PLENARY TALK

Beyond Engines: AI's Transformation of Automotive Engineering

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Abstract:

Automotive engineering is undergoing a major transition from hardware-dominated machines to AI-defined, software-centric autonomous systems. Drawing on over 30 years of R&D experience, this keynote maps the trajectory of AI's impact—from the era of rule-based expert systems and "shallow" neural networks to the rise of deep learning and generative architectures.
We will examine the practical challenges of integrating AI within conventional vehicle systems and the strategic shift from modular autonomy to end-to-end self-driving models. The keynote reviews the state of autonomous vehicle development by contrasting lessons learned from reinforcement learning, game theory, and model predictive control with emerging research trends in generative autonomy. This session concludes with a glance at the open research problems—from physics-based world models to adaptation, long term memory and knowledge integration—that provide a roadmap for the future of mobility.

Short bio:

Dr. Dimitar Filev is Senior Henry Ford Technical Fellow in Control and AI at Ford Motor Company (retired). He is currently a Distinguished Fellow at the Hagler Institute for Advanced Studies, Texas A&M University. His research is focused on computational intelligence, AI and intelligent control, and their applications to autonomous driving, vehicle systems, and automotive engineering. He holds 146 granted US patents and has over 200 publications, h-index of 67. He has been awarded 6 times the Henry Ford Technology Award, the 2025 IEEE Technical Field Award for Emerging Technologies, the 2015 IEEE Computational Intelligence Pioneer's Award, the 2008 IEEE Systems, the Man & Cybernetics Norbert Wiener Award. He was inducted into the Hall of Fame of the Vehicular Technology Society. Dr. Filev is a member of the National Academy of Engineering and a Life Fellow of the IEEE. He was President of the IEEE SMC Society (2016-2017). He received his PhD. in EE from the Czech Technical University, Prague in 1979.