Sim4CAMSens

Sim4CAMSens Project

Modelling, Simulation and Testing of Automotive Perception Sensors

Sim4CAMSens was a CCAV funded collaborative R&D project that developed methods to quantify and simulate camera, radar and LiDAR sensor performance under all conditions

AESIN
AUTOMOTIVE ELECTRONICS INNOVATION

CATAPULT
Compound Semiconductor Applications

CLAYTEX
A TECHNIA COMPANY

NPL
National Physical Laboratory

OXRF

rFpro

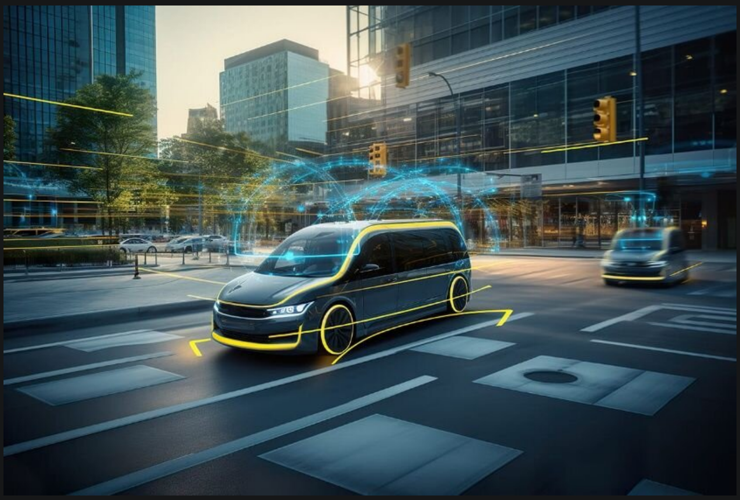
syselek

WMG
THE UNIVERSITY OF WARWICK

Scope of Work

The Sim4CAMSens project was setup to make a step forward in perception sensor modelling fidelity for autonomous vehicle and ADAS simulation through the combined test data collection, analysis and model development activities.

The project ran from 2023 to 2025 and carried out an extensive test program to collect data on the performance of camera, radar and LiDAR under a wide range of conditions including lab-based testing, field work and on automotive proving ground tests. The tests were designed to explore and identify the noise factors that affect sensor performance.



The modelling and simulation activities enhanced the sensor models for camera, LiDAR and radar and the virtual worlds that they see.

Material property studies were carried out to populate new databases within the simulation tools that mean every object will have the appropriate material properties for the wavelength that the sensor is working at.

The sensor models focus on modelling the physics of how light and em-waves propagate through the environment and return to the detectors.

Everything that was learnt and developed was applied to help accelerate the development of the novel perception sensors created by Oxford RF.

The validation process for sensor models was developed with support for safety assurance processes in mind. This work explored the topic of simulation tool credibility and produced a set of guidelines for sensor model validation.

Work Packages

WP1 - Perception sensor requirements

Identify generic sensor suites for selected applications and develop sensor performance requirements, DVMs, and targets

WP2 - Test data collection and analysis

Develop test methods to measure material properties and noise factors that affect sensor performance

WP3 - Modelling and Simulation

Improve the simulation environment and sensor models to allow for physics-based simulation of more noise factors

WP4 - Accelerating sensor development

Apply the learnings from WP2 and WP3 to accelerate the development of Oxford RF's perception sensors

WP5 - Dissemination

Workshops with external participants and generation of roadmaps and industry reports

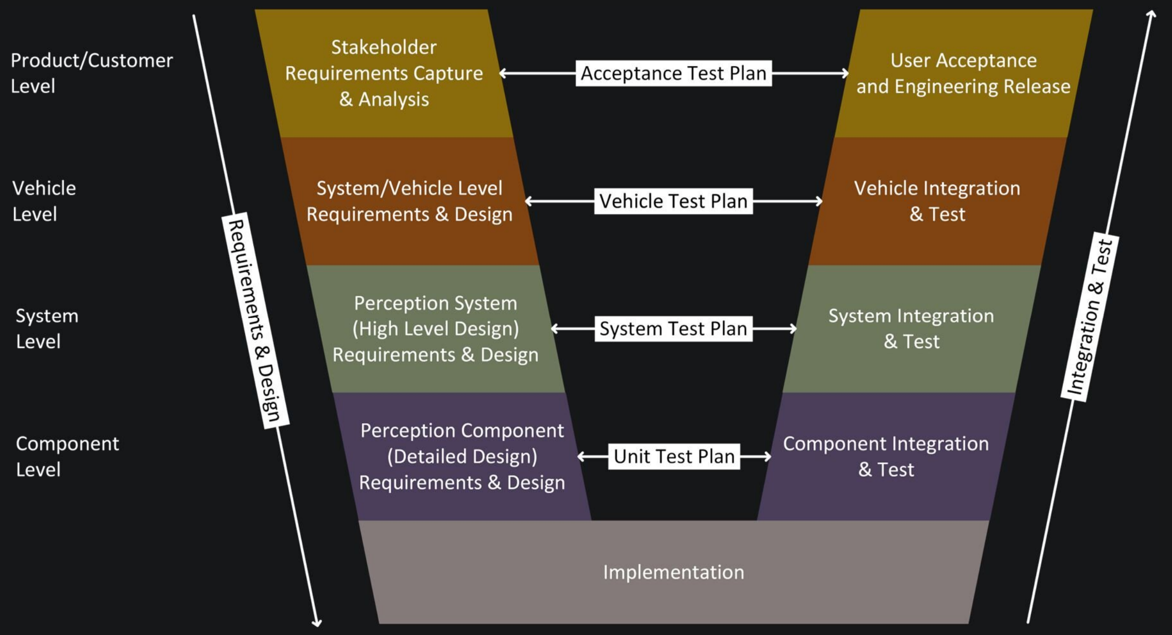
WP1 – Perception Sensor Requirements

Simulation is important for robust ADAS and AV perception system development and assurance. An engineering requirements decomposition methodology was used in Sim4CAMSens to define the fidelity of simulation needed, i.e., the minimum accuracy in replicating real-world conditions, distinguishing between:

- Physical fidelity: how realistic the simulation looks and behaves (e.g., lighting, weather, noise), and
- Functional fidelity: how accurately the unit under test responds in the simulation.

Understanding the simulation fidelity ensures that results are trustworthy and acceptable for safety assurance.

Structured Approach Using the V-Model

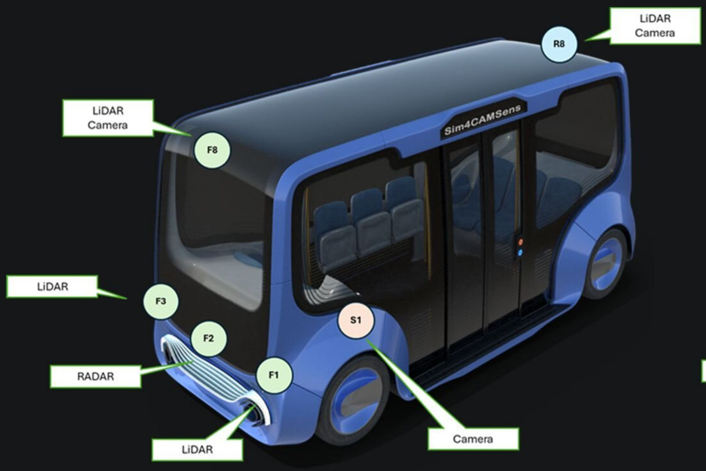


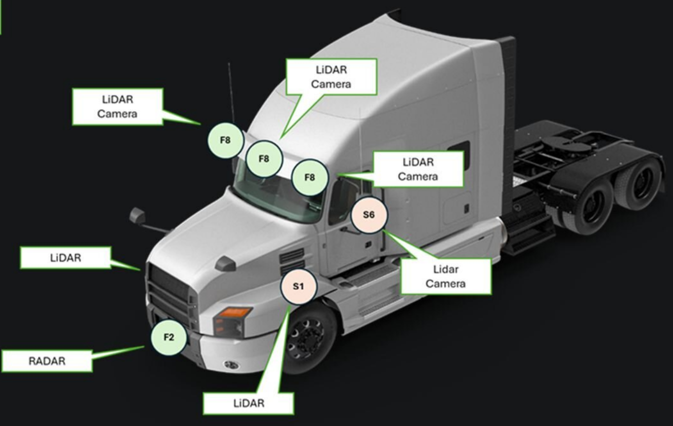
The V-model development process cascades engineering requirements from vehicle level down to individual perception sensors, providing traceability and alignment with ISO standards 26262, 21448, 8800. It enables:

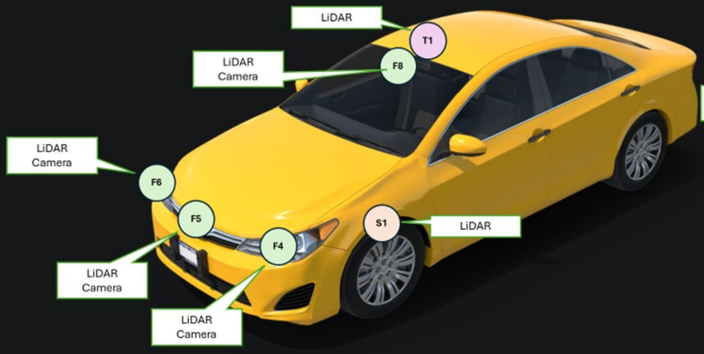
- System Engineers to define meaningful test cases and explore system-to-system interactions,
- Sensor Developers to align product specifications with system needs, and
- Simulation Tool Providers to build credible environments with the necessary fidelity.

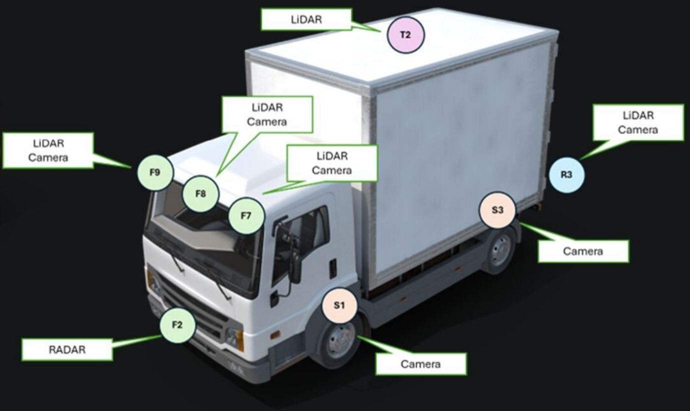
Perception System Sensor Suites

Example perception system sensor suites were defined for several typical AV applications, including shuttle/PTB, highway freight, passenger car/robotaxi, last mile, and yard truck. These examples were based on statistical analysis using the CAV Catalogue [cavcatalogue.syselek.com/], identifying sensors and locations on vehicle.









Highway Debris Detection

Considering, for example, location F8 on vehicle (camera and LiDAR), the cascaded perception function requirements covered road geometry and object detection. Quantifiable requirements were defined at Component Level (e.g., the LiDAR sensor returns 250 points, and the camera sensor returns 25 pixels, on 10 cm x 10 cm debris at 200 m). Meanwhile, Operational Design Domain requirements were defined at Vehicle Level (e.g., road geometry, weather).

Urban Vulnerable Road User (VRU) Detection

Further locations on vehicle were considered, for example, locations F1 and F3, which are common in shuttle/PTB applications for VRU detection, with field of view coverage requirements (e.g., 270°) defined at System Level.

WP2 – Test Data Collection

Throughout the project multiple test campaigns were executed by Claytex, NPL, WMG and CSA Catapult. The overall goals of these campaigns was to collect data on different noise factors that affect perception sensor performance and to collect data to enable the validation of the models being developed in WP3. The test work focused on camera, LiDAR and radar perception sensors.

Winter Test Campaign

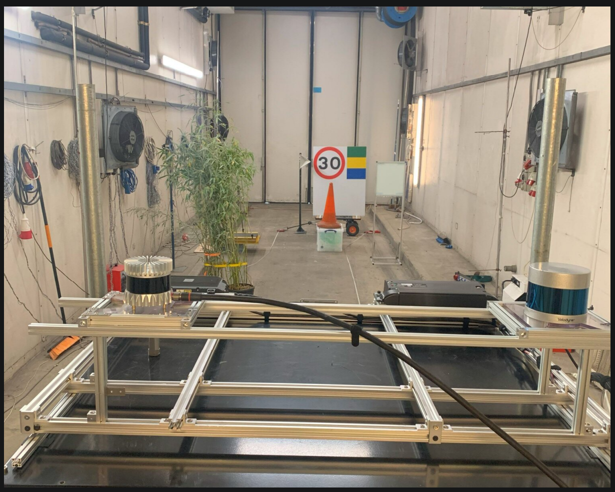
One of the major gaps in understanding that was identified early in the project was a lack of data relating to the performance of perception sensors in winter conditions. To address this, the project ran 2 Winter Test campaigns in the Scottish Highlands.

During these campaigns a suite of camera, LiDAR, radar and thermal imaging sensors were setup on a test range with static targets placed at a range of distances up to 200 m from the sensors. Perception sensor and weather data was collected every 5 minutes throughout the test campaigns resulting in over 120 TB of data for analysis.

The sensors experienced a wide range of weather including rain, snow, hail, fog and even some beautiful sunny days.

Cold Temperature Testing

To separate the effect of temperature of the targets from the general weather effects captured during the Winter Test campaigns, tests were carried out in an environmental chamber. In the chamber the sensors and targets were cooled down to -15°C. This process results in a dry environment so there was no frost or ice build-up on the targets or sensors. Once cooled, water was sprayed onto the targets to form ice layers and the change in sensor performance was measured as the thickness of the ice layers was gradually increased.



Model Validation Tests

One of the key challenges for the project was to define the validation process for perception sensor models. To support this a series of tests were carried out at an airfield using a variety of robots and test vehicles.

The perception sensors under test were mounted in the same test box as used in the Winter Tests and the targets were moved around the test range covering the field of view of the sensors.

Two real vehicles, the NCAP crash test target and a specialised robot were all used as targets. These were used as both static and dynamic targets to generate data to validate different aspects of the perception sensor performance.

Vehicle Testing

Real-world test data was also collected with the sensor suites mounted on our test vehicle and driven on public roads that have already been modelled in rFpro. The LiDAR and radar sensors were mounted externally on the roof of the vehicle and the cameras were placed behind the windscreen.

The test vehicle has also been put through K&C and dynamics testing at 2 UK automotive proving grounds to generate the data needed to validate the vehicle dynamics model.

VRU Measurements

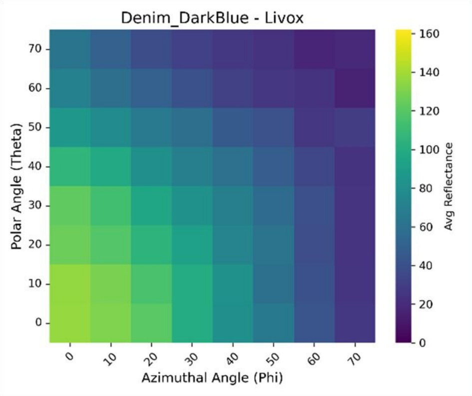
One of the challenges identified early in the project was to ensure that the simulation of vulnerable road users was accurate. To support this extensive lab-based measurements were carried out on clothing, pedestrians and related objects such as bikes, scooters and wheelchairs. For example, 360° measurements of pedestrians were taken using a VNA to estimate their RCS at every degree. This was repeated with numerous people of different sizes and shapes in different poses and clothing.

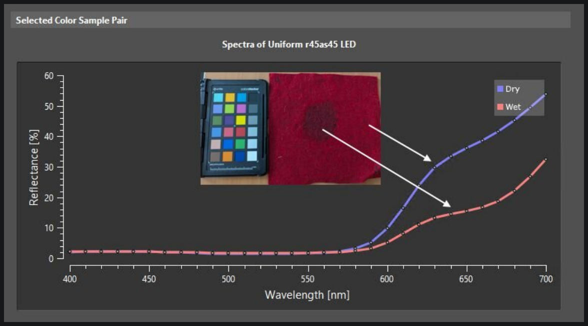
WP2 – Material Property Measurements

In addition to the measurement of sensor performance under different conditions (noise factors) the project also measured the material properties of a diverse range of objects that the sensors would be expected to encounter in their normal operation. This measurement work also took into account the different conditions that each material might be in when encountered e.g. fabrics were measured when wet and dry. These material properties are critical in the simulation to ensure that the reflection of light or em-waves is modelled correctly.

Bidirectional Reflection Distribution Function (BRDF)

Reflectance data was collected for a variety of fabric materials using LiDAR sensors to characterize their angular-dependent behaviour at different wavelengths. Each sample was mounted on a rotational holder that allowed systematic variation of azimuthal and polar angles relative to the sensor's axis. For each orientation, reflectivity was measured by analysing the point cloud data returned from the central region of the sample, ensuring consistency and statistical relevance across measurements.



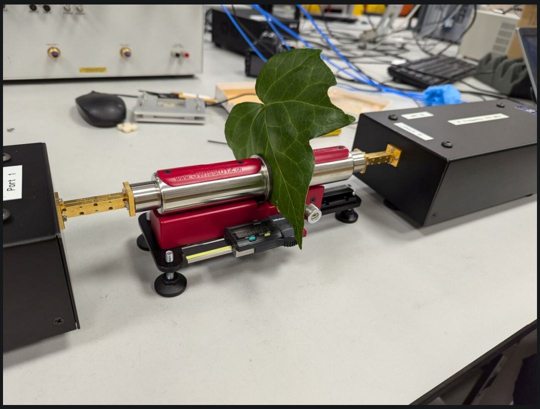


Spatially Varying BRDF

Whilst BRDF describes how light is reflected from a surface at a single point, SVBRDF does so at many points upon a material's flat surface. This extra data allows materials, especially those with complex surface textures, to be recreated in simulation with greater realism. These measurements were taken in the visible spectrum range between 400 nm and 700 nm.

Permittivity

To improve simulations involving radar models, the complex permittivity of many materials encountered by vehicles were measured. The materials were characterised from 75 GHz to 110 GHz using a calibrated Material Characterisation Kit, where the amount of radar energy that is transmitted through the material is used to calculate the permittivity. Materials measured included various clothing and fabrics such as cotton, leather and wool in their dry and wet states, and objects typically found by roads such as plastics and tree leaves.



WP2 – Test Data Analysis

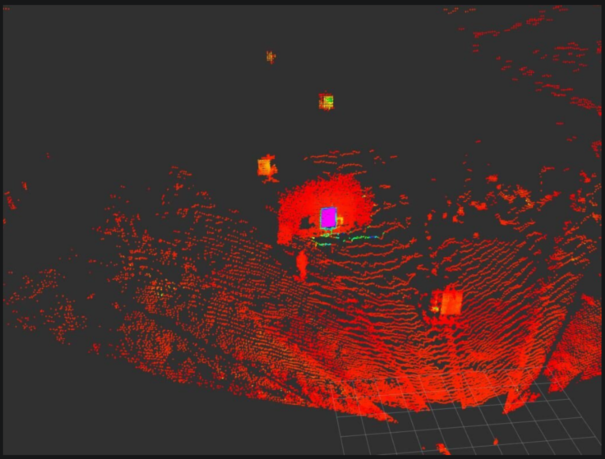
Alongside the collection of test data, there was analysis work carried out to develop methods to quantify the effect of each noise factor. The first step in this process is to review the data collected and identify the interesting sections of data that demonstrate the impact of different noise factors. The majority of this work has focused on the analysis of the weather data from the Winter Test campaigns.

Weather Impacts on Cameras

The data collected during the Winter Test campaigns enables us to analyse a number of different noise factors that affect camera performance. In the 35-minute sequence below we can see how a camera's ability to see is dramatically affected by light rain followed by bright sunshine. Whilst the visibility is initially affected to a small extent as the rain starts to fall, the visibility challenges increase with time as rain drops accumulate on the window in front of the camera lens. The visibility gets even worse when the sun appears from behind a cloud leading to glare through the rain drops.

LiDAR Blooming

LiDAR blooming is a well-known noise factor that impacts certain types of LiDAR and this was clearly demonstrated in the data collected. This image shows the LiDAR returns around a retro-reflective target where the physical edges of the target show up as the blue-green outline. The large point cloud surrounding this target is not real, this is the blooming effect. The magnitude of the blooming effect has been observed to change depending on the weather conditions.



WP3 – Modelling and Simulation

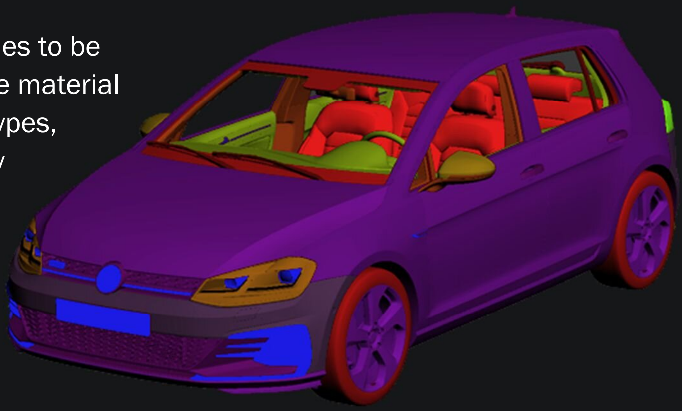
Claytex and rFpro worked on the development of camera, LiDAR and radar sensor models in addition to enhancements to the core simulation environment used in this project which was rFpro. This work resulted in the launch of a new product called rFpro AV elevate which incorporates the developments from this project.

Fog Model

The fog model within the rFpro engine was verified by comparing the attenuation of light through the simulated fog to theoretical values, for a variety of fog densities. This model was then validated against experimental test site data – the fog level within the simulated test site was matched to measured data by comparing visibility thresholds and luminance values. This comparison demonstrated that a wide range of realistic fog densities are possible within rFpro.

Multi-Spectral Material Definitions

Different sensor modalities require different material properties to be available for the virtual scene and objects. rFpro extended the material definitions beyond human-vision light allowing other sensor types, such as LiDAR and radar sensors to simulate accurate energy propagation through the scene and reflections. The physical material definition scheme was also a key contribution to ASAM’s OpenMaterial project during the project.



The LiDAR and radar models were enhanced to take advantage of these new material definitions. The approach adopted allows the material definitions to be varied based on the operating wavelength of the sensor. The required material properties were measured as part of the WP2 activities.

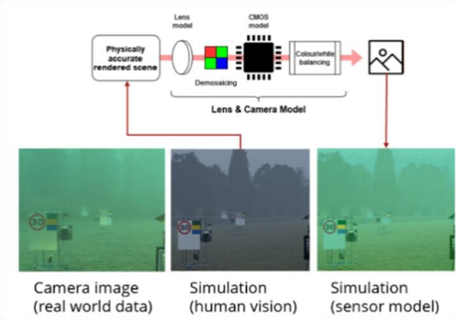


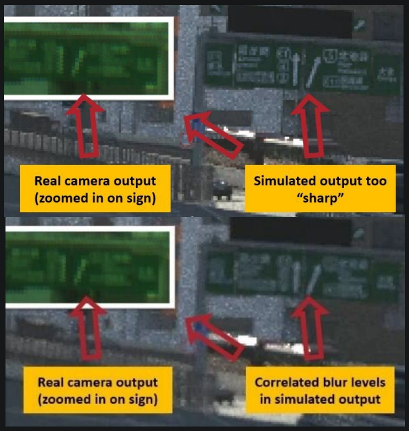
Image Signal Processing

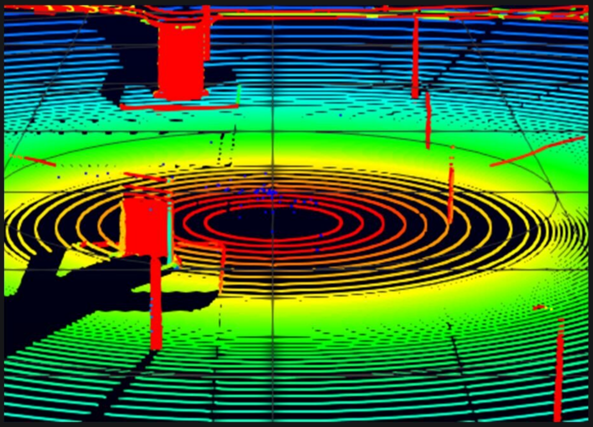
ISP pipelines are a series of complex steps that convert raw camera data to images and each is unique to a specific camera. A generic ISP model was developed that takes the luminance data measured from rFpro's world model and processes it to produce a realistic image through user-provided ISP parameters.

This ISP pipeline includes algorithms such as demosaicing, which converts CMOS subpixels into image pixels and introduces artifacts, white and colour balancing, which change the colour distributions of pixels within the image, and gain/exposure control and gamma, which change the overall brightness of the image by altering pixel luminance values.

Lens Modelling Workflows

Separate from the ISP model, all cameras are fitted with lenses which introduce various distortions and blur, depending upon their specifications and imperfections. Images taken at real-world locations were compared to their simulated counterparts and the noise distributions of these images due to blur were compared. This enabled the creation of a lens blur model within rFpro, which was further validated by comparisons to Winter Test site data.





LiDAR Modelling

The LiDAR models have been enhanced to take advantage of the ray tracing capabilities available in rFpro by running the LiDAR model on the GPU. The GPU acceleration of the model has enabled more details to be included in the simulation without compromising simulation performance.

The weather model within the LiDAR has been enhanced to incorporate extinction and backscatter coefficients that model the effect of raindrops. The extinction coefficient gives the reduction in intensity from all the rain drops in the beams path. The backscatter coefficient gives the intensity reflected back to the receiver by the raindrop. The overall effect is that rain lowers the intensity of all returns and causes returns from rain drops to appear in the point cloud.

WP3 – Validation of Sensor Models

Claytex and rFpro with support from WMG and NPL worked on the validation of sensor models with an emphasis on developing the methodology that could be applied to any sensor model. A key realisation is that the validation of a sensor model cannot start until the simulation environment and scene have been validated. A public output from this work is the guidance on how to create a simulation handbook documenting the validation of a sensor model and this is available from the project website https://sim4camsens.org.

Simulation Handbook

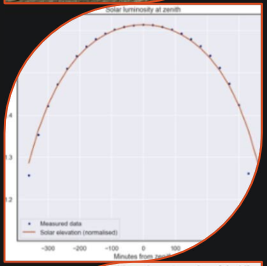
The Simulation Handbook is the name given to the series of documents that describe the sensor computational models and include details on the unit tests and validation of the model. Guidelines have been developed and published describing the information that is expected to be included in these documents. These guidelines have been generated to support the safety assurance processes and establish that the simulation environment has the required level of accuracy and credibility.

For each sensor model, the simulation handbook should break down the model behaviour into individual steps such as the scene, passive and active energy sources, propagation through the atmosphere and reflections. The document should present guidance on how to perform validation for each of the relevant elements of the simulation, giving an explanation of the underlying physics, experimental procedure and how this is mirrored in the simulation environment. References to theory should be clearly provided by citations.

For each aspect of the model there will be uncertainties related to the validation measurements and simulation results. The propagation of these uncertainties through the simulation toolchain must be covered.

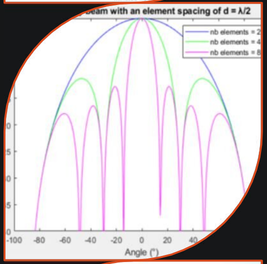
Scene

Validate the scene geometry using survey grade LiDAR scans



Passive energy sources

Validate against standards e.g. Light from the sun and moon is correct for the longitude, latitude and time of day



Active energy sources

Validate the energy from active sources e.g. Headlight patterns, radar beam patterns

Propagation through atmosphere

Validate the attenuation through the atmosphere for each weather condition e.g. Light propagation through variable density fog

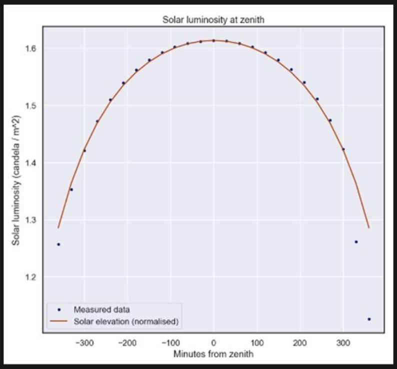
Reflections

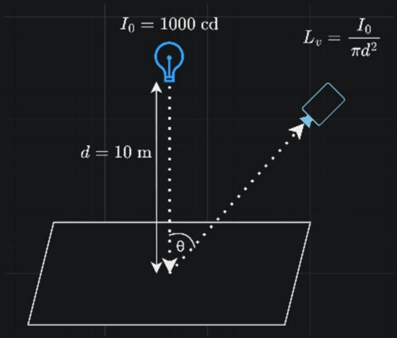
Validate material reflections in lab conditions e.g. BRDF measurements from the lab recreated in simulation

rFpro Lighting system validation

Starting from fundamentals, the lighting system was methodically validated through comparisons to theoretical data and existing standards. The first step was to ensure that the natural/ambient lighting of a scene corresponds to the range of realistic values found throughout the year, which is determined primarily by the luminance of the sun.

Following this, both point and area lights were validated – the former being lights which cast light equally in all directions, and the latter representing ones with shaped profiles, such as car headlights. The point light was used to illuminate a variety of surfaces with different physical qualities, demonstrating that the fundamental physics within the lighting engine is accurate. For the area lights, the measured luminance of car headlights was validated, confirming that headlights within the rFpro engine provide accurate luminance values.





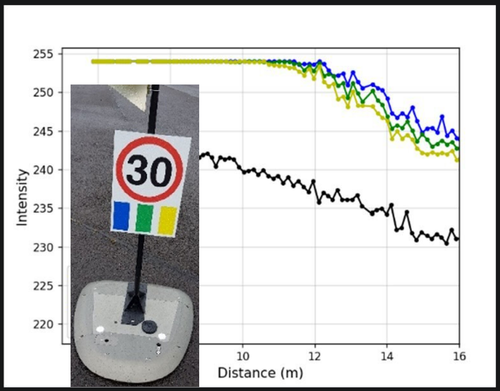
Camera Validation

The validation of the camera sensor encompassed a wide variety of optical, hardware and software processes, and the resulting simulation handbook consists of a series of documents. The workflow within these follows the path of a photon exiting the exterior scene, providing in turn a description of the validation process, experimental/theoretical reference values, accuracy of the simulation, acceptable parameter ranges and any necessary limitations - for the lens system, CMOS, ISP, and additional DSP.

As the settings of each camera sensor vary significantly, this document outlines the elements of the camera model that can be adapted for specific cameras - such as matching CFA settings using a Macbeth chart.

LiDAR Validation

The validation of the LiDAR models focuses on specific features within the experimental data such as the static targets at the Winter Test range. Focusing on these enables the validation of the range, scan pattern and intensity/reflectivity estimates for each LiDAR. Using data from the airfield test, atmospheric attenuation can be validated against distance to the target for different finishes on the same core material.



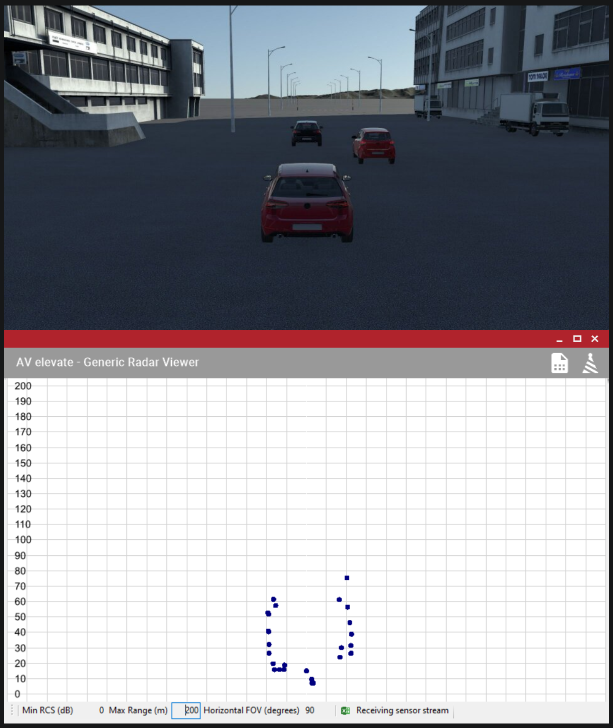
WP4 – Accelerating Sensor Development

Oxford RF used the project to accelerate the development of their first production radar sensors which were launched at the conclusion of the project in 2025. Within this work package Claytex and Oxford RF collaborated to develop and validate a model of the new radar sensors. This work included verifying that the simulation data from the model worked with the signal processing code developed by Oxford RF in addition to the version developed by Claytex as part of the radar model.

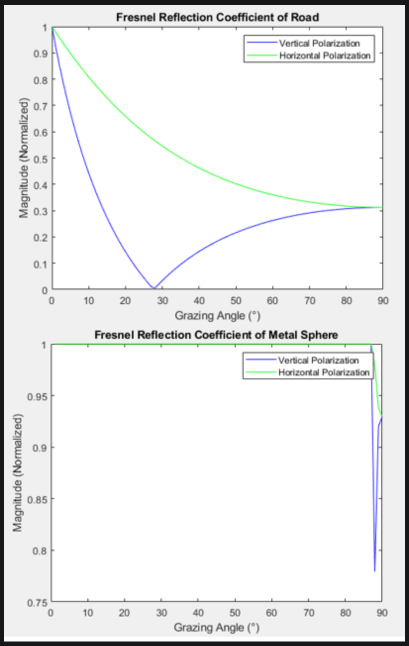
Radar Simulation

The radar models utilise the ray tracing capabilities available in rFpro and during the project these were modified to run on the GPU. The GPU acceleration of the model has delivered a huge improvement in computational time.

The model works by casting rays from each transmitter and tracing the route that these take through the scene until they reach a receiver. For each ray that reaches a receiver we know which transmitter it originated from, the amount of power the ray is carrying, how far it travelled and the velocity of the objects it encountered on its journey. This information enables us to generate the Intermediate or Beat Frequency (IF) used by an FMCW radar signal processing stack.



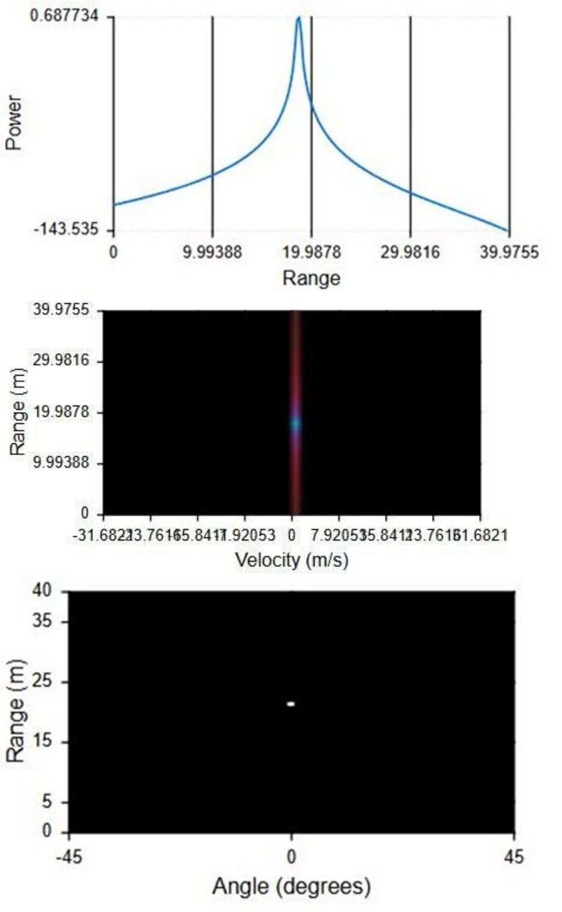
Min RCS (dB) 0 Max Range (m) 200 Horizontal FOV (degrees) 90 Receiving sensor stream

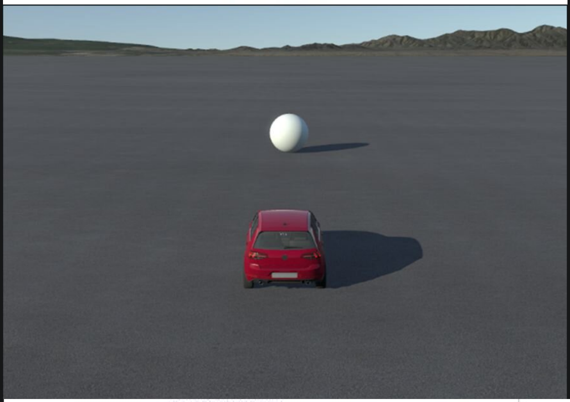


Ray Tracing for Radar Modelling

Due to the frequencies used in automotive radar we can simplify the radar models to focus on the optical region (far field) to model the propagation, reflection and scattering of radar waves using ray tracing. Diffraction however is not an optical effect, it is a wave effect and must be treated separately.

When modelling reflection there are 2 phenomena that we need to account for: specular and diffuse reflection. Both of these are influenced by the material properties of the object and the Fresnel Reflection coefficient is critical in the calculation of these reflections. To calculate the Fresnel coefficient we need the permittivity and permeability of the material and the ability to vary these to match the operating frequency of the radar sensor.





Signal Processing

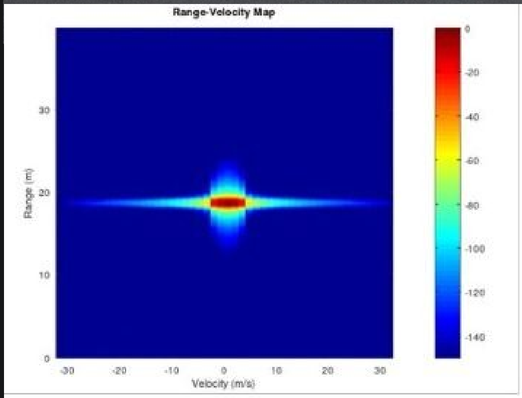
There are 2 ways that the radar model can be used: one is with the signal processing stack developed by Claytex; the other is with your own signal processing stack. For an FMCW radar the input to both is the IF signal.

The modelled signal processing stack includes support for interleaved chirps to ensure orthogonality, reduce interference and improves the SNR. The Hamming window and chirp timing can be calibrated to match the performance of different devices. Dynamic range compression is used to enhance weaker signals and capture of the I/Q components eliminates spectrum mirroring and boosts Doppler resolution.

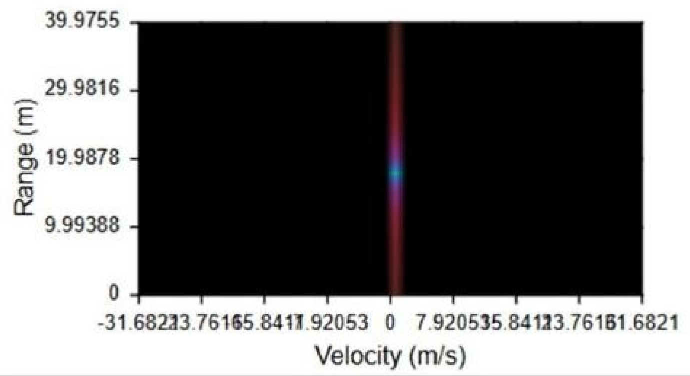
Integration of Oxford RF Signal Processing

A key step in supporting the development work carried out by Oxford RF was to ensure that the simulation data worked correctly with the signal processing they were developing for their new products.

A number of scenarios were simulated and the IF data generated was fed through both the Claytex and Oxford RF signal processing stacks to ensure that the detections were consistent between both codes. This validates that the model output can be used to develop the signal processing stack.



Velocity Profile from OxRF Script



Velocity Profile from Simulation

WP5 – Dissemination

AESIN took the lead on dissemination and outreach activities with support from all of the project partners. The project was presented at 12 international conferences during the 2 year life of the project. In addition several workshops and advisory board meetings were held with external organisations to provide input to shape the project.

Roadmaps and Standards Landscape

A comprehensive analysis of the current state of sensor technologies — including LiDAR, radar, and camera systems. There are challenges remaining in cost, scalability, environmental robustness and regulatory harmonisation.

These technologies are increasingly supported by a growing body of international standards that aim to ensure safety, interoperability and performance consistency across global markets.

	LIDAR sensor roadmap
2025 to 2030	• Solid-state LiDAR replaces mechanical units; systems become compact, energy-efficient. • Automotive-grade LiDAR drops below $500. • Sensor fusion with vision, radar boosts reliability via real-time deep learning.
2030 to 2035	• LiDAR-on-chip reaches commercial maturity, cutting cost, size, complexity. • FMCW LiDAR goes mainstream with velocity detection and interference resistance. • Adaptive resolution and beam steering focus scans on high-risk areas.
2035 onwards	• LiDAR becomes standard in Level 3+ vehicles, including entry-level EVs. • Extended-range and high-altitude LiDAR integrates with vehicle networks. • Quantum-enhanced and photonic LiDAR enter experimental deployment for high-precision sensing.

Recommendations Report on UK Perception Sensors

The UK’s automotive perception sensor sector has potential for growth but faces notable challenges and strategic opportunities.

- UK has growth potential in radar, camera, LiDAR, and quantum sensor technologies.
- Radar and camera systems are current UK strengths, while LiDAR and quantum technologies offer potential with further investment.
- Major challenges include high costs, limited manufacturing, and regulatory gaps.
- Recommendations: increase R&D funding, support product commercialisation, and advanced sensors such as solid-state LiDAR, AI-enhanced radar, and quantum-enabled PNT are critical investment areas.

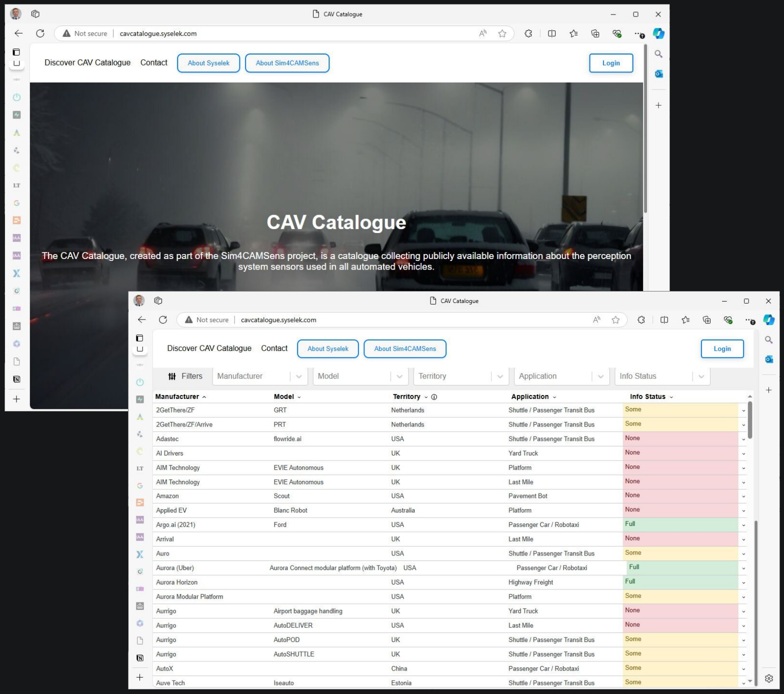
Project Outputs

The project resulted in a number of new and improved products and service offerings from the commercial partners: Syselek, rFpro, Claytex, and Oxford RF.

CAV Catalogue

Syselek owns the CAV Catalogue, capturing key details about the perception systems on more than 150 L4 automated vehicle models from more than 120 different developers.

The catalogue list is publicly available at https://cavcatalogue.syselek.com



CAV Catalogue

The CAV Catalogue, created as part of the Sim4CAMSens project, is a catalogue collecting publicly available information about the perception system sensors used in all automated vehicles.

Manufacturer	Model	Territory	Application	Info Status
2GetThere/ZF	GRT	Netherlands	Shuttle / Passenger Transit Bus	Some
2GetThere/ZF/Arrive	PRT	Netherlands	Shuttle / Passenger Transit Bus	Some
Adastec	flowride.ai	USA	Shuttle / Passenger Transit Bus	None
AI Drivers		UK	Yard Truck	None
AIM Technology	EVIE Autonomous	UK	Platform	None
AIM Technology	EVIE Autonomous	UK	Last Mile	None
Amazon	Scout	USA	Pavement Bot	None
Applied EV	Blanc Robot	Australia	Platform	None
Argo.ai (2021)	Ford	USA	Passenger Car / Robotaxi	Full
Arrival		UK	Last Mile	None
Auro		USA	Shuttle / Passenger Transit Bus	Some
Aurora (Uber)	Aurora Connect modular platform (with Toyota)	USA	Passenger Car / Robotaxi	Full
Aurora Horizon		USA	Highway Freight	Full
Aurora Modular Platform		USA	Platform	Some
Aurrigo	Airport baggage handling	UK	Yard Truck	None
Aurrigo	AutoDELIVER	USA	Last Mile	None
Aurrigo	AutoPOD	UK	Shuttle / Passenger Transit Bus	Some
Aurrigo	AutoSHUTTLE	UK	Shuttle / Passenger Transit Bus	Some
AutoX		China	Passenger Car / Robotaxi	Some
Auve Tech	Iseauto	Estonia	Shuttle / Passenger Transit Bus	Some

Enhanced Systems Engineering

The requirements decomposition methodology developed in WP1 has enabled Syselek to expand their independent AV systems engineering and analysis services. These support:

- Developers, with independent design review and to identify component suppliers,
- Component suppliers, to understand application performance and work with AV developers,
- Transport operators, to evaluate technical feasibility ("Is a proposed Target Operating Domain (TOD) suitable for AV operation?"), independent technical due diligence, supplier assessment/selection, and ODD/safety risk analysis,
- Certification agencies, to evaluate safety arguments and evidence, in-service monitoring data analysis, and incident investigation through root cause analysis, and
- Road operators, to assess Physical and Digital Infrastructure (PDI) hazards to AV operation, and the impacts of AVs on road operations ("Will PDI modifications or operational management improve TOD suitability for AV operation?").

Contact info@syselek.com for further information.

rFpro New Product Launched

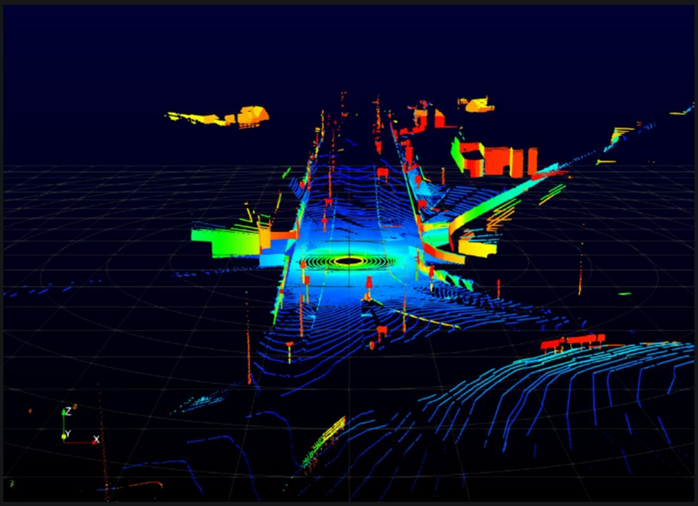
In October 2024, rFpro launched a new solution for autonomous vehicle and ADAS simulation called AV elevate. This new product incorporates the improved sensor models developed within the project.

AV elevate
powered by rFpro

Tune, Train and Test your ADAS and AV systems

High-Fidelity Sensor Models

The platform integrates high-fidelity models for all major AV sensor types, including LiDAR, radar, and cameras, allowing for sensor fusion testing with unmatched accuracy. AV elevate's synchronous architecture supports the parallel testing of hundreds of sensors, making it the ideal solution for optimising sensor configurations. rFpro's extensive library of standard sensor models also includes digital twins of commercially available sensors, such as Velodyne's HDL-32 LiDAR, enabling development to proceed before physical hardware exists.



Advanced Rendering for Unrivaled Realism

At its core, AV elevate leverages rFpro's industry-leading ray tracing rendering technology and physically modeled virtual environments. With a library of more than 180 real-world digital twins, AV elevate produces high-fidelity data, replicating how sensor systems perceive the world. This includes crucial phenomena, such as motion blur and rolling shutter effects, providing the highest quality training data and testing environment for AVs.

Accelerate Your AV Development with AV elevate

Designed to remove the biggest barriers to AV development, AV elevate ensures faster, safer, and more cost-effective testing. Its powerful synchronous architecture, coupled with cutting-edge sensor models and simulation tools, makes it the most advanced solution for tuning, training, and testing autonomous vehicle systems. Whether you are an OEM, a Tier 1 supplier, or a sensor developer, AV elevate will help you bring safer, more reliable AV technology to market faster.

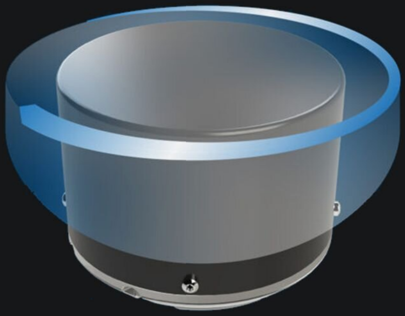
Contact info@rfpro.com for more information

Oxford RF New Products Launched

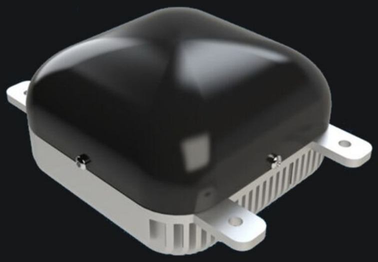
During the project Oxford RF worked on the development of their first production radar sensors offering unique capabilities. These products were launched in June 2025. Contact info@oxrf.co.uk for further details.

The world's first solid-state 360° radar

Unlike conventional radar systems that depend on rotating antennas, this ground-breaking sensor delivers full 360-degree coverage without any moving parts. By eliminating mechanical components like motors, the design significantly reduces complexity, minimises the risk of failure, and lowers maintenance requirements. These advantages make it a highly reliable and cost-effective solution, perfectly suited for demanding environments such as automotive systems, robotics and industrial applications.



Solid-state 270° radar



Our wide field-of-view sensors have the unique benefit of providing wide yet overlapping coverage, which means that the data from our sensors can be combined to improve the sensing and imaging of the environment. The overlap also ensures redundancy in the ADAS/ADS system. The use of fewer sensors (as low as 4 sensors per vehicle) enables a centralised ADAS/ADS sensing architecture. Overall this award-winning technology is a game-changer for automotive and autonomous platform developers.

World's first hemispherical radar

Oxford RF does not stop at providing full 360-degree coverage. 360-degree sensors cover the horizontal plane fully but do not cover the regions above and below the sensor in the zenith and nadir directions respectively. Enter hemispherical radar sensors: Oxford RF's sensor range that provide a dome-shaped coverage in the zenith or nadir directions in addition to full 360-degree coverage around the sensor – all in one solid-state package.

For further information about the project please visit sim4camsens.org or contact the lead partner, Claytex:

- sales@claytex.com
- +44 1926 885900
- https://claytex.com

The Sim4CAMSens project was part of CCAV's Commercialising CAM Supply Chain Competition (CCAMSC).

The Commercialising CAM programme is funded by the Centre for Connected and Automated Vehicles, a joint unit between the Department for Business and Trade (DBT) and the Department for Transport (DfT) and delivered in partnership with Innovate UK and Zenzic.

The CCAM Supply Chain competition was launched in October 2022 to support the delivery of early commercialisable Connected and Automated Mobility technologies, products and services and is part of the Government's vision for self-driving vehicles. Connected and automated mobility 2025: realising the benefits of self-driving vehicles.

Sim4CAMSens