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## Advancing innovation for human-centred autonomy tomorrow with BERTHA

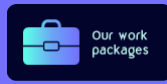
### What's new in the BERTHA project?

Since the release of our previous issue in December 2025, the project has entered an **important new stage in 2026**, marked by significant scientific progress, real-world validation milestones and high-level dissemination activities.

We have expanded our research footprint with **three new scientific publications**, advancing affective modelling, sensor fusion intelligence and 360° driver attention understanding, while new success stories and our second press release highlight breakthroughs in **Driver Behavioural Modules** and **Field Operational Tests**.

The year ahead will also be rich in engagement opportunities: BERTHA research will be presented at **top-tier international conferences**, the project will host its own **workshop at TRA 2026 in Budapest**, and partners will gather for the next in-person **consortium meeting in Valladolid** as we move toward the project's concluding phase.

### Find out more about the BERTHA project



## What have we been publishing?

**Bayesian network approach to building an affective module for a driver behavioural model**

Dorota Młynarczyk<sup>1</sup>, Gabriel Calvo<sup>2</sup>, Francisco Palmi-Perales<sup>1</sup>, Carmen Amero<sup>3</sup>, Virgilio Gómez-Rubio<sup>2</sup>, Ana de la Torre-García<sup>4</sup>, and Ricardo Bayona Salvador<sup>2</sup>

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**Abstract**  
 This paper focuses on the affective component of a driver behavioural model (DBM). This component specifically models some drivers' mental states such as mental load and active fatigue, which may affect driving performance. We have used Bayesian networks (BNs) to explain the dependencies between various relevant random variables and assess the probability that a driver is in a particular mental state based on their physiological and demographic conditions. Through this approach, our goal is to improve our understanding of driver behaviour in dynamic environments, with potential applications in traffic safety and autonomous vehicle technologies.

**Keywords**  
 Directed acyclic graph; Mental states; Probability and uncertainty; Statistical modeling.

### Bayesian networks for affective driver modelling

This latest publication presents an affective module for the Driver Behaviour Model, using Bayesian Networks to estimate mental load and active fatigue from physiological and demographic variables. The work strengthens BERTHA's modelling of internal driver states, supporting safer and more adaptive automated driving.

[Learn more](#)

**IMKD: Intensity-Aware Multi-Level Knowledge Distillation for Camera-Radar Fusion**

Shobhik Mishra<sup>1</sup>, Karan Patel<sup>2</sup>, Edoardo Sotgiu<sup>3</sup>, Jovan Raduech<sup>4</sup>  
<sup>1</sup>German Research Center for Artificial Intelligence (DFKI) | IPTU

**Abstract**  
 High performance Radar-Camera fusion detection systems are critical for ensuring level 4/5 autonomous driving. However, existing fusion methods struggle to capture complex dependencies between modalities, leading to sub-optimal performance. This paper introduces IMKD (Intensity-Aware Multi-Level Knowledge Distillation), a novel framework that leverages multi-level knowledge distillation to transfer information from a high-capacity teacher model to a smaller student model. IMKD captures a fine-grained, intensity-aware representation of the input data, enabling the student model to better understand the underlying relationships between modalities. This approach significantly improves the student model's performance, particularly in low-intensity and high-noise scenarios. The proposed method is evaluated on a standard camera-radar fusion dataset, demonstrating superior performance compared to state-of-the-art methods. The code and model weights are available at: [https://github.com/DFKI-PTU/imkd](#).

**1. Introduction**  
 Radar-Camera fusion has become the dominant approach for level 4/5 autonomous driving systems due to its ability to combine the strengths of both modalities. Radar provides accurate range and velocity information, while cameras offer rich contextual information and object classification capabilities. However, existing fusion methods often struggle to capture the complex dependencies between modalities, leading to sub-optimal performance. This paper introduces IMKD (Intensity-Aware Multi-Level Knowledge Distillation), a novel framework that leverages multi-level knowledge distillation to transfer information from a high-capacity teacher model to a smaller student model. IMKD captures a fine-grained, intensity-aware representation of the input data, enabling the student model to better understand the underlying relationships between modalities. This approach significantly improves the student model's performance, particularly in low-intensity and high-noise scenarios. The proposed method is evaluated on a standard camera-radar fusion dataset, demonstrating superior performance compared to state-of-the-art methods. The code and model weights are available at: [https://github.com/DFKI-PTU/imkd](#).

### Intensity Aware Knowledge Distillation for Sensor Fusion

This publication presents IMKD, an intensity-aware and multi-level knowledge distillation framework for camera-radar fusion. The work preserves each sensor's intrinsic characteristics while enriching fused representations through a three-stage, intensity-guided distillation pipeline.

[Learn more](#)

### 360° Driver Attention Modelling

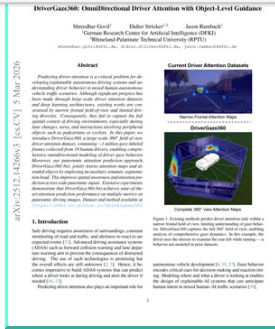
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Past Issues

The project's fourth scientific publication introduces Driver Gaze

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360°, a 360° driver-attention dataset with ~1 million gaze-labelled frames and a panoramic model that achieves state-of-the-art attention prediction.

This progress strengthens BERTHA's understanding of real driver gaze behaviour.

Learn more

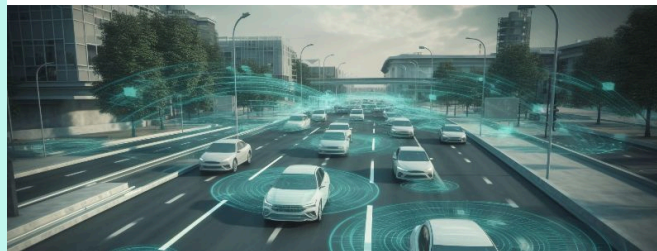
### BERTHA news



### Success Story #2 - Sharing Insights from RTR 2025

BERTHA's second success story highlights the project's first Professional Publication, summarising key insights from RTR 2025. It distils takeaways on human-centric CCAM, comparable behavioural indicators and simulation-driven validation, supporting safer, more predictable automated mobility across Europe.

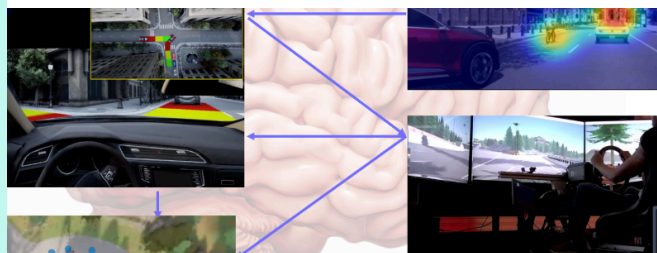
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### Success Story #3 - Field Operational Tests

This story showcases BERTHA's extensive Field Operational Tests, capturing diverse real-world scenarios with sensorised vehicles and a wide range of driver profiles. These trials feed rich behavioural data into BERTHA's Driver Behavioural Model, strengthening calibration, validation and safety assessment across 19 performance metrics.

Learn more



### Success Story #4 - BERTHA Releases and Validates Advanced Driver Behavioural Modules for Safer Automated Mobility

modelling human-like attention, mental states, and driving actions, all openly shared to support safer, more reliable CCAM development.

[Learn more](#)



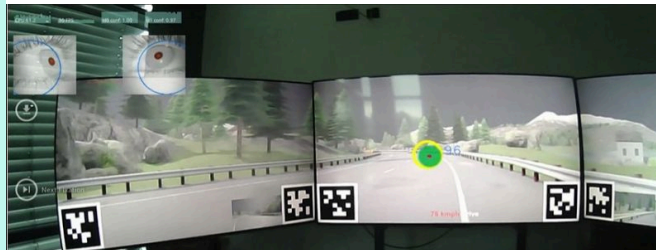
### **Press Release #2 - Breakthrough Driver Behavioural Modules Advance Human-Like Automated Mobility**

BERTHA's second press release announced the validation and release of the project's four Driver Behavioural Modules (Perception, Cognition, Affective and Motor Control), now accessible through the open source HUB and CARLA simulator.

Built from real-world data and validated through Field Operational Tests, these modules strengthen automated driving development with more human-like attention, decision-making and behavioural responses.

[Learn more](#)

### **Next steps**



### **DriverGaze360, accepted to CVPR 2026**

The DriverGaze360 paper, submitted by DFKI, has been accepted to CVPR 2026, one of the world's leading computer vision conferences, taking place 3-7 June 2026 in Denver, Colorado. This work plays an important role in BERTHA, as the dataset and method supported the development of the project's Perception Module in WP1, helping to model how drivers distribute attention in complex environments.

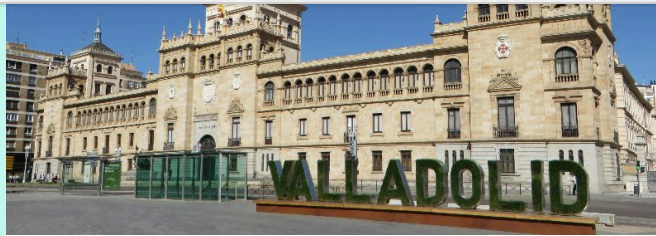
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### Consortium Meeting in Valladolid

The next BERTHA consortium meeting will take place in Valladolid, Spain, on 15-16 April 2026. The two-day gathering will allow partners to align on final developments, validation results and upcoming dissemination activities as the project enters its last phase.



### BERTHA Workshop at TRA 2026 - Save the date!

BERTHA will host a dedicated workshop on 21 May 2026 during the upcoming Transport Research Arena (TRA) 2026 conference, which takes place 18-21 May 2026 in Budapest, Hungary. The programme and speakers will be published soon on our channels, stay tuned!

[Secure your spot at TRA](#)

*Early Bird tickets available until 31 March*



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