Aptiv Automotive Services Synthetic Cockpit Data

DEVELOP, INTEGRATE AND VALIDATE INTERIOR SENSING SYSTEMS UP TO 10 TIMES FASTER WITH APTIV'S SYNTHETIC COCKPIT DATA SERVICE

Using live data to validate driver monitoring systems (DMSs) and cabin monitoring systems (CMSs) poses several challenges for an automotive OEM.

> The OEM needs to recruit enough people to serve as test subjects for short recordings. It is hard to find enough participants.

> The manufacturers need to comply with relevant data protection and privacy regulations. That can be particularly challenging for children and infants in the test dataset.

> The OEM must source a wide range of test vehicles, then install and maintain the test hardware in many configurations. It needs elaborate recording equipment scenarios and must annotate all of that video, which adds cost and complexity.

And when new edge cases arise, the OEM has to go back and try to re-create the original conditions with the original test subjects — which can be nearly impossible.

The Synthetic Solution

Aptiv's Synthetic Cockpit Data service eliminates all of those issues. It enables OEMs to create customized synthetic datasets that comply with regulatory standards and also reflect real-world complexity and edge cases with unmatched accuracy and scalability. The service generates synthetic data using cloud-based 3D rendering techniques. Testing cycles may be up to 10 times faster, with orders-of-magnitude reductions in cost.

The Synthetic Cockpit Data service uses a proprietary library of annotated real-world test data that includes challenging domains, such as drowsiness detection. It combines that with deep algorithmic expertise and direct feedback loops from machine learning. The results:

- Scalable synthetic data generation with a variety of avatars, noise factors, cabin interiors and camera models

- Automatic ground truth annotation of relevant parameters, including bounding boxes, key points, gaze direction, eye states, pixel-level labels and depth maps

- Systematic sweeps of parameters and noise factors to find system limits and expand around edge cases

- Rules-based scenario updates and motion-capture technology

- A pool of existing vehicle cabins and materials, expandable with customer computer-aided design (CAD) data

- No privacy concerns, because all data is virtual

Key Services

- **Generation of custom datasets** based on a manufacturer's vehicle CAD data and our library of more than 30 cabins, over 1,000 characters, more than 50 child seats and over 100 objects

- **Use of the synthetic data generation tool** in development and integration environments, for iterative data generation

- **Investigation** wherein Aptiv uses synthetic data creation to complete a feasibility or evaluation study of new camera positions, test new features or evaluate other software providers' performance

- **Pre-certification** of camera-based occupant-detection systems

Setting up a new Synthetic Cockpit Data service can take as little as one week. Contact Aptiv today to learn how to set up a proof of concept.

www.aptiv.com/en/contact

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