Summary of Multisensorial Systems Laboratory Project

Professorship
Communications Engineering

Mehmet Can Odabas, 667030

TECHNISCHE UNIVERSITÄT CHEMNITZ

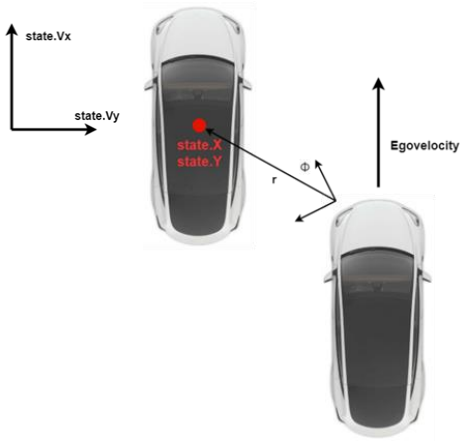
Forward Collision Warning System

The overall goal of this project is to develop - implement measurement and detection models for sensors used in forward collision warning system. The system calculates the 'time to collision' **(ttc)** to the closest object in the same lane as the ego vehicle and gives a warning if the **ttc** is below threshold. Integration between models which we create is done using **BASELABS Create Embedded**, a software solution for the fast and efficient development of sensor data fusion systems for automated driving functions. Implementation was done in a **C** environment.

Derive State Transition Matrix
It used to predict the future position of an object based on its current state (position and velocity). This matrix helps in estimating how the state of the object evolves over time.

↓

Radar Measurement Model
Performs necessary calculations based on the sensor's perspective and the vehicle's motion
A radar that observes the range, the azimuth angle and the doppler velocity of an object



This figure shows how the ego vehicle's sensor perceives a surrounding car. The relative position (range, azimuth) and relative velocity of a surrounding car detected by the sensor.

↓

Radar Detection Model
Determine the probability of a radar successfully detecting an object based on its position relative to the radar sensor

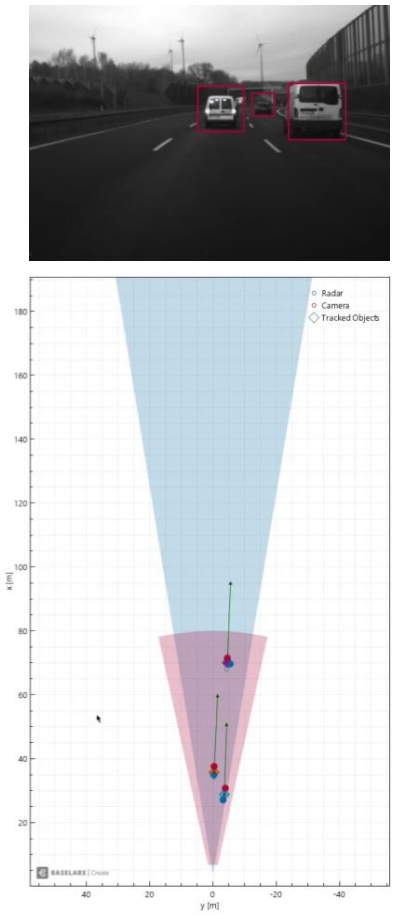
Radar Track Proposer
The track proposer determines which sensor measurement can be used to create new tracks..

↓

Camera Measurement Model
Projection of the 3D world coordinates onto the camera's 2D image plane via calibration matrix

↓

Camera Detection Model
Determines the probability of successfully detecting an object based on its position within the camera image



Ego vehicle camera view and bird's eye view of sensor fusion