ADAS/AD virtual platform for end-to-end software development, testing and validation
Porsche Engineering Virtual ADAS Testing Centre (PEVATeC)

1 Necessity for Simulation

2 What is PEVATeC?

3 PEVATeC in Customer Projects
1. Necessity for Simulation

➢ ADAS/AD involves HW & SW providers from diverse disciplines.
➢ ADAS/AD relevant corner cases not yet identified.
➢ Simulation is 100% safe. Safety comes first!
➢ SW develops fast and we keep up!
1. Necessity for Simulation

Fatality rate reduction

<table>
<thead>
<tr>
<th>Source</th>
<th>AD* = HD**</th>
<th>AD* = 0.8 x HD**</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAND</td>
<td>14.2B km</td>
<td>17.7B km</td>
</tr>
<tr>
<td>BMW</td>
<td>[240M, 11B] km</td>
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* AD – Autonomous Driving
**HD – Human Driver

NCAP & Certification

Concept Phase – Sensors Position (Ex. RADAR)

“Early” Development

Re-Simulation & Test Plan
1. PEVATeC Architecture & Tools

PEVATeC Simulation Environment

- PEVATeC is **NOT** a product
- PEVATeC is **NOT** a tool
- PEVATeC **is** a simulation environment that integrates the most suitable tools on project demand
- PEVATeC can be integrated in an ADAS simulation platform – flexible API
2. What is PEVATeC?

Simulation environment PEVATeC with modular architecture

- **Modular & Flexible** – **Integrates New Tools on Project Demand**
  - Standard formats & Middleware – Platform agnostic (Linux, Windows, rapid prototyping, RT-HW…)

- **Validated Vehicle Dynamics**
- **3D World**
  - Map Processing & Scene Creation
  - Photo-/Material-Realistic Rendering
  - Synthetic Data Country Specific
  - VR Applications
- **Sensors**
  - Ideal & Raw Sensor Models
  - Sensor Data Processing
- **Traffic & Agents**
  - Deterministic & Stochastic
- **Scenario**
  - Parametrization & Test Automation (Coverage)
  - Virtual Test and KPIs (Ground Truth)

- **Friendly User Interface**
- **Re-Simulation**
  - Real data ingestion in Simulation
- **Scalable to the Cloud**
  - (Cloud agnostic)
- **Continuous Integration**
  - XIL (F/ViL) & Shadow Mode
  - Sensor Raw data & BUS signals
2. What is PEVATeC?

Adaptive, Modular and Flexible Platform for ADAS/AD End-To-End Development
3. PEVATeC in Customer Projects

Simulation for Driving Assistance Systems

PEVATeC Simulation Environment
Local, distributed and Cloud implementation

Simulation data source

- HD Map
- Manually Created SCENE
- Textures (Physically Realistic)
- Import SCENARIO

Scenario Script
(Custom Parametrization & Test Automation)

Validated vehicle dynamics
(model source code platform agnostic)

Vehicle Model

Traffic & Agents

Traffic simulation
(deterministic & Stochastic)

Scenario

- Import SCENARIO
- Open SCENARIO

Scene

PEVATeC Simulation Environment

Sensors

- Real Sensor ECU
  (Black Model)
- Generic Data Processing
- Raw Data Sensor
  (High Fidelity)
- Ideal Sensor
  (Low Fidelity)

External Sensor Systems Integration

Cloud Scalable
(Docker Image & Built-Instance)

Measurements

Simulation data source

Re-Simulation & Variation

- Traffic simulation
- Data source

Vehicle Model

External Sensor Systems Integration

Cloud Scalable

AWS

Azure

Porsche Engineering

driving technologies
3. PEVATeC in Customer Projects

We work for Software developers

1. Test Plan Definition

- Scene/Scenario selection and test cases

- Our inputs: road data, elevation data, test cases and vehicle simulation.

2. Modelling Abstract Scenes/Scenarios

- Model abstract scene/scenario

- Interfaces & simulation environment

- User interface: parametrization

Camera_Position … VehOffset_Lane VehErratic_Lane

3. Simulation Variants and Training Data

PEVATeC Simulates

- Simulation parametrization
- Test automation of complete test plan

Create Tool for Software Developers

Independent executable simulation platform as local / cloud application
3. PEVATeC in Customer Projects
PEVATeC – flexible and modular simulation environment for virtual ADAS/AD testing

- result of integrating years of experience in full vehicle simulation at Porsche Engineering and expanding it for particular customer needs in the ADAS/AD scope
- allows for customized parametrization of scene, scenarios, and sensors and smart integration of software algorithms into a full vehicle simulation environment
- provides a cloud agnostic development, scalable for efficient test automation and coverage analysis
PEVATeC
Porsche Engineering
Virtual ADAS Testing Centre

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