Radio based Cooperative Positioning for Vehicle-to-Vehicle systems in Urban Scenario

A Goal Document for a Master’s Thesis Work

By

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1. Background and Motivation

As accelerating development in automatic driving industry, higher accuracy in car location is required, since the accuracy of GPS is about 10 meter and is easily blocked or attenuated by the tall buildings, trees, and pedestrian especially in Urban Scenario, contributing a larger error. The high solution location method is the urgent problem should be solved in this area.

2. Project Aims and Main Challenges

This master thesis aims at acquiring higher accuracy location down to 1 meter, which is assisted by the Wi-Fi sharing the information between vehicle and vehicle, such as data fusion of tracking the vehicle over a particular time. According to these information data fusion, find a possible model and possible solution to get a more correct positon. This is also the most challenges part in this theis.
3. Approach and Methodology

In order to fulfill high accuracy requirement in Urban scenario, some non-linear filters and tracking algorithm are used in this case, such as EKF (extended Kalman filter), UKF (unscented Kalman filter) and some other practicable filters. All these filter are the algorithm which are need to be simulated in the MATLAB or V2V software. Optimize the filter depending on the outcomes of the simulation. Since each filter has its advantage and disadvantage, balance these filters and find a best solution to the reality situation. At the end of thesis, we try to find out cooperative positioning solution with data fusion in the urban scenario and the practicable model to describe the data fusion in better way.

4. Previous work

Basic knowledge in this area can be found in [1][2][3][4].


5. Expectation

The title of this master thesis is a hot topic in automatic driving area nowadays. It is also an urgent problem should be solved for the sake of safety. Form this project, I should get well understand on how to handle with large data fusion and abstract the suitable model from them, which could be analyzed and optimized them to work in a better performance. This is also the main and most difficult part in the thesis. Besides, the knowledge I learnt in this master program, especially Channel modelling, would be very powerful method, helping me acquire in-depth knowledge in these areas as well.

6. Resources

According to this researching project, the only tools going to use are the simulation software, including MATLAB and V2V simulation. After discussion with principal in company, I would stay 2 days in college and 3 days in company to work on the project.

This goal document is approved by:

Main Supervisor  Examiner

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