

LIDAR SIMULATION IN A CERTIFIABLE ROS 2 NETWORK

SYSGO partnered with Apex.AI and Renesas to build an Automotive demonstrator that integrates the certifiable ROS 2 stack Apex.Grace with the PikeOS RTOS & Hypervisor. The demonstrator is based on the LiDAR 3D perception stack demo developed by Apex.AI.

ROS 2 is a flexible, open-source software platform for developing prototype applications. It provides a collection of tools, libraries, and algorithms that simplify the task of creating complex behaviours across a wide variety of robotic and Automotive platforms.

AUTOMOTIVE DEMO: HOW IT WORKS

The demo aligns to the flow starting with sensor connectivity and data filtering, followed by sensor fusion and object detection. Each domain acting as autonomous nodes, exchanging data over a Data Distribution System (DDS) and following real-time requirements of PikeOS and Apex.Grace. PikeOS adds its capabilities with regards to mixed criticality, so that the partitions can be allocated per safety severity and external communication can run in a separate partition that is defined as potentially insecure.

interactions with the target as well as providing additional development tools from PikeOS or Apex.Grace. The inputs from the separate front and rear LiDAR sensors is visualized in the colored point-clouds on the monitor, while the outputs, representing detected solid objects, are visible as grey bounding boxes.

LiDAR input is defined as critical and the video or Infotainment display stream as non-critical. One of the PikeOS features is to mix on the same platform rich OS such as Linux and real-time runtime environment. Running Linux or POSIX as a guest on the platform will enable easy

The demo shows the close integration of PikeOS and Apex.Grace, thus supporting the complete development cycle, starting from application code up to the deployment of the code to the target.

SYSGO has a long history in Safety and Security certification in different vertical markets. For Automotive PikeOS is Safety certifiable up to ISO 26262 ASIL D.

Automotive ADAS Platform

- With partner Apex.AI
- Hardware: Renesas R-Car H3
- LiDAR simulation in certifiable ROS2 network
  - Apex.AI 3D Perception Demo
  - Replay of captured LiDAR data
  - Processing in Apex.Grace / ROS 2 nodes distributed across multiple partitions
  - Visualization with RViz2 on external participant

Customer Value

- LiDAR simulation in certifiable ROS 2 network
- Platform for a software-defined smart vehicle based on hard real-time
- Deterministic, real-time, Automotive functional Safety certification up to ASIL D
- Processing in Apex.Grace / ROS 2 nodes distributed across multiple PikeOS partitions
- Seamless development workflow

AUTOMOTIVE DEMO PARTNERS

## Apex.AI

**Apex.AI** is developing breakthrough software for mobility, smart-machines and IoT. Learn more about Apex.Grace, the first and only safety-certified end-to-end operating system, and Apex.Middleware. Like Apple's iOS software development kit, which enables practically anyone to create an iPhone app, Apex.Grace makes programming a vehicle almost as easy as programming a phone. Apex.AI is backed by Toyota Ventures, Volvo Group VC, Jaguar Land Rover's VC arm, Continental, ZF, AGCO and more.

[www.apex.ai](http://www.apex.ai)

## RENESAS

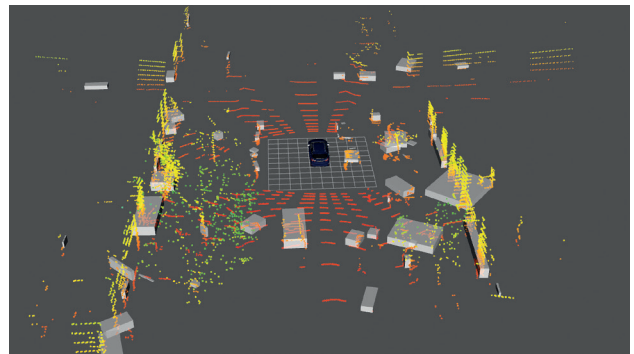
**Renesas Electronics** delivers trusted, embedded design innovation with complete semiconductor solutions that enable billions of connected, intelligent devices that make our lives easier. We're a global leader in Microcontrollers, Analog, Power devices, and SoC products that fuel a broad swathe of industries from Automotive, Industrial and Infrastructure to IoT.

[www.renesas.com](http://www.renesas.com)



**SYSGO** is the leading European manufacturer of embedded software solutions with its real-time operating system and hypervisor PikeOS and the embedded industrial-grade Linux ELinOS. Since 1991, SYSGO has been supporting customers in the Aerospace, Automotive, Railway and IIoT industries in the development of Safety-critical applications on highest industry levels. For security PikeOS 5.1.3 also holds the Common Criteria EAL 5+ certification level. SYSGO is part of the European Thales Group.

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### Webcast & Demo Video

[www.sysgo.com/ros-webcast](http://www.sysgo.com/ros-webcast)