

자율주행차 개발을 위한 NVIDIA Automotive Platform과 Sensor 그리고 Software

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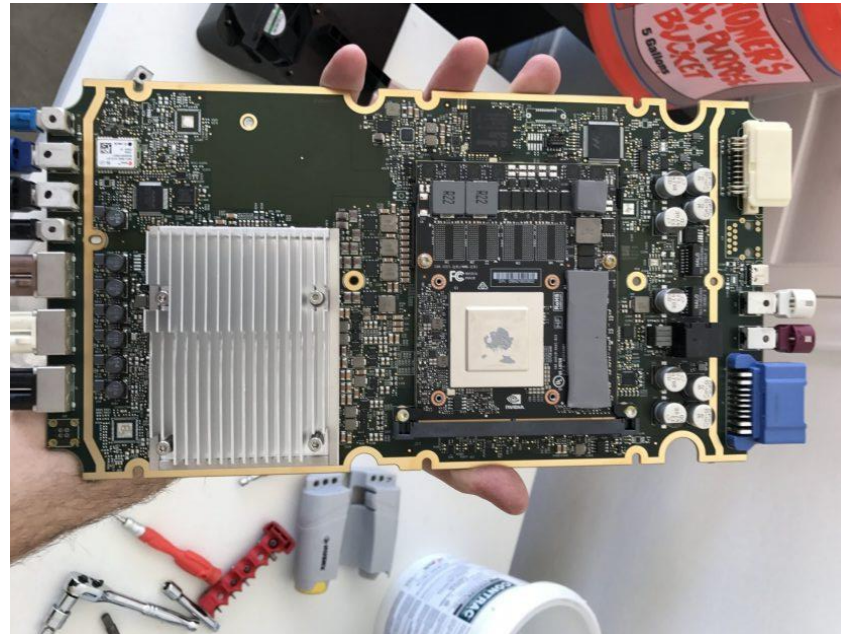
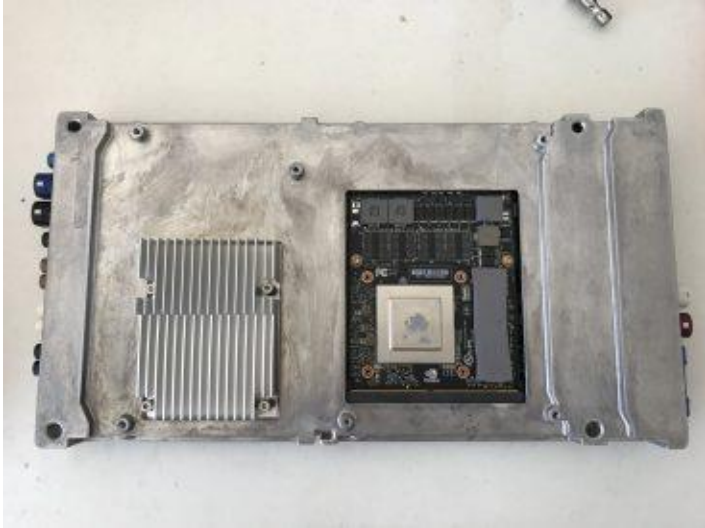
CONTENTS

- I. DrivePX2 자율주행차 구성과 센서들
- II. DriveWorks 그리고 Software

DrivePX2 사용예



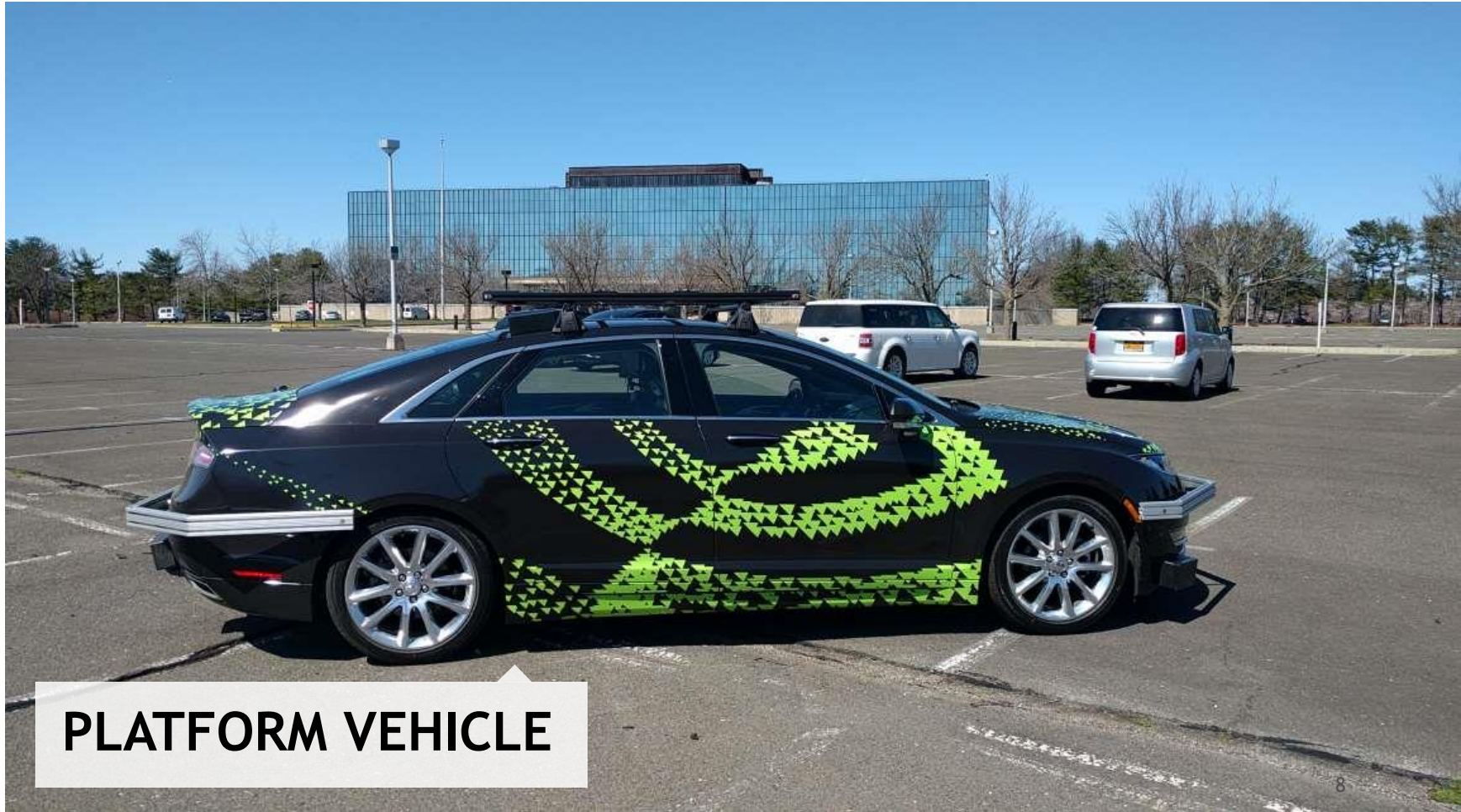
DrivePX2 사용예



- 현대/기아차



- 링컨 MKZ 하이브리드



Dual Tegra Parker

Dual Discrete GPUs

12 CPU Cores

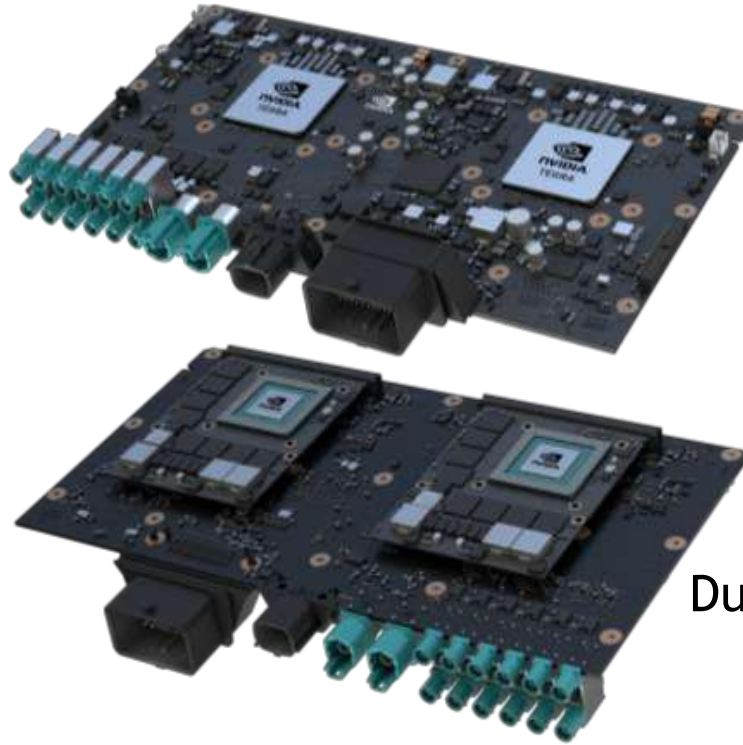
Pascal GPU

120 SPECInt

20DL TOPS

80Watt

12 simultaneous LVDS camera inputs



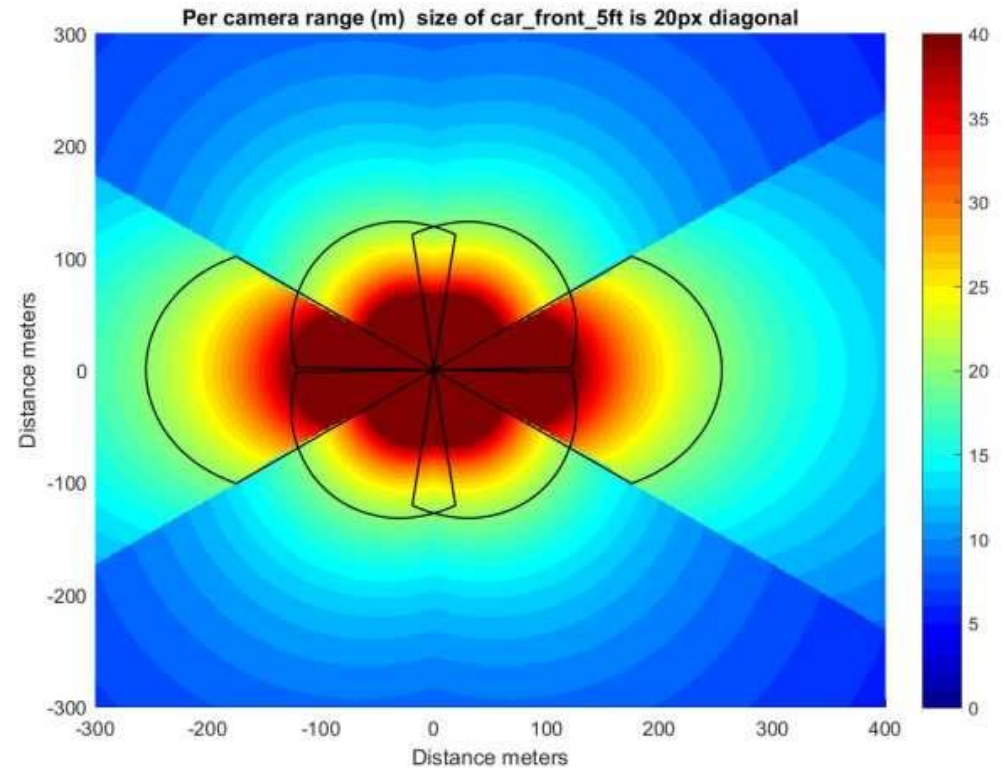
Dual Parkers on Top

Dual Discrete Pascal GPUs
on the Bottom

PERCEPTION

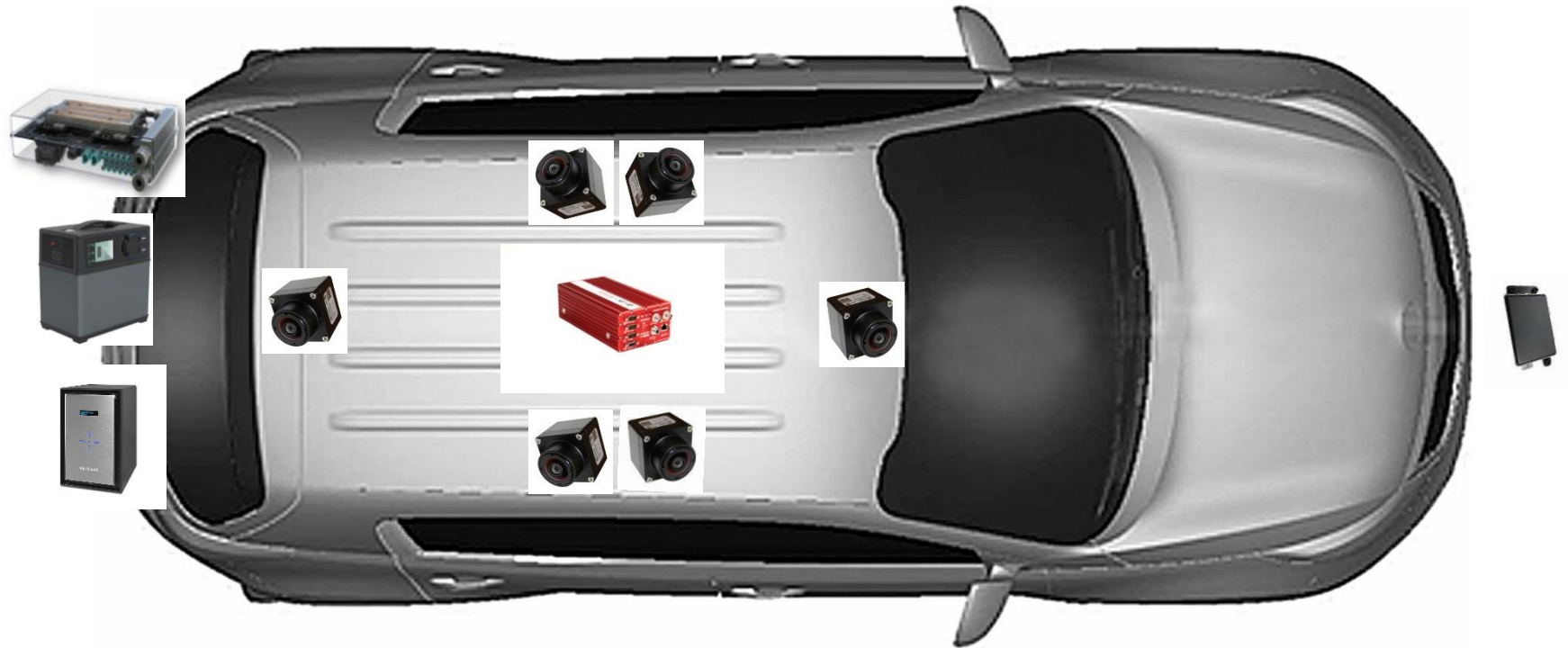
6 cameras providing
a 360degree surround view

All cameras: 2.3Mpix
Front and rear: 60d HFOV
Side: 100d HFOV



센서장착(카메라)

- 카메라 장착 위치

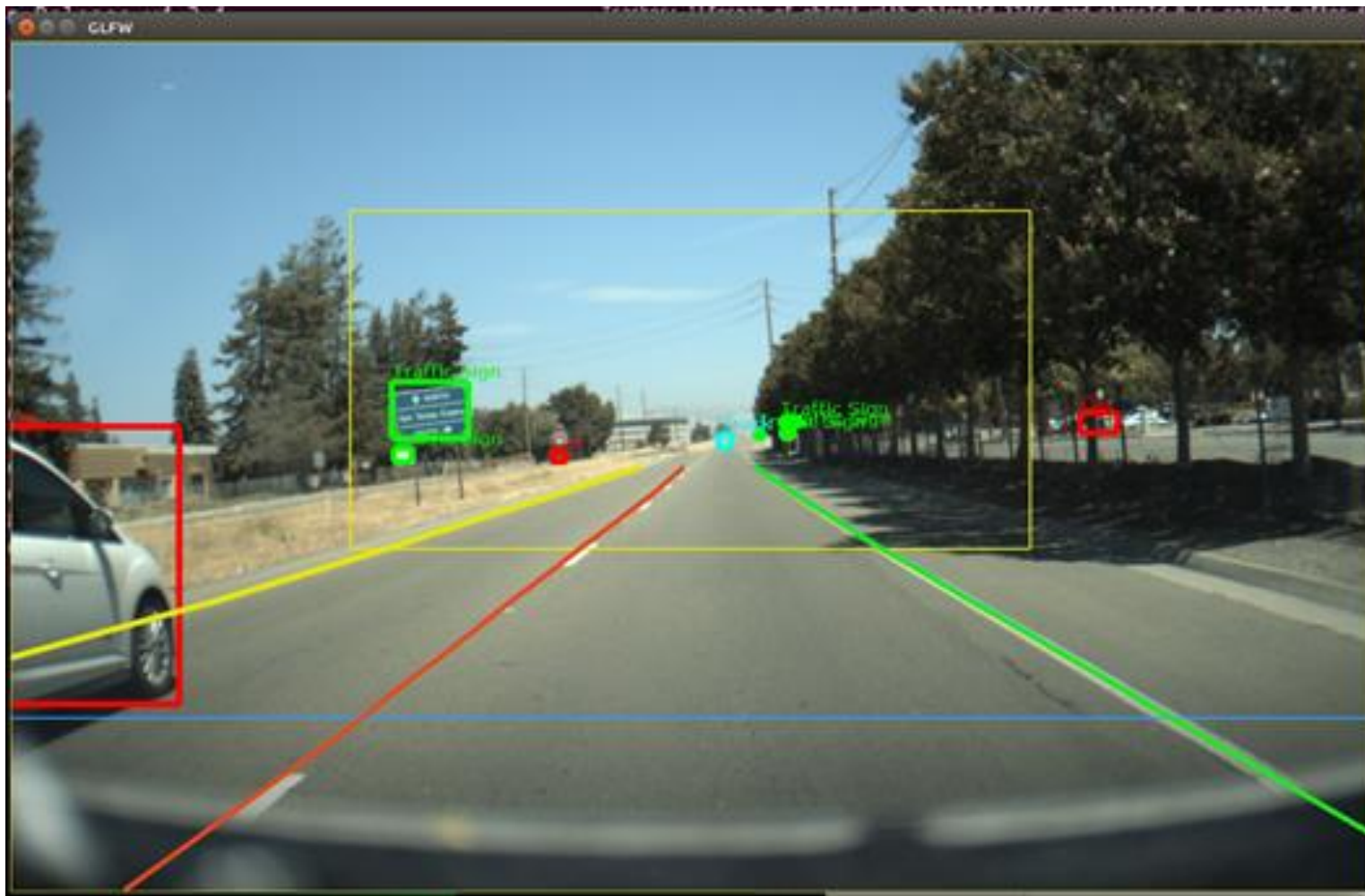


- 카메라 영상



화면 구성(Drivenet+Lanenet)

- 카메라 영상



지원되는 센서들

- **Camera**

- Sekonix GMSL Camera Module SS332x [AR0231 2.3MP RCCB sensor rev6/7]
- Continental GMSL Camera Module [OV10640 1.3MP RGGB sensor]
- FLIR /[Point Grey](#) (USB/Ethernet) cameras



- **GPS**

- NMEA output (e.g. Garmin 18x/19x, Xsens 710)
- Novatel dGPS



- **Lidar**

- [Quanergy M8](#)
- [IBEO Lux](#)
- Velodyne VLP32, VLP16, HDL32, HDL64



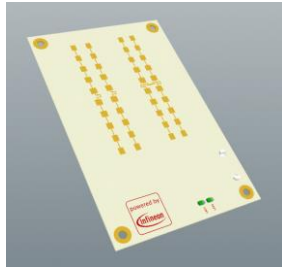
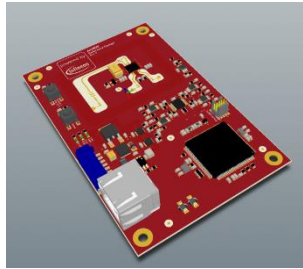
- **Radar**

- Continental ARS430
- [Delphi ESR2.5](#)



추가적인 센서들

- SAR 레이더 센서



- ToF 센서



- 열화상 카메라



FLIR BOSON Tripod Mount
*BOSON Sold Separately

- USB 3.0을 사용하는 SSD

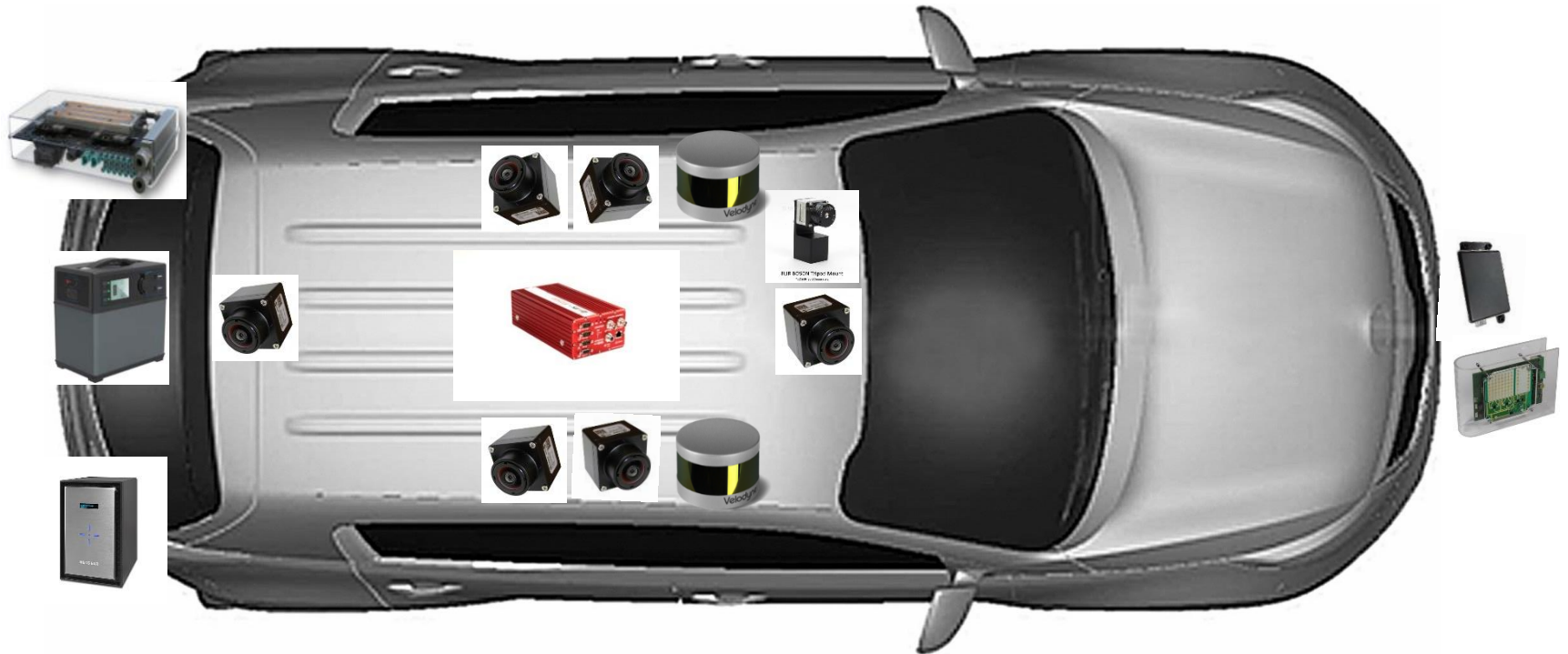


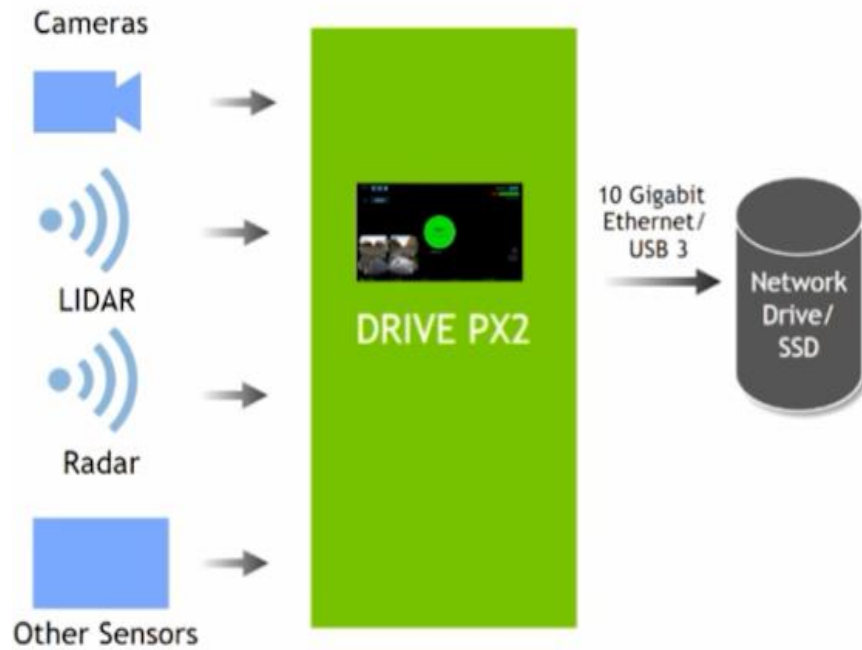
- 10G 이더넷을 사용하는 Network Storage (추천)



다양한 센서장착

- 모든 센서 장착 후 장착 위치





Intuitive UI to enable simultaneous capture data from sensors

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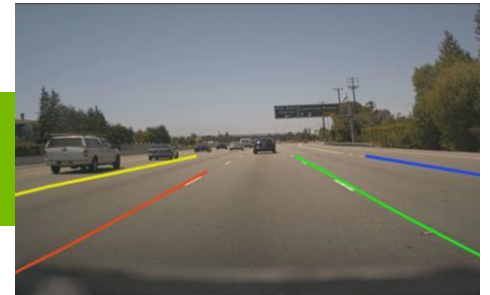
Deep Neural Networks

DriveNet



Multi-class detection: Cars, Trucks, Pedestrian,
Bicycles/Motorcycles, Traffic Signs*

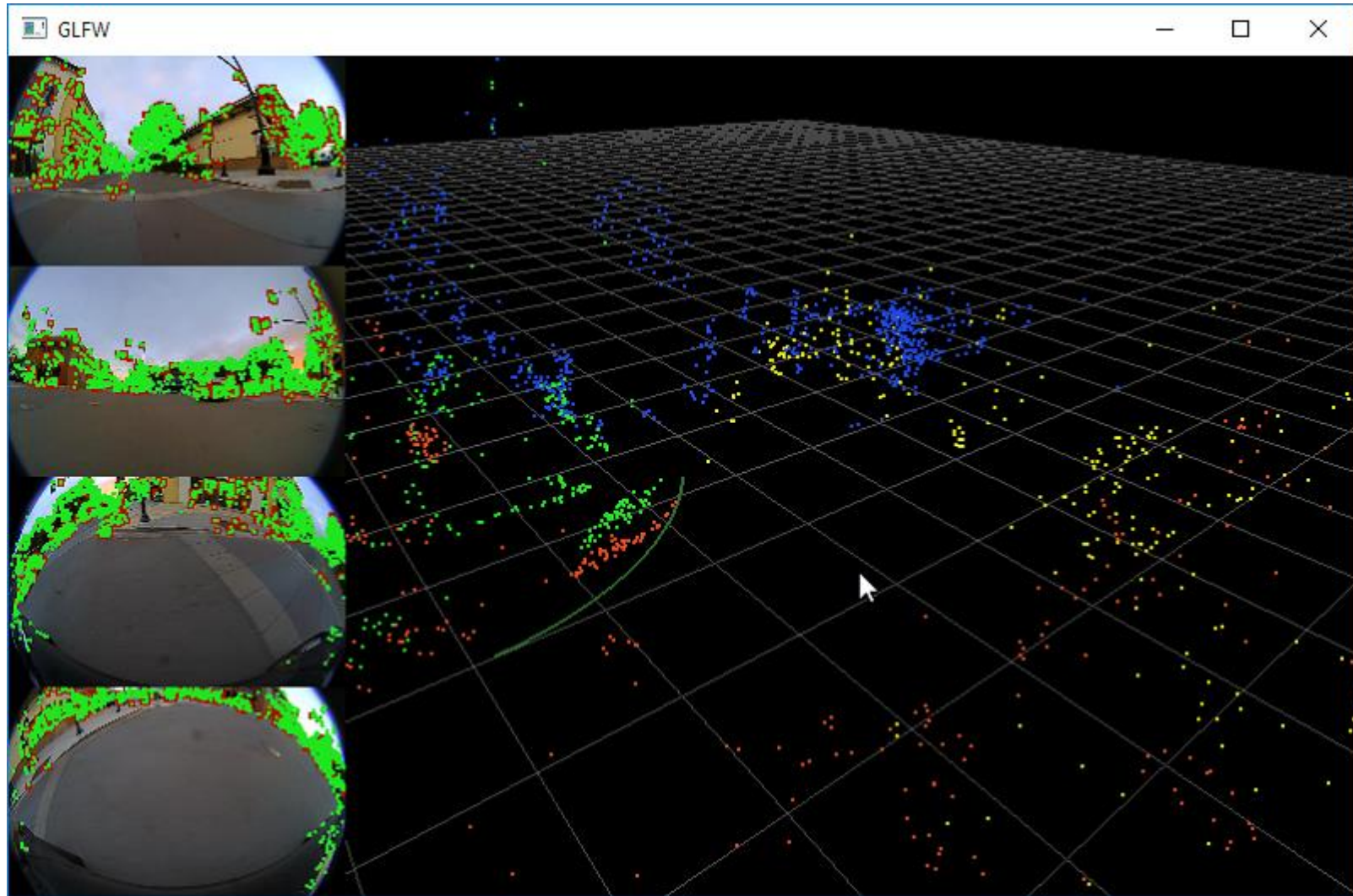
LaneNet

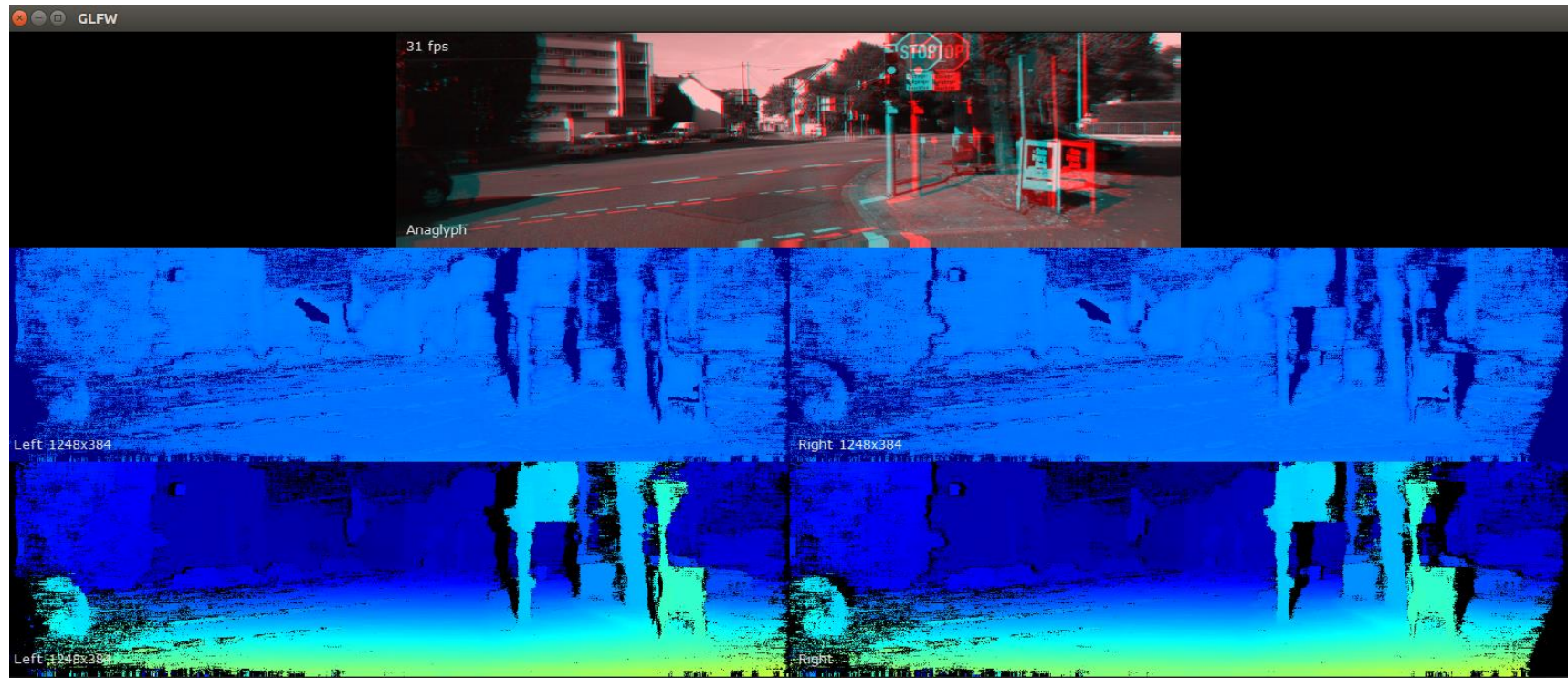


Lane Detection

OpenRoadNet

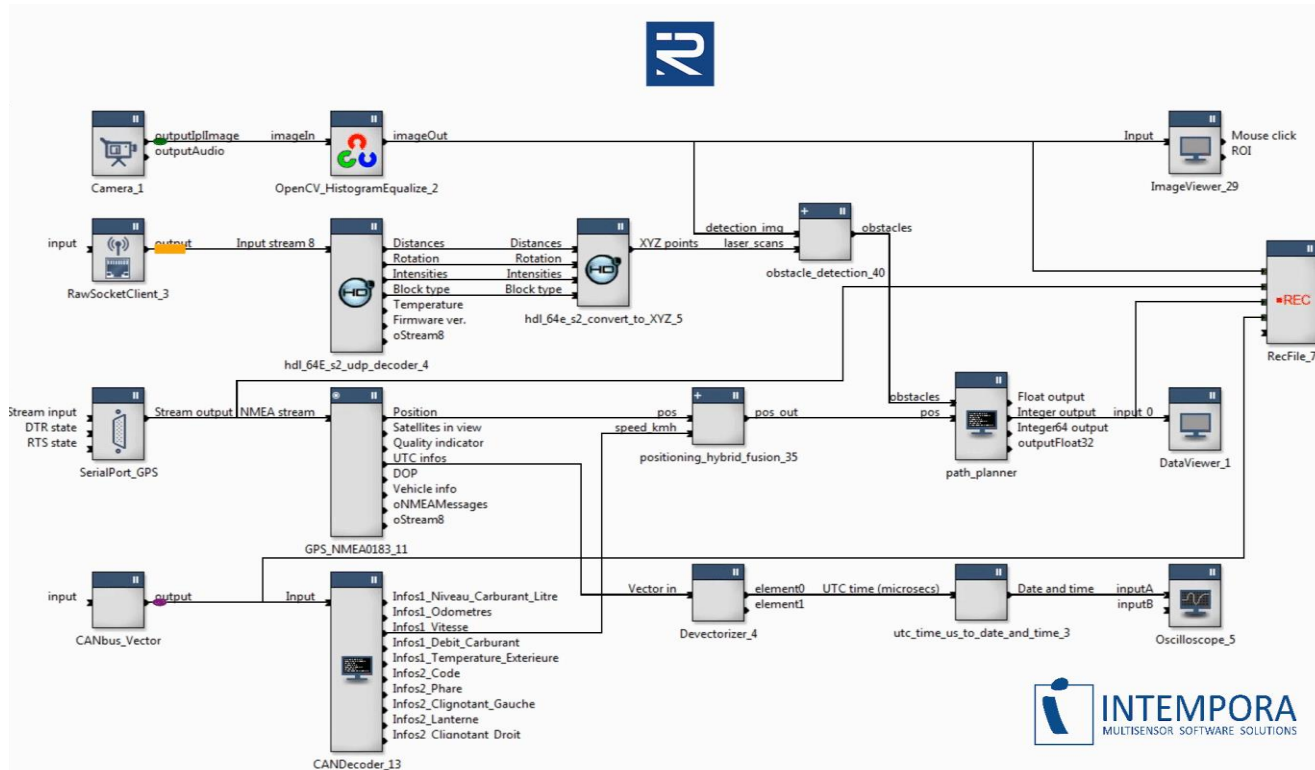






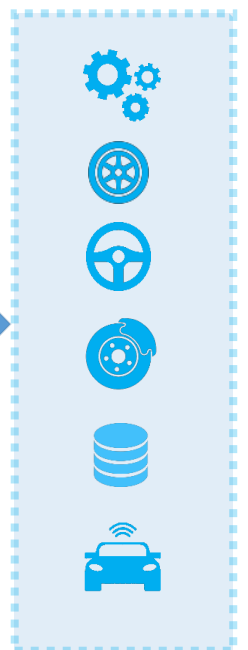
Sensors

Vision, RADAR, LiDAR, GPS, Maps, IMU, V2X



Actuators

Motor, Wheel, Brake, Database, V2X



Input

DATA PROCESSING

Output



NVIDIA DriveWorks Components (C++ / CUDA)



RTMaps

NVIDIA DRIVE PX 2

DriveNet



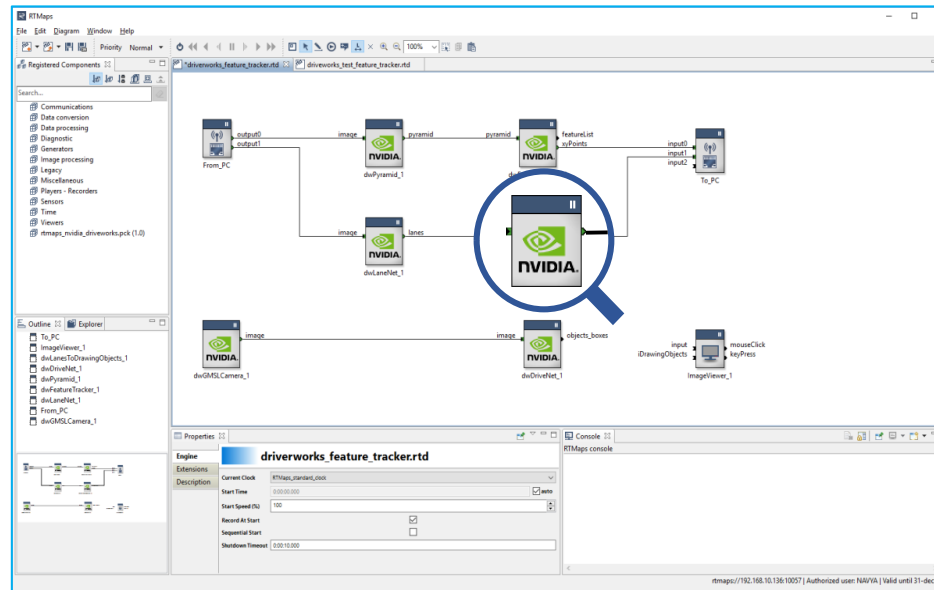
LaneNet



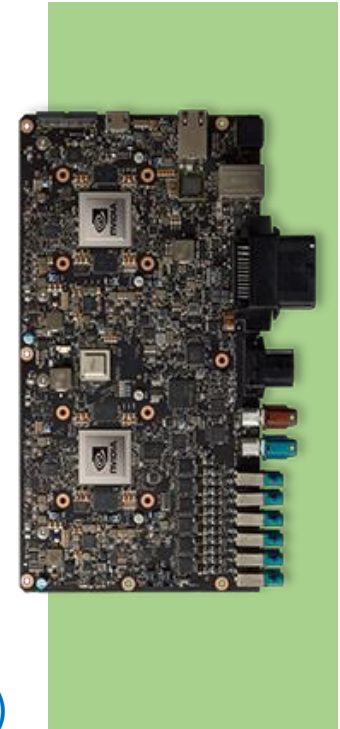
Feature Tracker

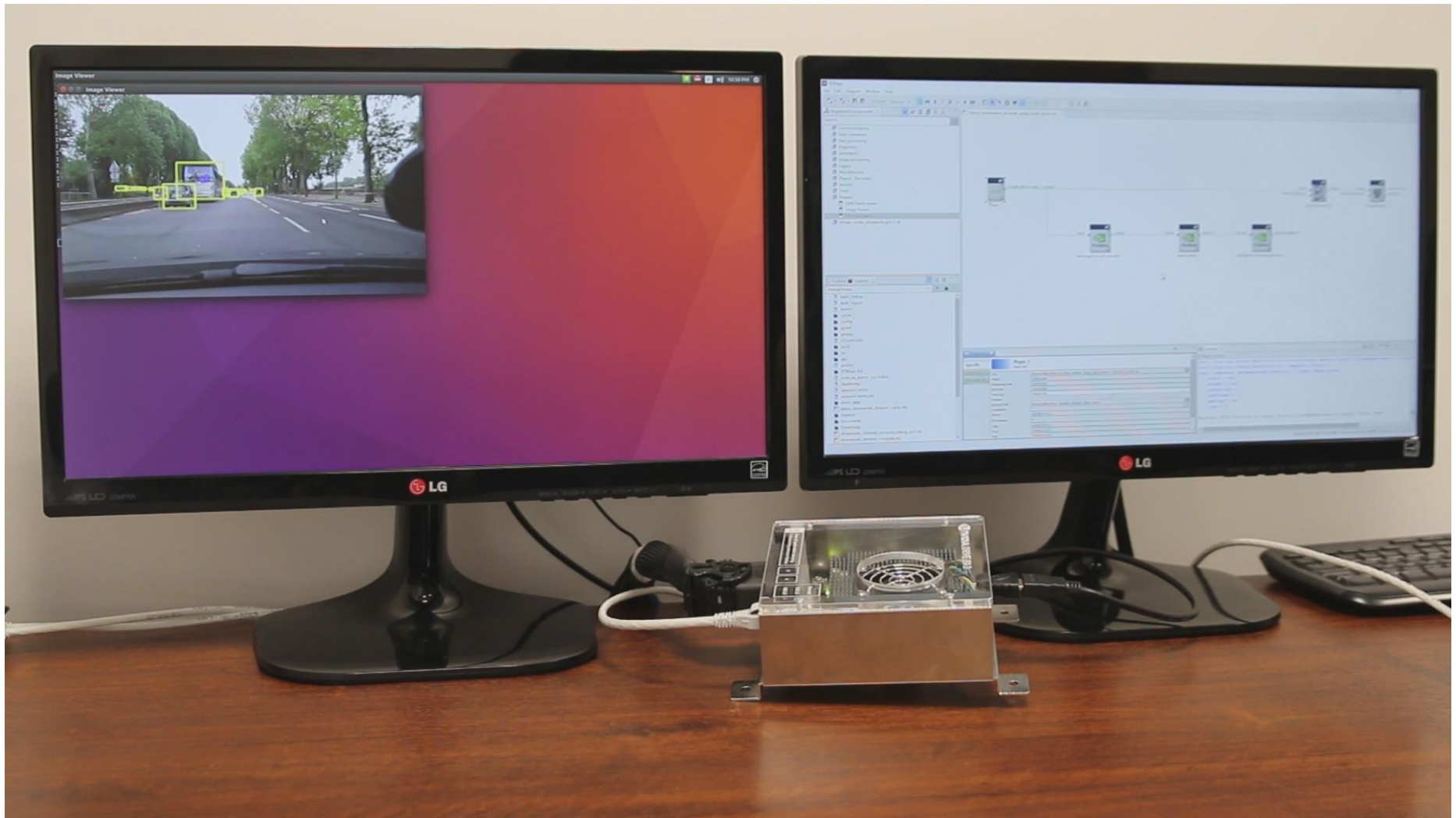


etc...

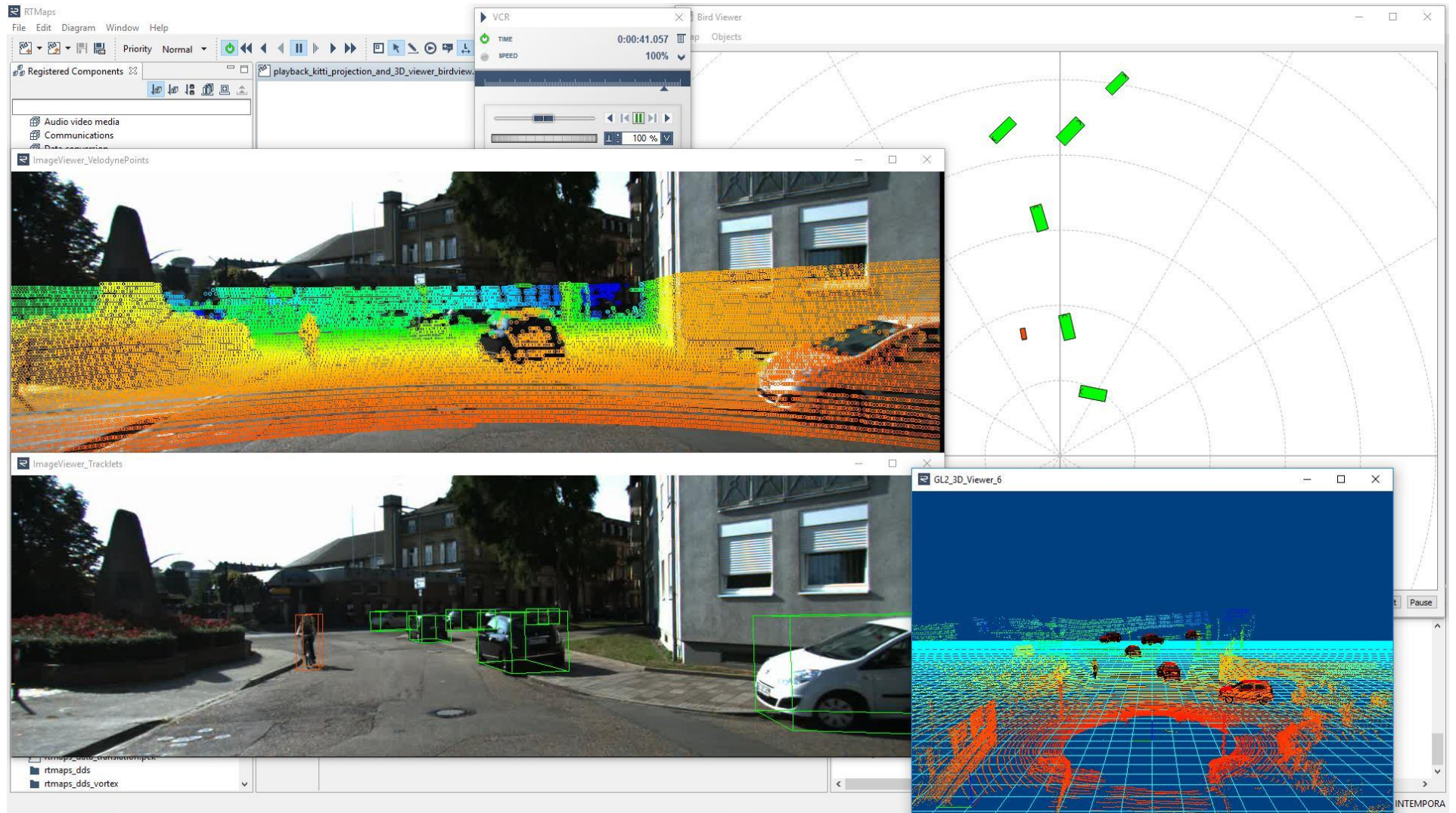


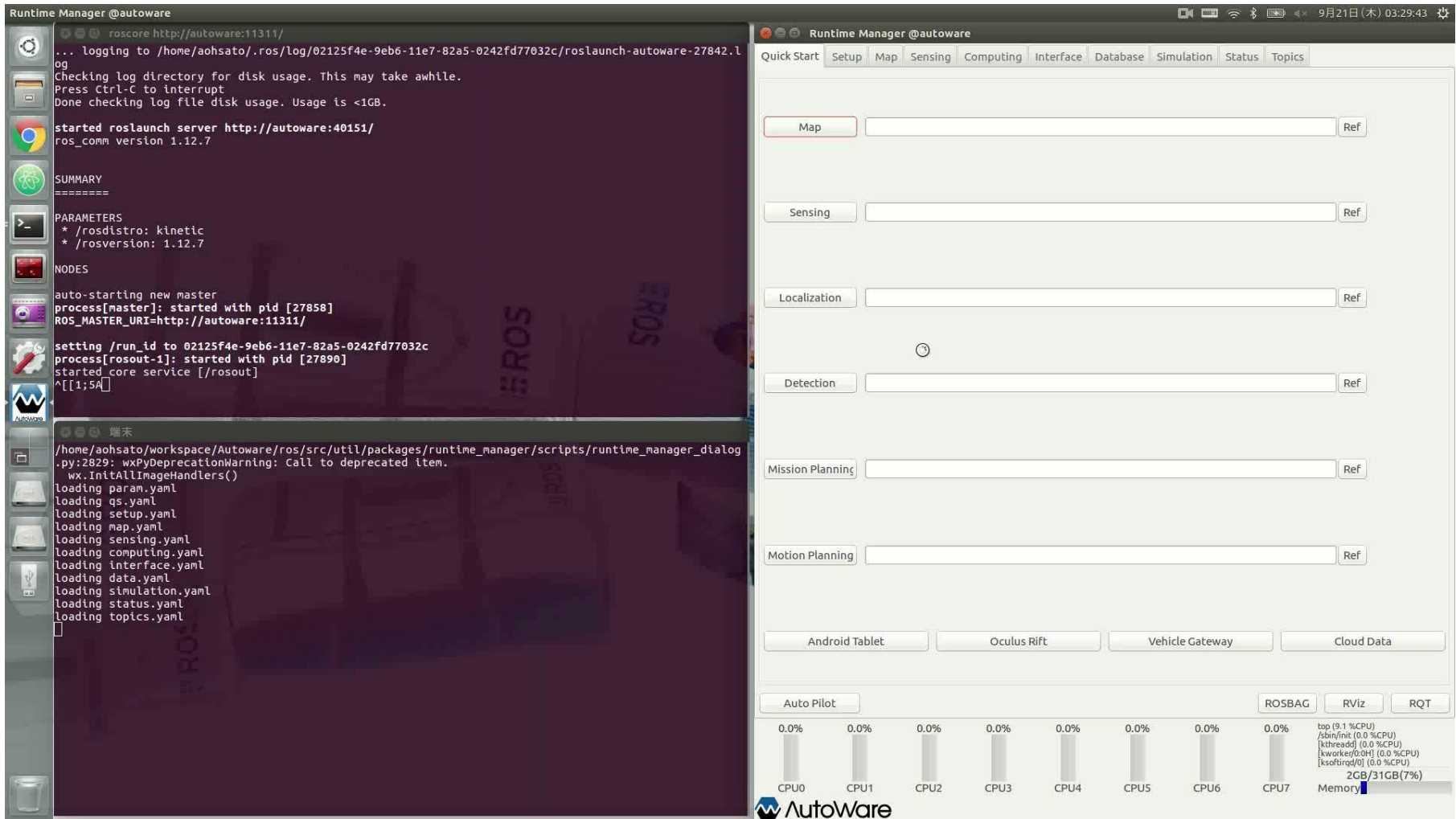
* Easily deploy on target with RTMaps Remote Studio (SSL)





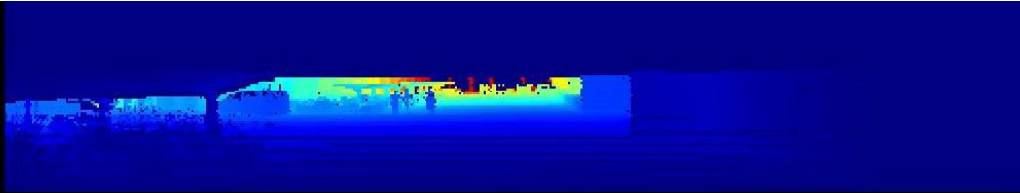
RTMaps & KITTI



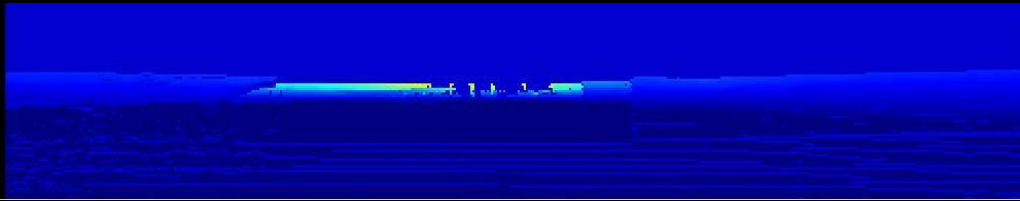


Convolutional Neural Networks (CNN) for Detection

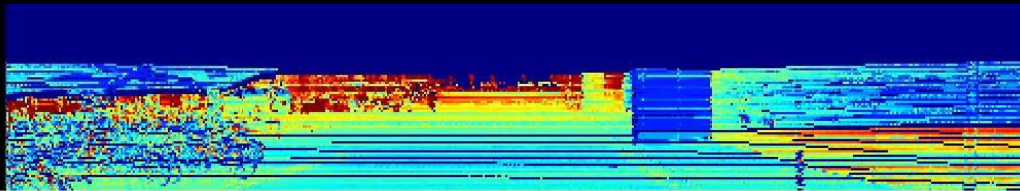
Depth Image



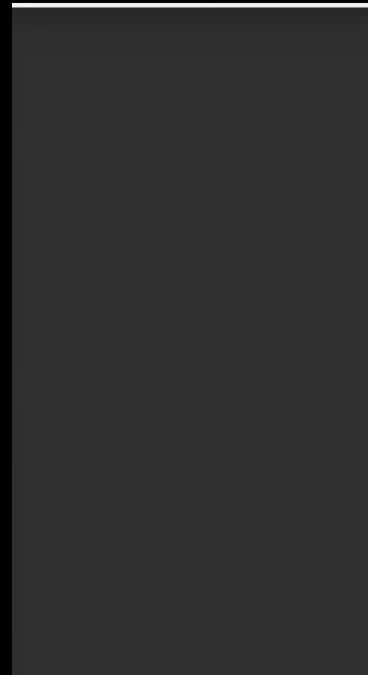
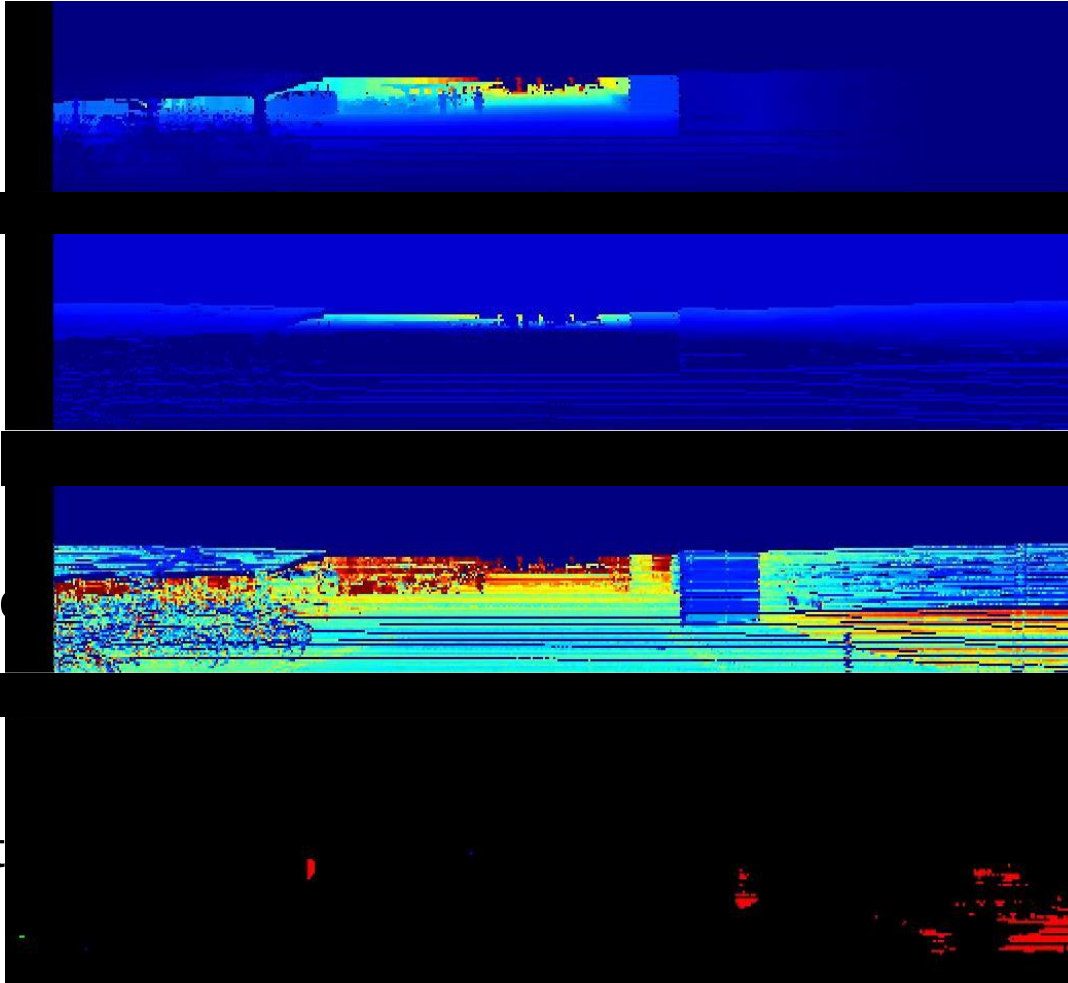
Height Image



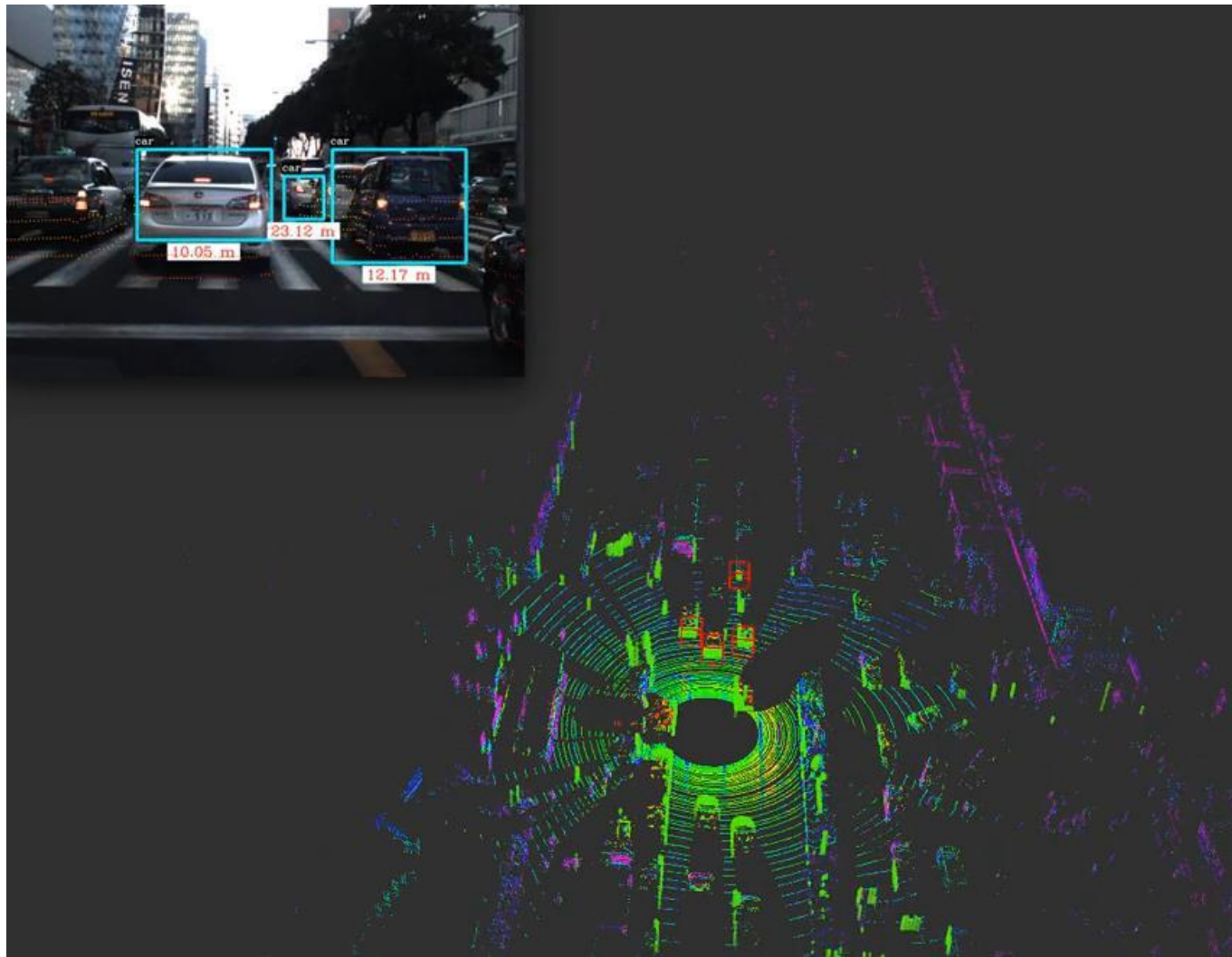
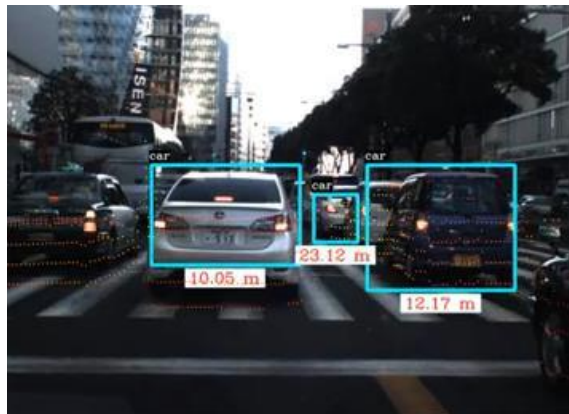
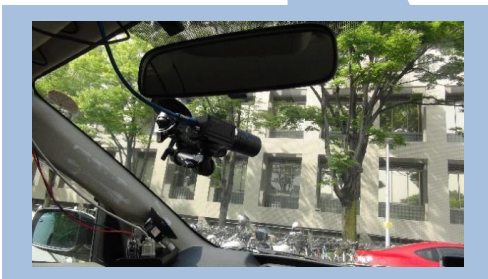
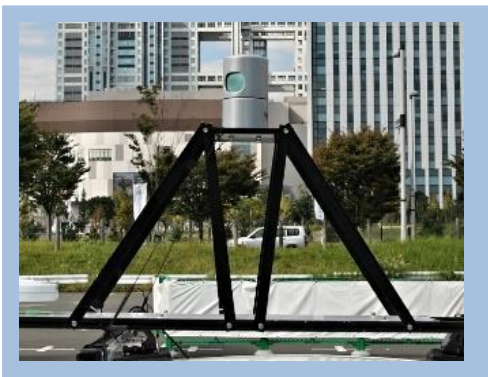
Intensity Image



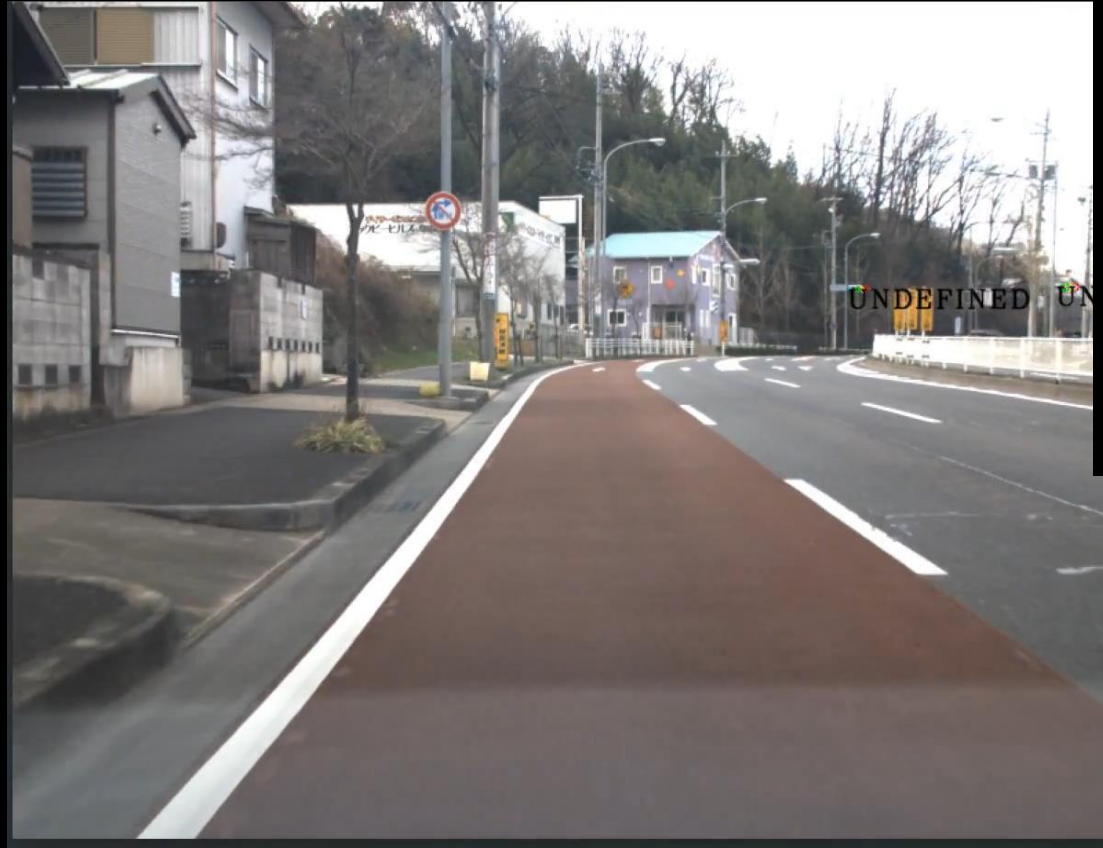
CNN Segment



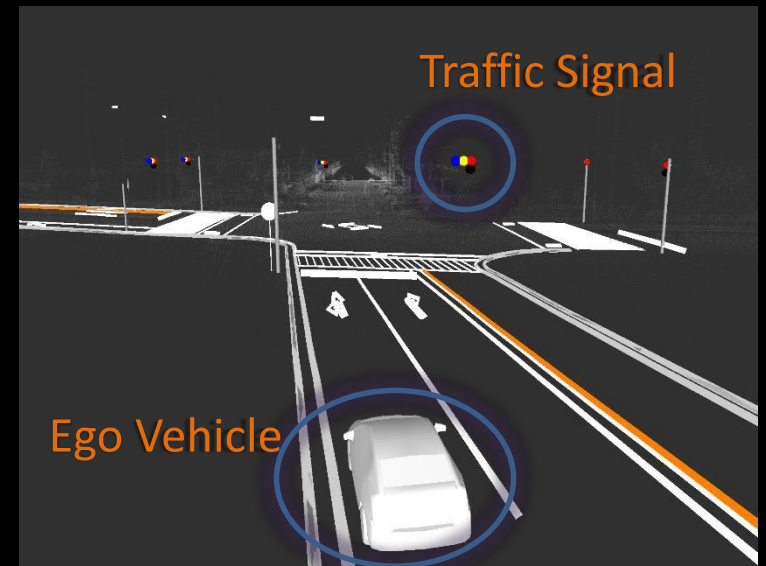
Camera-LiDAR Calibration and Sensor Fusion



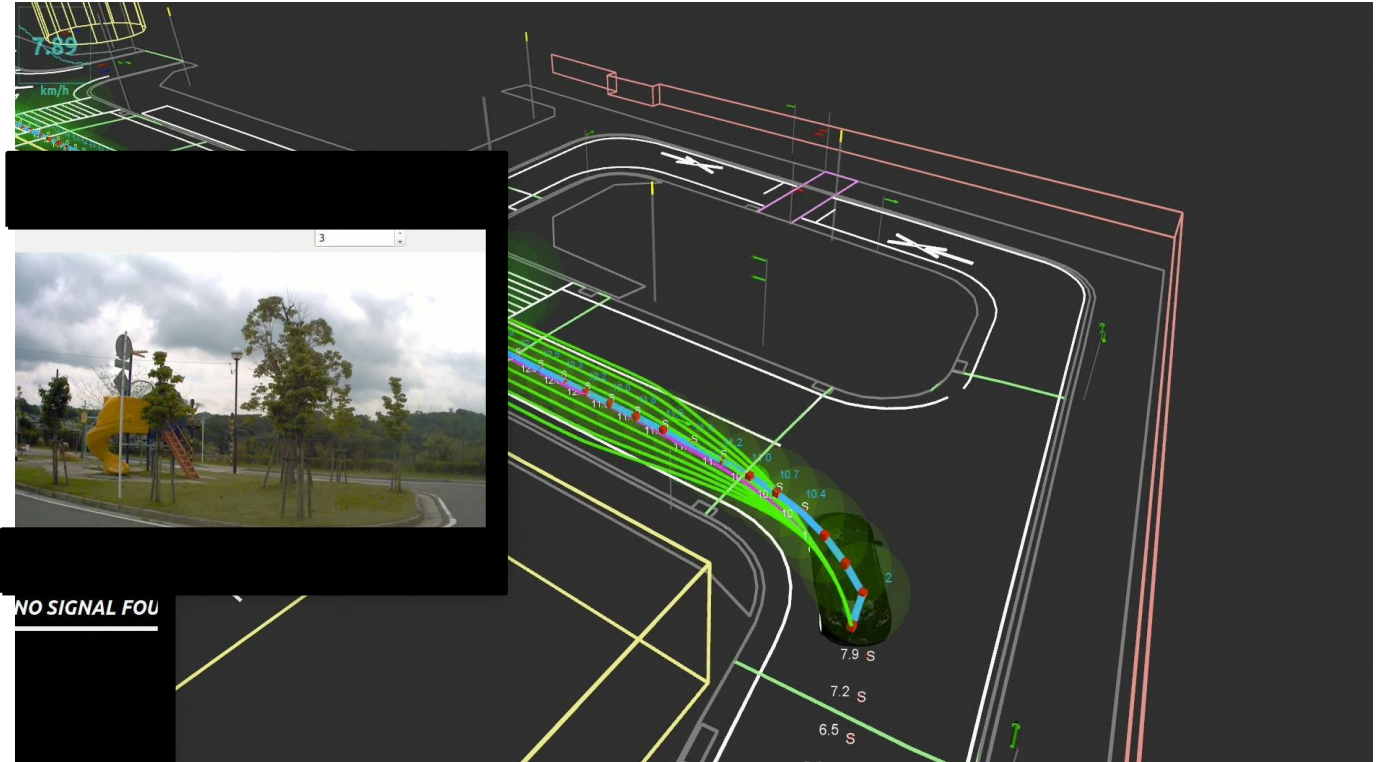
Traffic Light Recognition using 3D Map Information



NO SIGNAL DETECTED



State Lattice for Path Planning (Trajectory Generation)



Q & A

Thank you

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