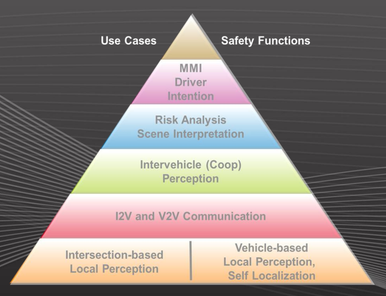

Vehicle Self-Localization
Cooperative Relative Positioning

Project Ko-PER

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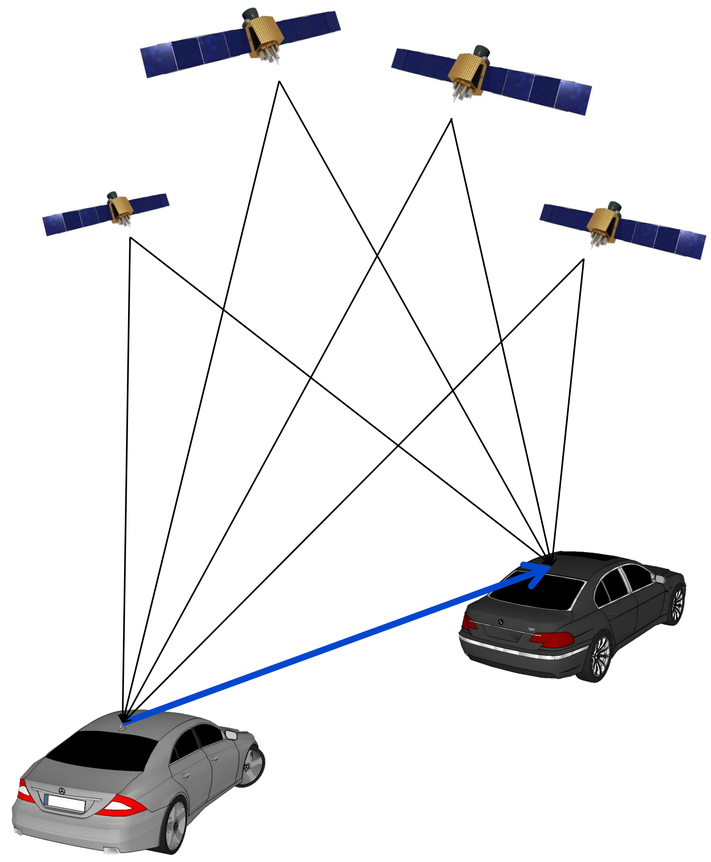
Relative positioning context

- Usage of available GPS hardware
- Usage of the V2V communication for data transfer
- Improved relative positioning between two vehicles

Example applications

- Deceleration detection in directional traffic
- Detection if two vehicles are located on the same lane
- Assignment of local perception information to communicated data



Why relative positioning?

- Influence of several error factors to the absolute GPS position
- Two adjacent vehicles have correlated errors
- Elimination of systematical errors due to relative observations of two vehicles
- Minimization of the total error

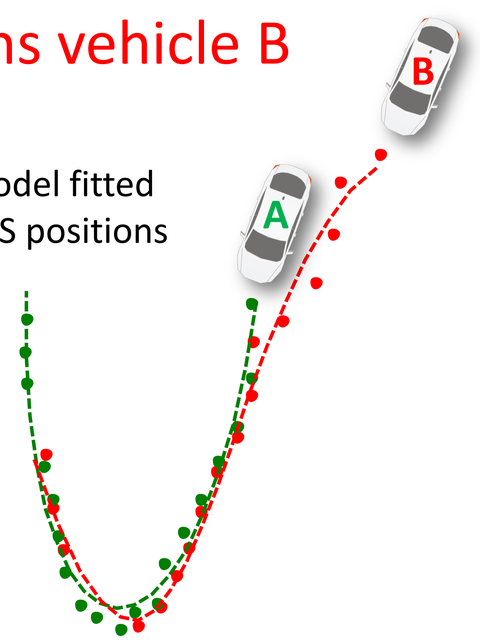
Approach

- Communication of GPS raw data
- Selection of common satellites
- Calculation of the positions of the GPS satellites
- Processing of pseudo-range measurements of cooperating vehicles
- Calculation of a relative vector

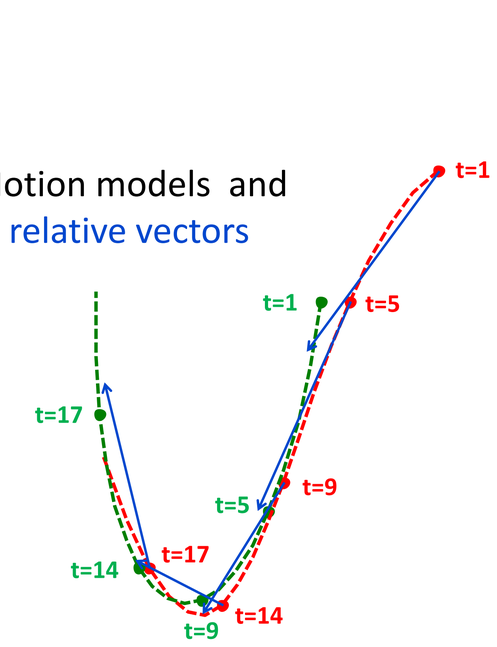
Results

- Two vehicles with low-cost GPS
- Positions vehicle A
- Positions vehicle B
- Relative vectors are robust against errors in the absolute GPS positions

Motion model fitted to noisy GPS positions



Motion models and relative vectors



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