Project Ko-TAG

Transponder- and Camera-Based Advanced Driver Assistance System

Pedestrian Protection
- Movement Field
- Weighted Areas
  - Maximum pedestrian movement area based on a physiological model

Vehicle-Vehicle Protection
- Collision zone of the ego vehicle according to the impact direction
  - Probabilistic approach
  - Weighted movement areas

Object Tracking (EKF)
- State vectors for the object movement prediction and parameter estimation
- Measurement model with mounting offsets
- Vehicle ego motion compensation

System Architecture
- Sensors
  - Ko-TAG
  - Kinematic Sensors
  - Camera
- Tracking
  - Association
  - Correction
  - Prediction
- Categorization
- Fusion
- Collision Risk
  - Collision Risk Calculation
- Decision Module
- Hypothesis Generation
- Image-Based Detection
- HMI
  - Retractor
- Actuators
  - Autonomous Brake
  - Reversible Seatbelt Retractor

Continental Test Vehicle
- CSF 2xx Camera
- CV-Sensor Lidar
- ARS 301 Radar
- Ko-TAG2 Antenna

Hypothesis Generation
- Based on Ko-TAG Tracks (Homography)
- According to object dist., orientation and size
- Classification with HOG and linear SVM
- CPU (7ms) or GPU (6ms) for each pedestrian

Ko-TAG Transponder System
- Direction (DOA)
- Distance (TOF)
- OBU
- TAG

Results
- Pedestrians
  - 100% system activation for collision scenarios with vehicles
  - 83.7% avoidance, 16.3% mitigation
- Vehicles
  - 80% collision avoidance for crossing vehicles with 50 km/h
  - Excellent field of view of Ko-TAG

Demonstration Scenario
- Pedestrian crossing the street initially obstructed by parked vehicle
- Sensor vehicle approaches VRU and engages countermeasures in order to prevent a collision

V = 30 kph

Safe Driving State

System Activation