Fast and Continuous Look-Ahead Distance Control for Autonomous Vehicles

Fadel Tarhini*[1], Reine Talj[1], and Moustapha Doumiati[2]

[1]Heuristique et Diagnostic des Systèmes Complexes [Compiègne] – Université de Technologie de Compiègne, Centre National de la Recherche Scientifique, Centre National de la Recherche Scientifique : UMR7253 – France

[2]ESEO-IREENA Lab UR 4642 – École supérieure d'électronique de l'ouest [Angers] – France

Résumé

The advent of autonomous vehicles has brought about significant advancements in transportation technology, promising safer and more efficient means of travel. However, their full integration into society depends on the accuracy of path-tracking realised by a lateral controller. Lateral control is achieved by regulating the steering angle to minimise the lateral error between the vehicle and a target point at a look-ahead distance on the reference path. This abstract summarizes the performed investigation on the look-ahead distance as it is considered a key parameter that impacts vehicle performance, stability, and energy consumption. An explicit mathematical formulation is developed for the look-ahead distance as a function of veocity, road curvature, and adherence. Simulation results carried out in a joint simulation between Simulink/MatLab and SCANeR Studio vehicle dynamics simulator demonstrate the effectiveness of the developed model on vehicle performance, stability, computational efficiency, and energy consumption.

*Intervenant