Applications

- Car simulators
- Virtual reality platforms
- Sound quality studies

GeneCARS is an advanced real-time audio synthesis tool for the generation of car-related sounds (powertrain, aerodynamic noise, rolling noise, screeching tires, traffic, starter...). 3D real-time processing allows 3D audio rendering of each sound source. GeneCARS is designed to receive data through a network and to be integrated within driving simulators and virtual reality platforms. Its sound database is open, meaning that customized car-related sounds can be created.

Two key technologies

Real-time audio synthesis

Real-time audio synthesis consists in generating sound sources according to real-time events in a scenario. When the driving conditions are changing, the synthesis algorithms match the new conditions and each sound source evolves accordingly. For instance the powertrain source is controlled by the RPM and a percentage of charge linked to the engine torque, while aerodynamic and rolling noises are controlled by the speed of the car.

3D Sound

Innovative techniques and algorithms are used to give a 3D perception of sounds either with headphones or loudspeakers. This allows more immersive and realistic simulations.

geneCARS features

- Interactivity and 3D sounds for unrivalled realistic sound rendering
- A complete set of sounds:
  - Powertrain partials and noise
  - Aerodynamic and rolling noise
  - Traffic noise with Doppler effects
  - Tire screeching
  - Starter
  - Windshield wipers, power windows, Autoradio …
  - Weather effects (rain, wind…)
- Individual control of each sound source
- Additional wav player for the playback of sound samples (e.g. siren, blinkers…)
- Possible integration of additional effects:
  - Impacts
  - Air conditioning
  - Tunnel effect
  - Rolling noise for different surfaces
- Open datasets: with prior measures GenCARS can synthesize the sound of any vehicle
- 3D audio rendering can be adapted to clients’ configurations
- SCANeR compatibility
- Network control using UDP protocol
GeneCARS architecture:

GeneCARS software is installed on an audio PC connected to the simulation supervisor via an Ethernet link. It can also be implemented on an independent PC integrating a dynamic car model and driver controls (steering wheel and pedals). Synthesis data is loaded at start-up with the information included in a configuration file.

GeneCARS receives the simulation parameters (RPM, car speed, load, key/starter position, traffic information, etc.) through a dedicated network. These parameters are sent to the real-time sound generators.

GeneCARS synthesizes the sounds according to the received data, applies 3D processing and routes the signals to the sound card outputs.

For any specific simulation supervisor protocol, GENESIS can develop a dedicated communication interface with GeneCARS.

GENESIS audio simulators

GENESIS is a high-technology company whose core business is high-performance 3D audio simulators and sound quality tools & expertise.

GENESIS real-time audio simulators are used for industrial or military applications that require a realistic and interactive soundscape with an accurate sound reproduction.

Examples include:
- Virtual reality platforms
- Training simulators: helicopter flight simulators, car simulators, training facilities for sonar operators, etc.
- Simulators for research and study purposes: car simulators for multisensory analysis tests, virtual aeroplane cockpit to study ergonomy, train coach simulation tool for studying passenger audio comfort, etc.

The GENESIS know-how is based on over 15 years of experience with major simulators built for industry and defense: RENAULT, PSA, DCNS, AIRBUS, SNCF, EUROCOPTER, etc.

Synthesis data

GeneCARS is delivered with the data package for one car. Synthesis data contains the following parameters:

**Engine partials:**
- Level of partials as a function of engine speed
- Frequency of partials as a function of engine speed
- Partial gain as a function of pedal load

**Engine noise:**
- Bark band levels

**Aerodynamic noise:**
- Bark band levels or 3rd octave levels as a function of speed

**Rolling noise:**
- Bark band levels or 3rd octave levels as a function of speed

If needed, GENESIS can supply customized synthesis data from sound recordings or data sets.

Product information

**OS Compatibility:** Windows XP 32/64 bit, Windows 7 32/64 bit, Windows 8 32/64 bits, Windows 10 32/64 bits