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CSFM Mini-Conference on
**Technological Perspectives and
Scientific Challenges of
Automatic Train Operation**
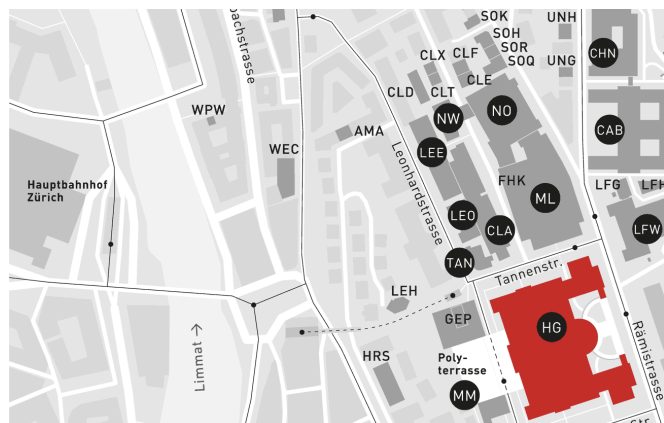
Conference-Program

CSFM Mini-Conference on
Technological Perspectives and Scientific Challenges of Automatic Train Operation

Save the date for the upcoming seminar on December 12, 2024, where we will delve into the future of rail transport with Automatic Train Operation (ATO). This technology promises to revolutionize train operations, potentially enhancing network capacity, traction energy efficiency, and infrastructure utilization. Despite its huge potential, several technological and organizational challenges remain.

Discover how ATO can transform the industry and what research is still needed, particularly in developing new and robust control regimes, to fully realize its benefits. Don't miss this opportunity to gain insights from leading experts.

Date, time & venue

Date:	Thursday, **12 December 2024**
Time:	14:00-18:30
Building:	HG (ETH Zentrum) Rämistrasse 101, Zürich
Room:	HG E3
GPS:	47.3765, 8.5475

Registration & Conference Page

Conference Page:

https://csfm.ethz.ch/en/outreach/whats-on/2024/12/ato-mini-conference.html

**Reserve your spot!
Registration is open:**

http://www.event.ethz.ch//CSFM_ATO_Mini-Conference

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Program

Time	Content / Title	Speaker
14:00	**Registration Coffee**	
	Session 1	
14:30	Welcome speech	Prof. Francesco Corman, Dr. Gloria Romera
14:40	Automatic Train Operation on high frequency lines: mitigation of aleatory factors to improve traffic regularity	Prof. Ricci
15:00	More trains, better connections, higher availability - rail traffic management using automatic train operation	Jonas Kley
15:20	ATO – Technical Challenges from an operator's perspective	Dr. Michael Matthias
15:40	Digital challenges of meter-gauge railways	Gerhard Züger
16:00	Approaches for a more sustainable railway enabled by driving assistance systems	Michael Nold
16:30	**Break**	
	Session 2	
17:00	Modelling and Analysis of Virtual Coupling under dynamic and uncertain railway operations	Prof. Quaglietta
17:20	ATO in Switzerland: Current projects and challenges in the railway industry	David Frei
17:40	Brown field ATO: Are cost-efficiency and social sciences key?	Dr. Markus Spindler
18:00	How quality can prevent innovation?	Markus Bolli
18:20	Closure	Prof. Francesco Corman
18:30	**Apero**	

Chairpersons: F. Corman (Session 1), M. Nold (Session 2)

Conference organisation

Dr. Gloria Romera Guereca
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Michael Nold
Lecturer at the Department of Civil,
Environmental and Geomatic Engineering | IVT

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Presentations & Abstracts

This event brings together the following leading experts from science, railway operations and industry to discuss the latest advancements and challenges on the topic:

Academia

Title: **Automatic Train Operation on high frequency lines: mitigation of aleatory factors to improve traffic regularity**

Abstract: Starting from operational analyses of high frequency line operated without Automatic Train Operation (ATO), theoretical formulations can be derived to measure, by suitable indices, the mitigating effects of aleatory factors achieved by the ATO implementation and the corresponding expected improvements of traffic regularity.

Speaker: Prof. **Stefano Ricci**, PhD (Sapienza University - Roma)

CV: Full Professor. Dean of Transport Area. Director of Post-Master Course in Railway Infrastructures and Systems Engineering. Teaching: Transportation Science and Economy (BSc), Railway Engineering (MSc), Maritime Transport (MSc). Coordinator of rail and maritime transport research area. Founder of University Spin-off Development & Innovation in Transport Systems.

Title: **Modelling and Analysis of Virtual Coupling under dynamic and uncertain railway operations.**

Abstract: The novel railway concept of Virtual Coupling envisages trains to exchange real-time information with each other via a Vehicle-to-Vehicle radio communication layer to allow them reducing the safe separation and moving synchronously within radio-linked platoons. Such a concept would unleash the full capacity potential of existing rail networks and meet the ever-growing rail transport demand. Many are however, the safety, technical and technological challenges yet to be solved to provide safe operations in a dynamic and uncertain railway environment where endogenous and exogeneous risks can occur. This presentation will illustrate safe operational principles and innovative models for assessing impacts of Virtual Coupling on train service and control performances in presence of risk factors due to e.g. delays in train communication, positioning errors or sudden emergency brake applications.

Speaker: Dr. ir. **Egidio Quaglietta** (Assistant Professor, TU Delft)

CV: Egidio Quaglietta is a tenured assistant professor at TU Delft and co-director of the Digital Rail Traffic Lab. He has been leading research on digital rail innovations including Moving Block, Virtual Coupling signaling and self-organsing rail traffic for European projects such as MOVINGRAIL, PERFORMINGRAIL and SORTEDMOBILITY. He has worked for international railway companies such as Ansaldo STS (now Hitachi STS), Network Rail and TrenoLab on simulation and optimization of rail signalling and operations. His main interests are in the areas of railway traffic and infrastructure optimization, innovative signaling technology and automated railway operations.

Title: **Approaches for a more sustainable railway which require driving assistance systems or ATO**

Abstract: The railway is a sustainable transport system. Due to climate change and political goals, the sustainability of the railway must also be further increased. In order to achieve this, new approaches and optimizations are being researched. Many of them require further automation of the railway system, such as driver assistance systems or ATO. This presentation will describe a selection of approaches to increase which require assistance systems or ATO to increase the railway's sustainability. On the one hand, well-known technologies such as energy-efficient driving are considered; on the other hand, the potential of new technologies is presented using the example of dynamic coupling.

Speaker: **Michael Nold**, Dipl.-Ing. (ETH Zürich)

CV: Michael Nold received the Dipl.-Ing. degree in mechanical engineering from the Karlsruhe Institute of Technology in 2014. He is currently pursuing the Ph.D. degree with the Chair of Transport Systems, Swiss Federal Institute of Technology, ETH Zurich. From 2014 to 2018, he worked as a Project Manager and an Engineer with Rhaetian Railway in the rolling stock division. Responsible for the system areas of responsibility: developments, calculations and measurement technology.

Approval

Title: **Brown field ATO: Are cost-efficiency and social sciences key?**

Abstract: ATO faces a challenging environment for automation, this is why focusing on functional challenges may not suffice: Cost efficiency in roll out and retrofitting, operational convergence and customer accepted incident resolution stay hotter topics than it seems. A quick overview and what's happening in ERJU's System Pillar on the topic.

Speaker: Dr. **Markus Spindler** (Sihl4 AG)

CV: Dr. Spindler's work focuses on software-based systems facing safety and security requirements. He is CEO of Sihl4 AG and contributes to the ERJU on behalf of Deutsche Bahn. He worked several years for Siemens and Thales, e.g., heading Thales' Swiss RAMS department for a decade during the Gotthard and Ceneri Tunnel projects. He contributed, e.g, to ERTMS, TSI, technical books, and is an IRSE member.

Title: **How quality can prevent innovation?**

Abstract: We look at the difference between industry level 3.0 and level 4.0. The new OR Art. 964b orders an End-to-End perspective overall. Writing this kind of report with WORD and ECXEL will fail because of the vast amount of data. This also applies to any RAMS report (EN50126 pp.; 2018/545). Any innovation is locked because of this 'state of the art'. Conclusion: Quality level 3.0 prevents innovation 4.0.

Speaker: **Markus Bolli** (Suprexa AG)

CV: Markus Bolli is CEO of the Suprexa AG in Switzerland. He is experienced and focuses on complex and highly integrated systems, like digitalization, automatization, ATO and ERTMS/ETCS-RAMS.

Railway Companies

Title: **Digital challenges of meter-gauge railways**

Abstract: The presentation reports on the current situation of the Swiss meter gauge railways and their joint work in the VöV ATO meter, special gauge/tram working group. Their objectives, the current development progress, and further procedures are reported. In addition, nextRAILplus is reported on in the overall system context.
(Note: German language presentation)

Speaker: **Gerhard Züger** (Zentralbahn)

CV: Gerhard Züger graduated in mechanical engineering (TS) and earned an MBA. He is head of production and rolling stock at Zentralbahn and head of VöV group ATO meter gauge, special gauge/tram.

Title: **ATO – Technical Challenges from an operator's perspective**

Abstract: We show potential applications of ATO at SBB and their rationale. Test results show certain technical implications. Currently, GoA2 works for EMUs but complex driving dynamics of freight trains require optimizations. One of the most promising use cases for ATO would be automatic stabling.

Speaker: Dr. **Michael Matthias** (SBB)

CV: Michael Matthias graduated in Astrophysics at the University of Heidelberg and got a PhD at the University of Basel. He has been working on several topics since 2001 at SBB. In recent years, he has focused on ATO specification, PoCs, and European standardisation.

Industry

Title: **ATO in Switzerland: Current projects and challenges in the railway industry**

Abstract: Automatic Train Operation (ATO) has been the subject of much discussion for several years. However, implementation is progressing more slowly than initially expected. Nevertheless, various ATO projects are currently underway in Switzerland. This talk presents and discusses various examples and challenges of ATO in the rail industry.

Speaker: **David Frei** (Stadler)

CV: At Stadler Signaling AG for around 4 years. Current position Head of Sales & After Sales

Title: **More trains, better connections, higher availability – rail traffic management using automatic train operation**

Abstract: Siemens is among the leaders in rail infrastructure operations technology – facilitating more trains, better connections, higher availability. The presentation will outline, how automatic train operations needs to be embedded in traffic management systems and will highlight achievements in existing reference implementations – both in Switzerland and internationally.

Speaker: **Jonas Kley M.Sc. ETH (Siemens)**

CV: Jonas Kley has been the Head of Product Management for Traffic Management Systems at Siemens Mobility since 2020. Previously, he gained over 15 years of experience in the public transport and railway industry in various companies and functions as a manager, system engineer and software developer.

Posters

- Markus Bolli (Suprexa AG)

- Adrian Egloff (Rail Systems Engineering AG)

- Dr. Dimitris Kouzoupis (FHNW)

- Jonas Kley (Siemens)

- Dr. Markus Montigel (Private Researcher, Past President IRSE)

- Michael Nold (ETH)

- Dr. Adrian Wagner (FH St. Pölten)

https://csfm.ethz.ch/en/outreach/whats-on/2024/12/ato-mini-conference.html

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