Sensory Platform for Driving Data Collection

Centre for Mechatronics and Hybrid Technology
Department of Computing and Software McMaster University
Howard Zhang, Dr.Martin.v.Mohrenschildt , Dr. Saeid Habibi

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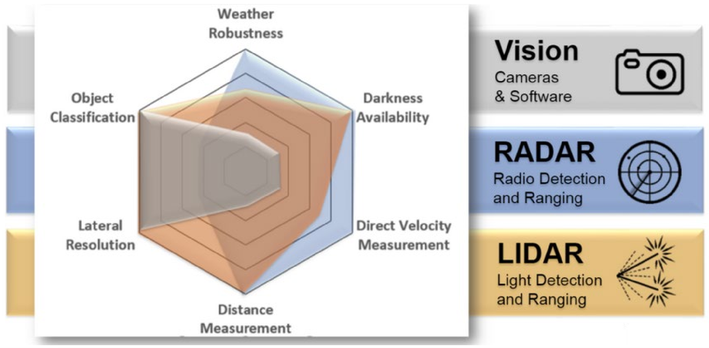
Sensors in Autonomous Driving

Application:
A wide variety of sensor configurations are being explored by the early adopters of level 3 autonomous driving. The most prominently featured sensors: Lidar, Vision Camera, Radar each have their specializations and limitations in autonomous driving. A data gathering platform is a necessity for sustained research and testing for development in autonomous driving, and can generate data for vast amount of different test cases.



Possible test cases include:
- Combinations of various sensors differing in:
  - Type
  - Placement
  - Specifications
- Data from different weather/driving conditions
  - Day/Night
  - Rain/Snow
- Combination of different sensors with Sensor Fusion

Driving Platform

A Driving Platform with a synchronized* sensor suite has been developed consisting of:

- Velodyne HDL-32E Lidar
- mmWave Radar*
- Vision Camera
- Infrared Camera

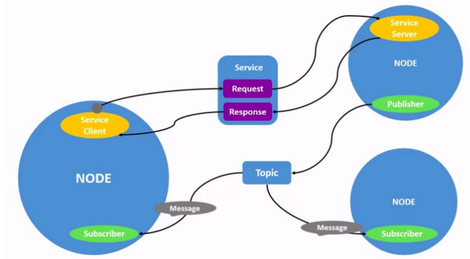
That is capable of 10 Hz real-time data gathering

*All sensors except for radar are synchronized to the lidar

ROS2

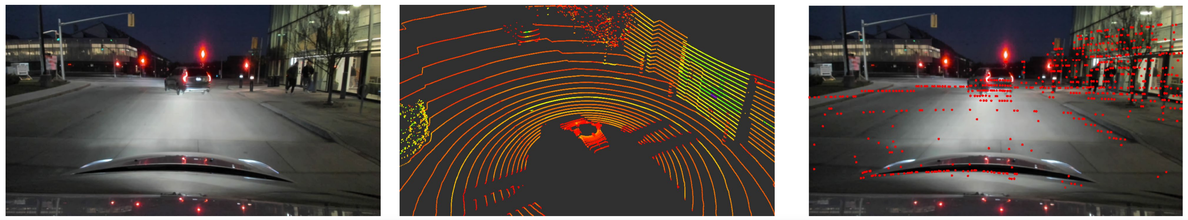
ROS2 is the middleware used to implement the software system. It follows a publisher subscriber model, and has several benefits including:

- Real-time communication protocol
- Distributed sensor architecture
- Modular/ Scalable number of sensors
- Modular / Scalable interface access
- Rapid development with open source algorithms

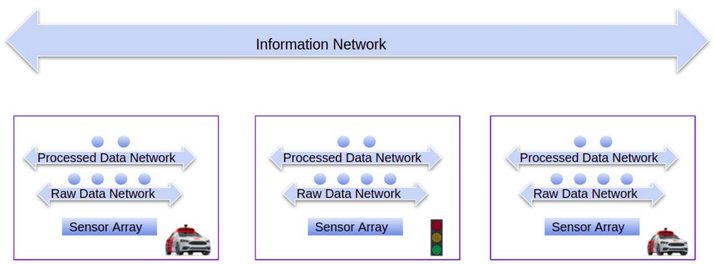


Sensor Fusion

Distributed architecture allows for sensor fusion at all three information levels:
- Data Fusion
- Feature Fusion
- Decision Fusion



V2V Fusion



Publisher subscriber model can be abstracted to V2V communication:

- Individual vehicles and traffic monitoring systems can communicate meta-data with each other
- Eliminates blind-spots and increases information range of every vehicle in the network
- Applications in level 5 autonomous driving and Smart City design

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