Photonics21 Press Release

EU Invests €5 Million to Detect Earthquakes and Infrastructure Damage Using Internet Cables

Brussels – December 2025

A new €5 million EU-funded project has begun work to allow fibre optic cable lines under our roads, fields and seas to double up as sensors capable of spotting earthquakes, monitoring traffic and detecting changes in the natural environment.

An interdisciplinary team specialising in photonics is developing sensors that read tiny changes in the light travelling through fibre, to see whether Europe's internet cables could soon do far more than carry data.

Light travelling through a fibre cable reacts to vibration, pressure and heat. By analysing these tiny changes, the same cable that delivers our broadband and Netflix can also reveal what is happening in the ground around it.

With Europe facing more extreme weather, ageing infrastructure and rising demand for early-warning systems, authorities need broader and more continuous information than existing sensors can provide.

Most environmental monitoring relies on isolated sensors that only cover small areas, which means early signs of ground movement or flooding often go unnoticed. By using cables that are already in the ground, the project aims to offer a far cheaper and far broader source of information than any system built from scratch. In time, this could give public authorities a way to track environmental shifts across thousands of kilometres without installing separate equipment.

Recent incidents of accidental damage and suspected sabotage of subsea and terrestrial cables have highlighted how vulnerable Europe's communications and energy networks can be. The project will test whether fibres can also act as an early-warning system for unusual vibrations or disturbances that may signal accidental or malicious tampering.

The work is being led by the CONNECT Research Ireland Centre, headquartered at Trinity College Dublin, together with a network of academic and industrial partners across Europe. Calling themselves the "ICON" project, they offer more than environmental insight.

Dr Aleksandra Kaszubowska, Trinity College Dublin, project coordinator, said: "ICON takes critical infrastructure security to a new level, by including physical layer monitoring. Communication links are critical for energy production, transport and finance. Many fibre routes sit alongside gas pipelines, power lines or wind-farm links. As a result, the sensing system could also flag accidental or malicious damage to critical infrastructure, whether that is from anchor strikes on subsea lines or underground construction work. ICON offers much more than mere environmental monitoring."

Giving Cables a Second Job

Europe has a vast network of fibres running beneath streets and along coastlines. Today, they are used only for communications. ICON wants to give them a second job: to listen for movement, heat and other signals that indicate what is happening nearby.

The project is based on a concept known as joint communication and sensing. This means the same strand of fibre carries internet traffic while also running a low-level optical signal used for measurements. The challenge is to let both tasks happen at once without affecting the quality of the connection.

To manage this, ICON is developing two key tools. The first is an "intent interpreter", which converts simple requests into technical instructions. For example, if a civil protection agency wants to check for unusual ground movement along a particular route, the system works out how to run the measurement while keeping normal internet traffic flowing.

The second tool is a digital twin: a live virtual model of the network that shows how the fibres are behaving at any moment. Operators can use it to test different sensing tasks before switching them on, helping to avoid disruption.

If the project succeeds, the fibres running across a city could help monitor road congestion or detect damaged infrastructure. Subsea cables might pick up early signs of underwater landslides or changes in ocean conditions. Long rural routes could support earthquake monitoring where there are few traditional sensors.

ICON will test these ideas first in the lab and then through field trials, including work on a production subsea cable later in the project. These trials will examine how sensing behaves in real-world conditions and how well the system copes with the noise of heavy data traffic.

Strengthening Europe's Networks

The ICON team say the technology could support climate monitoring, transport planning and disaster response. Because the fibres are already in the ground, the approach could give governments and scientists a large stream of useful environmental data at relatively low cost.

The aim is to make better use of the infrastructure that is already there. "Millions of kilometres of fibre run across Europe," Dr Kaszubowska said. "These cables are stable, widespread and highly sensitive. We want to understand how they can help us see what is happening in the world in real time, without building separate sensor networks."

ICON will run for three years until 2027. The team will first test the sensing methods in controlled settings, then work with telecom operators and public agencies on pilot sites. Findings will be shared openly with industry and research bodies to help wider adoption.

If trials go well, the technology could begin appearing on major fibre routes later in the decade, turning everyday internet cables into a new source of environmental insight for Europe.

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About ICON

https://iconproject.eu/

Duration: 2025–2027

Funding: €4.99 million from the Horizon Europe programme

Coordinator: CONNECT Centre, Trinity College Dublin, www.connectcentre.ie

Consortium partners include: Trinity College Dublin (Ireland); Adtran Networks SE (Germany), Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany), Cyprus Research and Innovation Centre Ltd., Brno University of Technology (Czechia), VPIphotonics GmbH (Germany), Tallinn University of Technology (Estonia), Tampnet AS (Norway), Technical University of Denmark, LightSenseAI (Ireland).

About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics, a technology encompassing all products and processes related to the emission, manipulation, and detection of light. Photonics is integral to a wide range of industries, including the medical, healthcare, transport, manufacturing, and telecommunications sectors.

"Photonics21" was established in December 2005 to bring together the photonics research community and industry. The European Commission defined photonics as one of five European Key Enabling Technologies (KETs) in September 2009. Shortly after, the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public-Private Partnership". The "Photonics 21 Association", a legal entity under Belgian law, became the private contract partner in November 2013 as part of a public-private partnership with the EU Commission.

Today, Photonics21 represents over 4,300 personal members from across Europe and beyond. Our members are experts in the photonics industry, as well as research organisations and universities, who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

Photonics is one of the few critical technologies for which Europe remains a global powerhouse in research and business. Several Nobel Prizes have been awarded to European scientists for their achievements in photonics over the past two decades. Approximately 5,000 European SMEs are considered hidden champions and world market leaders in their respective photonics markets. Europe ranks number two in the world in terms of production volume and market share. With more than 400 start-ups, Europe is one of the most thriving and innovative photonics regions in the world. Leadership in the development of photonics components and systems provides a competitive advantage in numerous key markets and policy areas, including the quantum internet, quantum computing, next-generation microelectronics, autonomous vehicles, Industry 5.0, virtual worlds, fusion energy, and many more.

As of 2022, the global photonics market was worth $ 864.6 billion. The European photonics industry grew from €103 billion in 2019 to €124.6 billion in 2022. With a 6.5% CAGR between 2019 and 2022, the European Photonics Growth exceeds the EU's GDP. The European photonics industry has considerable global leadership positions and employs more than 430,000 people directly.

With a positive growth forecast of €175 billion by 2027, current industry trends, such as digitalisation, resource efficiency, and individual and zero-failure production, will continue to drive the photonics industry forward.

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