Ben-Gurion University of the Negev
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IEEE ICASSP 2025 Conference
Participation Report

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In April 2025, I had the privilege of presenting my research at the IEEE ICASSP 2025 conference, held in the city of Hyderabad, India. My travel and participation were fully funded by the Israeli Smart Transportation Research Center (ISTRC), and I am deeply grateful for their generous support.

The IEEE ICASSP conference is dedicated to experts conducting research in signal processing, covering areas such as audio, speech, language, image, video, biomedical applications, and machine learning. In recent years, the conference has seen a growing number of presentations in emerging fields such as deep generative models, spatial audio, smart transportation systems, and data-driven communication technologies. The objectives of the conference are to foster high-quality research dissemination and promote professional interactions between industry and academia for the advancement of science, technology, and collaboration. As such, it provides an opportunity for scientists, professional engineers, and students to present their work, publish their results, exchange ideas, and build networks for future scientific and industrial partnerships. Leading technology companies such as Google, Meta, Microsoft, and others actively participate in the conference, contributing to the strong connection between cutting-edge research and real-world innovation.

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This was my first experience presenting at a conference, and I had the privilege of sharing my recent work, *"Learned Approximated Optimization for Rapid Low-Complexity Hybrid Beamforming Design"* [1], before peers. This opportunity allowed me to engage in valuable discussions with fellow researchers, exchange ideas, and explore potential future research projects and collaborations. I would like to highlight the following works, which particularly caught my interest and align with the ISTRC's mission to promote Zero Casualties, Zero Delays, and Zero Environmental Damage.

- **[1]** ***Enhancing Autonomous Driving through Dual-Process Learning with Behavior and Reflection Integration*** **–** This work introduced Dual-Process Learning (D-PL), a cognitive-inspired approach that improves autonomous vehicle decision-making by combining fast intuitive actions with careful analytical reasoning. By enhancing adaptability to rare and unexpected real-world scenarios, D-PL can significantly reduce the risk of car accidents.

- **[2]** ***Fine-grained Vital Sign Reconstruction through Machine Learning on Multi-channel Radar Signals*** **–** This study demonstrated the ability to monitor human vital signs contactlessly using radar. This technology is crucial for ensuring the safety of both drivers and passengers, allowing for real-time monitoring of vital signs. A possible application of this system is that, in the event of a health emergency inside the car, it can alert the relevant authorities and safely bring the vehicle to a stop.

- *Plenary Talk* ***- How Differentiable Simulation is Driving AI Innovation in Communication Systems*** **–** This Plenary was given by Jakob Hoydis a Principal Research Scientist at NVIDIA, in it he explains about the creation of differentiable simulators for communication systems which will allow end-to-end optimization and calibration of the systems. In the context of smart transportation this will allow optimizing communication in real-time and adapting to

dynamic conditions, enhancing the efficiency and responsiveness of connected transportation networks. This approach has the power to significantly reduce delays, enhancing both the speed and reliability of connected systems, which is critical for safe smart transportation solutions.

In conclusion, participating in ICASSP 2025 was a truly rewarding experience that greatly expanded my perspective on various signal processing applications. I would like to express my sincere gratitude to ISTRC for funding my participation.

Sincerely,

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[1] Milstein, Amit, Tomer Yablonka, and Nir Shlezinger. "Learned Approximated Optimization for Rapid Low-Complexity Hybrid Beamforming Design." *ICASSP 2025-2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2025.

[2] Zhang, Xiao, et al. "Enhancing autonomous driving through dual-process learning with behavior and reflection integration." *ICASSP 2025-2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2025.

[3] Li, Changming, et al. "Fine-grained Vital Sign Reconstruction through Machine Learning on Multi-channel Radar Signals." *ICASSP 2025-2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2025.