

## GPS location improvements in cooperative systems

In daily traffic location information is becoming more and more important as navigation systems are becoming a standard driving accessory. This dependency will only grow in the future, as next generation cars are making the step towards automatic driving. By letting cars share information using vehicle-to-vehicle communication, car manufacturers are now actively creating systems in which the speed of a car is automatically controlled based on its own position and that of others. In systems such as these it is crucial for a vehicle to have accurate location information.

When using a commercial GPS receiver in an urban context, obstacles such as buildings cause bad satellite visibility and multi-path fading, which in turn cause significant location errors.

There are several possibilities to improve the accuracy:

- Using knowledge about your z-coordinate (elevation).
- Using differential correction.
- Using (Kalman) filtering.

Cooperative system technology (in particular communication with roadside devices) can make the improvement methods low-cost and practical.

Activities:

- Investigate the possibilities to perform location improvements with commercially available low-cost GPS-receivers.
- Work out the theory of using z-coordinate knowledge and differential correction in a V2I context.
- Work out the theory of using (Kalman) filtering to improve the on-board localization (possibly using directives from the infrastructure about possible paths)
- Make a proposal for the information that needs to be transmitted between infrastructure and vehicles.
- Make a practical demo implementation in the Peek hardware/software environment.
- Analyse results and report.

This is an external assignment to be completed (partially) at PEEK Traffic, Amersfoort. Their website can be found at <http://www.peaktraffic.nl/page/379>

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