KI DATA TOOLING
The Data Kit for Automotive AI

# Real Data Recording Campaign with Vehicle and Infrastructure Perspective

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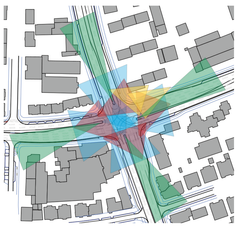
## Recording Vehicles

AVL, Bosch and Valeo are contributing their recording vehicles in order to provide sensor raw data for the KI Data Tooling dataset. Each of the three vehicles is equipped with video cameras, one or more LiDARs and an inertial navigation system. AVL's vehicle is equipped with its own roof top box, consisting of 4 cameras, 3 LiDARs and an IMU. Bosch and Valeo additionally use their respective radar sensors.

## Intersections in Aschaffenburg and Braunschweig

The TH Aschaffenburg equipped their research intersection with 6 high-resolution cameras, one high-speed camera and weather sensors. Two LiDARs will be installed for the final campaign. In Braunschweig the research intersection consists of 14 stereo camera systems and additional weather sensors. Those systems perceive the trajectories of motorised and non-motorised road users.



## Calibration and Synchronisation

For the fusion of the different sensors in one car, several cars or cars and the infrastructure, calibration in space and time is necessary. On the one hand, the sensors' translation and rotation to the origin of the vehicle needs to be determined. To fuse data of several cars and infrastructure sensors a precise global position is needed, e.g. through an IMU combined with GNSS and RTK data. In addition, the differences in recording timestamps must be known. Therefore a common time base, e.g. TAI or UTC received through a GNSS antenna, is needed. All data sources need to have a timestamp from a clock synchronised to the common time base. The highest precision is reached either using directly a GNSS antenna connected to the data source or using PTP (Precision Time Protocol), the state-of-the-art synchronisation mechanism to correct the drift of clocks and network delays. The described methods are realised by all partners such that there is a common way to use the data and to be able to combine data of several recording vehicles with or without the infrastructure.

## Recording Campaign at the Research Intersections

| Site | Date | Sequences |
|---|---|---|
| Aschaffenburg | 17.-19.05.2021 | 255 |
| Braunschweig | 28.-30.06.2021 | 317 |
| Braunschweig | 08.-10.02.2022 | 316 |
| Aschaffenburg | Fall 2022 | - |

## Processing Pipeline

- valeo
  - 20201223_105939_000v000_07500
    - ground-truth
      - 3d-bounding-box_json
        - 00000000_1608717621667652.json
        - ...
      - 2d-bounding-box_json
        - 00000000_1608717621719171.json
        - ...
      - semantic-group-segmentation_png
        - 00000000_1608717621719171.png
      - semantic-instance-segmentation_png
        - 00000000_1608717621719171.png
    - sensor
      - lidar_top
        - 00000000_1608717621667652.pcd
        - 00000001_1608717621757475.pcd
        - ...
      - camera_front
        - 00000000_1608717621719171.png
        - 00000001_1608717621813442.png
        - ...
      - camera_front_left
        - ...
      - calibs
        - lidar_top.json
        - ...
      - can.json
    - context.json

The sensor frames are extracted as single files named by their frame number in the sequence and the common timestamp. Every type of sensor has a specified data format for which libraries for reading it are publicly available (e.g. pcd, png, json). The collected real data is updated continuously in the project data platform along deliverable D2.

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