 2025. In: *Proceedings of the 8th International Conference on Advanced Communication Technologies and Networking (CommNet)*, pp. 1–7. IEEE.
4. Vallinder, Gustav et al. Time-Optimal Lane Change for Tractor-Semitrailer on Varying Road Friction: Performance Bounds for Autonomous Driving; 2025. In: *12th IFAC Symposium on Intelligent Autonomous Vehicles, IAV 2025*, Phoenix, United States of America, May 7 2025 - May 9 2025.
5. Wong, Annika; Tang, Zhiqi; Jiang, Frank J.; Johansson, Karl Henrik; Mårtensson, Jonas. Beyond line-of-sight: Cooperative localization using vision and V2X communication; 2025. In: *Proceedings of the IEEE International Conference on Intelligent Transportation Systems (ITSC)*. IEEE.
6. Zhao, Lin; Nybacka, Mikael; Rothhämel, Malte; Mårtensson, Jonas. Exploring the learning rate of remote drivers: A simulator-based study with realistic feedback and delays; 2025. In: *The 29th International Symposium of the International Association for Vehicle System Dynamics (IAVSD 2025)*, Shanghai, China, Aug. 2025.

## Preprints and manuscripts

1. Chen, Xiao; Tang, Zhiqi; Johansson, Karl Henrik; Mårtensson, Jonas. Safe platooning control of connected and autonomous vehicles on curved multi-lane roads; 2025. In: arXiv preprint arXiv:2502.10180.
2. Wong, Annika; Tang, Zhiqi; Jiang, Frank J.; Johansson, Karl Henrik; Mårtensson, Jonas. Beyond line-of-sight: Cooperative localization using vision and V2X communication; 2025. In: arXiv preprint arXiv:2507.20772. Note: extended version of the ITSC 2025 conference paper.

## PhD Theses

1. Jiang, Frank J. Human-Centric Control Design for Safe & Connected Vehicles; 2025.
2. Chen, Xiao. Coordination for safe interactions of connected and automated vehicles on highways and intersections. 2025.
3. Palmberg, Robin C. O. Put your heart into it: What biometrics and behaviour can teach us about road users; 2025.
4. Raoofi, Zeinab. System-level impact of electrification on the road freight transport system: a System Dynamics approach; 2025.
5. Zhao, Lin. Remote Driving of Road Vehicles: Feedback Effects, Latency Compensation, and Driver Behavior; 2025.

***ITRL associated publications in 2025 can be found [here](#).***



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