

SCANeR™ Studio 2021

FAQ

TABLE OF CONTENTS

1	PRESENTATION	3
	WHAT IS SCANer™STUDIO?	3
	WHAT TYPES OF SIMULATORS DEVELOPS AV SIMULATION?	4
2	INTEGRATION AND SUPERVISION	5
	WHICH LICENSES SOLUTIONS ARE AVAILABLE?	5
	WHAT IS THE COMMUNICATION PORT NUMBER USED BY THE LICENSE MANAGER?	5
	CAN WE MANAGE LICENSE'S ACCESS RESTRICTION?	5
	CAN WE USE A FIREWALL (AN ANTI-VIRUS) ON SAME MACHINE AS SCANer™STUDIO?	5
	DOES AV SIMULATION PROVIDE SERVICES?	5
	HOW SCANer™STUDIO COMMUNICATION WORKS?	6
	WHAT IS THE NETWORK COMMUNICATION PORT RANGE USED BY SCANer™STUDIO?	6
	DOES SCANer™STUDIO IS AVAILABLE FOR LINUX OPERATING SYSTEMS?	6
	CAN WE CONNECT A TRACKING SYSTEM TO SCANer™?	6
	DOES SCANer™STUDIO ABLE TO RUN AUGMENTED REALITY (AR)?	6
	CAN WE CONNECT A MOTION PLATFORM TO SCANer™?	6
	IS IT POSSIBLE TO DO HARDWARE IN THE LOOP (HIL)/SOFTWARE IN THE LOOP (SIL) WITH SCANer™?	6
	IS IT POSSIBLE TO DO VEHICLE-TO-VEHICLE (V2V)/VEHICLE-TO-INFRASTRUCTURE (V2I) CONTROL?	7
	DOES SCANer™ HAVE AN HPC SOLUTION?	7
	DOES SCANer™ SUPPORTS PHYSICAL SENSORS?	7
3	PROGRAMMING WITH SCANer™STUDIO	8
	WHICH PROGRAMMING LANGUAGE CAN BE USED WITH SCANer™?	8
	CAN WE INCLUDE CUSTOM PROCESSING ALGORITHMS?	8
	CAN WE DO Co-SIMULATION WITH SCANer™?	8
4	EXPERIMENTATION DEVELOPMENT	9
	WHICH SENSORS MODELS ARE AVAILABLE WITH SCANer™STUDIO?	9
	CAN WE ADD NOISE ON SENSORS?	9
	CAN WE CUSTOMIZE EVENTS TO CREATE SITUATIONS?	9
	HOW TO SIMULATE AN AUTONOMOUS (EGO) VEHICLE?	9
	HOW TO POPULATE A GIVEN TERRAIN WITH TRAFFIC?	10
	HOW TO INTEGRATE SCANer™STUDIO IN A ROS ENVIRONMENT?	10
5	VEHICLE DYNAMIC	10
	WHAT IS CALLAS?	10
	WHAT IS A SIMPLE MODEL?	10
	CAN WE CONNECT OUR OWN DYNAMIC VEHICLE MODEL TO SCANer™?	10
	WHAT IS A HUMAN DRIVER?	11
	WHAT IS A VIRTUAL DRIVER?	11
	WHAT IS A TRAFFIC DRIVER?	11
	CAN WE MANAGE LATERAL / LONGITUDINAL COMMANDS OF ONE OR SEVERAL CARS?	12
	CAN WE DEFINE A TRAJECTORY FOR ONE OR SEVERAL CARS? AND HOW TO?	12
6	TERRAIN DEVELOPMENT	13
	CAN WE IMPORT/CREATE GEO-REFERENCED/GIS TERRAIN IN SCANer™?	13
	CAN WE IMPORT OUR OWN 3D OBJECTS?	13
	CAN WE MANAGE ROAD SURFACE?	13

1 PRESENTATION

We are pleased to provide you the **FAQ** manual for your SCANeR™studio Evaluation.

This manual will give you an overview of all possibilities you have with SCANeR™studio.

If information is missing or if you need any further details please feel free to contact our services:

Support		
Phone	France	+33 (0)1.46.94.93.50
	Canada	+1 450.274.0221
Email	support-scaner@avsimulation.fr	

What is SCANeR™studio?

SCANeR™studio is a complete automotive simulation software offering environments for Researchers, Engineering and Training:

- Research:

Research Segment are the Universities, laboratories and institutes of research. Main aim is to conduct Human Factor research on systems and means of transport, as well as transport infrastructure from technical, economic and sociological perspectives.

Also involved in the improvement of driver assistance systems, comfort and security as well as security from an ergonomic viewpoint, man-machine interaction, etc.

- Engineering:

Automobile manufacturers (OEM) and equipment manufacturers developing complete vehicles or systems (ADAS, Lighting, etc.). The implementation of our simulation solutions and SIL/HIL benches allow:

- Reduction in the cycles of development,
- Limiting of the gap between functional validation and the prototype test,
- Fine-tuning and validation of on-board systems.

- Training

Worldwide, an increasing number of those involved in driver training and driver awareness (Training centers, Transport operators, Insurance companies, Local and District councils) are interested in acquiring simulators.

What types of simulators develops AV Simulation?

AV Simulation has a range of 4 simulators:

- **Advanced Simulator:**

Real instrumented vehicle (car / truck / bus) embedded into a dome (360° visual system) mounted on at least one motion platform.

- **Full Scale Simulator:**

Real instrumented vehicle (car / truck / bus) with optional components (motion platform HIL, etc.)

- **Premium Simulator:**

Simulator that regroups several key driving components, as the dashboard and other elements from real vehicles. It includes 3 screens and can be equipped with a motion system, vibrating chair or eye-tracking capability, etc.

- **Compact Driving Simulator (CDS):**

The CDS was conceived in order to provide the driver with a realistic driving interface and a large field of vision at a low cost. Its compact format makes it easily transportable between several sites. This simulator is equipped with features including 3 screens, a manual or automatic gearbox, a handbrake and real steering wheel with force-feedback. It can also be equipped with a motion system as an option.



2 INTEGRATION AND SUPERVISION

Which licenses solutions are available?

2 solutions are available to fit to your needs:

- **Physical license:**
It is a USB dongle, it can contains from 1 to N instances of our software features.
This solution is useful for workstations, multi-machines simulators and also company who search a solution for physical server license sharing.
- **Software license:**
It is a non-physical license, it can contains from 1 to N instances of our software features.
It resides in the secure storage of a specific computer; once generated it cannot be moved to another computer.
This solution is useful for workstations and also company who search a solution for virtual server license sharing.

What is the communication port number used by the license manager?

The communication port number is 1947.

License Administration Control Centre: <http://localhost:1947>

Can we manage license's access restriction?

Yes, using the License Administration Control Centre you can customize access restriction per license.

Can we use a firewall (an anti-virus) on same machine as SCANeR™ Studio?

It is not recommended, nevertheless it is possible.

Rules are added to Windows firewall during the installation.

If you use an external firewall or anti-virus your network administrator must to allow SCANeR™ studio UDP communication port range.

Does AV Simulation provide services?

Yes, AV Simulation can provide you:

- Driving simulator components:
 - Steering-wheel with force-feedback
 - Gear box connected to clutch
 - Pedals with force-feedback
 - Sound System
 - Vibration system
 - Etc.
- Specific data set developments:
 - Database environment (highway, city, etc.)
 - Vehicles
 - Experimentation
 - Etc.

How SCANeR™studio communication works?

SCANeR™studio software uses 2 communication protocols:
Network and Shared Memory.

The Network allows users to share computer resources (visual, ADAS, sounds, etc.).
It publishes UDP packets using Multicast.
We recommend to use SCANeR™studio on a dedicated network to avoid network noise.

The Shared Memory is used for dynamic vehicle high speed computation.

What is the network communication port range used by SCANeR™ Studio?

Default port range is: 25999-25300

Rules are automatically added to Windows firewall to allow this port range.

If needed you can tune this port range but you will have to manually configure the firewall.

Does SCANeR™studio is available for Linux operating systems?

Yes. SCANeR™studio modules are compatible with Ubuntu 16.04 LTS x64.

Linux binaries are not delivered with SCANeR™studio installer; if you need it please contact our services.

Can we connect a tracking system to SCANeR™ ?

Yes. SCANeR™studio allows to connect different tracking systems:

- Head tracking.
- and/or Eye tracking.
- and/or Virtual Reality headset.
- and/or Heart rate tracking systems.

Does SCANeR™studio able to run Augmented Reality (AR)?

Yes. Using cameras mounted on the face of a headset, it is possible to create a mixed reality environment for the simulation. The driver will see his real hands and the steering wheel, seamlessly integrate with the virtual world and the vehicle's cabin. Combined with eye tracking technology, this setup provides tools for analysis of the most advanced driving systems being developed today.

Can we connect a motion platform to SCANeR™ ?

Yes. SCANeR™studio allows to connect different manufacturer motion platform and/or your own custom motion platform using our Motion API.

Is it possible to do Hardware In the Loop (HIL)/Software In the Loop (SIL) with SCANeR™ ?

Yes.

Is it possible to do Vehicle-to-Vehicle (V2V)/Vehicle-to-Infrastructure (V2I) Control?

Yes. 2 prototypes have been realized:

V2X with iTetris:

This prototype has been developed as part of the SINETIC projects.

Aims were to develop a complete simulation environment dedicated to cooperative ITS and connected vehicle, at two level:

- System level including all system components (vehicles, infrastructure, server, etc.).
- Component level with detailed components models and physical phenomena.

V2X with Veins:

This prototype has been developed through several projects.

The benefits for SCANeR™studio are:

- Simulation of network layers and protocols (OMNet++ and MiXiM).
- Standard automotive Protocols already implemented.
- Perturbation models like buildings and obstacles.
- Open Source models and large research community.

Does SCANeR™ have an HPC solution?

Yes. SCANeR™studio software is ready for running on HPC systems with addition of Multi instance. One computer node may run many paralleled SCANeR™ sessions. All these features will be available and packaged within upcoming new dedicated product: SCANeR™compute.

Does SCANeR™ supports physical sensors?

Yes. A preview of the PHYSICALSENSOR module is available in an extra package for SCANeR™studio 1.8.

The package includes:

- Mobiles (car, pickup and motorcycle) and Terrain (Urban and Highway) fully described with physical materials.
- Physical Radar Sensor Module with Full EM computation with Shooting and bouncing forward ray-tracing technique & RF asymptotic methods (GO, PO, PTD, ECM).
- Display of the Results via Doppler/range map.

3 PROGRAMMING WITH SCANER™ STUDIO

Which programming language can be used with SCANeR™?

Programming language depends of the API you will need:
C/C++, C#, LabView, Matlab/Simulink, FMI, RTMaps, Python.

Can we include custom processing algorithms?

Yes. Depending of your algorithms you will have to use different provided APIs, for example:

- SCANeR™ API:
Communicate in real or non-real time with SCANeR™studio (ADAS, etc.).
- CALLAS API:
Create and externalize your own vehicle components (GMP, suspensions, etc.).
- VehicleDynamics API:
Connect your own advanced vehicle model to SCANeR™studio.
- Motion API:
Connect your own custom motion platform or develop your own cueing strategy.
- Etc.

Can we do Co-simulation with SCANeR™?

Yes. Co-simulation with SCANeR™ can be used in 2 ways:

- Full Vehicle Dynamics.
- Components Vehicle Dynamics.
- Custom algorithm for decision.

4 EXPERIMENTATION DEVELOPMENT

Which sensors models are available with SCANer™studio?

Functional sensors:

- Radar,
- Ultrasonic,
- Camera (2 outputs: Images and Road marking detection).
Compatibility with Segmentation and Depth of Field delivered plugins.
- LIDAR,
- GPS.

Physical sensors:

- Hardware in the Loop (HiL):
Using SCANer™ SDK interface any ECU with simulation data.
- Radar Modelling:
Full EM computation with shooting and bouncing forward ray-tracing technique & RF asymptotic methods (GO, PO, PT, ECM). Results are available as a Doppler/range map.

Can we add noise on sensors?

Yes. To provide a more realistic testing setup for ADAS and autonomous functions, the sensors can be degraded by noise. The noise can be fine-tuned and dependent on the current weather conditions (using python script).

Can we customize events to create situations?

Yes. Using the user-friendly interface, MICE (My Interface to Create my Experiments), you can easily tune events (eg. force a pedestrian to cross the road, force a vehicle to change lane, etc.) without any development knowledge.

To get the list of the available actions available to customize events you can refer to menu "HELP\Scripting help".

Note that for users who would like to create events using "common" languages it is possible using C/C++, C#, LabView, Matlab/Simulink, FMI, RTMaps, Python.

How to simulate an autonomous (EGO) vehicle?

Depending of your project you will have different solutions:

- Human factors research project related to autonomous driving:

With SCANer™ the Autonomous driving feature offers the possibility to simulate an ADAS system by switching during a simulation between a Human and an Autonomous driver. A set of parameters are available to easily customize how the Autonomous driver will manage lateral and longitudinal commands.

Using [MICE](#) dedicated functions users can customize their own ADAS without development knowledge.

- Control law conception and embedded systems development (Active Cruise Control (ACC), Speed Limiter, Around View Monitor (AVM), Road Marking detection, Trajectory following, Etc.).

Using the SCANer™ API ADAS designers and developers can read in Real-Time simulation data, process these and insert control laws into the dynamic vehicle.

[Sensors models are available with SCANeR™studio.](#)

How to populate a given terrain with traffic?

Different solutions are available:

- Populate the terrain with traffic manually,
- Use a Swarm Area around the driven vehicle. Using this option with few vehicles the driver will feel that a lot of vehicle are around.
e.g manual "SCANeRstudio_SCENARIO" chapter "Swarm and trailer"
- Use traffic tools as "Source and Sink", a source is a vehicle producer (X veh/hour), a sink will absorb the vehicles produced by a source.
e.g manual "SCANeRstudio_SCENARIO" chapter "Sink"
- Use AimsunTraffic module. Aimsun traffic is external software; A.V.Simulation has developed a gateway to communicate with this software. Aimsun allows to manage micro traffic and display vehicles into SCANeR™.
e.g manual "SCANeRstudio_SIMULATION" chapter "AIMSUN TRAFFIC".

How to integrate SCANeR™studio in a ROS environment?

To integrate SCANeR™studio with ROS the solution is to use our SCANeR™ API with Linux (Ubuntu 16.04).

5 VEHICLE DYNAMIC

What is CALLAS?

CALLAS is the advanced vehicle model of A.V.Simulation used into SCANeR™studio.

CALLAS is a French acronym, it means: **C**ouplé **A** La **L**imite d'**A**dhérence au **S**ol.

It is the premium model used for high-end driving simulators and automotive engineering. The level of detail and validation of this model enables a realistic driving experience when used in a simulator and can be used to develop, evaluate and validate vehicles and systems in an engineering environment.

CALLAS covers a wide range of applications: truck, bus, cars, motorsport, machine, tractors, and military vehicles (such as tracked vehicles).

CALLAS specifications are available on demand.

What is a Simple model?

The Simple model is a model used for surrounding vehicles elements. Indeed, these do not have dynamic, they do not consume so much resources so they are ideal to populate your experimentation.

Can we connect our own dynamic vehicle model to SCANeR™?

Yes, depending of the dynamic vehicle model and the solution you would like to implement there are different solutions:

- Use one of SCANeR™studio existing plugin (AMESim, Vi-CarRealTime, Carsim, etc.).
- Use the VehicleDynamics API to:
 - Develop a gateway between your existing dynamic vehicle and SCANeR™studio.
 - and/ or develop a new dynamic vehicle model from scratch compatible with SCANeR™studio.

What is a Human Driver?

The Human Driver is the end user, the one who will control commands from the simulator cabin.

What is a Virtual Driver?

The Virtual Driver allows you to emulate a real driver behaviour by setting up the longitudinal and/or the lateral commands.

What is a Traffic Driver?

Intelligence Artificial of the surrounding vehicles, usually used with Simple models.

Can we manage lateral / longitudinal commands of one or several cars?**Can we define a trajectory for one or several cars? And how to?**

Yes, depending of the vehicle model the solution will be different. There are 2 types of vehicle into SCANeR™ studio:

- Dynamic models (as [CALLAS](#)):

Dynamic models are made to be controlled by a [Human Driver](#) (or [Virtual Driver](#)).

Most of the time in a scenario only 1 dynamic model is used because only 1 driver is needed.

- Simple models: Simple models are made to be controlled by a [Traffic Driver](#).

LATERAL COMMAND (TRAJECTORY)

- On dynamic models (as [CALLAS](#)) it is possible to define a trajectory using a [Virtual Driver](#) using a close or an open loop:
 - Close loop: Provide steering wheel angle information.
 - or Open loop: Define a trajectory.
- On Simple models 2 options are available to manage the lateral position:
 - Setup an itinerary on a vehicle.
 - or using [MICE](#) users can define car position/orientation on tracks with “goToLane” or “setLateralShift” or “setPosition”.

LONGITUDINAL COMMANDS

- On dynamic models (as [CALLAS](#)) it is possible to set up a longitudinal profile using a [Virtual Driver](#).
- On Simple models script functions of [MICE](#) can be used as “setSpeedObligatory” (to force a specific velocity on a vehicle) and/or “readProfileFile” (to define a speed profile related to the simulation time).

NOTES

- Using the [VehicleDynamics API](#) you will have the possibility to develop your own driver plugin. Using this solution you will be able to inject your homemade algorithms for lateral and longitudinal commands.
- Using the [SCANeR™ API](#) you will have the possibility to overwrite [Human Driver](#) or [Virtual Driver](#) commands. Using this solution you will be able to inject your homemade algorithms for lateral and longitudinal commands.
- Data acquisition import from recording of test track. Using this solution you will be able to inject recording data for lateral and longitudinal commands in order to compare and/or reproduce driver behaviour in a simulation world.

6 TERRAIN DEVELOPMENT

Can we import/create geo-referenced/GIS terrain in SCANeR™?

Yes, the most popular file formats imported into SCANeR™studio are:

- Standard Shapefile (SHP, GPS Tracks, etc.),
- Open Street Map,
- Here HD Maps,
- TomTom HD Maps.

By using the “Map background” layer of Studio TERRAIN mode customers can also create from scratch georeferenced terrain.

Studio TERRAIN mode also supports:

- OpenDrive.
- CSV.

The CSV file import can be used to import a custom terrain (not available into our importer list).

The specification of the CSV file comes with our installer.

Can we import our own 3D objects?

Yes, the 3D formats compatible with SCANeR™studio are native OpenSceneGraph file formats, as OSGEarth, OSGB, OSGT, OSG, IVE, etc.

SCANeR™studio also embeds plugins delivered with OpenSceneGraph to load (or save) additional 3D file formats, as DAE, 3DS, OBJ, FLT, DXF.

For object creation we recommend 3ds Max, a plugin is delivered with SCANeR™studio to export 3D objects built in 3ds Max to Studio.

Can we manage road surface?

Yes, road surface can be managed, this may have an influence on the driving.