

# ARGObox

*Intelligent All-in-One Roof-Top Box*



## A complete Embedded Data Collection System, including:



- HD LiDARs, Cameras, Radars
- GNSS, IMU, V2X
- Vehicle Bus Connection (CAN)
- Sensors Synchronization
- Spatial Calibration
- Real-time Data logger
- Tagging and monitoring HMI
- Rechargeable Power L-Ion Battery

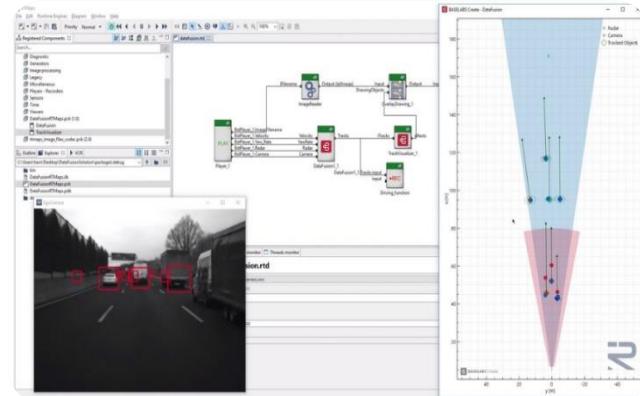
- ✓ Modular
- ✓ Customizable
- ✓ Plug & Play
- ✓ Vehicle agnostic
- ✓ Waterproof
- ✓ Certified



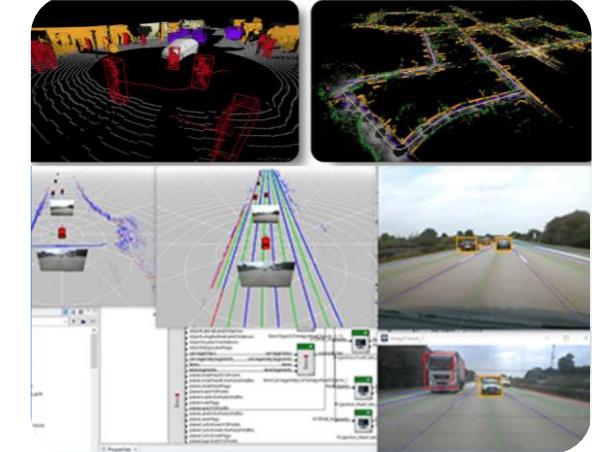
➤ Multiple uses, different outputs



Record synchronized data



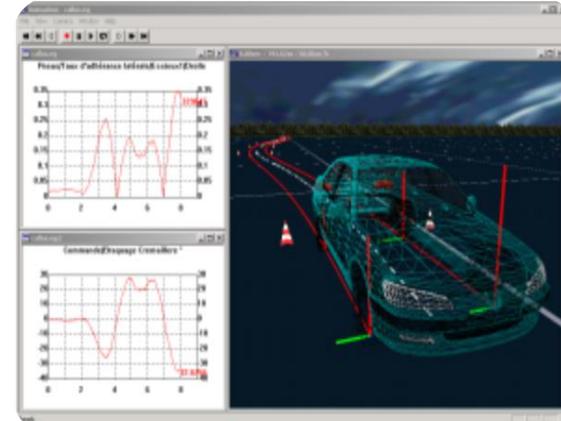
Calibration & Data Fusion



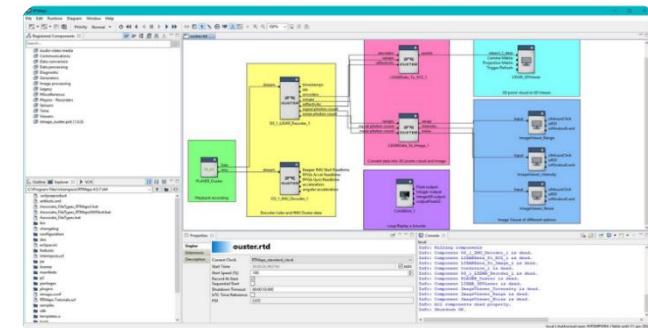
Use case detection & Map builder



Work on new technologies (V2X, Deep Learning, SLAM Lidar, IR camera...)



Competitor analysis



Directly integrate your algorithms in the box

➤ Based on carry-over parts:



Existing after-market roof-box



Existing after-market roof-bars



✓ *Save time&money !*



Existing tools



Existing accessories

# MULTI-SENSOR PERCEPTION

ARGObox

- Adaptable configuration , based on Customer needs & Use cases:

HD LiDARs



Radars



Cameras



front camera:  
65° FOV

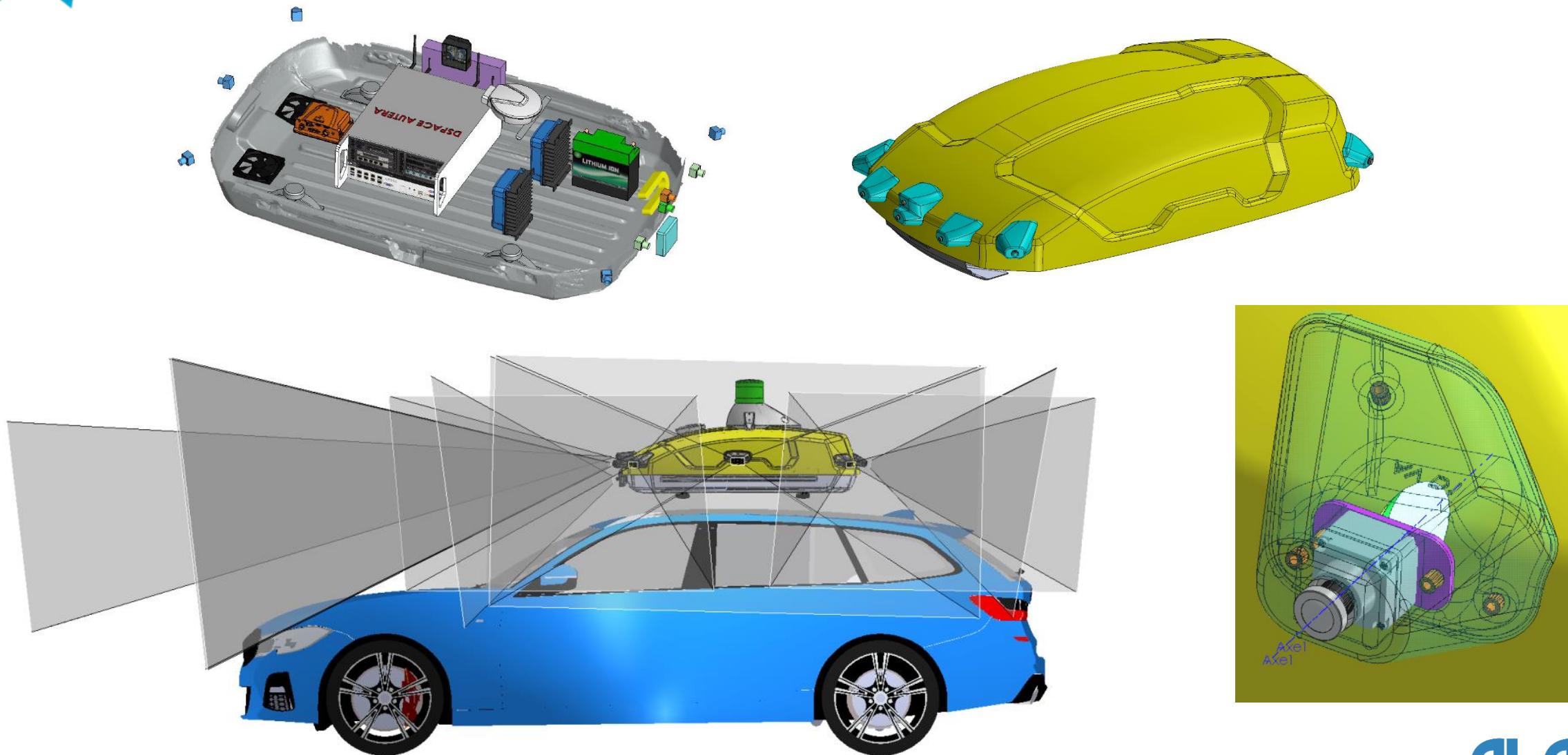
front camera:  
30° FOV

stereo front cameras:  
65° FOV

surround cameras:  
90° FOV

# SENSORS INTEGRATION – CUSTOMIZATION ARGObox

- The modular definition of ARGObox allows many possible configurations:



# LOCATION (adaptable for all needs)

ARGObox

## High precision GNSS, IMU



## Can Interface



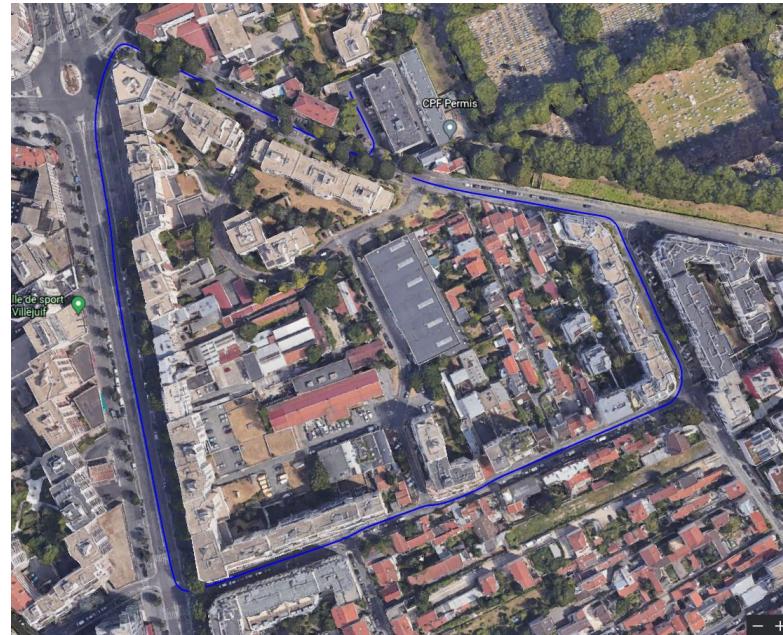
DUNASYS

## V2X, 5G



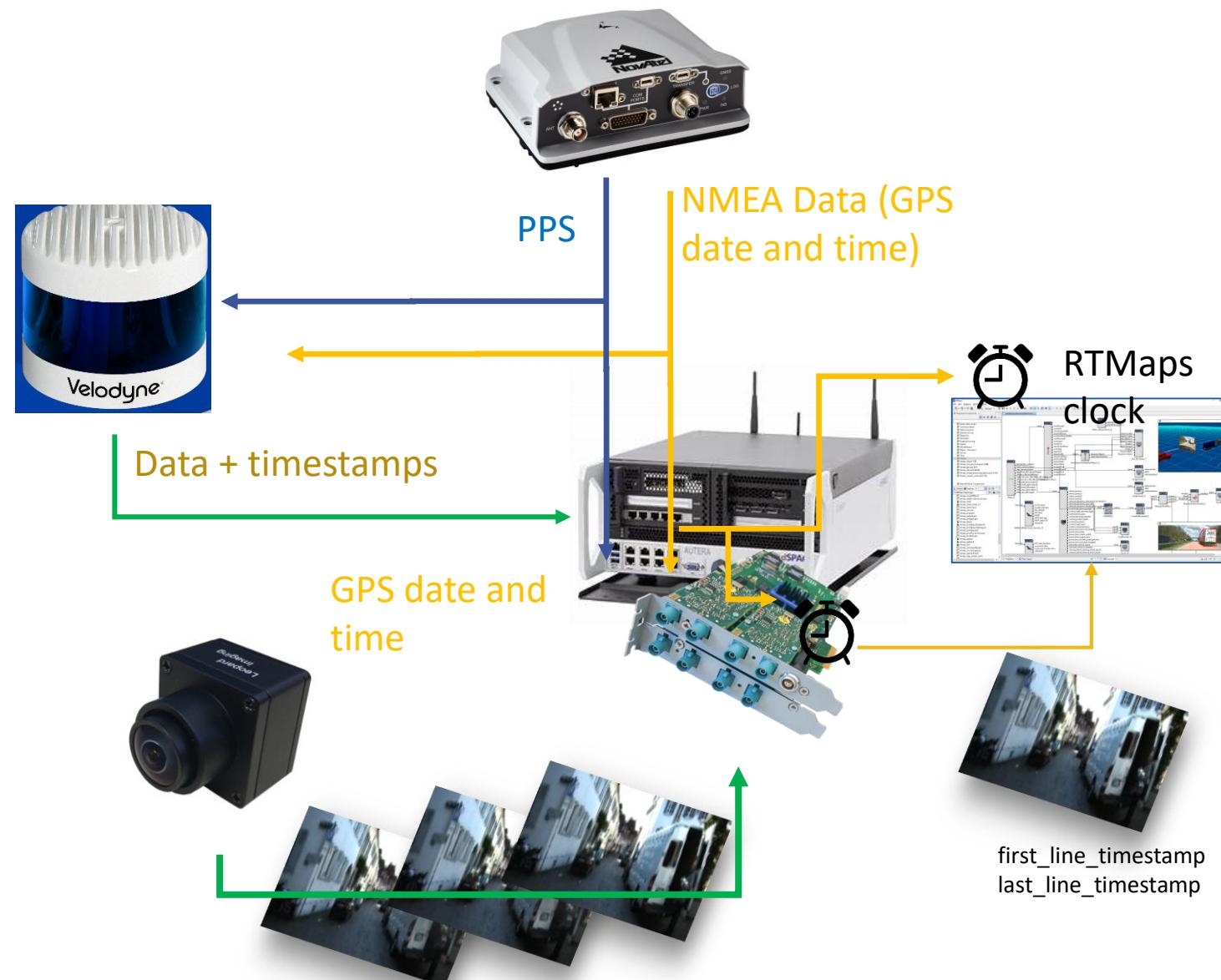
Different levels of precision:

- GNSS basic 10 m
- GNSS / IMU 1 m
- GNSS / IMU with PPP 10 cm
- GNSS / IMU with RTK ~1 cm



# SENSORS SYNCHRONIZATION-TIMESTAMPING

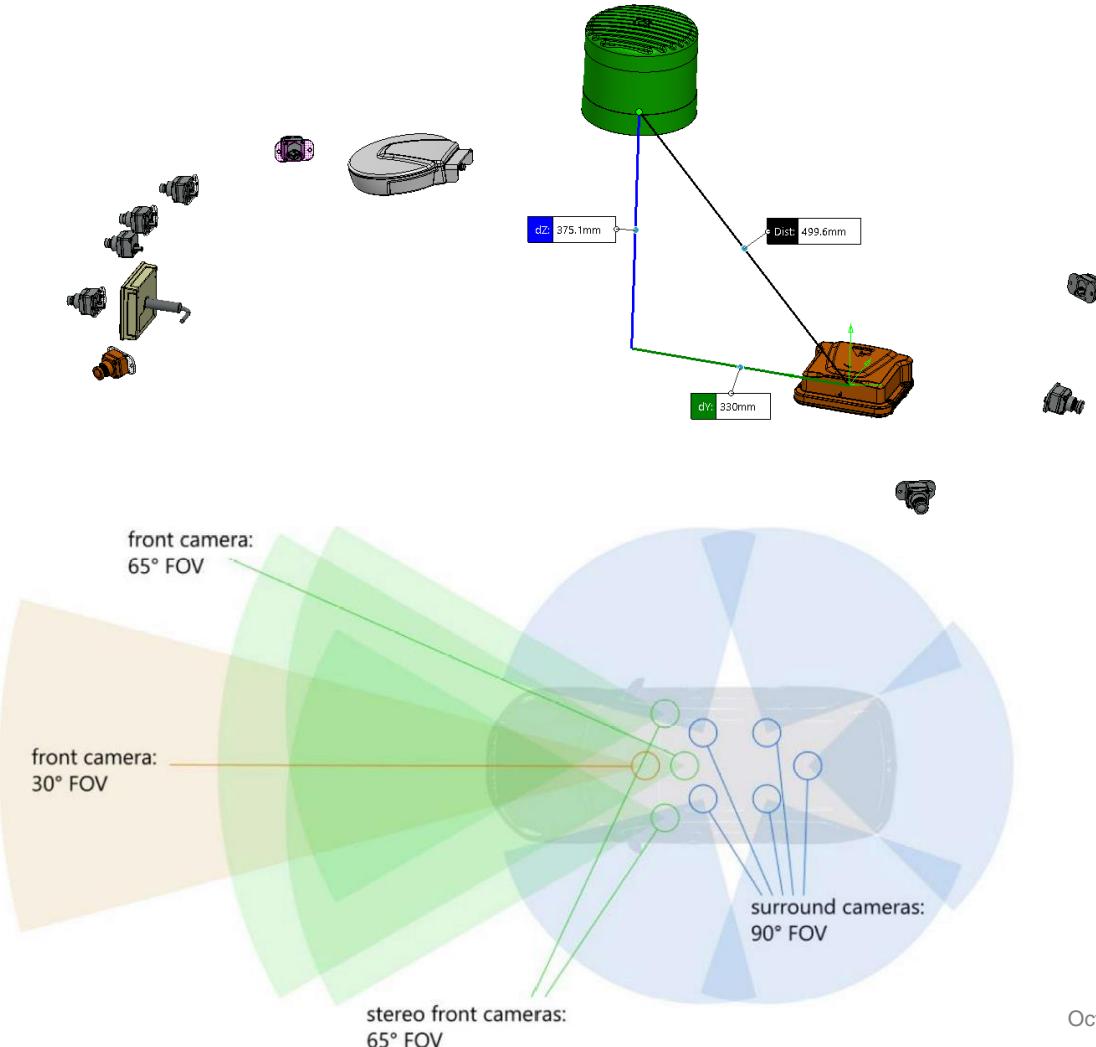
ARGObox



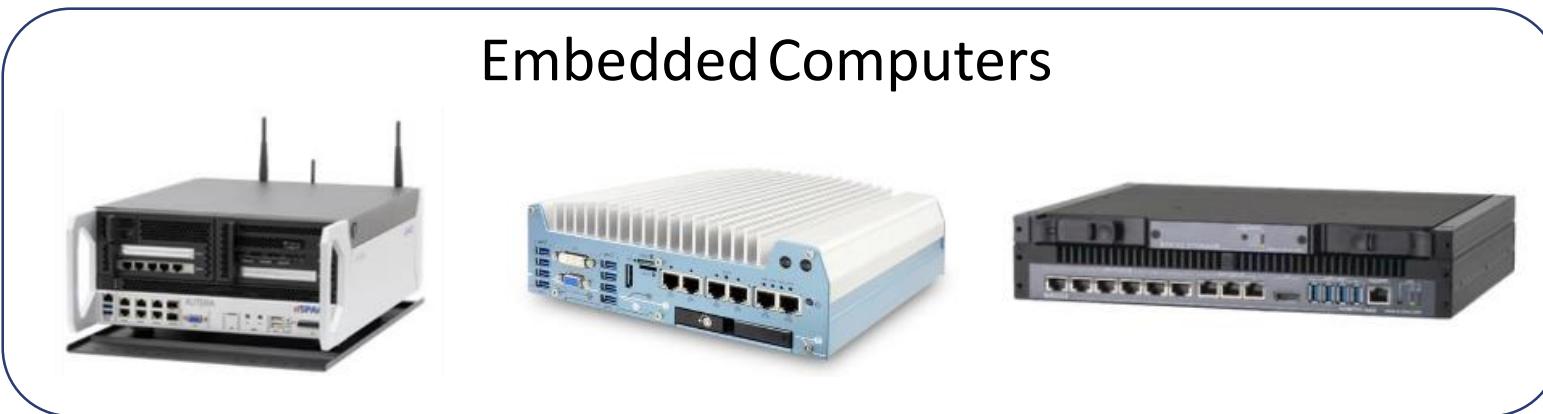
# SENSOR'S CALIBRATION METHODOLOGIES ARGObox

For the calibration of the different RTB sensors, we got a software solution with a checkboard.

- The first software allows for real-time recording.
- The second software allows post-processing of the data.



## Embedded Computers



- The embedded computer installed in the RTB depending of the application.
- RTMaps Midware to easily adapt the sensor to your needs.



- With RTMaps you can easily integrate near-coded blocks or integrate code in various python languages, C++ ...
- The programming language by blocks allows a rational and pedagogical decomposition of the software (interfaces, decoding, treatments ...)
- RTMaps allows with just a replay block make re-simulation for testing algorithms

ARGObox is designed to be electrically autonomous per cycle of use:

- Power consumption from 250W
- Powered by car and more 1h autonomy internal buffer battery
- Operating Voltage: 12V - 15V (including regulated power supply)

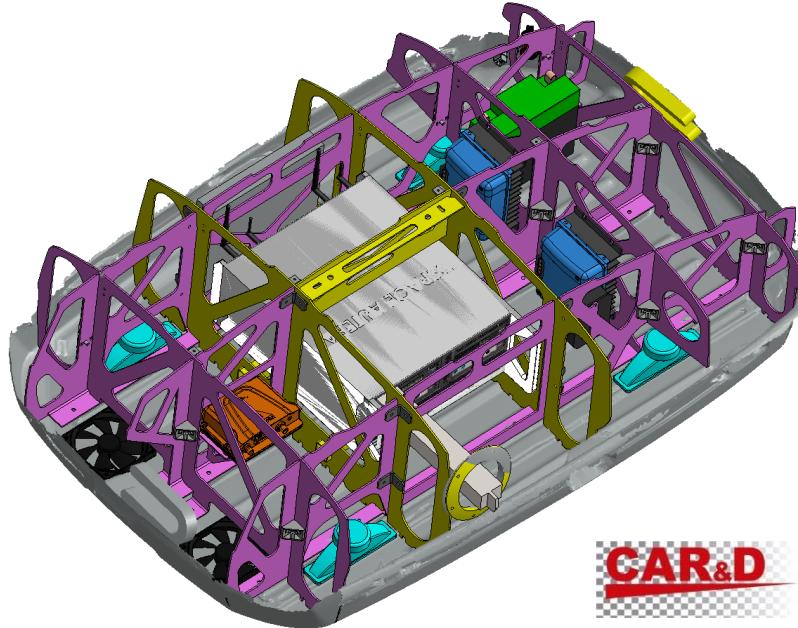
Two ways to supply power on the RTB (with just 1 connector):

- 12-15V on the car
- 220V on the lab



\* with the same way, we can share information to the vehicle (Can, Ethernet).

ARGObox is based on a mechanical study by automotive chassis engineers, and tested by an automotive certification agency.

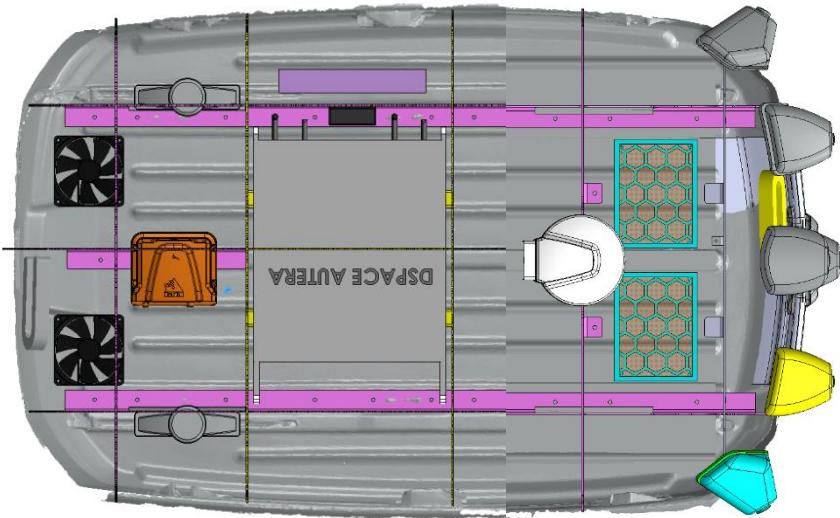


Testing of high stress situations : high speed, high braking, damaged track, Paved track, Speed bumps, ripples, curves...



Fig. 5 : Sequences of dynamic tests

ARGObox is based on a thermal and tested by an automotive certification agency.



- Normal Operating Temperature: -20°C to 35°C
- Extreme Operating Temperature: -35°C to 45°C (with temperature monitoring);
- Environmental Protection: dust & rain.

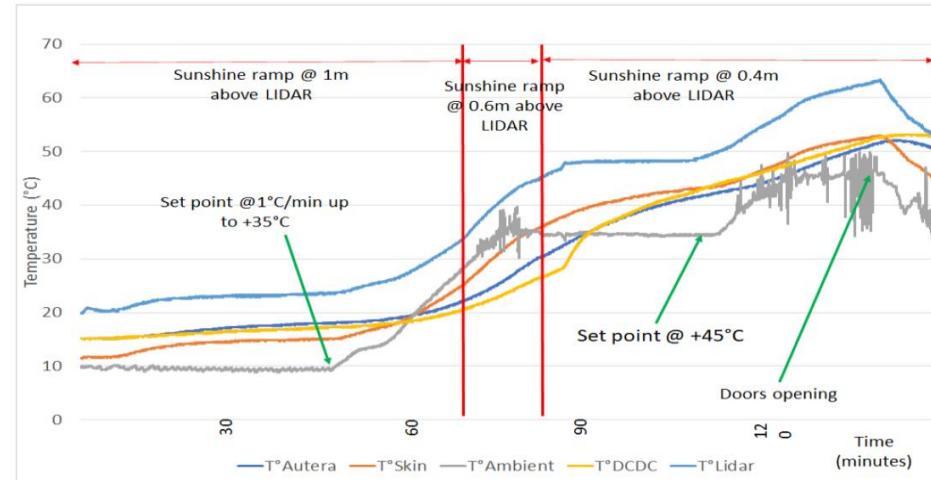


Fig. 16 : Evolution of the temperatures during the test (at sunshine ramp installation)

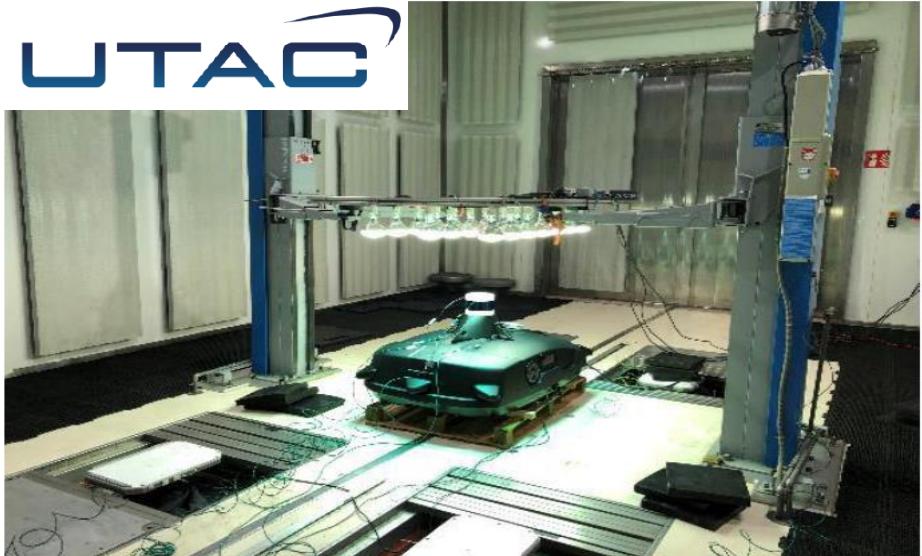


Fig. 15 : Device placed under the sunshine ramp

**The default configuration of ArgoBox can be adapted according to the needs of each user:**

ALADIN is able to complete the ArgoBox offer with the following products and expertise in particular around ADAS / AD applications :

- ❖ On-board connectivity system (V2V, V2X, cloud communication, etc.)
- ❖ Perception system: Smart cameras (Deep Learning or Spike / event cameras), LIDARS, radar.
- ❖ Advanced embedded UX / HMI (outdoor, indoor HMI)
- ❖ Centralized system for storing and managing recorded high-speed sensor data (finding situations, post-processing)
- ❖ Perception algorithms (AI, fusion ...) and localization (SLAM) :
  - Real time
  - Post processing (ground truth extraction, scene analysis and detection, function benchmarking)
  - Simulations, virtual validation.
- ❖ Physical tests
- ❖ Small series production
- ❖ Maintenance, upgrade.

# PRODUCT CONFIGURATIONS

ARGObox

- Here a customer's configuration, as example : **dSPACE Autera Rooftop box:**



**dSPACE**



Specifications	
<b>Sensors (example)</b>	<ul style="list-style-type: none"><li>1 – #1 LIDAR Velodyne Alpha Prime 128 layers (or similar)</li><li>2 – Till to 9 Automotive Cameras 2880x1860 20Hz</li><li>3 – High accuracy GNSS + IMU localization system</li><li>4 – #1 Front Radar</li><li>5 - CAN input (via direct vehicle CAN access or OBD-II connector) (Sensor setup can be adapted on demand)</li></ul>
<b>Mechanical/Electrical /Operational</b>	<ul style="list-style-type: none"><li>• Power consumption: 250W</li><li>• Powered by car and more 1h autonomy internal buffer battery</li><li>• Operating Voltage: 12V - 15V (including regulated power supply)</li><li>• Weight: ~ 72kg</li><li>• Dimensions: 1485mm x 898m x 658mm</li><li>• Normal Operating Temperature: -20°C to 35°C</li><li>• Extreme Operating Temperature: -35°C to 45°C (with temperature monitoring)</li><li>• Environmental Protection: dust &amp; rain</li></ul>
<b>Data collection system</b>	<ul style="list-style-type: none"><li>• Total recording bandwidth: up to 50 Gbps/s</li><li>• Cameras hardware triggering &amp; Lidar phase locking</li><li>• Microsecond accuracy data timestamping on UTC time</li><li>• Internal storage: 16 or 32 Tera Bytes</li><li>• Hot swappable storage units</li><li>• Connectivity (Wi-Fi, 4G, V2X)</li><li>• Remote monitoring and sensors data visualization (tablet)</li><li>• Manual tagging system (tablet)</li></ul>
<b>Accessories</b>	<ul style="list-style-type: none"><li>• Roof rack Thule</li><li>• 220V Power supply</li><li>• Monitoring tablet</li><li>• OBD II to Wi-Fi</li></ul>

# HOW TO USE:

ARGObox

- ✓ Easy to plug, Easy to use, Easy to manage, Easy to change and Easy to adapt...



Remove the protection



Plug on 12V to the car



Start the RTB & the Record

*And let's go!*



Thank you

FOR YOUR INTEREST