Proposition de recherche doctorale

Autonomous vehicle: behavior prediction and Interaction with road users

Mots clés :

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- **Co-encadrant(s)** :
- **Unité de recherche** : INRIA-Paris
- **Ecole doctorale** : École Doctorale Informatique, Télécommunications, Électronique de Paris
- **Domaine scientifique principal**: Divers

Résumé du projet de recherche (Langue 1)

This PhD offer is part of the works conducted on driving automation but we will focus here on autonomous urban driving. It involves integrating the human behavior in the autonomous vehicle control strategy. This cognitive-founded strategy called "Daring" consists in having a behavior close to the one of a human drive in order to manage some tricky situations. For example, situations where it has to force the passage, and other situations where it has to impose certain behaviors to other users in conflictual situations. The scientific objective is to study and model the behavior of human drivers in their interaction with other road users to replicate similar behaviors in maneuvers and trajectories planning and in the autonomous control strategy. This is especially necessary in some specific situations requiring the automated system forces the passage for example, or impose a certain behavior to another road user to avoid standing still on the road. It also involves the prediction of the behavior of other road users and their trajectories before and after the strategy of "Daring". Work should integrate the driving rules including the respect of driving priorities. The PhD candidate will have to propose original ideas on the stated problems, especially in modeling and implementing a human driver behavior in the autonomous system using embedded perception (image processing, Lidars data processing, ultrasound, radar, etc.). References: [1] S. Bonnin, T. Weisswange, F. Kummert and J. Schmüdderich, “Accurate behavior prediction on highways based on a systematic combination of classifiers,” 2013 IEEE Intelligent Vehicles Symposium. [2] R. Graf, H. Deusch, F. Seeliger, M. Fritzsche and K. Dietmayer "A Learning Concept for Behavior Prediction at Intersections", 2014 IEEE Intelligent Vehicles Symposium, page 939-945, 2014. [3] P. Kumar, M. Perrollaz, S. Lefèvre and C. Laugier, “Learning-based approach for online lane change intention prediction,” 2013 IEEE Intelligent Vehicles Symposium. [4] A. Lawitzky, D. Althoff, C. Passenberg, G. Tanzmeister, D. Wollherr and M. Buss, “Interactive scene prediction for automotive applications,” 2013 IEEE Intelligent Vehicles Symposium. [5] M. Liebner, M. Baumann, F. Klanner and C. Stiller, “Driver intent inference at urban intersections using the intelligent driver model,” 2012 IEEE Intelligent Vehicles Symposium. [6] D. Petrich, T. Dang, D. Kasper and C. S. Gabi Breuel, “Map-based long term motion prediction for vehicles in traffic environments,” in 16th International IEEE Conference on Intelligent Transportation Systems, October 2013. [7] M.S. Shirazi, B. Morris, "Observing behaviors at intersections: A review of recent studies & developments," 2015 IEEE Intelligent Vehicles Symposium.

Résumé du projet de recherche (Langue 2)

Behavior analyzes and prediction are needed to improve the safety of drivers and pedestrians and to avoid collisions.

Informations complémentaires (Langue 2)

The work will be done in the RITS team of Inria Paris-Rocquencourt and in direct collaboration with a large industrial group with strong experience in autonomous driving. Methodologies proposed in this thesis will be validated on the test vehicles provided by RITS and the industrial partner. Before proceeding further, please contact: Anne Verroust-Blondet (anne.verroust@inria.fr).