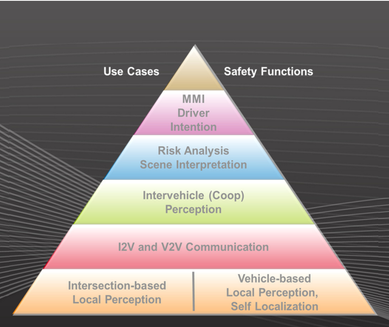


Scene Interpretation and Collision Risk Prediction

Project Ko-PER

FORSCHUNGSINITIATIVE
K O - F A S

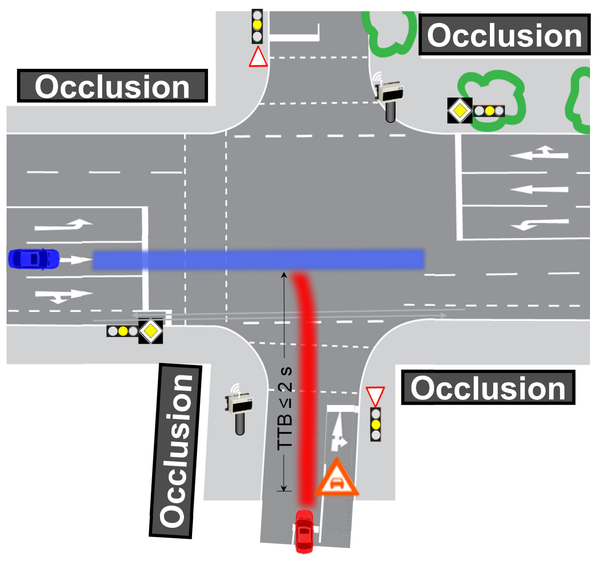
Context-Dependent Modeling for Situation Interpretation

Objectives

- Recognition of Driver Intention
  stop, turn L/R, straight, follow
- Risk Assessment

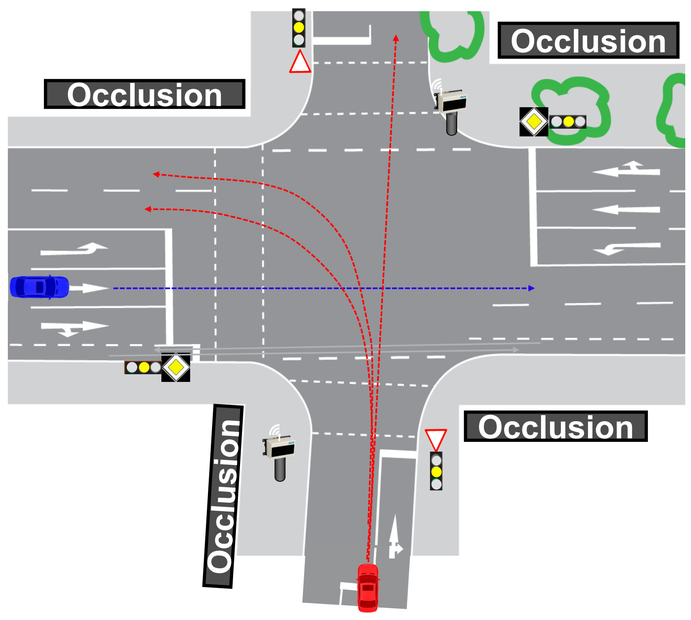
Goal

- Warn the driver 2 seconds before the last instant to avoid the collision by braking



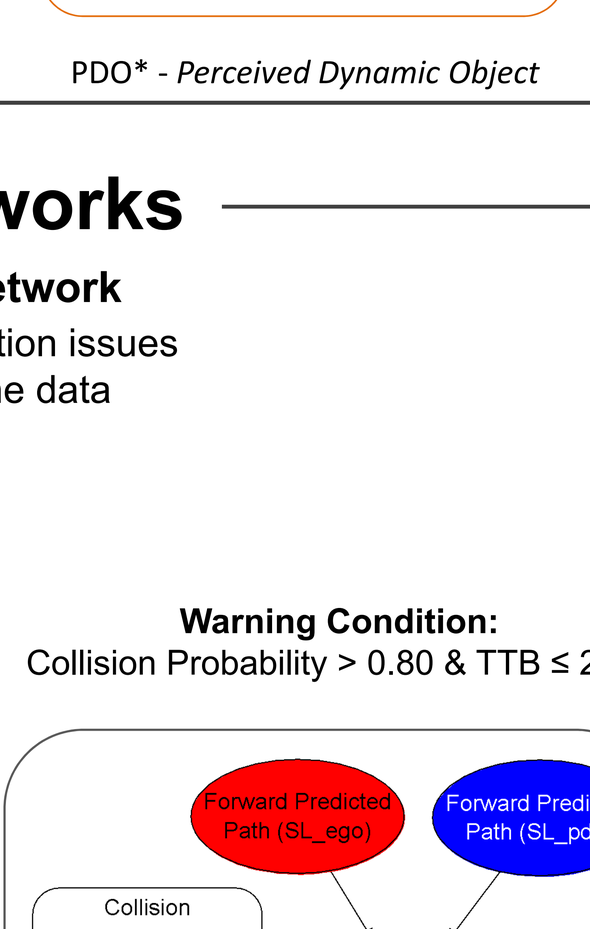
Input for Intention Recognition

- Assumptions:
  All vehicles follow the allowed lanes
- Digital Map:
  allowed maneuvers, priority rules
- Forward predicted paths (red, blue)



Aschaffenburg intersection:
Forward predicted paths to deliver all potential collision areas

System Design

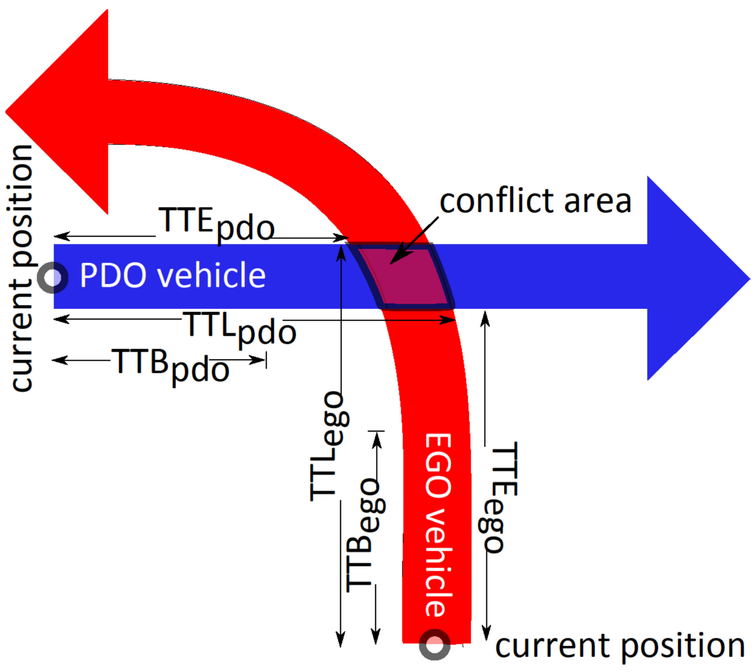


PDO* - *Perceived Dynamic Object*

Risk Assessment by Bayesian Networks

Situation Features

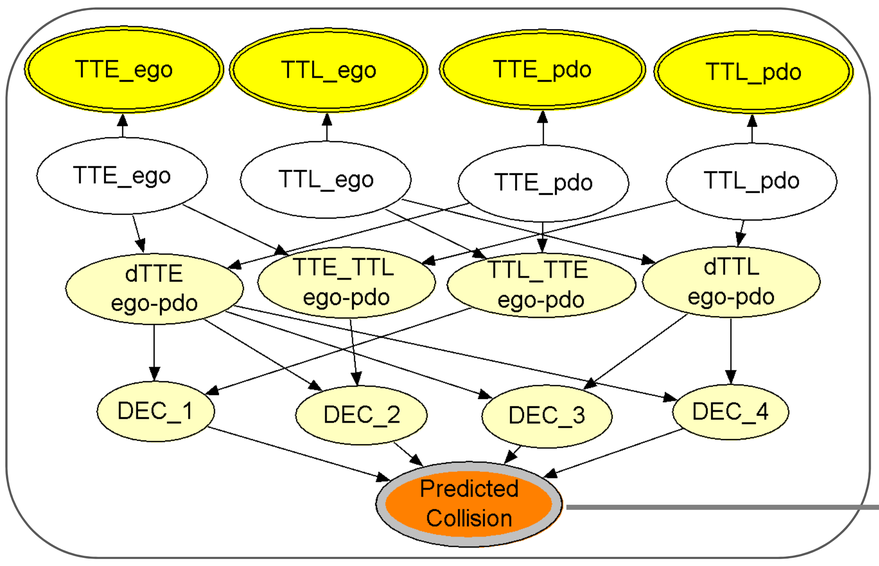
- TTx = {TTE, TTL} – Time to Enter/Leave
- TTB - Time to brake in order to avoid the collision
- SL – Significance level of a predicted path



TTE, TTL and TTB on the forward predicted driving paths of EGO and PDO vehicle

Object-oriented Bayesian Network

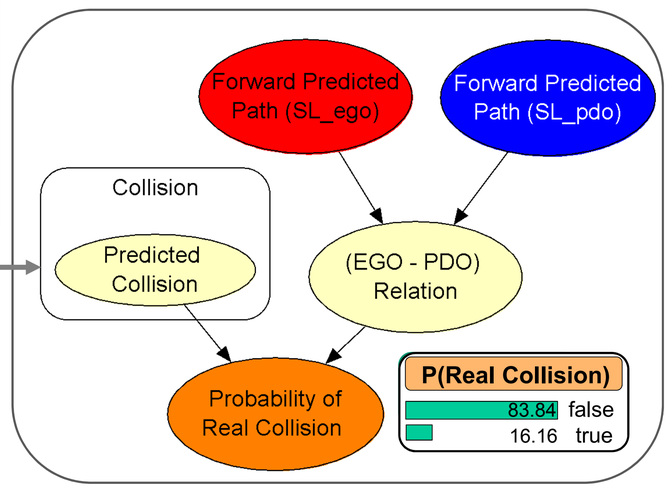
- Resolves combinatorial and interpretation issues
- Capable of handling uncertainties in the data
- Mimics human reasoning



Bayesian variable

Time values based on continuous Gaussian distributions

Warning Condition:
Collision Probability > 0.80 & TTB ≤ 2sec



Summary

- Scalable system approach
- Combination of forward path prediction with object-object relations → Reliable collision detection based on risk assessment
- Hierarchical object-oriented modeling → Creation of model libraries with generic OOBN-fragments → Easily extendable
- Successfully implemented and tested in the experimental vehicle

BMW Group Forschung und Technik
DAIMLER
hochschule aschaffenburg university of applied sciences
IZVW
UNIVERSITÄT PASSAU
Continental
DELPHI
ITE
SICK Sensor Intelligence.
ulm university universität ulm

Supported by:
Federal Ministry of Economics and Technology
on the basis of a decision by the German Bundestag