ADAS & Autonomous Vehicle INTERNATIONAL

THE INTERNATIONAL REVIEW OF AUTONOMOUS VEHICLE TECHNOLOGIES: FROM CONCEPTION TO MANUFACTURE TO IMPLEMENTATION

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Team effort

How the Sim4CAMSens project aims to forge a robust perception sensor ecosystem

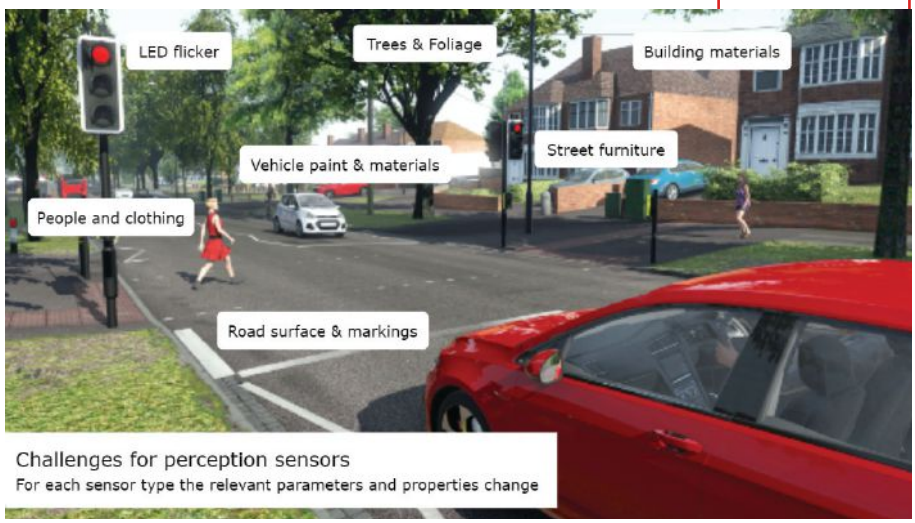
By **Mike Dempsey**, managing director, Claytex

In a rapidly evolving automotive landscape, the promise of autonomous vehicles heralds a new era of mobility characterized by efficiency, lowered operational costs and enhanced safety. Significant investments are being funneled into the development and deployment of AVs, with a critical emphasis on ensuring their safety to satisfy regulators. At the heart of this venture lies the indispensable role of simulation in the development and safety assurance of AVs, especially given the vast array of sensor types and the numerous factors affecting sensor performance. The challenges extend to the massive and diverse spectrum of training data required, and the vital need to establish the credibility of simulations. The Sim4CAMSens project seeks to address these challenges by developing and maturing a modeling and simulation supply chain specifically for perception sensor development and testing.

The Sim4CAMSens project is a collaborative effort of innovation aimed at nurturing the simulation, modeling and physical testing ecosystem for the developers of connected and automated mobility (CAM) perception sensors and systems. The project endeavors to construct a robust supply chain to elevate the quality of modeling, simulation, test and characterization capability. This initiative hopes to accelerate and de-risk the design, development, validation and utilization of perception sensors and the algorithms crucial for automated driving functions. By forging clear links between tools, methodologies, standards and safety cases, Sim4CAMSens is setting a course toward state-of-the-art modeling and simulation environments. These environments are anticipated to generate synthetic training data of requisite quality for training the AI systems employed in AVs.

The collaborative spirit of Sim4CAMSens manifests in its assembly of a world-class consortium of expert partners dedicated to fostering an emerging perception sensors and systems industry. The project is led by Claytex and includes rFpro, Oxford RF, Syselek, NPL, WMG, Compound Semiconductor Applications Catapult and AESIN. It is supported by funding from the UK's Centre for Connected and Autonomous Vehicles as part of its Commercialising CAM program.

Sim4CAMSens will rigorously test sensor performance



Challenges for perception sensors
For each sensor type the relevant parameters and properties change

The project has three key goals. The first is to quantify and simulate the perception sensors under all conditions to allow sensor suppliers to demonstrate the capabilities of their devices and enable ADS developers to establish a robust process to compare competing devices. The sensor evaluation framework will also support the development and validation of sensor models.

The second key goal is to enhance synthetic training data by improving perception sensor models. Given the challenges that are associated with collecting enough real-world training data, the project will develop high-fidelity sensor models that include the same noise factors as the real devices.

Finally, the project aims to provide regulators with a framework for simulation credibility and AV safety. This is crucial to unlock the path to type approval and enable AVs to be deployed safely on public roads.

Test, test, test

At the core of the Sim4CAMSens project is a rigorous approach to the testing of perception sensors to be able to measure and quantify their performance under a wide range of test conditions. This involves lab- and field-based test work to identify and quantify the noise factors that affect sensor performance. Throughout the project, different test campaigns will investigate various factors that affect perception sensor performance, covering weather (particularly snow), material properties and other environmental factors. For example, one of the first test activities, which has already started, is to investigate the effect of clothing on the detection of VRUs (vulnerable road users). It has already been observed that lidar sensors can fail to detect pedestrians if they are wearing non-reflective or dark clothing, and the project will also investigate the effect on radar.

The sensor evaluation framework will include synthetic training data

The journey of Sim4CAMSens reflects a concerted effort to navigate the complexities and potential of the autonomous landscape, fostering a cooperative relationship between simulation developers and sensor developers and formalizing the test methodologies and frameworks required. This venture embodies the essence of collaborative innovation, driving the industry closer to realizing the promise of an autonomous future. We see this as the start of a journey to grow a relevant and competitive modeling and simulation community and supply chain that will work together in the years to come. ‹