Coupling Autoware and Simcenter Prescan for digital development of AV software
Simcenter Prescan
Embracing the AV development challenge

Billions of scenarios
Explore critical situations
Prepare for certification

Simcenter Prescan provides solutions for the AV development challenge while addressing the important aspect of safety and reliability.
Simcenter Prescan
Focus on critical scenarios

Recreate dangerous real life scenarios in simulation and test under harsh conditions
Simcenter Prescan
Ready to use sensor models

20 ready to use sensor models
• Camera
  • Depth
  • Segmentation
  • Bounding rectangles
  • Object camera
• Radar
• Lidar
• Ultrasonic
• V2X
• Lane marker
• …
Simcenter Prescan
Physics based sensors

Physical Device
- Lens modeling
- Color filter array
- Image sensor
- Circuit board
- Noise model

Simulation Engine
- Beam cross section
- Emission pattern
- Scan pattern
- Pulse shape
- Simulate exactly how a beam propagates through a scene
- Take into account multiple bounces and reflections based on object properties and materials
- Simulate important time effects to mimic how beams are projected through a scene
- Path tracing simulation uses physics based real life equations

World
- Simulate the environment as accurately as possible (e.g. sun, sky, atmosphere, etc.)
- Ensure that every object in simulation has material objects that represent real-life interaction with the desired spectrums
- Ensure that every object has the right level of geometric detail needed to produce accurate results

CAMERA
- Antenna pattern
- Location Tx
- Location Rx
- Waveform
- Operating frequency

LIDAR
- Beam cross section
- Emission pattern
- Scan pattern
- Pulse shape

RADAR
- Antenna pattern
- Location Tx
- Location Rx
- Waveform
- Operating frequency
Solving the AV development challenge

Prescan supports the ideal development process for automated vehicles

Emphasizing a **Continuous Integration** approach
Speed up development with synthetic sensor data

Simcenter Prescan synthetic sensor data interfacing with Autoware

• Digital twin of the vehicle and the complete software stack
• Develop faster and safer with synthetic sensor data
• Easily compare algorithm output to simulation ground truth
Application example
Developing path following algorithms

Coupling Simcenter Prescan and Autoware for development
- Faster iteration
- Frontloading your development efforts
- Test corner cases safely
Digital verification of automated driving software

Algorithm verification in simulation

• Compare algorithm results to simulation ground truth
• Introduce variation in the environment through Prescan APIs
• Results flow directly back into the development process
Algorithm verification on test vehicles

Verification of algorithms on test vehicles

- Assess algorithm performance on real vehicle
- Switch easily between vehicle and lab environment with identical software stacks
- Results flow directly back into the development process
Simulation validation using test vehicle

Validate simulation fidelity

- Compare simulation data to real-world data
- Use recorded data to fit your sensor model parameters
- Available as a service
Thank you!

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