WFCS 2025 meets Rostock

The 21st edition of the IEEE International Conference on Factory Communication Systems (WFCS 2025) was held from 10 to 13 June 2025 for the first time in Rostock, Germany. This event occurred 30 years after the first edition that took place in Leysin, Switzerland.

The conference was hosted in the main building of the University of Rostock, which is the oldest university in the Baltic Sea region (founded in 1419) and the third-oldest university in Germany.

Like previous editions, the WFCS conference continues its tradition of focusing on the industrial sector as the only IEEE event dedicated explicitly to communications for automation systems. This deep connection is highly valued by researchers from both worlds (i.e., academia and industry) because it enables a perfect balance and synergy between theoretical and practical aspects. WFCS 2025 introduced several main novelties compared to past editions, in particular tutorials and demonstration papers. The conference was extended to four days for the first time in its history, to accommodate these events, especially tutorials.

The general chairs of the 2025 edition were Frank Golatowski (University of Rostock, Germany) and Stefano Scanzio (CNR-IEIIT, Italy), while the program chairs were Mohammad Ashjaei (Mälardalen University, Sweden) and Ramez Daoud (American University in Cairo, Egypt).

To have the best accommodation for tutorials, the first day of the conference was held in a separate building from the other days, the Institute for Applied Microelectronics and Computer Engineering (IMD), which is part of the Faculty of Electrical Engineering.

The first tutorial "Openwifi and its Wireless Times Sensitive Networking Extension: from basic principle to deep dive" was subdivided into three sub-presentations of 45 minutes each, which were done by Xianjun Jiaom, Jetmir Haxhibeqiri, Pablo Esteban Avila Campos (imec,

Figure 1: Xianjun Jiaom, Jetmir Haxhibeqiri, Pablo Esteban Avila Campos presenting the tutorial about Openwifi, and Levente Mészáros presenting the tutorial about OMNeT++.

IDLab, Ghent University, Belgium). These presentations (Fig. 8) described the Openwifi framework and hardware, its application for implementing wireless time-sensitive networks, and provided practical demonstrations and examples. Both tutorials offered technical and practical knowledge on topics relevant to industry and research. The second tutorial (Fig. 8) was about OMNeT++ and was titled "Simulating Time-Sensitive Networking using OMNeT++/INET Framework". It was held by András Varga and Levente Mészáros (OMNEST, Hungary). As part of the simulator development team, they provided highly accurate information on its application in real-world scenarios, offering interesting firsthand insights and suggestions. The afternoon was concluded with the presentation of five demonstrations (Fig. 2) and with the active interaction among the attendees of the conference.

The program for the subsequent three days was rich and full of interesting events, starting with the opening ceremony of the conference (Fig. 3). It comprised four regular technical tracks, one Work-in-Progress track and the related poster session (Fig. 4), and one demo papers track held on the first day. It was finally enriched with four special sessions and the related tracks: Wireless communication systems in real-world environments, Unlicensed Spectrum Technologies: The Next Frontier for Reliable Industrial Wireless, Intelligent Systems, and Artificial Intelligence for Industrial Networks and Distributed Applications, Communication Technologies for Rural Areas and Sustainable Agriculture. This year, the WFCS conference

Figure 2: Demo presentation and discussion.

initially had nine accepted special sessions, which is a record in the history of the conference. Regarding statistics, the WFCS conference confirms its high selectivity, with a global acceptance rate, excluding demo papers but including WiP papers, of 60%.

The entire conference took place in an atmosphere full of sociality and cross-fertilization opportunities (Fig. 5), in particular during the welcome cocktail on Wednesday (Fig. 6), June 11, which was held at the main building of the University of Rostock, and the next day during the gala dinner, which was held on boat cruising the scenic Warnow river. The gala dinner was an event rich of scientific and cultural exchanges (Fig. 7), which concluded with the ceremony of presentation of the Best Papers Awards.

In particular, two awards were recognized: for the best regular conference paper entitled "Seamless Roaming based on Distributed Multi-Link Operation over IEEE 802.11bn" assigned to Ben Mecklenburg, Ahmed Hasan Ansari, Bjoern Richerzhagen, Michael Bahr, Georg Carle, and for the best Work-in-Progress paper assigned to the paper titled "First Analysis of Time Synchronization for TSN networks with Hot Standby" with authors Mahin Ahmed, Lucas Haug, Raheeb Muzaffar, Damir Hamidovic, Armin Hadžiaganović, Hans-Peter Bern-
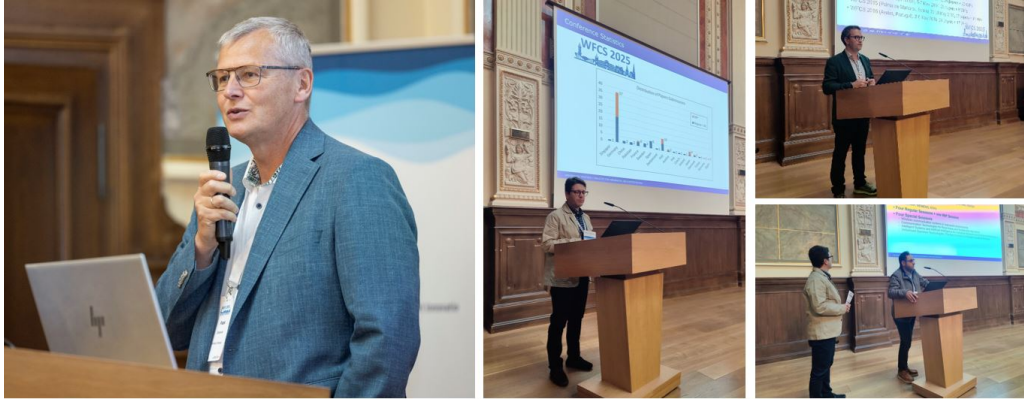
Figure 3: Frank Golatowski, Mohammad Ashjaei, Stefano Scanzio and Ramez Daoud during the opening ceremony of WFCS 2025.

Figure 4: Poster session associated to Work-in-Progress papers.

hard. During the second day of the conference, Prof. Axel Sikora presented the new edition of WFCS that will be held in 2026, April 21-24 in Offenburg, Germany (`https://www.hs-offenburg.de/wfcs2026`).

Two inspiring keynote speeches enriched the conference. The first was made by Kirsten Matheus (BMW, Germany) about "Communalities and differences in the quest for the optimum communication infrastructure in cars and factories". She analyzed communication infrastructure in factories and cars, giving the main insight regarding their growth, diversification, and evolution alongside EE architectures' development. The presentation examined the similarities and differences between the two industries where, in both sectors, Ethernet has been adopted as the primary communication technology. Instead, "Has the time come for flexible real-time sys-

Figure 5: Cross-fertilization and interaction with the audience during the conference.

tems?" is the title of the second keynote made by Luis Almeida (University of Porto, Portugal). In this talk, the speaker discussed the growth of IoT, IIoT, and edge computing in the context of real-time applications that require dynamic service management while maintaining strict timing constraints. The presentation examined adaptive real-time network protocols, with particular reference to software-defined networking, time-sensitive networking, and other technologies.

The last day of the conference included the Industry Forum (Fig. 9). The first part is characterized by four impulse talks given by João Lopes (NXP, Germany), Michael Bahr (Siemens, Germany), Filippo Dell'Agnello (IUVO, Italy), Kirsten Matheus (BMW, Germany), and aimed at inspiring discussion and new ideas. Impulse talks were followed by a very interesting and challenging panel discussion, which was moderated by Hans-Peter Bernhard (Silicon Austria Labs, Austria) and Valerio Frascolla (Intel, Germany), and it was composed of the following speakers: Kirsten Matheus, Filippo Dell'Agnello, Michael Bahr, and João Lopes.

Frank Golatowski finally concluded these four amazing days, thanking all the organizers, including the local organizers, for their excellent jobs. Many thanks to Thomas Rahr, University of Rostock, for taking care of the photos included in this article.

In summary, regarding the technical content, this year's edition of WFCS focused on the following main topics, subdivided into specific sessions: Live Demonstrations (interactive demonstrations on the latest cutting-edge technologies); Time-Sensitive Networking (TSN) and Inte-

Figure 6: General and Program Chairs during the welcome reception on Wednesday, June 11, 2025. From left to right: Frank Golatowski, Stefano Scanzio, Mohammad Ashjaei, Ramez Daoud.

gration to 5G (analysis of the synergy between TSN and 5G networks); 5G Networks (advancements and applications of 5G in industrial communication); Wireless Communication (recent advancements and technologies for resilient wireless systems); IoT Applications (implementation of Internet of Things networks in industrial settings); Security and Performance (improving the security and performance of industrial networks); AI for Industrial Applications (make use of artificial intelligence to enhance and optimize industrial processes); Work-in-Progress (presentations of ongoing research with an emphasis on future developments); Wireless communication systems in real-world environments special session (challenges and solutions for practical deployment scenarios based on wireless); Communication Technologies for Rural Areas and Sustainable Agriculture special session (using 5G, Internet of Things, and satellite connectivity to enhance precision agriculture), Intelligent Systems and Artificial Intelligence for Industrial Networks and Distributed Applications special session (use of AI for distributed systems and networks); Unlicensed Spectrum Technologies special session (dependable solutions for industrial applications based on wireless networks operating in unlicensed bands).

Figure 7: Gala dinner in the scenic Warnow river.

Figure 8: Keynotes of Kirsten Matheus and Luis Almeida.

Figure 9: Participants to the Industry Forum. From left to right: Valerio Frascolla, Kirsten Matheus, João Lopes, Michael Bahr, Filippo Dell'Agnello, Hans-Peter Bernhard.