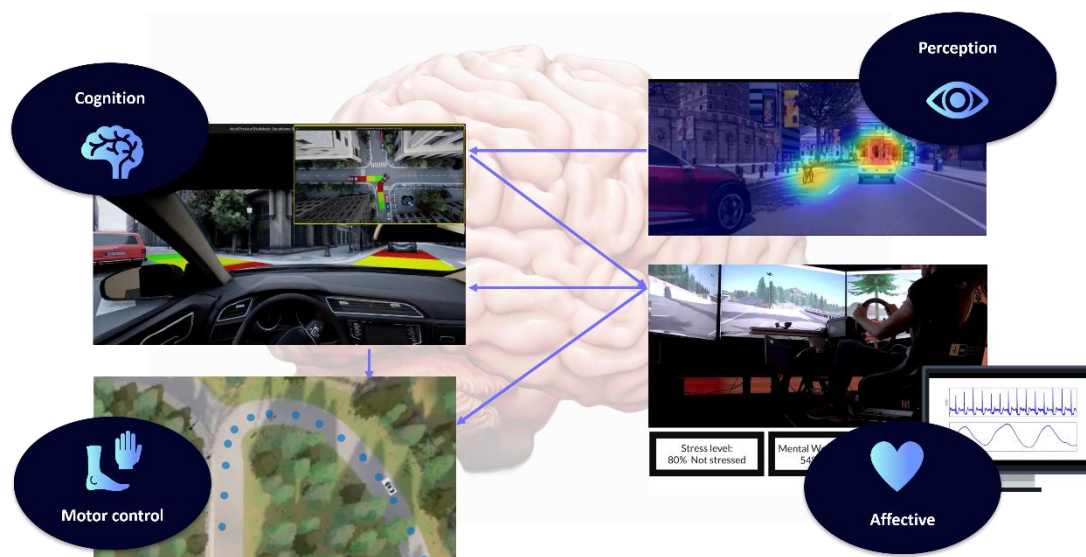


The BERTHA Project Achieves Breakthrough with Advanced Driver Behavioural Modules, Setting New Standards for Safer, Human-Like Automated Mobility

The BERTHA project, funded by the European Union under the Horizon Europe programme (Grant Agreement n° 101076360), has reached a pivotal milestone with the release and validation of its advanced Driver Behavioural Modules (DBMs). This achievement marks a significant leap forward in the development of Connected, Cooperative, and Automated Mobility (CCAM), offering a new paradigm for safer, more human-centric automated vehicles.



An integrated view of how cognition, perception, motor control, and emotional states shape human behaviour in immersive driving simulations.

Valencia, 27 February 2026. The Horizon Europe project BERTHA has successfully validated a suite of Driver Behavioural Modules, now accessible to academia and industry via an open-source data HUB and the CARLA autonomous driving simulator. This accomplishment is the result of a multi-disciplinary, pan-European collaboration, and represents a major step toward embedding authentic human behaviour into the core of automated mobility systems.

Technical Innovation: Real-Time Perception, Affective Intelligence, and Human-Like Motor Control

- **Perception Module:**

Leveraging over nine hours of real-world driving data from 21 diverse users, the Perception module delivers real-time, 360° attention mapping within the CARLA simulation environment. This module employs advanced machine learning techniques to replicate human gaze and attention distribution, enabling automated vehicles to interpret and anticipate driver focus on complex, dynamic traffic scenarios. The result is a system that



not only reacts to the environment but does so in a way that mirrors human situational awareness, enhancing both safety and trust.

- **Cognition Modules:**

Cognition is modelled in BERTHA by the Risk Assessment and Decision Making modules, which simulate the driver's perception and understanding of the traffic situation, determine the most appropriate driving behaviour according to perceived and accepted level of risk, to progress safely within the environment. These two cognitive processes, have been modelled and simulated on the basis of the theoretical model COSMODRIVE, and specifically adapted to the objectives and use cases investigated within the project

- **Affective Module:**

The Affective module is built on Bayesian Belief Networks, allowing it to predict and model key mental states such as fatigue, drowsiness, and stress. By integrating physiological and demographic data, this module provides a nuanced understanding of driver readiness and emotional state. This capability is crucial for developing automated systems that can adapt to the variability of human behaviour, ensuring that vehicles respond appropriately to both routine and critical situations.

- **Motor Control Module:**

Calibrated with data from 30 participants, the Motor Control module outputs probability distributions for a wide range of driver actions. This probabilistic approach captures the inherent variability in human driving styles, from cautious to assertive, and translates it into nuanced, context-aware vehicle responses. By bridging the gap between simulation and reality, this module enables the development of automated vehicles that behave in ways that are both predictable and acceptable to human users.

To Helios De Rosario-Martínez (IBV), *“the release of these four software components is the starting point to the implementation of BERTHA's DBM, as a modular and scalable resource that will facilitate CCAM research in the area of human driver behaviour”.*

Collaborative Methodology and Open Science

The development of these modules is the product of intensive collaboration among [14 partners from six countries](#), coordinated by the Instituto de Biomecánica de Valencia (IBV). The project's commitment to open science is reflected in the public release of these modules on GitHub, fostering transparency, reproducibility, and community-driven innovation. This approach not only accelerates the adoption of BERTHA's solutions within the CCAM ecosystem but also invites ongoing contributions from researchers, developers, and industry stakeholders across Europe and beyond.

Validation and Real-World Impact

A cornerstone of BERTHA's methodology is **the rigorous validation of its modules using Field Operational Test (FOT) data**. By grounding performance assessment in real-world driving conditions, the project ensures that its models are robust, reliable, and ready for



deployment in next-generation automated mobility systems. This real-world validation is essential for building public trust and regulatory confidence in automated vehicles, paving the way for broader societal acceptance.

Strategic Significance for CCAM

The release and validation of these advanced driver behavioural modules position BERTHA as a leader in the **global effort to develop human-like, trustworthy automated mobility**. By addressing the critical gap in modelling holistic, personal, and cultural aspects of human driving, **BERTHA's work directly supports the European Union's vision for safe, inclusive, and efficient mobility**. The project's scalable, probabilistic approach sets a new benchmark for digital validation and interoperability in the CCAM industry.

In the project coordinator's words, a vision for what comes next:

"The release of the DBM modules marks a turning point for automotive R&D. By moving away from rigid, 'black-box' systems toward a modular driver behavioural model, we are enabling manufacturers and developers to iterate faster and with greater precision. These building blocks allow for integration into existing workflows, reducing the cost and complexity of developing next-generation Advanced Driver Assistance Systems (ADAS) and personalized in-car experiences".

Andrés Soler Valero, BERTHA's project coordinator (IBV)

About BERTHA:

BERTHA (BEhavioural ReplicaTion of Human drivers for CCAM) is a Horizon Europe project dedicated to developing scalable, probabilistic driver behavioural models to enhance safety and trust in automated mobility. Learn more at <https://berthaproject.eu/>.

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