



# Scientists harness Face ID lasers to make Super Smart Specs

**An EU-funded project is developing a smart glasses system based on photonics (the science of light) that uses VCSELs to track your eye movements without cameras – a breakthrough that could make cars safer, workplaces smarter, and wearable tech finally intuitive.**

Many of today's smart glasses aren't very smart. They can't sense what you're doing – whether you're reading, climbing stairs or drifting off while driving – and they're often bulky, warm and uncomfortable to wear for extended periods. Some even leave users feeling disoriented or motion-sick.

But a new project, funded by the European Commission, aims to change this. Using the same class of tiny VCSEL lasers as those in smartphone Face ID systems, the consortium is building eyewear that understands your intentions from the unique patterns of your eye movements.

The result could be glasses that are instinctively in tune with your gaze and finally respond to your intentions, simply by where you look. Glance left at a junction, and the street name appears. Look down while cycling, and your speed pops up. Focus on a dashboard, and only the information you need is shown.

The project, called [VIVA](#), is building the photonics-based intelligence that makes these experiences possible – using light to track eye movements with extreme precision, helping warn us when we're distracted on the road, easing cognitive strain in complex workplaces and making wearable tech feel far more natural to use.

"For years, eye-tracking has been stuck in research labs or bulky headsets. With VIVA, we want to improve the end-user experience," said Dr Thomas Schlebusch, VIVA project coordinator at Bosch Sensortec.

The glasses being deployed in the project are test platforms designed to demonstrate what the underlying eye-tracking system can enable in future consumer and industrial devices.

"Laser-based sensing lets us shrink the hardware to the point where it fits naturally into something as familiar as a pair of glasses. It's fast, it's accurate, and it respects your privacy because it doesn't rely on cameras or photograph your retinas. We're building something people can genuinely use in the real world, not just in controlled test setups.

"The frame prototypes built within the VIVA project are not consumer products, but research demonstrators built to validate the VIVA eye-tracking system in real-world conditions. They illustrate what future smart glasses could do once this sensing principle is integrated into next-generation wearable displays."

## Super Smart Specs

One of the project's first demonstrations is a pair of auto-focal smart glasses that adjust their lenses automatically based on what the wearer is doing, without any buttons, gestures or manual input.



Today's autofocus systems often rely on bulky video-based eye-tracking or electrical sensors, which can be slow, imprecise or uncomfortable.

VIVA replaces all of that with laser-based eye-tracking, small enough to fit inside everyday eyewear, enabling the glasses to detect when a user begins reading – a behaviour marked by distinctive, well-studied eye-movement patterns – and instantly sharpen the lenses for close-up vision.

The system aims for over 95% reliability, a >100 Hz gaze-angle detection rate, and robustness to false triggers, such as simply glancing downward.

### **Lightweight, Enhanced Privacy**

The VIVA spectacles rely on a new approach, with the team taking a novel step towards smart security.

Instead of imaging the eye with built-in cameras, VIVA is deploying laser-based sensing to detect microscopic eye movements with extreme precision. Because the system measures light reflections with VCSELs (the same lasers that scan your face on an iPhone) rather than recording images, it avoids collecting visual data altogether – a shift that allows the hardware to shrink dramatically.

Combined with meta-optics, ultra-thin nanoscale optical components, and fast signal processing, the technology can be integrated into lightweight, smart-glasses-style frames suitable for all-day wear.

By building an eye-tracking system based entirely on photonic sensing rather than conventional electronics, the consortium aims to demonstrate Europe's ability to lead in next-generation interface technologies.

The project brings together partners from Germany, the Netherlands, Denmark, Belgium, Spain, Sweden, Switzerland and beyond, combining expertise across laser design, metamaterials, signal processing, artificial intelligence and advanced manufacturing.

### **Prototypes and Tests**

The consortium is currently developing prototypes and performing system-level integration tests. Initial applications are anticipated in automotive and industrial settings, where reliability and privacy are critical, while integration with consumer-grade smart glasses remains a longer-term goal.

If successful, the technology could mark a quiet but profound shift in how people interact with machines – replacing taps, swipes and spoken commands with something far more natural: simply looking.

Bosch Sensortec GmbH coordinates the VIVA project in Reutlingen, Germany, and brings together 13 partners from seven countries, including TRUMPF Photonic Components, Sigma Connectivity, NIL Technology, Morrow, RWTH Aachen University, the Technical University of Munich, Universidad Pública de Navarra and TNO. The consortium spans Europe's leading expertise in photonics, sensing, software and advanced manufacturing – a collaborative effort to push eye-tracking technology out of the lab and into everyday devices.