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Integrating generative AI, such as Large Language Models (LLMs), into autonomous driving technology offers transformative potential across perception, decision-making, and human-vehicle interaction. In this talk, we introduce LLM4AD, a framework that leverages LLMs to enhance human-autonomy teaming of autonomous driving through natural language understanding, situational reasoning, and personalized motion control. Our system includes a novel benchmark to evaluate instruction-following capabilities and employs a Retrieval-Augmented Generation (RAG)-based memory module for continuous learning, enabling adaptive control strategies based on human feedback. Extensive field experiments using a drive-by-wire-enabled autonomous vehicle demonstrate the system's ability to translate complex natural language instructions and environmental inputs into actionable control policies, achieving reductions in human intervention by up to 76.9% while enhancing safety, comfort, and alignment with user intent. Additionally, insights from a related study on an efficient on-board Vision-Language Model (VLM) reveal how real-world deployment of personalized motion control further bridges the gap between human preferences and autonomous vehicle behavior, setting new benchmarks in trust and reliability.