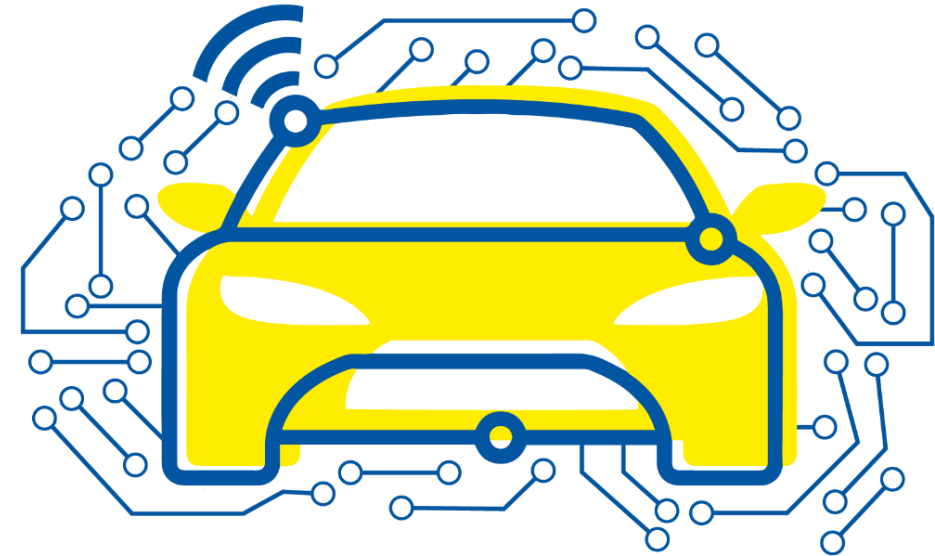**Automated and Connected Driving Challenges**

Section 3 – Object Fusion and Tracking

Introduction

Challenges

Prof. Dr.-Ing. Lutz Eckstein
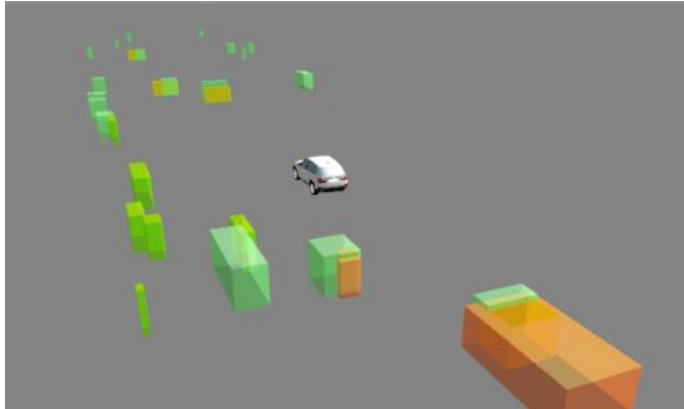
Institute for Automotive Engineering

Object Fusion and Tracking

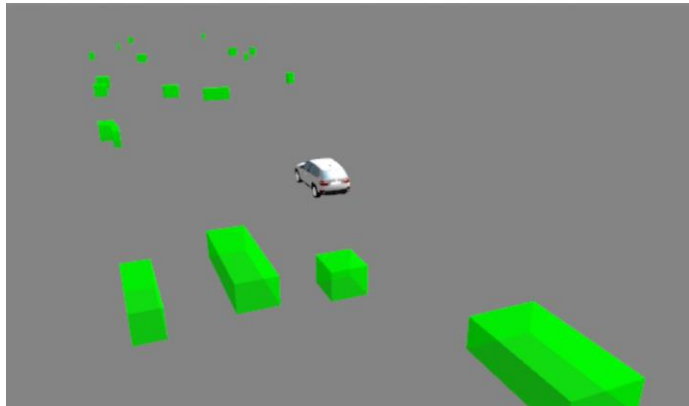## *Multi-Instance Kalman Filter: Input / Output and Challenges*

Input

- Detected objects of multiple sensors

Challenges

- Different sensor types with different measurement characteristics
- False detections (false positives)
- Missing detections (false negatives)
- Partially correct objects (incorrect orientation / classification / …)

Output

- Single list of tracked objects

Object Fusion and Tracking

Multi-Instance Kalman Filter: Input / Output and Challenges

Input

- Detected objects of multiple sensors

Challenges

- Different sensor types with different measurement characteristics
- False detections (false positives)
- Missing detections (false negatives)
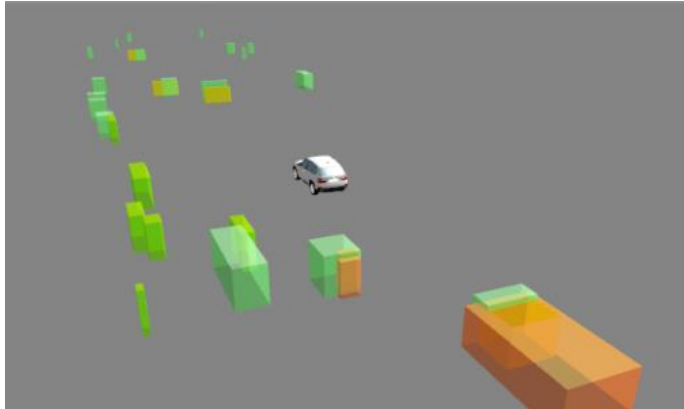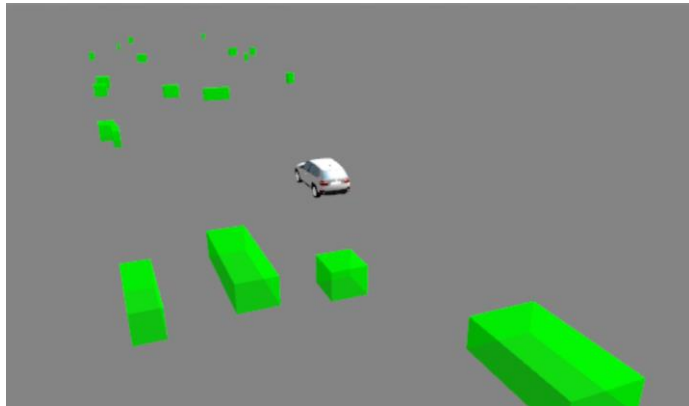- Partially correct objects (incorrect orientation / classification / …)

Output

- Single list of tracked objects
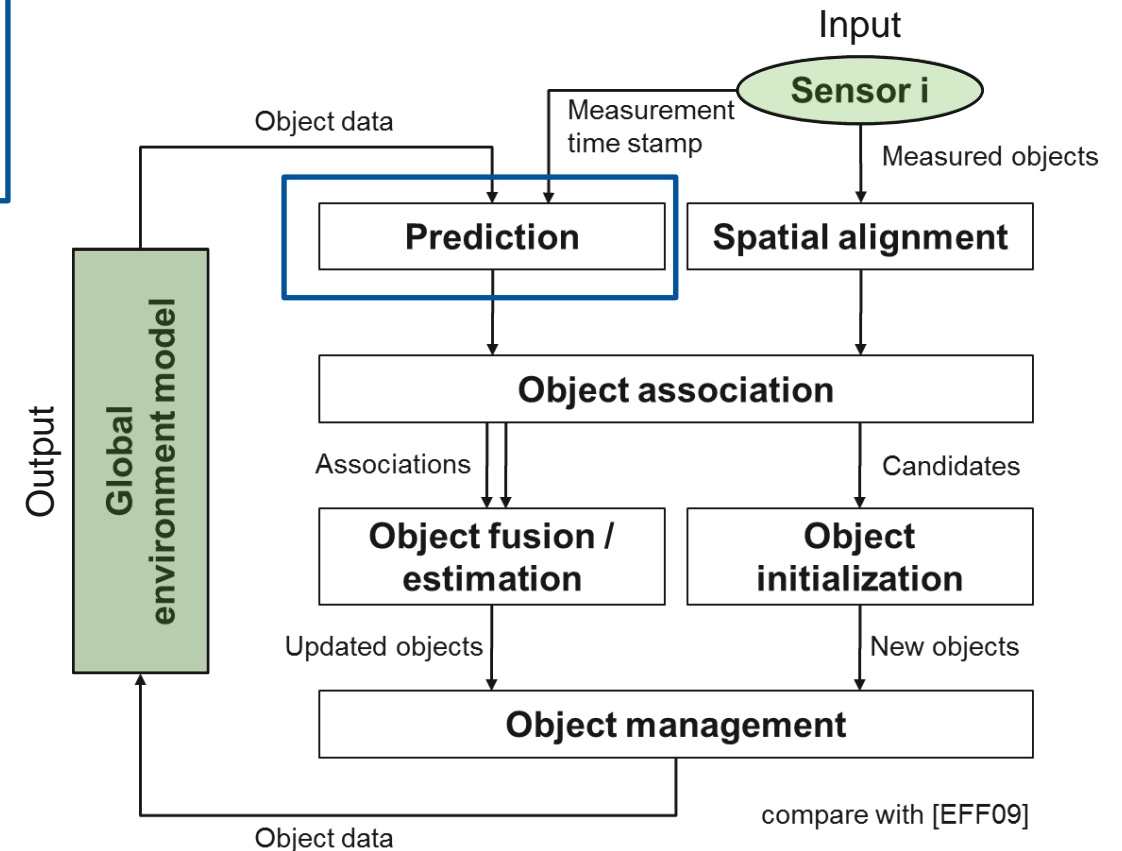
Object Fusion and Tracking

Challenges

→ **Three subsections**

Multi-Instance Kalman Filter

Object Prediction

- Temporally align sensor objects with global objects
- Use a motion model to predict state of the vehicle

compare with [EFF09]

Object Fusion and Tracking

Challenges

→ **Three subsections**

Object Prediction
- Temporally align sensor objects with global objects
- Use a motion model to predict state of the vehicle

Object association
- Efficiently associate sensor objects to global objects
- Find candidates for new global objects
- Mark undetected global objects

Object fusion
- Fuse all object states
- Minimize uncertainties

Multi-Instance Kalman Filter