Toward a Shared Lateral Control Between Driver and Steering Assist Controller

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Abstract: Future driving assistance systems must be designed in order to guarantee a smooth steering control action of the controller continuously, considering the driver in-the-loop and without generating negative interference. This paper proposes the design of a shared lateral control in the framework of the active safety systems that integrates the coordination of the authority between human driver and automatic copilot. The vehicle steering assist controller is designed using a driver model in order to take into account the driver's intentions in particular during curve negotiation. This approach minimizes controller intervention while the driver is awake and steers correctly. To reduce the complexity in control computations, a simplified linear combination of the system state is determined via an optimal control by solving a Linear Quadratic Regulator (LQR) problem. A decision making algorithm for the control authority shifting between the driver and the electronic copilot is implemented and the trade-o? between the accuracy of lane following and ratio of system interference is investigated.

Keywords: human-machine cooperation, shared control, active safety, driver-vehicle interaction, lane keeping assist controller.