

Press release

Sensor technology makes shadows a game changer

- CSEM has honored one of its technologies with its “Inventor Award 2024”.
- The technology uses light, shadows, and sensing technology to achieve ultra-precise measurements.
- The technology is well worthy of acclaim and has great potential for various industries and MedTech applications.

Neuchâtel, Switzerland, February 6, 2024 – Precision measurement is essential for many industries. A team of researchers at CSEM has developed a sensing technology that sets new standards in this field – by using the interplay of light and shadow. Their innovation, called “spaceCoder”, has been recognized with an award from within the company.

Where there is light, there is also shadow – a universal principle that CSEM researchers exploit in an innovative way. Their spaceCoder technology consists of a system that uses specialized algorithms and an optical sensor that detects light passing through a custom-made shadow mask. When an object is placed in front of the sensor, the system can precisely determine the position of a light source in space based on the shadows it creates. This clever method allows for the measurement of illuminated objects with extreme accuracy. “We are operating at a nanometric level here, that’s to say at the scale of one thousandth of a thousandth of a millimeter,” explains Andrea Dunbar, Business Developer for Data and AI at CSEM.

CSEM researchers Eric Grenet and Edoardo Franzi were the pioneers of this technical achievement, as they filed the patent for the underlying technology in 2010. Since then, Grenet and other members of Dunbar’s team have improved and refined spaceCoder’s technology through continuous research and development, making it suitable for practical use. The sensor is now almost as small as a sugar cube and offers high precision, reliability, and affordability, as it does not require expensive components like optical lenses. Therefore, shadow-based measurement technology has great potential for various sectors: “We have already used the technology for some exciting applications in precision machinery and MedTech,” says Andrea Dunbar.

Measure with precision before picking up the scalpel

For example, the sensor can measure a patient’s knee accurately before surgery, which is crucial for fitting an artificial knee joint. In future, the technology could be useful in minimally invasive surgeries, by tracking the 3D position of robot-controlled instruments in real-time. This could enhance surgical precision even further. The technology could also revolutionize the railways, as it can check the track alignment perfectly.

SpaceCoder’s technology has a huge economic potential, which could reach several billion Swiss Francs, depending on the sector and application. Eric Grenet and Edoardo Franzi who co-invented spaceCoder’s technology with former CSEM employees David Hasler and Peter Masa, received the “CSEM Inventor Award 2024” yesterday for their visionary work and its diverse applications. By presenting this accolade, the technology innovation center highlights how it is essential to not only have forward-thinking ideas, but also pursue and improve them. “The full potential of an idea or a patent often only emerges over time, as more use cases are developed,” notes Dunbar. The development of spaceCoder’s technology illustrates this point and reflects CSEM’s mission to develop practical and

innovative solutions that not only advance working practices, but also have a positive impact on Swiss society and its economy.

About the CSEM Inventor Award

Researchers currently employed at CSEM can be nominated for this annual award. The award program also recognizes people who no longer work at the research institute but have made a significant contribution to a nominated innovation. With the award, CSEM aims to showcase the importance of collaboration between research, development, and industry to honor first-class work within its own company, and to inspire smart thinkers of today and tomorrow.

Further information

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About CSEM – Facing the challenges of our time

CSEM is a Swiss technology innovation center developing advanced technologies with a high societal impact, which it then transfers to industry to strengthen the economy. The non-profit orientated, public-private organization is internationally recognized, and works to support the disruptive activities of companies in Switzerland and abroad. CSEM operates in the domains of precision manufacturing, digitalization, and sustainable energy. To accomplish its mission as gateway between research and economy, CSEM's more than 600 employees from 46 countries collaborate with leading universities, scientific institutions, research institutes, and industrial partners. With its six sites in Allschwil, Alpnach, Bern, Landquart, Neuchâtel and Zurich, CSEM is active all over Switzerland.
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