

Code 7670ff

# PreSense DRIVE

Sound Simulation for Driving Simulators

# OVERVIEW

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## PreSense DRIVE

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Vehicle interior noise simulation for the use in driving simulators

PreSense DRIVE is an interactive vehicle interior noise simulation to increase immersion by a true-to-life sound in third-party vehicle simulators. It is based on the PreSense NVH Simulator technology and uses the same advanced algorithms.

With an immersive sound simulation, the driver of the simulated vehicle experiences the simulation as if they would be driving a real vehicle.

PreSense DRIVE can be integrated into any driving simulator using an API, the CAN FD bus system, or IPG CarMaker®.

## KEY FEATURES

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Acoustic subsystem for vehicle simulation

Interactive true-to-life re-synthesis of powertrain, tire/road, and wind noise in real-time using advanced algorithms

Special events to play sound samples, e.g., for chimes, turning indicator, warning and notification sounds

External events to simulate traffic noise (vehicles passing by) or to play sound samples with Doppler effect and distance-dependent attenuation (e.g., ambulance or police siren)

Integration into a third-party vehicle simulator using an API (gRPC interface), IPG CarMaker®, or a CAN FD bus system

Multi-channel playback, e.g., sound at driver's ears, vibration at the seat and the steering wheel

Calibrated and equalized headphone playback using HXB-PreSense (code 7661) or calibrated and equalized playback of binaural signals using multiple loudspeakers with cross talk compensation (according to ETSI TS 103 224)

# DETAILS

## Sound Simulation

PreSense DRIVE simulates the complete vehicle interior soundscape which contains powertrain, tire/road, and wind noise. The Special Event Audio source is used to play back sound samples for chimes, turning indicator, warning and notification sounds, or operational noise. The External Event Audio Source simulates traffic noise (vehicles passing by) or reproduces sound samples with Doppler effect and distance-dependent attenuation, for example, for an ambulance or police siren. For playback, binaural headphones or loudspeakers are used. Vibration playback via shakers is optional.



## Third-Party Vehicle Simulator Integration

PreSense and PreSense DRIVE can be integrated into any vehicle simulator. The sound simulation software PreSense DRIVE receives operating state variables such as engine speed, vehicle speed, and load from the simulator via a software interface or a CAN FD bus system and adapts the sounds accordingly.

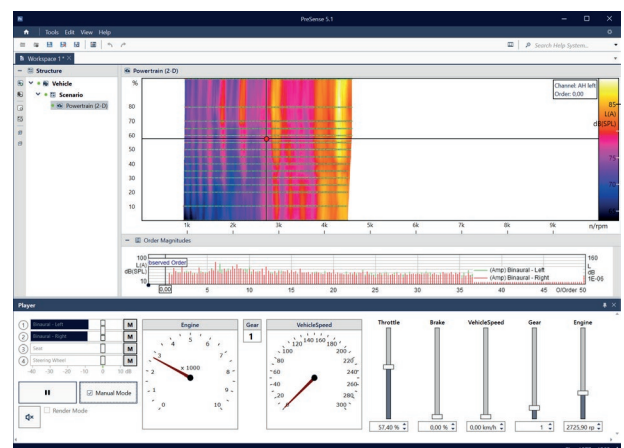
PreSense DRIVE integrates with the following interfaces: PreSense gRPC remotely using gRPC technology, IPG CarMaker®, and CAN FD bus systems. These APIs use the Document Remoting Service to control or read out the currently opened Drive Project and its structure of vehicles, scenarios, and audio sources.

## Dataset Generation

PreSense DRIVE comes with predefined maps of several vehicle types, e.g., sports car, electric vehicle, compact or sub compact class. These maps can be used for basic but nevertheless realistic interior noise simulation.

If you already have a PreSense license that includes PSM 10 (PreSense Audio Sources Automotive Standard, code 7610), you can use PreSense to generate more sophisticated maps that meet your products and standards more closely.

Furthermore, our Engineering Services offer map generation according to your specification.



# LICENSES AND FEATURES

## PSD 00 PreSense DRIVE (code 7670)

- › Load existing PreSense Drive Projects
- › Easy-to-use user interface to switch between vehicles and scenarios which are included in the active Drive Project.
- › Multiple supported audio sources with authentic, realistic, artifact-free re-synthesizing algorithms: Powertrain (2-D), Powertrain (n-D), Wind, Tires/Road, Wind and Tires/Road
- › Triggered playback of sound samples, for example, turning signal, warning sounds, voiced instructions, background noise, transient noise phenomena as Special Events Audio Source
  - » Every Special Events Audio Source consists of one or more events each of which consists of one or more sound files
  - » Different event playback modes: Serial, Random Sound, Loop Multiple Times, or indefinitely
  - » Events can be triggered from third-party software via gRPC interface or via configurable triggers depending on an operating state
- › External Events Audio Source for simulating traffic noise (vehicles passing by) or playing sound samples with Doppler effect and distance-dependent attenuation (ambulance or police siren)
- › Flexible configuration of operating states (RPM(s), load(s), speed, ...)
- › Several interfaces to integrate PreSense DRIVE into a third-party vehicle simulator:
  - » CAN FD with the supported devices HXB PreSense (code 7661) or PCAN-USB / PCAN-USB FD from PEAK Systems
  - » IPG CarMaker®
  - » Software programming API (network interface) using gRPC technology including documentation and code examples (C++/C#)
- › WAV to HDF file converter
- › ASIO support
- › Support for multiple audio output channels, for example, additional shaker playback
- › Output channel filter matrix for loudspeaker equalization

## PSD 01 PreSense DRIVE Editor (code 7671)

- › Requires PSD 00 PreSense DRIVE (code 7670)
- › Create new or modify existing PreSense Drive Project, define vehicles and scenarios including the required audio sources.
- › Each scenario is a combination of the following audio sources: Powertrain (2-D), Powertrain (n-D), Wind, Tires/Road, Wind and Tires/Road, Special Events, External Events
- › Datasets (maps) are derived from PreSense (code 7600ff). No support for maps created with contributions from Transfer Path Analysis (TPA) created by PSM 21 (PreSense TPA Support, code 7621).
- › Configuring Special Events Audio Sources
  - » Adding and removing events
  - » Adding and removing sounds (HDF files)
  - » Defining conditional triggers
  - » Selecting Playback Mode (Serial, Random Sound, Loop, Loop Multiple Times)
- › Configuring External Events Audio Sources
  - » Adding and removing passing sources
  - » Selecting passing source sound (map with vehicle sound created with PSM 12 or from HDF file)
- › Changing level of an Audio Source, muting or soloing channels or Audio Sources

## PreSense DRIVE Software Modules

PreSense DRIVE (code 7670ff) contains

- › PSD 00 PreSense DRIVE (code 7670)
- › PSD 01 PreSense DRIVE Editor (code 7671)

## Related Software

- › PreSense (code 7600) Interactive Simulator for NVH Assessment

## Compatible Playback

- › Recommended: HXB PreSense (code 7661)
- › RME Audio Interface with optical output connected to *labO2/labP2* (codes 3731 / 3732) via *labADAT* (code 3794)
- › *labP2* (higher latency compared to HXB PreSense or an RME Audio Interface)
- › Integrated sound card (uncalibrated playback and higher latency)
- › Calibrated and equalized playback of binaural signals with several speakers and crosstalk suppression (according to ETSI TS 103 224) via 3PASS
- › Vehicle driving simulators, e.g., SoundSeat II (code 7041)

## System Requirements

- › Windows 11 x64
  - » Pro, Enterprise, Education; version 21H2 or newer
  - » Languages: US / Western Europe
- › Processor
  - » Xeon E5-1680, Core i7-7700, Core i5-8250U, AMD Ryzen 5 1500X, AMD Ryzen 5 2500U
  - » Recommended: Core i7-9700KF, Core i9-9980HK, AMD Ryzen 5 3600, AMD Ryzen 9 4900HS
- › RAM
  - » Minimum: 16 GB
  - » Recommended: 64 GB (Laptop), 128 GB (Desktop PC)
- › Solid State Drive (SSD) for the data
- › Graphics adapter
  - » Minimum: NVIDIA® card with 640 CUDA™ cores and 2 GB of dedicated RAM, e.g., Quadro® K2200
  - » Recommended: NVIDIA CUDA 6.1, Pascal architecture with 1024 CUDA cores (or more) and 4 GB dedicated RAM (or more), e.g., Quadro P2000, P2200, P3200, P5000
  - » Minimum graphics driver version requirements:  
GeForce RTX / GeForce Quadro: 553.35  
GeForce: 566.36
- › Display with WXGA resolution (1366x768), full HD with 1920x1080 recommended
- › .NET framework 4.8
- › HASP dongle driver
- › Optional HEAD USB driver

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