iTSV-KIA-NIRO

Fully Automated Vehicle to be used on Proving Grounds as Sensor Validation Carrier or Traffic Simulation Vehicle

iMAR's **iTSV-KIA-NIRO** is a hybrid vehicle, which can execute programmed trajectories with up to 150 km/h on proving grounds. It is part of iMAR's iSWACO-ARGUS proving ground automation toolset to setup simple and complex traffic scenarios for the validation and homologation of vehicles of all SAE Levels (1 - 5). The iTSV-KIA-NIRO is used in this context as **Traffic Simulation Vehicle (TSV)** to validate the behavior of so-called Vehicles under Test (VUT), but it can also be used for any other application in R&D where a programmable road vehicle is required, e.g. to validate cameras, Lidar or radar systems (i.e. object and event detection and response systems, **OEDR**) on an repeatable driving carrier (**Sensor Validation Carrier, SVC**).

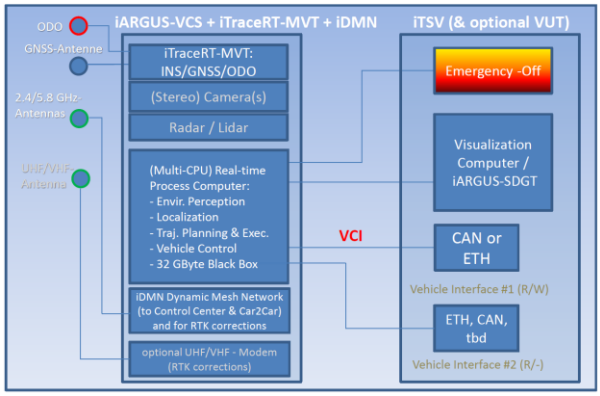
- Fully automated driving on proving grounds
- Integrated INS/GNSS based very accurate localization system iTraceRT-MVT with RTK capability to achieve centimeter level monitoring accuracy with lowest data latency and multi vehicle tracking capability; output of precise time information and PPS
- Full access to all internal vehicle's actuators (steering, throttle, braking) in real-time; no driving robot required
- Integrated vehicle control system iARGUS-VCS
- Fully supported by iMAR's iSWACO-ARGUS system for enhanced Proving Ground Automation
- Integrated Dynamic Mesh Network iDMN for multi vehicle communication for even 100+ participants
- Integrated iARGUS-LTG local trajectory generator
- Interface to iARGUS-CMD software for trajectory planning on polynomial basis as well as on teach-in basis.
- Communication protocol fully compatible with the future ISO 22133-1 standard
- Optional integrated UPS available with 12 VDC and 235 VAC output
- Easy to use: Simple and fast capability of activation / de-activation of fully automated driving mode possible to allow operation also on public roads (TÜV approved)

The iTSV-KIA-NIRO is operated on the proving ground typically with a safety driver, but this is not mandatory. Once the gear selector of the automatic transmission is pushed to "D" by the operator, the iTSV-KIA-NIRO is ready to go.

It remains in standstill condition until a drive command is received from the iARGUS-VCS control system. Then the vehicle executes the programmed (or locally adapted or synchronized) trajectory. From the safety

driver no activity is requested, but he can overrule the automatic control or interrupt the running operation at any time using the Emergency Off button .

iMAR's technology applied in iTSV-KIA-NIRO is also the base for intelligent platooning operations, driving fleets of many vehicles highly automated. Customized adaptations and operation of other vehicles is possible on request.



Technical Data of iTSV-KIA-NIRO (excerpt):

Position accuracy:	± 1 cm + 1 ppm CEP position measurement (control accuracy depends on dynamics and environment)
Data rate:	up to 400 Hz for position, velocity, acceleration, heading / attitude, standard deviations, timestamp and status
Timeing Interface:	Output of PPS (RS422 level) and GPS Time provided to allow accurate synchronization of external systems
Vehicle control:	the integrated vehicle controller allows to command the vehicle regarding speed and direction (iARGUS-VCS); the iARGUS-VCS has access to the internal actuators, horn, direction indicators, wipers etc. of the vehicle
Interfaces:	Ethernet, UART, CAN
Communication Network:	iDMN Dynamic Mesh Communication Network to communicate with the iARGUS-CC Control Center and with any other vehicle being equipped with the iDMN (local operation is also possible without the iDMN installation)

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