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From storms to sensors: how cross-border research with UK partners shapes safer and greener technologies

Since the UK rejoined Horizon Europe in 2024, EU-funded cross-border research with UK partners has been delivering safer, smarter, more sustainable technologies for everyday life.

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On a test track in southern Germany, engineers watch as an automated vehicle drives through simulated heavy rain. As the vehicle pushes through sheets of water and poor visibility, researchers are recreating one of the toughest sensing challenges for automated driving.

“Bad weather is one of the situations the car will face, and the car must deal with that,” said Professor Werner Huber from the Technical University of Ingolstadt in Germany, home to world-leading testing facilities for autonomous vehicles in both real and virtual environments.

Rain, fog and snow distort the sensor signals that automated vehicles rely on. That undermines safety for both future driverless cars and today’s vehicles, which increasingly depend on automated features such as emergency braking and speed control.

Huber’s team is part of an EU-funded project called ROADVIEW. The four-year initiative brings together researchers across Europe, including the United Kingdom, which rejoined the EU’s Horizon Europe programme for research and innovation on 1 January 2024. The project is working to ensure that vehicles can operate safely in the real world, even under adverse weather conditions.

Among the partners is Professor Valentina Donzella from Queen Mary University of London, who provides specialist expertise in sensor technology.

Donzella studies how sensors collect data, analysing and modelling how data degrades due to environmental conditions and noise, and how algorithms interpret it. Her work improves the reliability of vehicle perception systems, making automation safer and more trustworthy.

“The problems we are facing are so difficult that even industry cannot face them alone. We really need this kind of collaboration and complementary expertise coming together,” she said.

With partners in Sweden, Finland, France, Türkiye and Switzerland, ROADVIEW researchers aim to improve future automated vehicles, and also strengthen current car safety standards.

They hope their findings will help expand the testing of new cars to include adverse weather – potentially reducing accidents and saving lives.

“Horizon Europe is enabling us to tackle the problem in a rigorous way, where we put safety in first place,” Huber said, referring to the EU’s key funding programme for research and innovation.

“If we improve sensor technology and perception, we improve driver assistance systems, and we improve safety systems. That’s where the real impact for society is,” he added.

Building machines that see

Elsewhere in Europe, another international collaboration called NimbleAI is helping teach machines to see like humans. In this case, Horizon Europe funding is bringing together researchers from eight EU countries, along with several universities in the United Kingdom.

These researchers are working to transform how machines see and interpret the world by developing ultra-efficient, brain-inspired, or “neuromorphic”, vision systems.

“Neuromorphic AI is highly interdisciplinary, combining expertise in biology, optics, hardware, software and AI,” explained project coordinator Dr Xabier Iturbe from IKERLAN, a research centre that belongs to the Basque Research & Technology Alliance (BRTA) and is part of the Mondragon Corporation from Spain.

“Horizon Europe allows us to bring together the real experts on each part of the problem.”

At the heart of the project is a new kind of bio-inspired vision sensor that combines mechanisms from both insect and human vision. It mimics human visual attention, scanning a scene and focusing selectively on the most important details, while also borrowing from compound insect eyes, which achieve 3D perception using remarkably little energy.

Researchers at the University of Manchester contribute leading expertise in neuromorphic computing, developing hardware and algorithms that process information using short electrical “spikes”, similar to the way the human brain works, rather than continuous data streams.

In these systems, artificial neurons stay mostly quiet and fire brief pulses only when they need to pass on important information, which cuts energy use.

“What we’re trying to do is achieve intelligent processing at a fraction of the energy cost, and that changes what is possible,” said Dr Oliver Rhodes, a lecturer in bio-inspired computing at the University of Manchester.

The technology could improve safety and autonomy in robots, drones, vehicles and smart devices. This will support healthcare, manufacturing, transport and emergency response.

“Their contribution gave us a boost in moving from a concept toward real system,” said Dr Iturbe. “For us at IKERLAN, this project has been transformative. We have gone from zero to a strong pace of innovation in neuromorphic technology in record time.”

Greener medicines, healthier ecosystems

In a very different field, collaboration is reshaping the way medicines are developed and their impact on the environment.

Researchers from six EU countries plus the United Kingdom are working on a project called ETERNAL that focuses on making medicines more sustainable: from greener manufacturing to reducing environmental risks of pharmaceutical residues in soil and water.

Such residues can reach rivers and farmland through wastewater and agricultural practices, potentially affecting wildlife and ecosystems.

By bringing together environmental scientists, engineers and industry partners, ETERNAL is accelerating practical solutions to adopt cleaner manufacturing methods, reducing waste and cutting carbon footprints.

“The UK has a very strong industrial heritage, not only in the pharmaceutical sectors, but across many other industrial fields,” said Susana Gómez, senior mechanical engineer from IRIS Technology Solutions in Barcelona. “So the UK partners bring powerful, practical knowledge and know-how to our consortium.”

Dr Sam Harrison from the UK Centre for Ecology & Hydrology is modelling how pharmaceuticals move through water and soil, helping to identify risks and create stronger environmental protections.

“Healthy ecosystems matter because they underpin our food systems, our water quality and, ultimately, human wellbeing,” said Dr Harrison.

ETERNAL researchers are also exploring scientific approaches that reduce reliance on animal testing. By combining knowledge of how drugs behave in the body with environmental modelling, they hope to predict which species are most at risk and design safer medicines from the outset.

ETERNAL is also part of a wider EU-funded Green Pharmaceuticals cluster that links five EU initiatives working to make medicines more sustainable across their entire life cycle.

Collaboration that changes what is possible

Taken together, these three projects point to the same lesson: complex challenges demand international expertise.

By combining disciplines, industries and perspectives, and drawing on renewed UK participation, Europe can move faster to tackle shared challenges and improve lives.

“This kind of project would be extremely difficult to do alone,” said Dr Iturbe from NimbleAI. “Being able to assemble this team across Europe is what makes ambitious, high-risk ideas possible.”

That is why the UK’s return to Horizon Europe is a welcome development in the story of EU cross-border cooperation. In the end, one thing is clear: when knowledge crosses borders, science moves forward.

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More info

- ROADVIEW (CORDIS)
- ROADVIEW project website
- NimbleAI (CORDIS)
- ETERNAL (CORDIS)
- EU-UK and Horizon Europe