Traffic Awareness Driver Assistance based on Stereovision, Eye-tracking, and Head-Up Display

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Outline

• we present a system which monitors traffic and the driver’s attention to support driver awareness

• if the driver misses gazing at other vehicles or red traffic light, the system gives different warnings

• stereo camera, eye-tracker, head localization, HMI, acoustic warning
System Description

![System Diagram]

- **Vision**
  - Traffic light detection
  - Vehicle detection

- **Core**
  - Objects in gaze dir
  - Right of way analyzer
  - GPS localization
  - Car centered gaze dir

- **Gaze dir. estimator**
  - Head localization
  - Eyetracker

- **HUD and Acoustic**
  - Traffic light warning
  - Right of way warning

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Test Platform

- **Vehicle**: VW Passat Variant, modified by VW
- **Integration of sensor systems**, Drive- and Steer-by-Wire, CAN
- **Positioning system**: Applanix POS LV 510
  - IMU, odometer, correction data via UMTS
- **Camera systems**:
  - 2 INKA Cameras (HellaAglia)
  - Continental Lane Detection
- **Laser scanner**:
  - IBEO Lux 6-Fusion System
  - 3D Laser scanner: Velodyne HDL 64 E
- **Radar systems**:
  - 2 short range (BSD 24 GHz)
  - 4 long range (ACC 77 GHz)
  - 1 SMS (24 GHz)
Stereo Camera

• developed at Freie Universität Berlin

• uses FPGA and synchronized images to generate disparity map
Gaze Localization

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Head-Up Display
System at Work
Gaze Direction
Experimental Results

Histogram of traffic light hue values

Traffic light detection
For further discussion, please come to poster 3.9 at interactive session 2:50 p.m. (Weln-CaP3)