Release 2022 R1 Highlights
Ansys AVxcelerate

What's New

Ansys AVxcelerate 2022 R1

Platform

- Co-Simulation capability with IPG Automotive CarMaker®
- New Sensors Labs user interface and Automation API
- Real-time control of sensor behavior

Sensors

- Large and complex LiDAR simulation
- Large MiMO Radar simulation **(beta)**
- Surface Roughness in Radar simulation **(beta)**
- Segmentation for camera perception testing **(beta)**

Headlamp

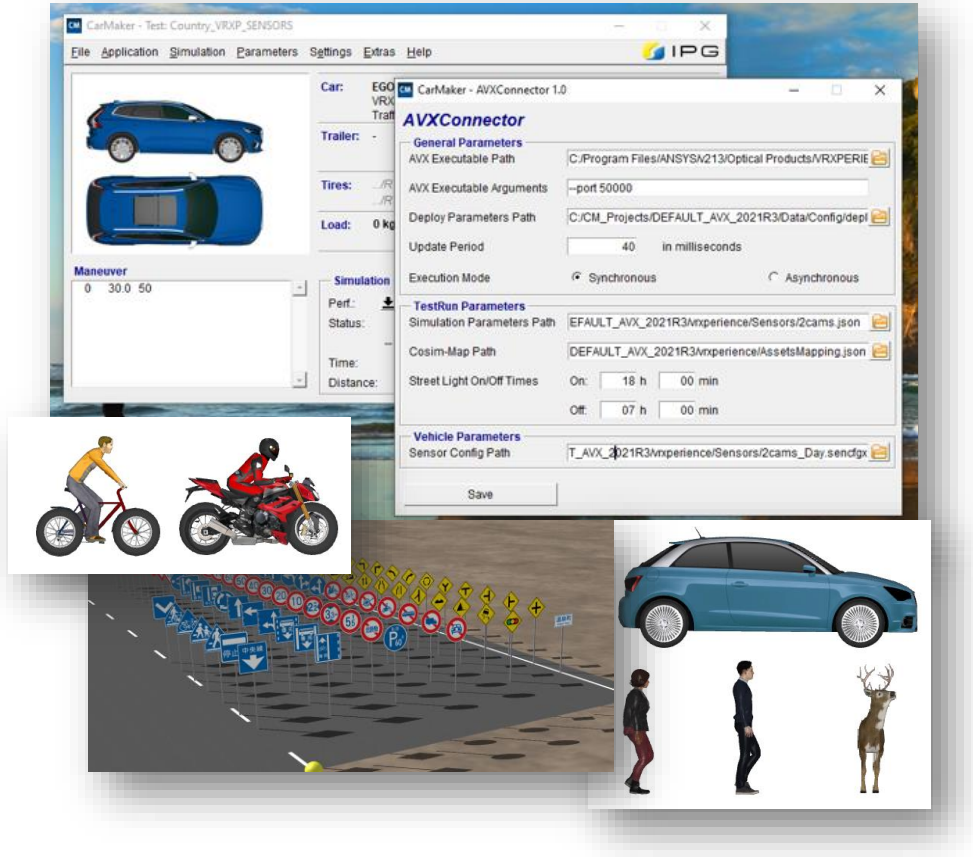
- Lighting system management API for automation
- Smart headlamp management in camera simulation **(beta)**

Co-Simulation Capabilities with IPG Automotive CarMaker

Benefit from Ansys Physic-Based Sensors as part of IPG Automotive CarMaker simulation

Robust and seamless co-simulation

- AVxcelerate Sensors preparation UI integrated in IPG Automotive CarMarker UI
- AVxcelerate **Physics-based sensors** simulation (camera, radar, lidar) run in-sync with **IPG Automotive CarMaker** vehicle dynamic and scenario
- Ansys library of 3D environment ready for physic-based simulation available in IPG CarMaker (150km, 50 vehicles, 950 traffic signs DE, US, CN, etc.)

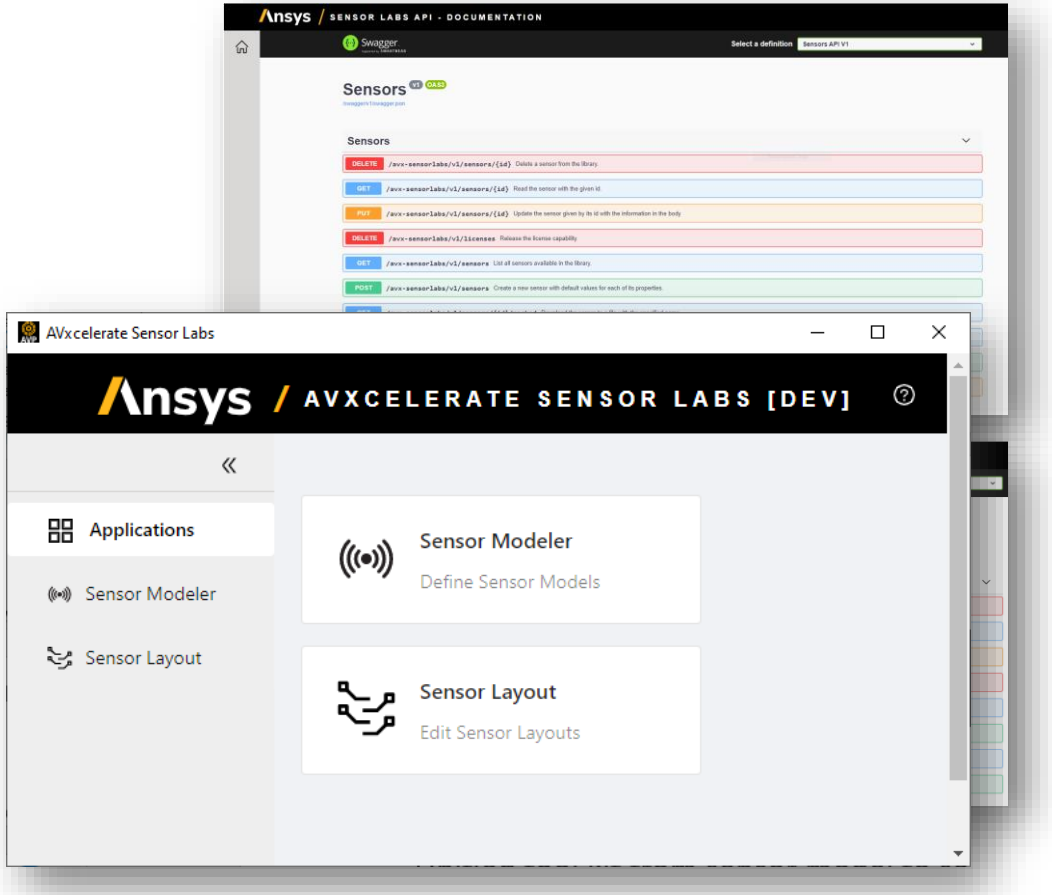


New Sensor Labs UI and Automation API

One tool to configure sensors and layout

Unified tool kit from sensor model to sensor layout

- Modern user interface with new search, multi-sensor import capabilities
- Creation of AVxcelerate compatible sensors.
- Adding Ansys Speos Camera compatible parameters
- REST API for the scripting of sensor and layout creation.



Real-time Control of Sensor Behavior

Simulate back-channel from DSP to sensors front-end

Drive sensors behavior during the simulation

- Apply live camera, lidar and radar updates
- Simulate dynamic of sensor such as:
  - Exposure adaptation requested over ISP back-channel
  - Laser beam focusing on POI
  - Radar range adaptation

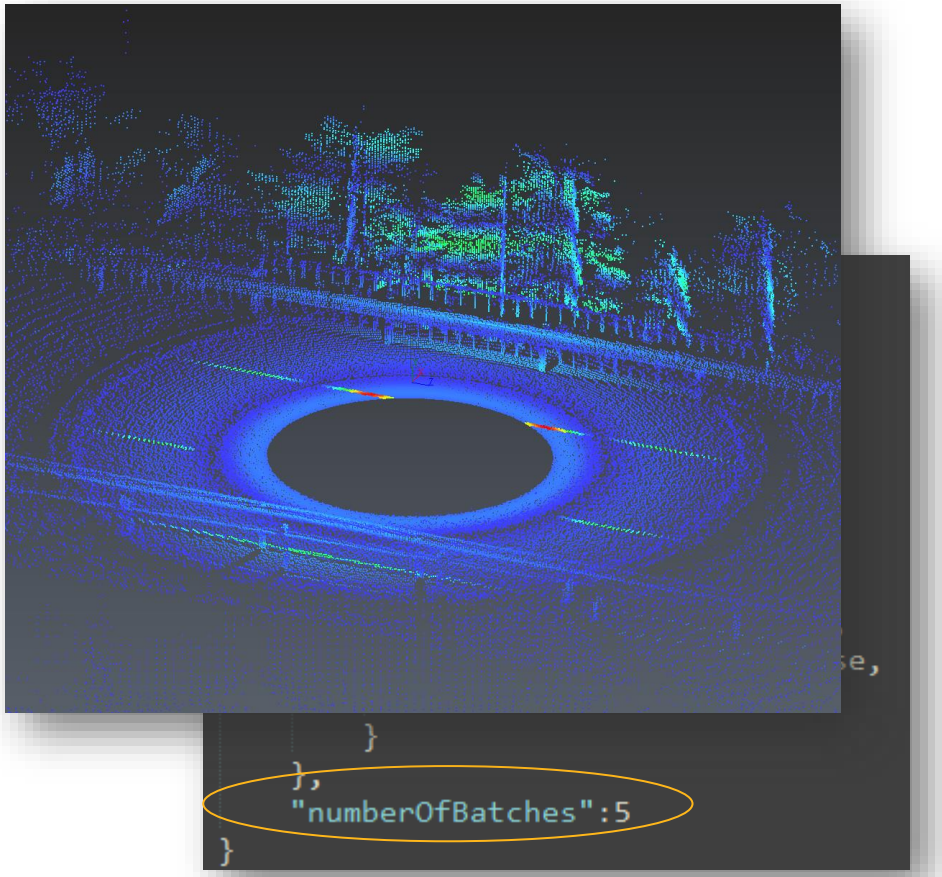
```
message Feedba
  // The ident
  //
  // \note Thi
  // a sensor
  //
  string sens

  // Contains
  //
  oneof feedback_control_sensor_parameters {
    // This message is used to update a camera parameters during
    // the simulation.
    //
    FeedbackControlCameraParameters feedback_control_camera_parameters = 2

    // This message is used to update a radar parameters during
    // the simulation.
    //
    FeedbackControlRadarParameters feedback_control_radar_parameters = 3;

    // This message is used to update a lidar parameters during
    // the simulation.
    //
    FeedbackControlLidarParameters feedback_control_lidar_parameters = 4;
  }
}
```

Large and Complex LiDAR Simulation

GPU memory is no longer a limit for LiDAR simulation

Detailed simulation of complex LiDAR can run

- Run simulation with firing sequence file common to Ansys Speos with per beam Pulse shape, duration and energy
- Simulate LiDAR with large number of beams and high spatial precision.
- User defines number of batches required to get the simulation done



Large MIMO Radar Simulation

GPU memory is no longer a limit for Radar simulation

Radar with any number of channels can be simulated out of the box

- Simulate Radar with large number of TX/RX channel
- User select between a custom defined number of batches required to get the simulation done or an automatic batching mode

```
"automaticBatching": {
    "maxNumberOfRayBatches": 1,
    "gpuMemoryQuota": 0.5
```

```
"manualBatching": {
    "numberOfRayBatches": 1,
    "rxBatching": [{
            "modeId": 0,
            "numberOfRxBatches": 1
        }
```

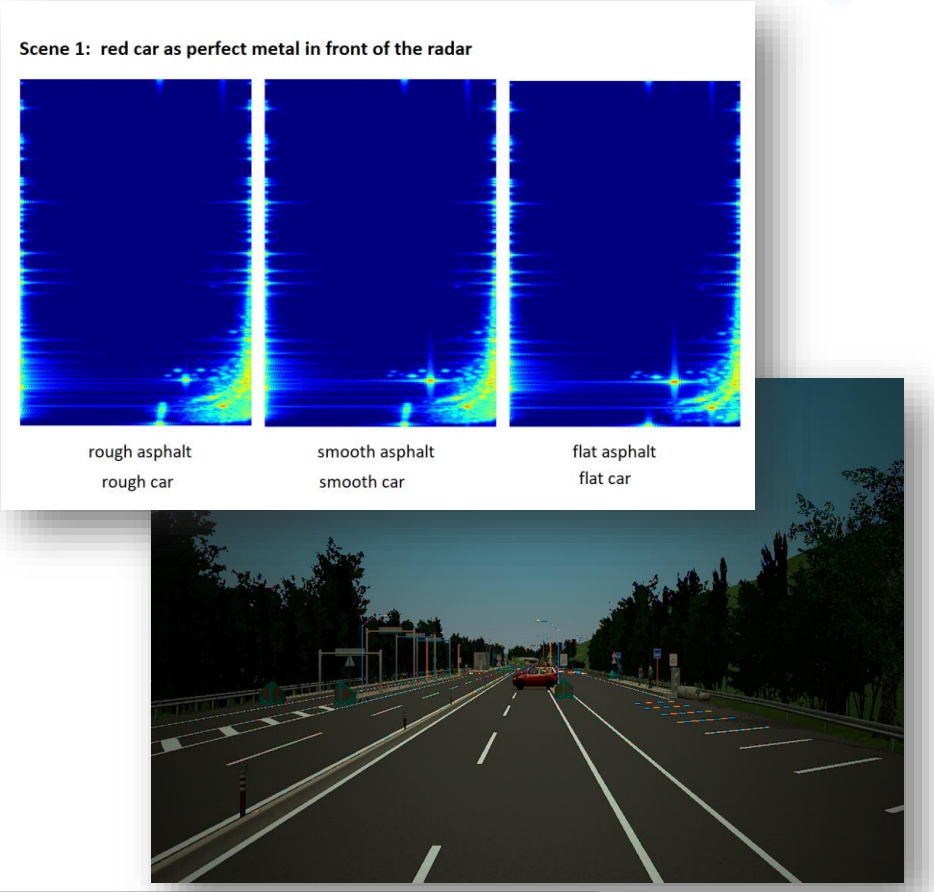
Surface Roughness in Radar Simulation

PATENT PENDING

Best real-time radar simulation fidelity ever

Accurate radar reflection due to rough surface backscattering

- Define surface of each road section as part of the dielectrically materials
  - Roughness as the ratio between the standard deviation of the height profile and its correlation length.
  - Standard deviation of the height profile
- Run simulation where roughness impact electromagnetic waves reflection on targets
- Accurate and efficient means to simulate rough surface backscatter (diffuse scattering) of radar reflections

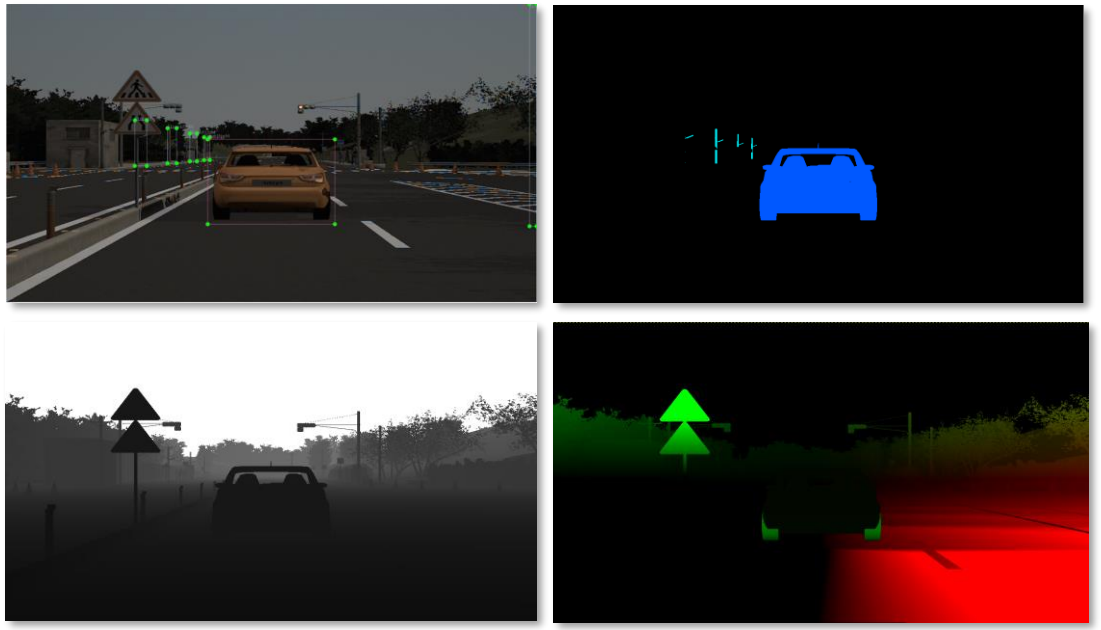


Segmentation for Camera Perception Testing **(beta)**

Train your camera perception algorithms thanks to ground truth data

Get labeled data out of simulation

- Camera ground truth data available per sensor:
  - depth map,
  - pixel segmentation,
  - optical flow,
  - 2D bounding boxes
- Data store on disk or streamed to evaluator thanks to grpc/protbuff API

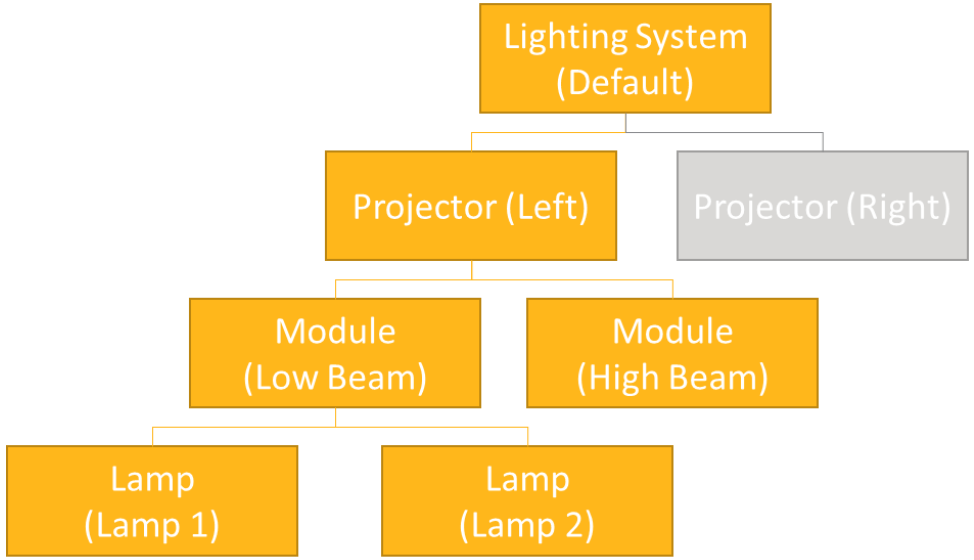


Lighting System Management API for Automation

Public API to create AVX compatible lighting systems

Lighting system creation automation

- New REST API to create advanced lighting systems for the ego-car in AVX simulations
- Create the complete lighting system structure and manage the file dependencies (IES and Spectrum) via scripting
- In-memory lighting system creation unlocks variation and optimization capabilities



Smart Headlamp Management in Camera Simulation

Ease automation of camera perception virtual test at night with smart headlamps

Matrix beam lighting systems for physics-based camera simulations

- Define ego's car advanced lighting system and its layout
- Plug lighting system control ECU using provided API
- Simulation of advanced lighting systems behavior and see impact on camera result
- Validate camera perception in SiL or HiL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