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NOVEL SENSING PLATFORM THAT IMPROVES THE SENSITIVITY OF OPTICAL SENSORS

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Value Proposition: *A new plug-in sensing platform system that uses exceptional points (EPs) to enhance the sensitivity of optical sensors, without requiring redesign or costly hardware modification.*

Technology Description

Researchers at Washington University in St. Louis have developed a novel phase sensing platform that incorporates conventional optical sensors and exceptional points to significantly boost the sensitivity of optical sensors. The approach is compatible with a broad range of optical sensors, including whispering-gallery resonators, photonic crystals, and fiber-based sensors. Exceptional points (EPs), as spectral singularities in non-Hermitian systems, have been exploited to enhance the sensitivity of optical sensors due to their strong response to perturbations. While prior reported EP-enhanced optical sensors are elaborately designed for specific and limited targets, this platform enables EP-enhanced sensitivity to be applied broadly to existing sensing technologies.

This new exceptional point system improves the environmental detection, health monitoring, and biomedical imaging of existing optical sensors, reduces the cost of realizing EP sensors, and enhances sensing performance without further modification to the sensors.

Stage of Research

Further Experimental Validation

Publications

Mao W, Fu Z, Li Y, Li F, Yang L. Exceptional-point-enhanced phase sensing. Sci Adv. 2024 Apr 5;10(14):eadl5037. doi: 10.1126/sciadv.adl5037. Epub 2024 Apr 5. PMID: 38579005; PMCID: PMC10997194.

Applications

- Optical Sensing
- Remote phase sensing
- Environmental monitoring
- Health monitoring system

- Biomedical imaging

Key Advantages

- Enhances optical sensor sensitivity
- Cost effective enhancement to traditional optical sensors
- Can be easily integrated with existing conventional sensors
- No major modification required to conventional sensors

Patents

Patent application filed

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