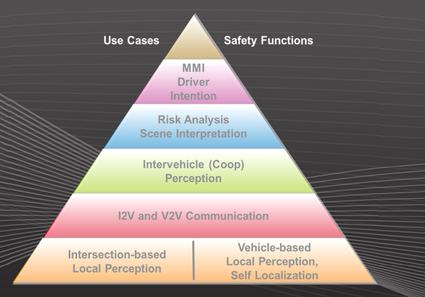

Vehicle Self-Localization Overview

Project Ko-PER

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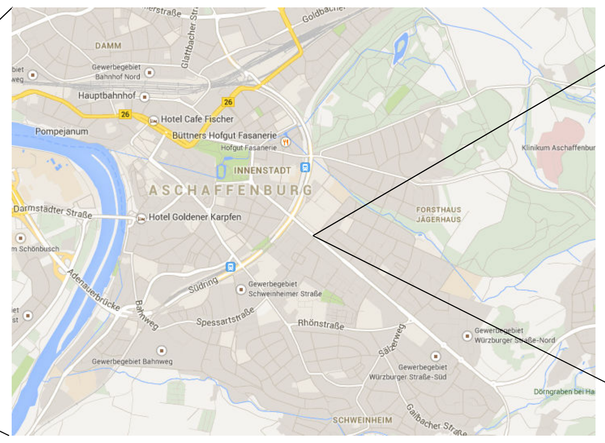
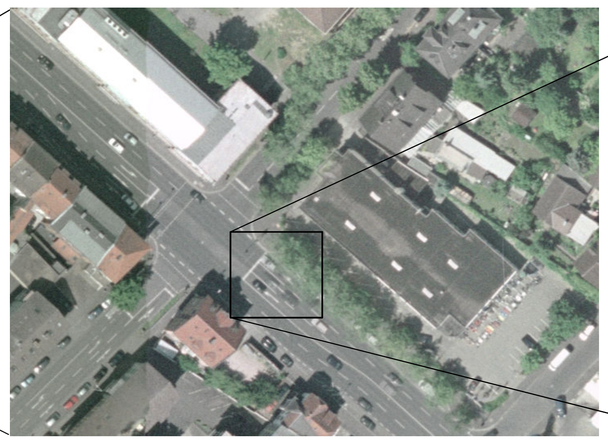
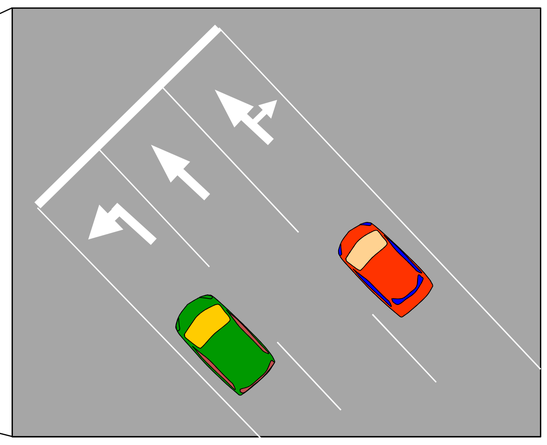
Vehicle self-localization: What is it?



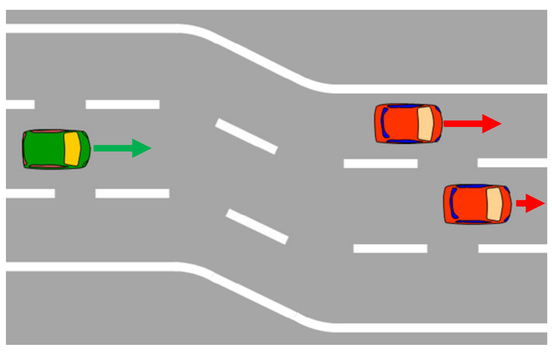




Maps: Google Maps; Sattelite picture: Bayrisches Landesvermessungsamt

What is the need for self-localization?

Example: Association of wireless transmitted data



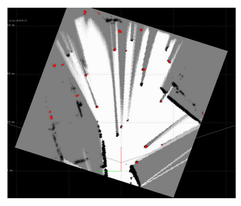
- One of the red car signals an emergency braking.
- What about the green car? Does it have to brake, too?
- Left: imprecise self-localization
  → Assignment of warning not feasible
- Right: very precise self-localization
  → Assignment of warning possible

Further examples

- Self-localization utilizing a precise digital map
- Association of received and perceived object data
- Determine distance to road & lane boundary
- Determine distance to stop line

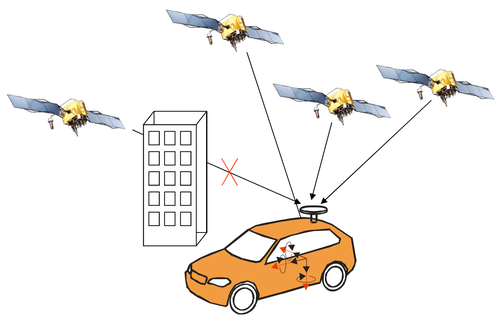
Investigated approaches of vehicle self-localization

Laser scanner, camera and digital maps



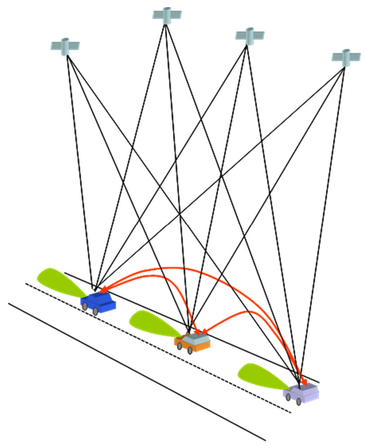
- Extraction of landmarks using laser scanners and cameras
- Association with landmarks from digital maps
- Estimation of vehicle position and orientation using e.g. Extended Kalman Filter

Tightly Coupled GPS/INS



- Fusion of inertial measurement data
- GPS raw data (pseudo-range)
- Works with even less than 4 satellites
- Increase availability and robustness of GPS-based self-localization

Cooperative GPS/GNSS



- Exchange GPS/GNSS raw data
- Determine relative positions
- Avoid inaccuracies due to systematic errors of GPS/GNSS

Ko-TAG-Transponder

- Receive intersection transponder signals including global position
- Determine relative position and orientation to transponder
- Derive vehicle´s global position

Evaluation of different self-localization approaches

Each self-localization approach has been evaluated by employing a reference system featuring cm-precision and reviewed for the use in different safety and comfort applications in vehicles.

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