
Autoware Use Cases

Motivation for using Autoware @ Virtual Vehicle Research

PhD Thesis

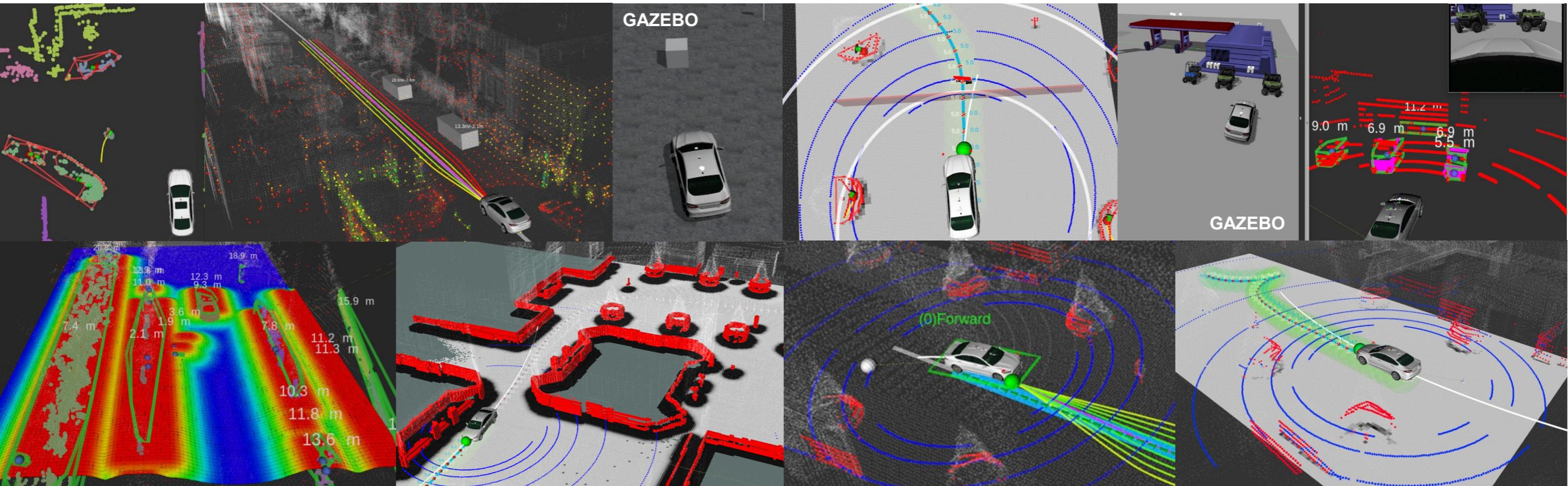
Autonomous Racing Graz



- To show any AD functionality you need a complete AD stack
- Interfaces / compatibility to simulation environments
- Environment for student projects



Motivation at Virtual Vehicle Research



Collision Avoidance System

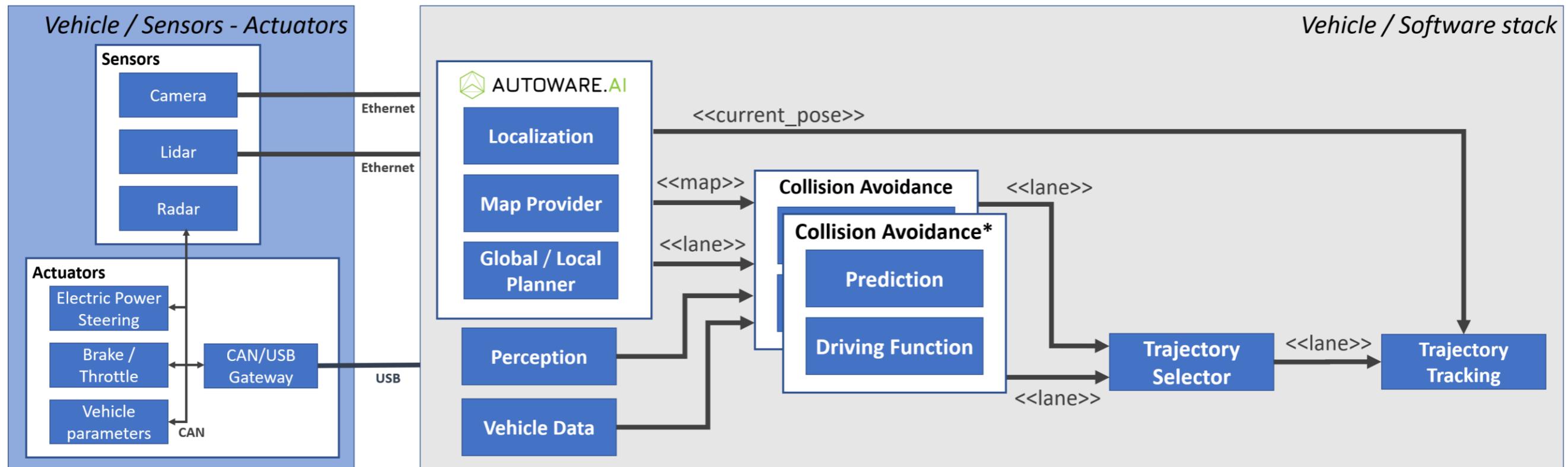
- Handling critical situations
(e.g. failure object prediction, disregarding of traffic rules)
- Emergency Braking / Evasion
- Interfaces:
 - Input:** Objects, HD map, trajectory from AD stack
 - Output:** Emergency intervention (trajectory)
- Autoware.AI as Automated Driving stack



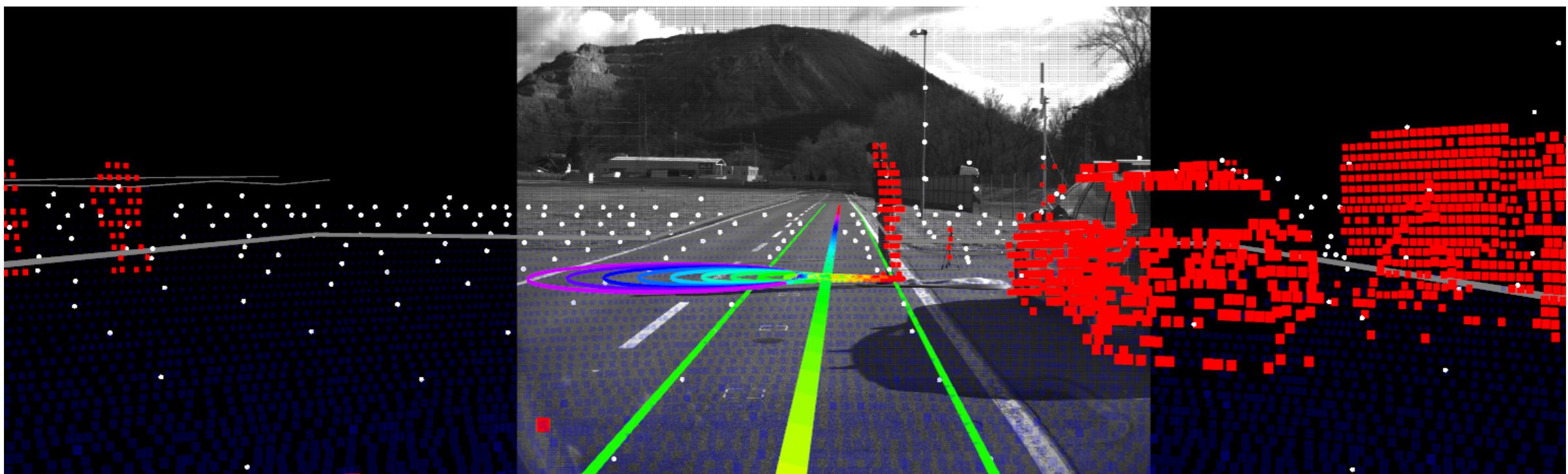
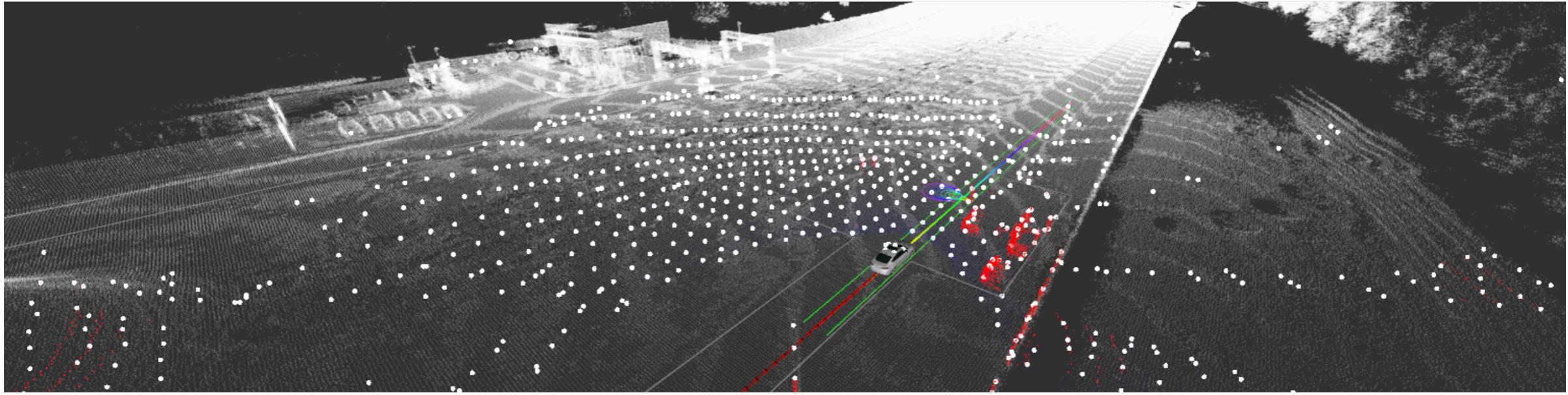
Pedestrian Collision Avoidance System for Autonomous Vehicles
DOI: <https://doi.org/10.4271/12-02-04-0021>

Used Autoware.AI components:

- *Mapping: Point cloud, HD map*
- *Localization: Lidar localization, EKF localizer*
- *Mission planning: Global planner, Motion planning: Lane planner / Open planner*

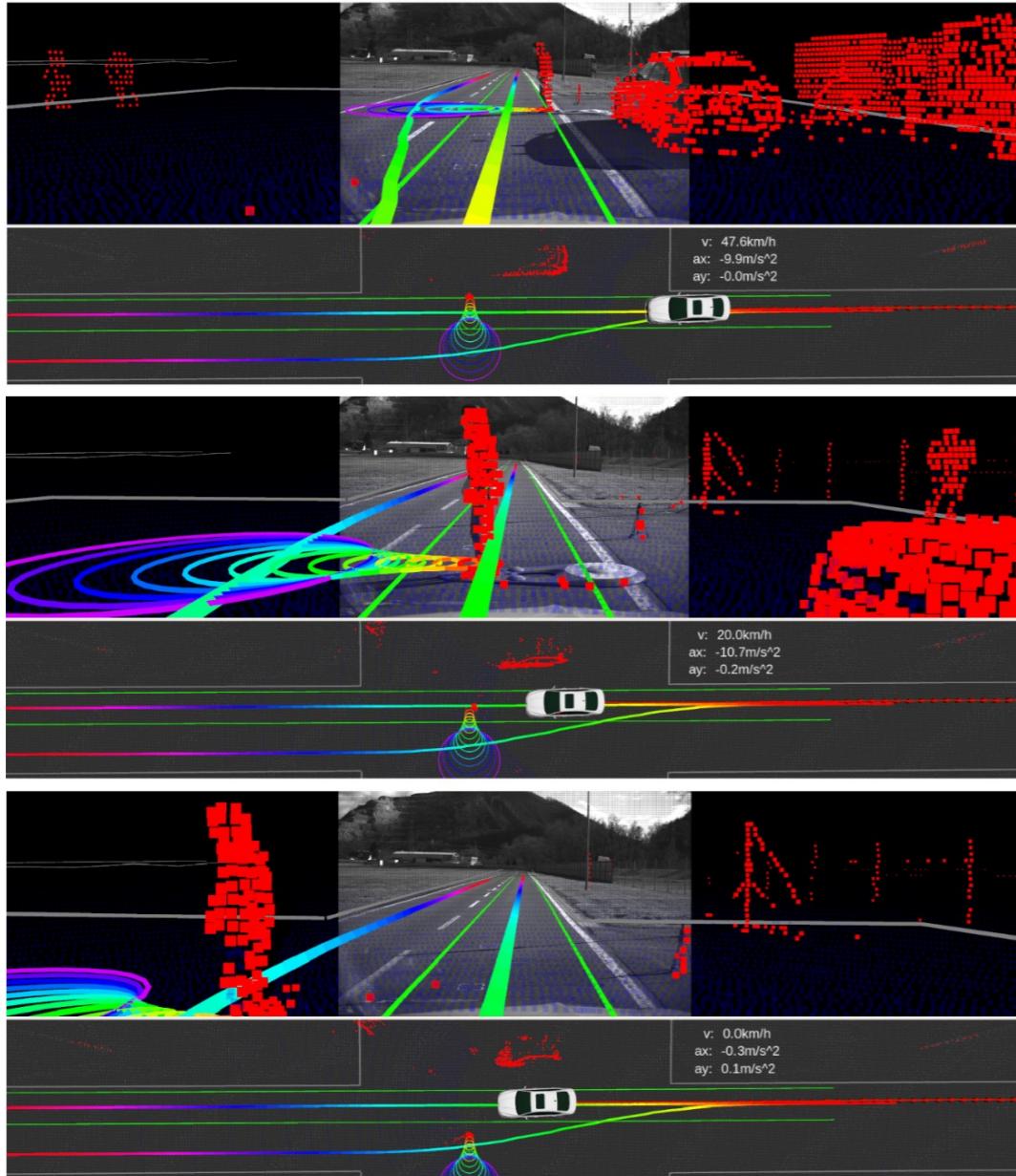


Validation on proving ground

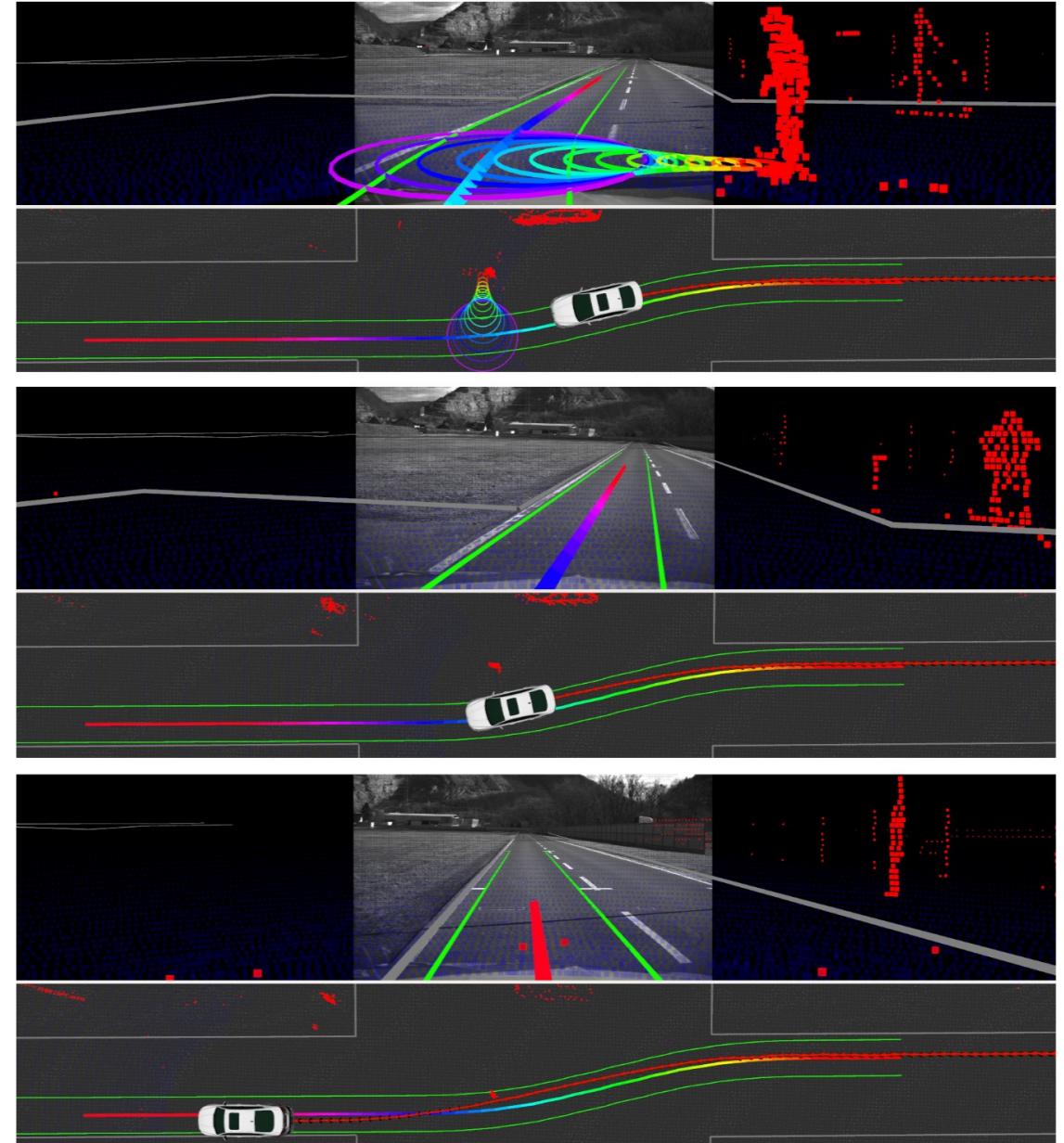


Collision Avoidance System

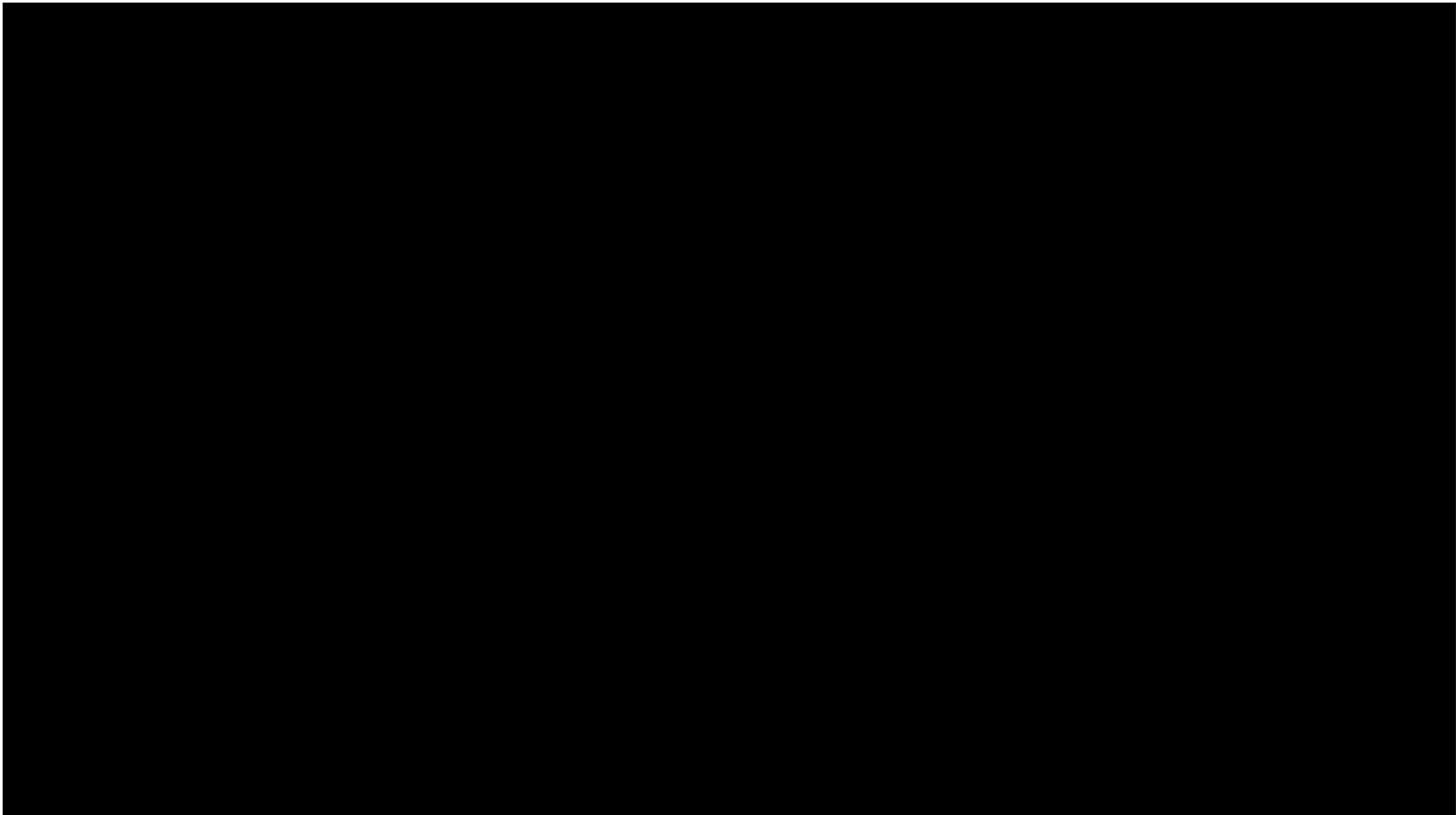
Emergency Braking

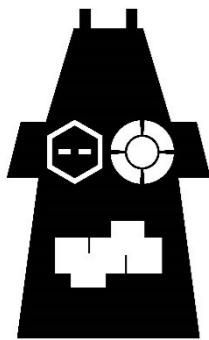


Emergency Evasion



Collision Avoidance System in Action



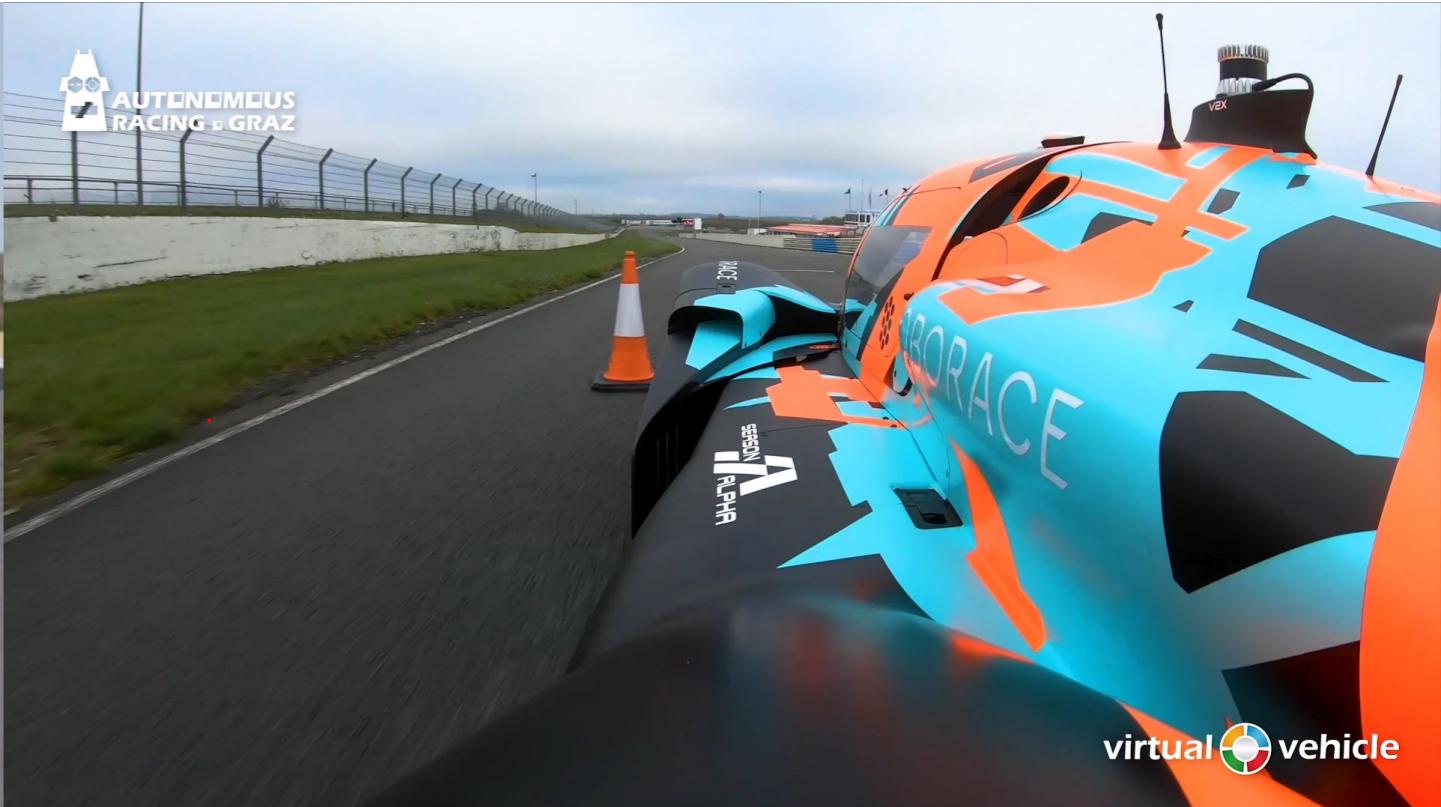


2019/09: Localization Challanges Zalazone (HU) – 2nd place

2019/11: Precision and Performance Challange Croix-en-Ternois (FR) – 1st place



ROBORACE



virtual vehicle

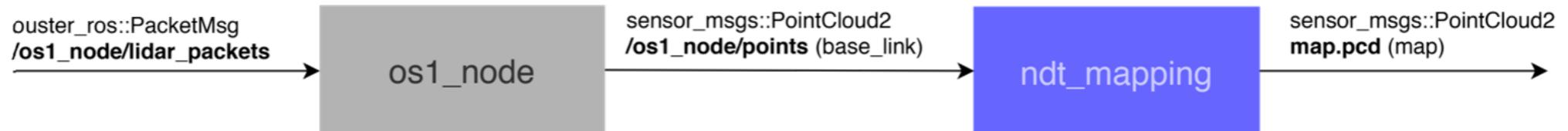
<http://www.autonomoursacing.ai/>

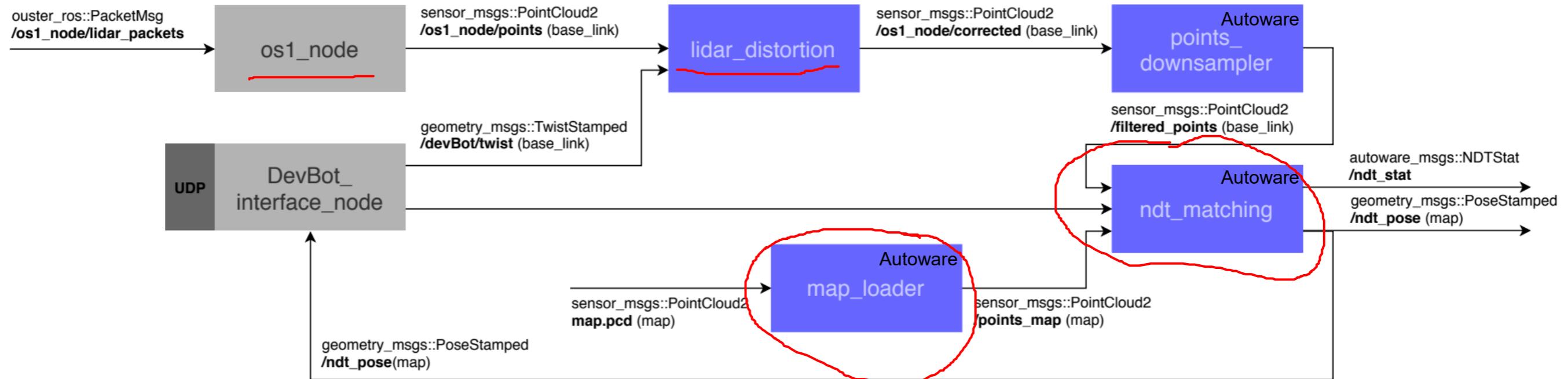


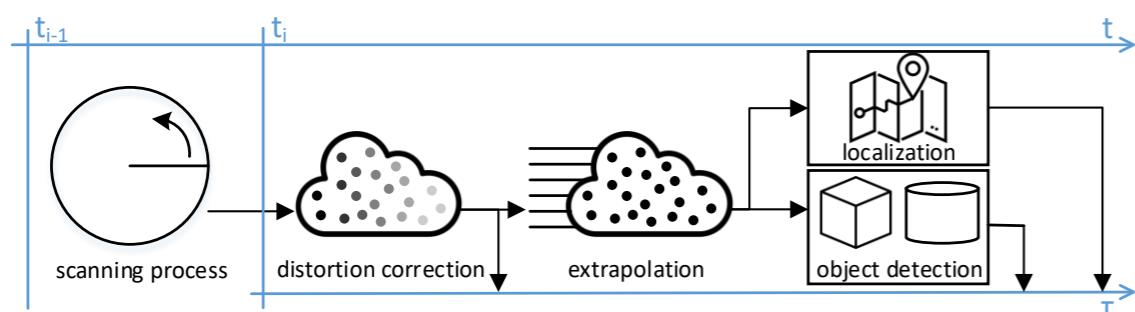
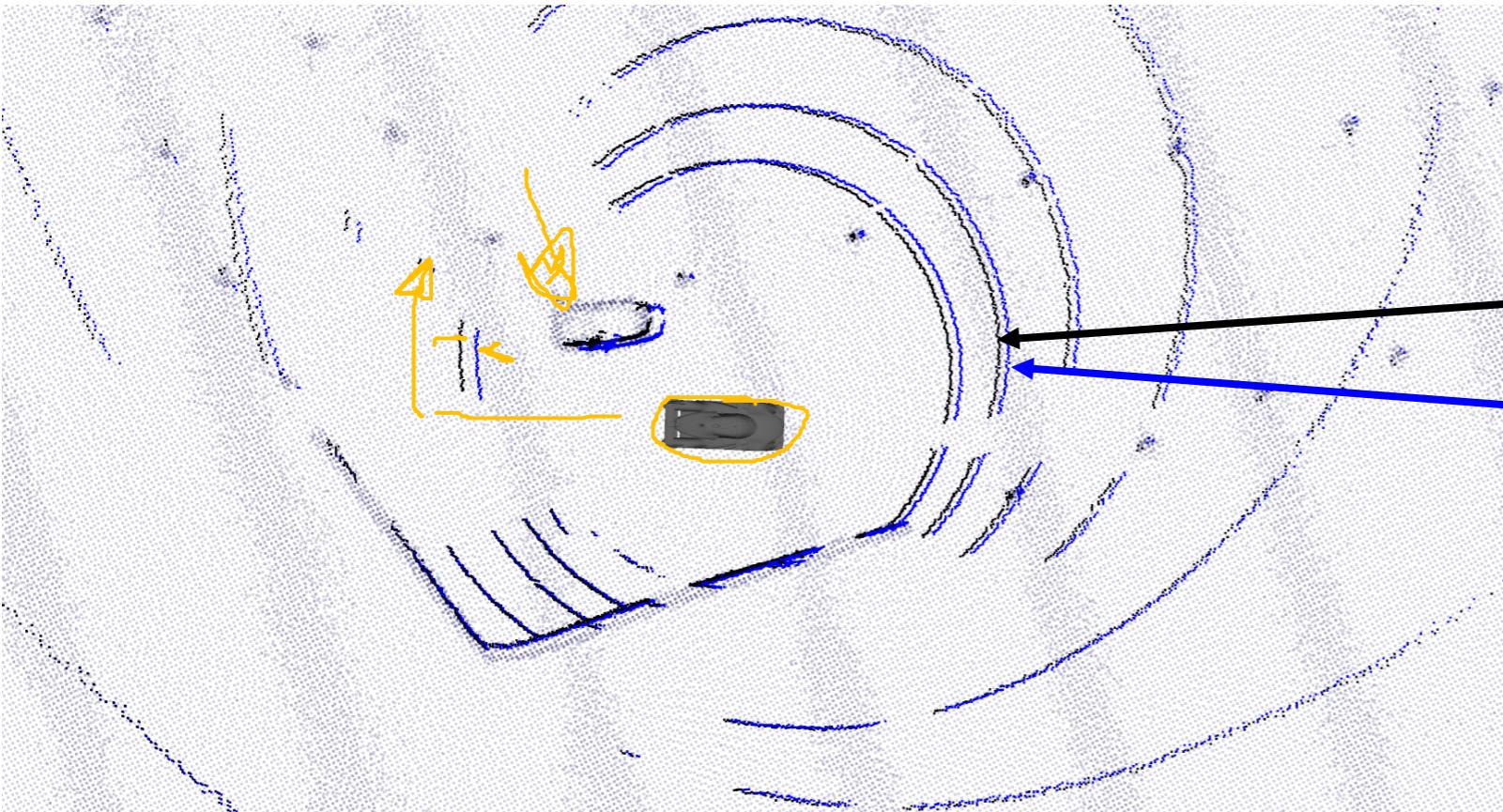


Use cases:

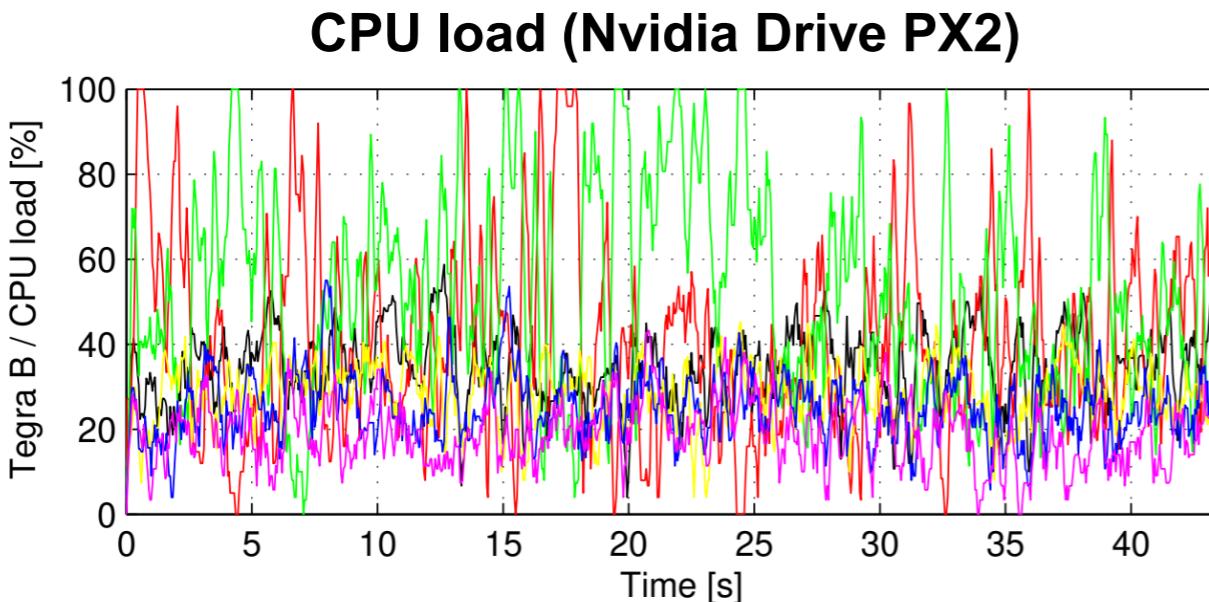
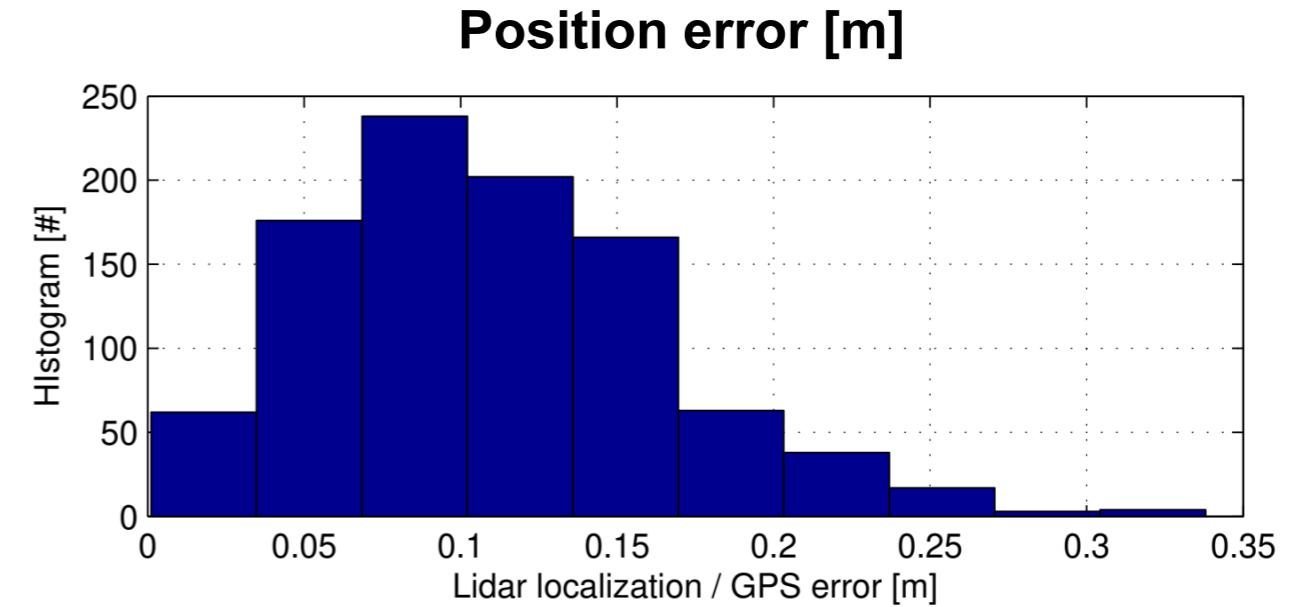
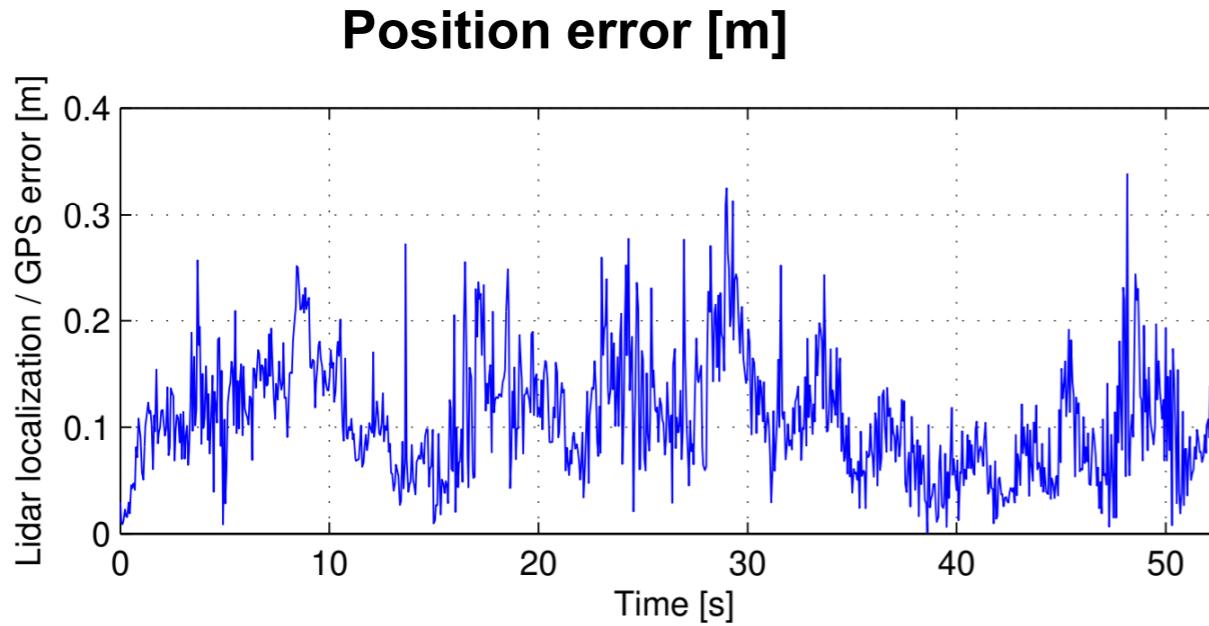
- Racetrack layout
- Lidar localization





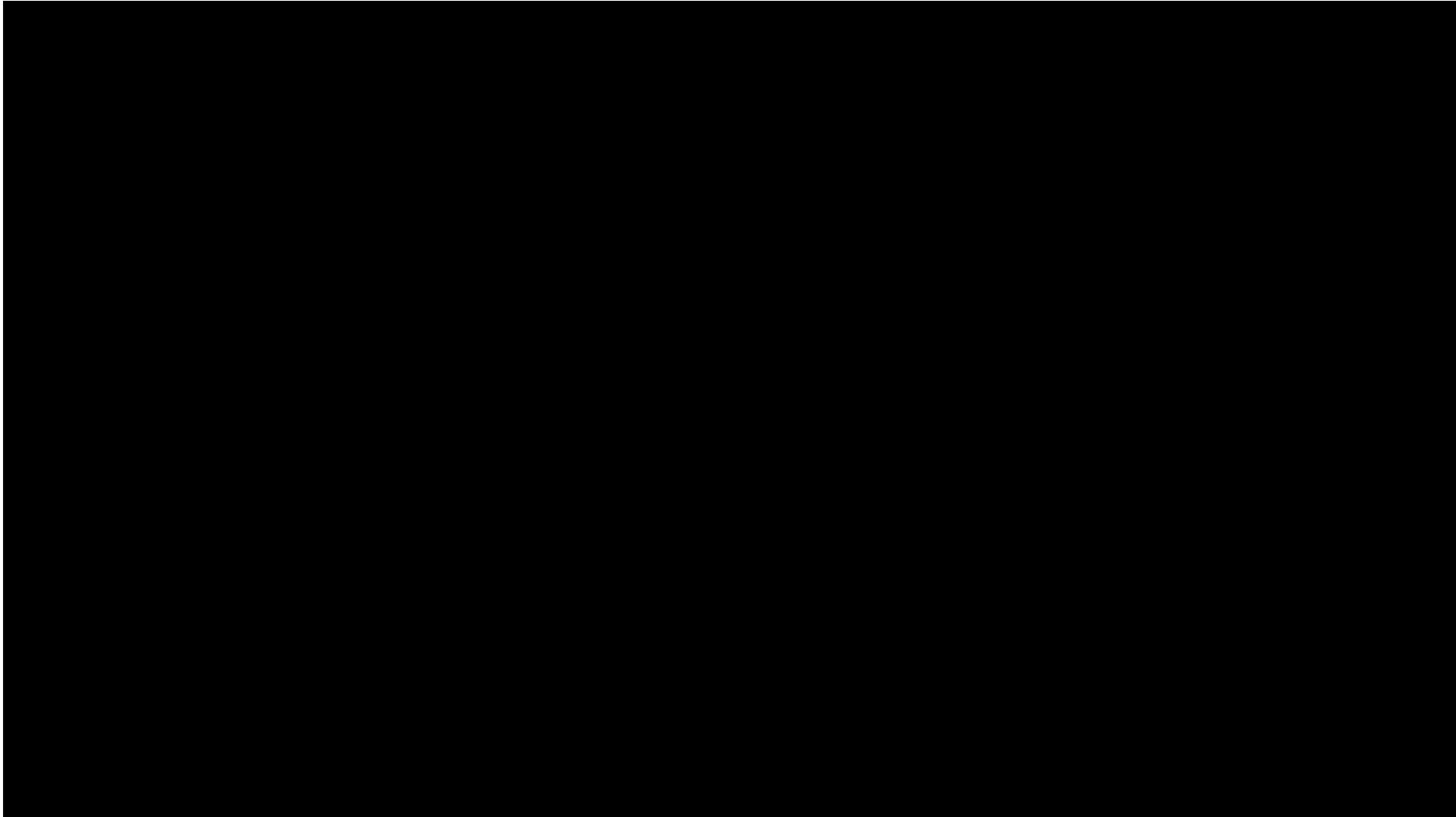


T. Renzler, M. Stolz, M. Schratter, D. Watzenig, "Increased Accuracy For Fast Moving LiDARS: Correction of Distorted Point Clouds", IEEE International Instrumentation and Measurement Technology Conference, 2020.



- NDT CPU mode
- High CPU load @ high accelerations ($>1g$)
- Stabile localization





<http://www.autonomousracing.ai/>

