Hybrid Sensor Networks
Improve Preventive Safety at Intersections

Motivation
German traffic accident statistics for 2012 [2]: 48% of all accidents in urban areas with personal injury occur at junctions and intersections.

Issue: Drivers are often overloaded in critical situations at intersections showing highest complexity.

Public Intersection Used as Test Site
- 5 and 3 lanes
- 3 crosswalks
- Bicycle lane
- Approx. 23,000 vehicles per day
- High VRU traffic volume

Architecture of Perception System

Laserscanner Subsystem
14 SICK LD-MRS research multilayer lasercanners:
- 4 horizontally aligned for central intersection area and crosswalks
- 8 vertically aligned for incoming lanes
- 2 for sidewalks, crosswalks and bicycle lane

Camera Subsystem
10 monochrome cameras:
- 2 high definition (HD) cameras for crosswalks and critical area (1)
- 4 VGA cameras for intersection center (2)
- 3 VGA cameras for intersection approaches (3)
- 1 top view camera for critical crosswalk area (4)

Sensor Calibration
Extrinsic calibration of all cameras and lasercans is done with different target devices. Global position reference measurements are done utilizing DGPS (WGS84).

Results [1]
All subsystems: Std. deviation in position < 17 cm
Time data assoc. error < 80 ms
HD cam. system: Absolute error in position < 20 mm (on ground plane) < 30 mm (2m above ground)

References