



ROLLOVER PREDICTION AND CONTROL IN HEAVY VEHICLES VIA RECURRENT HIGH ORDER NEURAL NETWORKS

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ABSTRACT—In this paper, a predictor is developed in order to estimate roll angle and lateral acceleration for tractor-semitrailers. Based on this prediction, an active control system is designed to prevent rollover for these vehicles. In order to develop this control structure, a high order recurrent neural network is used to model the unknown tractor semitrailer system; a learning law is obtained using the Lyapunov methodology. Then a control law, which stabilizes the reference tracking error dynamics, is developed using Control Lyapunov Functions and the inverse optimal control approaches. Via simulations, the control scheme is applied to the speed-only and speed-yaw rate trajectory tracking in a tractor-semitrailer during a cornering situation.

Key Words: Recurrent neural networks, rollover prediction, trajectory tracking, adaptive control, speed-yaw rate control