

# The new fiber optic sensor is capable of transmitting data 100 times faster

Fiber optic sensors are sensors composed of an amplifier and an optical fiber, customized for each specific purpose. Currently, fiber optic sensors have two main types, which are transceivers and diffuse types.

They are often used in critical tasks such as detecting fires in tunnels, pinpointing leak locations in pipes, and predicting landslides. Therefore, speed and accuracy are the most important factors in any type of fiber optic sensor.

Engineers from the Swiss Federal Institute of Technology Lausanne (EPFL) and Beijing University of Posts and Telecommunications (BUPT) have recently successfully developed a more advanced encoding and decoding system, enabling Fiber optic sensors can send data up to 100 times faster and over a significantly wider area than current technology.

*"Unlike conventional sensors, which take measurements at a specific location or space, such as a thermometer, fiber optic sensors record data about all the changes that occur along the way. One fiber, which in turn provides a much wider range of surveillance, however, fiber sensing technology has barely improved over the past few years, leading to applicability in more complex situations as well. thus, it is reduced , "* commented Professor Luc Thévenaz, head of the research team.



The research team conducted real tests

**Use in missions that require high safety**

Thanks to the advantages of data transfer rate and wide control capabilities, fiber optic sensors are often used in hazard detection systems. Sensors, for example, can read the temperatures at the places where the fiber goes, thereby creating a continuous thermal chart of a given location - even if it's a row spanned area. tens of kilometers - provides control and early prediction of potential problems before they can happen.

## Improve signal quality

The team has successfully developed a new system that improves the encoding and decoding of data sent along optical fibers. With this method, the sensor can receive higher energy signals and decode them faster, resulting in measurements to be made in shorter intervals and over a wider area.

Engineers describe their system as an 'echo'. If you shout a word, you will hear its echo again. But if you sing a song, what you hear is a mix of indistinguishable sounds. You will need a 'key' to decode the sounds and make them clearer.

Fiber optic sensors work in a similar way, except that it will emit pulses of light - not sound - along the fiber. The signal bounced back to the fiber is decoded, turning it into usable data.

To make the sensor work more efficiently, the team grouped light pulses in series so that the signal was reflected back with greater intensity. However, this does not solve the "echo" problem - ie finding the key to making the signals readable. Therefore, they have developed a new encoding method of data sent along an optical fiber, using special optimization algorithms. The end results show the fiber optic sensor is capable of transmitting data 100 times faster, as well as for more stable operation.

In the coming time, the research team will continue to perform more field trials on a larger scale to most accurately evaluate the ability of the new system to mass deploy.

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