

Evolving Frontiers in Vehicle Motion Control and Autonomy

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Abstract: Vehicle motion control has undergone a profound evolution over the past several decades. Early contributions established foundational principles for enhancing roadway safety and improving energy efficiency through advanced, robust, fault-tolerant, and energy-efficient vehicle motion control algorithms. With the rapid emergence of connected and automated vehicles, the field has expanded beyond traditional performance metrics to include human-centric objectives such as trust, acceptance, intent interpretation, and socially compatible behaviors in mixed-autonomy traffic. This talk provides a technical overview of such a trajectory in vehicle motion control, highlighting key advances from classical control methodologies to contemporary frameworks that integrate sensing, learning, prediction, and human behavioral models. Emphasis is placed on how motion control strategies are reshaped by heterogeneous autonomy, the need for ensuring human acceptance, and the pursuit of socially harmonious interactions among human and machine drivers. The talk concludes with some open challenges and opportunities for next-generation vehicle motion control systems that simultaneously address safety, energy efficiency, human trust, and collective road harmony.

Vehicle Automation for Human Trust and Acceptance

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Abstract: We are living through a revolution in mobility. Advances in computing and communications are giving us the tools to rethink how ground transportation works—and to solve problems that have challenged us for decades. But real-world driving is more than algorithms and hardware. People—with all our unique characteristics—bring uncertainties that affect both safety and energy efficiency on the road. This talk will present work on intelligent vehicles that don't just drive themselves, but drive with us: safer, more efficient, and most importantly, attuned to the individual humans they serve. The key is human-centric, personalized automation: systems that learn, adapt, and work in harmony with their users and surroundings. By combining the strengths of data-driven learning, adaptive control, and a deep understanding of both human behavior and vehicle dynamics, we can create ground mobility systems that are not only intelligent, but trusted. The goal is clear: ground transportation that is efficient, safe, and fosters genuine cooperation between people and machines.