GROUND TRUTH SYSTEM - GTS
Localisation and objects detection in Urban Environment

Urban domain is the most challenging environment that CAVs can encounter, including vulnerable road users, complex junctions, challenging light exposure, and many other difficulties. In the Hi-Drive project we want to extend STLA ADF (Autonomous Driving Function) to urban domain. At a first step, we have to collect real world data in urban environment and design challenging scenarios for this future ADF. This enabler is designed using a top-roof system that can be mounted on different cars.

As the Oxford Reference defines it, "ground truth" refers to "the facts that are found when a location shown on a map, air photograph, or satellite image is checked on the ground, as validation."
The goal of this system is to capture the most accurate 360° field of view of a vehicle's environment, including all static and dynamic participants focusing on urban, but also functioning on rural roads and motorway domain.

This top-roof mounted system goal is to obtain a ground truth for precise localization of EGO and surrounded environment and participants in urban environment in order to collect urban scenarios for our future STLA ADF in urban environment.

The developed system will be able to:
- Detect all static and dynamic participants in a scene,
- Detect all infrastructure elements, such as horizontal and vertical road signs, traffic lights, barriers, lines, ...
- Detect V2X communication information,
- Position itself with very high accuracy,
- Generate high fidelity scenarios in urban environment.

Using live LIDAR data information, we can obtain an absolute 3D relocalization in an existing pre-recorded georeferenced data point cloud at centimetric level.
The ground truth system will contain hardware for perception and software for fusion and relocalization.

On the hardware side, the ground truth system will contain: 8 LIDAR, 1 panoramic CAMERA, 4 context CAMERAS, 1 GNSS receiver, 1 IMU, 2 V2X system, 1 RECORDER
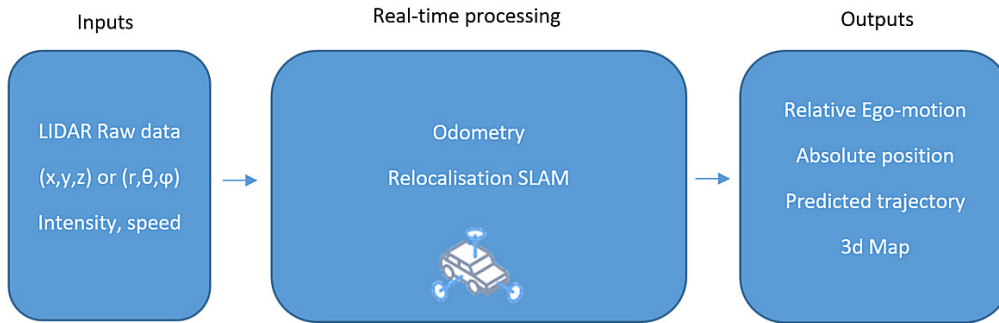
RTMAPS software will be used to collect and fuse data. Using different techniques, like LIDAR SLAM, we can estimate vehicle Motion and Navigation.

Roof Top for the Ground truth system

Ground Truth System I/O diagram

This system will be used to collect open-road urban driving scenarios for validation of a future STLA urban ADF.

We want to collect realistic urban scenarios on open-roads, including infrastructure definition, vehicles, and vulnerable road users, in various traffic conditions, for day and night.

To obtain the best from this ground truth system, we will first focus on good weather conditions.

Inputs

LIDAR Raw data
(x,y,z) or (r,θ,φ)
Intensity, speed

Real-time processing

Odometry

Relocalisation SLAM

Outputs

Relative Ego-motion

Absolute position

Predicted trajectory

3d Map

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