Deliverable D4.1

D4.1 Specification of Situation Understanding and Trajectory Planning Modules

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Document information

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Executive summary

Autonomous Driving is a prevalent trend in today's automotive industry. One of the main challenges that still remain for autonomous driving is the robustness of sensor systems including the subsequent processing steps like planning and driving functions to all weather and driving conditions. The RobustSENSE project's goal is to generate a multi-layered platform for tackling this problem to create a reliable situation map for vehicle control units in all possible outdoor conditions.

Just like modules of the lower sensor-dependent layers, high-level modules – such as scene understanding, scene prediction, behaviour planning and trajectory planning – need to cope with harsh weather conditions, too.

This report aims to describe the components of the situation understanding and trajectory planning layer, including the architecture of all hardware and software addressed in WP 4 as well as the specification of the mechanical, electrical and information interfaces.

The situation understanding and trajectory planning layer has been divided into four separate modules:

1. **Scene Understanding:** Identifies interactions among traffic participants and provides an interpreted understanding of the given traffic situation.

2. **Situation Prediction:** Predicts future behaviours and trajectories of traffic participants based on the environment model and scene understanding.

3. **Behaviour Planning:** Reduces the search space for trajectory planning by generating a semantic space from geometric space. Also plans safe semantic manoeuvre chains for the ego vehicle.

4. **Trajectory Planning:** Calculates provably safe trajectories using the environment model, enriched with the interpreted data from the remaining modules of this layer.

For each module a so-called Performance Assessment module ensures the correct performance regardless of the weather conditions. Through the combination of the individual Performance Assessment modules a coherent performance value can be provided for the situation understanding and trajectory planning layer to the system-wide performance assessment.