3rd Edition of Innovation Week – Renault do Brasil
November 22-25, 2022

SegurAuto

GSA
Grupo de Sistemas Automotivos

RENAULT

UTFPR
UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ

ROTA2030
FUNDEP

FUNTEF-PR

We drive innovation for the next generation of road vehicle with safety, intelligence, and comfort using methods, processes, tools, and standards

Brazil

SegurAuto Project

SegurAuto consists in design, build, and testing of driving assistance and vehicular communication functions considering the conditions of Brazilian road network. We drive to build data with high quality to create a dataset from data acquisition of Brazilian roads for:

- Data acquisition from sensors over 50,000 Miles;
- Vehicle modeling and real-time simulation;
- Dataset for artificial intelligence and computer vision;
- Virtualization for driving assistance and autonomous driving;
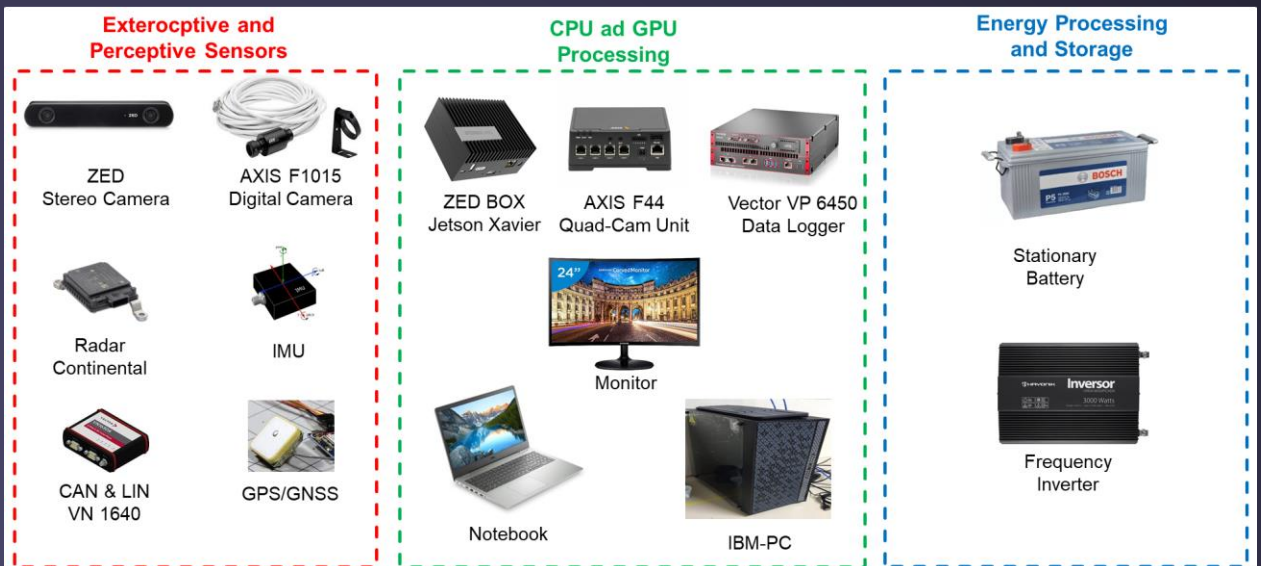- Built driving scenarios for hardware in the loop simulator.
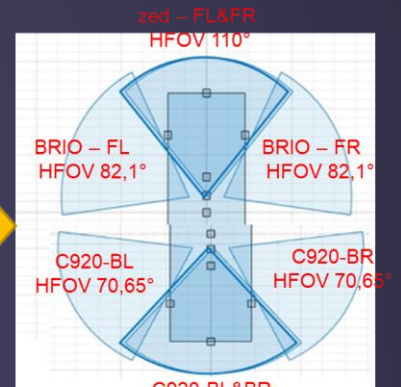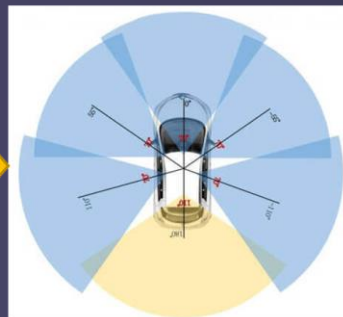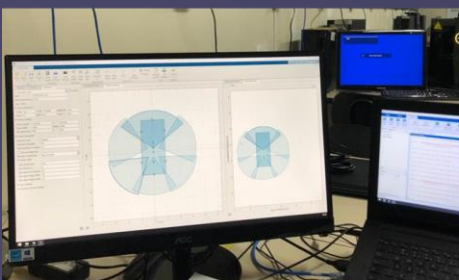
Vehicle Instrumentation

Vehicle instrumentation consists of the integration of hardware and software to perform data acquisition cameras, CAN Bus, GPS, IMU, lidar, and radar in order to develop, virtualization, sensor fusion, and perception algorithms.
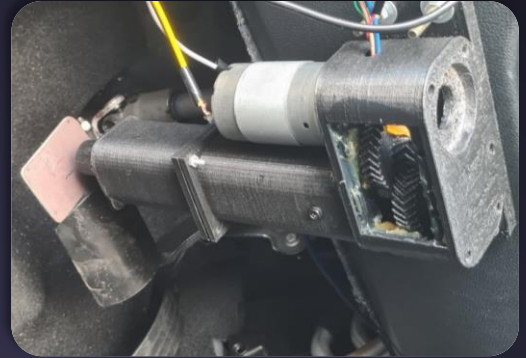
Pedal actuation

Sensors, processors, storage and energy


Camera calibration

Modeling and Simulation

Vehicle kinematic and dynamic modeling are important to have a product with: +Accuracy, +Quality, +Fast and –Errors. Then, we can use it to design, build, and test ADAS features such as ACC, AEB, LKA, APS, TJA, etc. The current simulation methods and tools have a high fidelity and maturity to do that.

The main software tools available in our Lab to design, simulate, and test are:
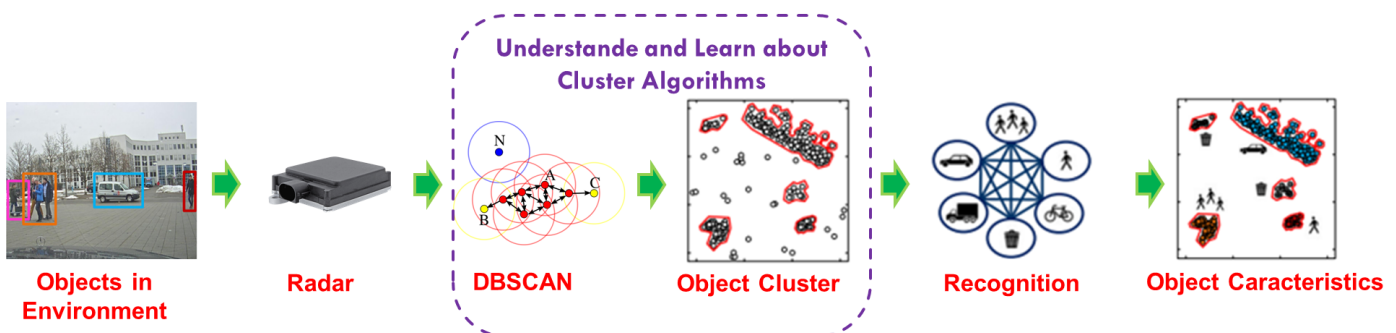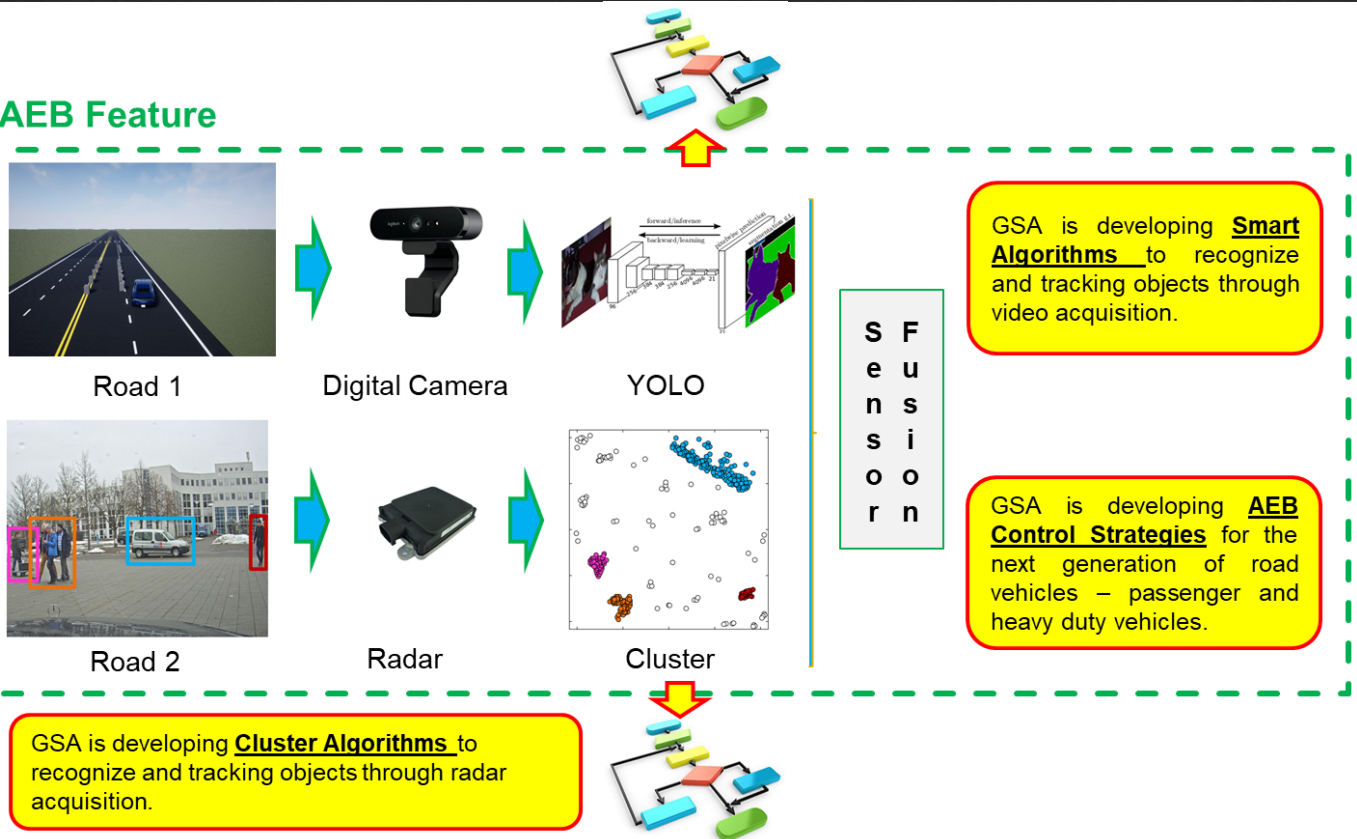
      1. Automotive Toolbox – MathWorks

      2. Dyna4 – Vector Informatik

      3. ASM – Automotive Simulation Model – dSPACE
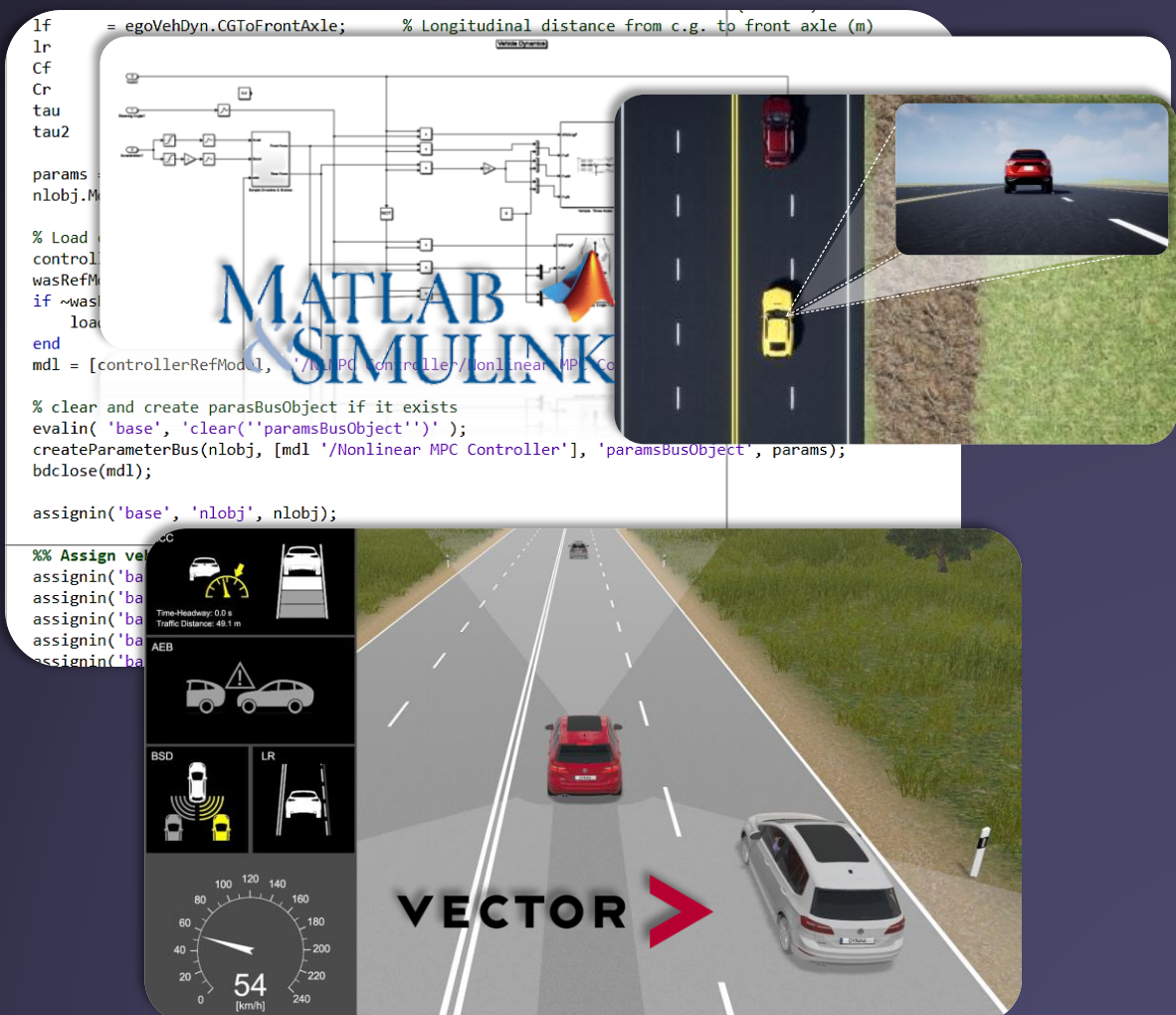
Computer Vision and Artificial Intelligence

We are developing, improving and customizing for automotive applications, techniques of computer vision and artificial intelligence to be deployed in driving assistance and autonomous driving. This is helpful for camera and radar sensors.

AEB Feature

Road 1

Digital Camera

YOLO

Road 2

Radar

Cluster

S e n s o r
F u s i o n

GSA is developing **Smart Algorithms** to recognize and tracking objects through video acquisition.

GSA is developing **AEB Control Strategies** for the next generation of road vehicles – passenger and heavy duty vehicles.

GSA is developing **Cluster Algorithms** to recognize and tracking objects through radar acquisition.

Understande and Learn about Cluster Algorithms

Objects in Environment

Radar

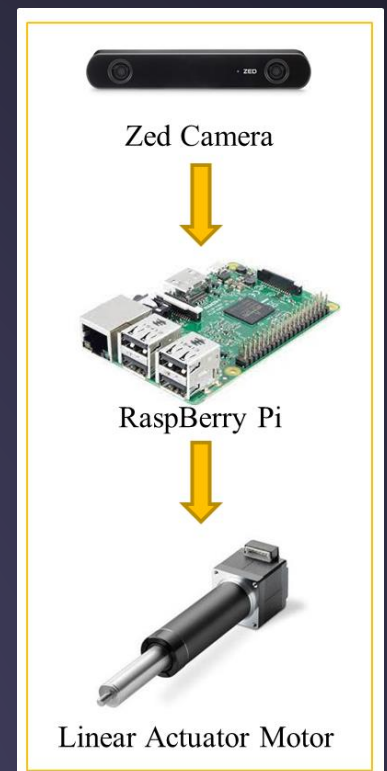DBSCAN

Object Cluster

Recognition

Object Caracteristics

Autonomous Emergency Braking

We are working hard on understand and develop AEB feature according our road characteristcs in simulation and real scale applications. In simulations we are developing our framework to OEM and Supplier test and validate their algorithms and contol strategies according to UNR152 and NCAP regulation. In real scale we are developing all componentes to deploy an AEB in passenger and truck vehicles.

Components for AEB: Camera, processor and actuator

Parameter configuration · **Birds eye view** · **Front view**

AEB simulation – UNR152 and Euro NCAP

Zed Camera

RaspBerry Pi

Linear Actuator Motor

Stereo camera – ZED and GPU - Jetson Nano

Autonomous Parking System

Modeling, simulation, and testing of control strategies for autonomous parking system (APS), for parallel, perpendicular, and oblique modes. Parking system is essential for driving assistance and autonomous driving.

In software a cost map is generated, in which values from 0 to 1 are assigned to the cells to explain whether they are occupied by an object or if they are free, as necessary for the path planning algorithm to be able to find a free path to the parking spot.

DYNA4 of Vector.
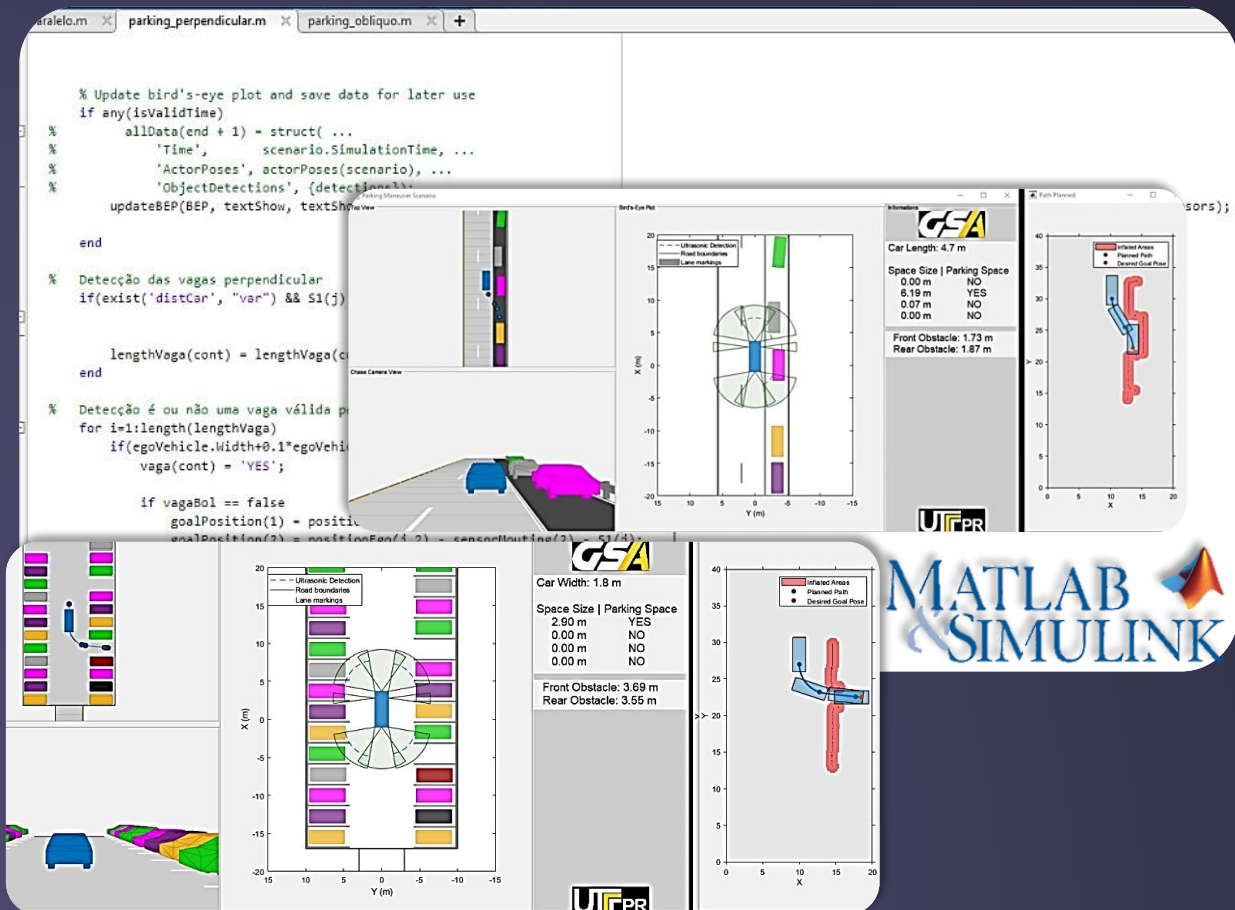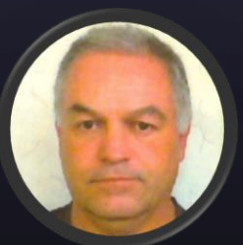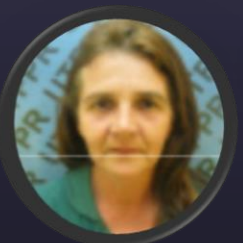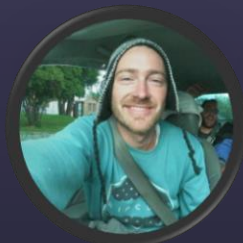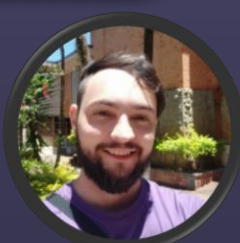
For further information,
please visit our website

smartup.net.br/gsa