A Dynamic Vision Sensor Controller for Lane Keeping

Motivation
Conventional cameras are important sensors used for navigation and mapping in robotics. Algorithms for image processing have been well developed, however they require a lot of computational power, cannot deal well with motion blur and image processing algorithms are sensitive to the illumination changes. To overcome this shortcomings, we would like to investigate the possibility of using Dynamic Vision Sensors (see https://inilabs.com) for automotive applications.

Task
We would like to develop a control algorithm (purely vision based) so that a vehicle can track the heading reference. Ideally, we would like to retain some theoretical guarantees given in [1]. While [1] gives sufficient conditions for stability in the case of a simple setup with one edge, it is unclear how this approach would behave in a more complex environment setup. The work done in [2], considers the general problem of tracking the given yaw angle, however doesn't give any guarantees for stability and considers merely the case of a pure rotation. By combining the ideas from the previous work, we hope to achieve the mentioned goal of autonomous lane keeping.

Working Packages
- Literature research, System modeling
- Controller design, Theory
- Simulation and Experimental Verification of the proposed algorithm on a 1:10 scale RC car
- (optional) Experimental verification on the full size go-kart

Skills Required
Control knowledge, good problem solving skills and fondness for theoretical problems and desire to work with hardware. Ability to conduct independent work.

Whom do I talk to:
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