

## Huan WU

Research assistant Professor, Department of Electrical and Electronic Engineering (EEE)  
The Hong Kong Polytechnic University (PolyU)

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### RESEARCH INTERESTS

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- Distributed optical fiber sensing
- Hardware and algorithm co-designed intelligent sensing solution

### EDUCATION

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<b>The Chinese University of Hong Kong, Hong Kong SAR</b> Ph.D. in Electronic Engineering Advisor: Prof. Chester SHU	Aug. 2014 – Jul. 2018
<b>Nanjing University of Aeronautics and Astronautics, Nanjing, China</b> B.Eng. in Information Engineering Advisor: Prof. Shilong PAN	Sep. 2009 – Jun. 2013

### RESEARCH EXPERIENCE

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<b>Research Assistant Professor</b> Department of Electrical and Electronic Engineering (EEE) The Hong Kong Polytechnic University	Oct. 2022 – present Hong Kong SAR
<b>Postdoc Research Fellow</b> Department of Land Surveying and Geo-Informatics (LSGI) The Hong Kong Polytechnic University Advisor: Prof. Xiaoli DING	Oct. 2020 – Oct. 2022 Hong Kong SAR
<b>Postdoc Research Fellow</b> Department of Electronic and Information Engineering (EIE) The Hong Kong Polytechnic University Advisor: Prof. Chao LU	Oct. 2018 – Oct. 2020 Hong Kong SAR
<b>Research Assistant</b> Department of Information Engineering Nanjing University of Aeronautics and Astronautics Advisor: Prof. Shilong PAN	Jul. 2013 – Jul. 2014 Nanjing, China

### PUBLICATIONS

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#### Patent

[P1] 郑华, 吴欢, 吕超, 马鼎炯, 缪赞, 周李, 严敏, 孙杰, 一种基于超弱光纤光栅的煤矿输送带准分布式加速度阵列监测系统, 申请专利号: 92032661

#### Journal Papers

- [J16] H. Zheng<sup>+</sup>, **H. Wu**<sup>+</sup>, D. J. Ma, Y. Miao, L. Zhou, M. Yan, J. Sun, C. Y. Yu, X. L. Ding, C. Lu. "Novel mining conveyor monitoring system based on quasi-distributed optical fiber accelerometer array and self-supervised learning," *Under review*.
- [J15] **H. Wu**<sup>\*</sup>, H. F. Duan, Wallace Lai, K. Zhu, X. Cheng, H. Yin, B. Zhou, C. C. Lai, C. Lu, and X. L. Ding. "Leveraging optical communication fiber and AI for distributed water pipe leak detection," *IEEE Communications Magazine*, early access, doi: 10.1109/MCOM.003.2200643.
- [J14] H. Zheng, **H. Wu**<sup>\*</sup>, C. Y. Leong, Y. Y. Wang, X. L. Shen, Z. Fang, X. Chen, J. X. Cui, D. J. Ma, Y. Miao, L. Zhou, M. Yan, J. Sun, H. Y. Tam, X. L. Ding, C. Lu. "Enhanced quasi-distributed accelerometer array based on phase-OTDR and ultraweak fiber Bragg grating," *IEEE Sensors Journal*, vol. 23, no. 16, pp.18176-18182, 2023.
- [J13] X. L. Shen, **H. Wu**<sup>\*</sup>, K. Zhu, H. H. Liu, Y. J. Li, H. Zheng, J. L. Li, L. Y. Shao, P. P. Shum, and C. Lu, "Fast and Storage-Optimized Compressed Domain Vibration Detection and Classification for Distributed Acoustic Sensing," *Journal of Lightwave Technology*, early access, 2023.
- [J12] Y. Y. Wang, H. Zheng, **H. Wu**, D. M. Huang, C. Y. Yu, and C. Lu. "Coherent OTDR with large dynamic range based on double-sideband linear frequency modulation pulse," *Optics Express*, vol. 31, no. 11, pp. 17165-17174, 2023.

- [J11] **H. Wu**, B. Zhou, K. Zhu, C. Shang, H.Y. Tam, and C. Lu. "Pattern recognition in distributed fiber-optic acoustic sensor using an intensity and phase stacked convolutional neural network with data augmentation," *Optics Express*, vol. 29, no. 3, pp. 3269-3283, 2021.
- [J10] Z. Y. Zhao<sup>+</sup>, **H. Wu**<sup>+</sup>, J. H. Hu, K. Zhu, Y. L. Dang, Y. X. Yan, M. Tang, and C. Lu. "Interference fading suppression in phase-OTDR using space-division multiplexed probes," *Optics Express*, vol. 29, no. 10, pp. 15452-15462, 2021.
- [J9] K. Zhu, B. Zhou, **H. Wu**<sup>\*</sup>, C. Shang, L. Y. Lu, M. Adeel, Y. Y. Xi, Z. Y. Zhao, H. Y. Tam and C. Lu. "Multipath distributed acoustic sensing system based on phase-sensitive optical time-domain reflectometry with frequency division multiplexing technique," *Optics and Lasers in Engineering*, vol. 142, pp. 106593, 2021.
- [J8] **H. Wu**, C. Shang, K. Zhu, and C. Lu, "Vibration detection in distributed acoustic sensor with threshold-based technique: a statistical view and analysis," *Journal of Lightwave Technology*, vol. 39, no. 12, pp. 4082-4093, 2020.
- [J7] M. Adeel, C. Shang, D. Hu, **H. Wu**, K. Zhu, A. Raza, C. Lu, "Impact-based feature extraction utilizing differential signals of phase-sensitive OTDR," *Journal of Lightwave Technology*, vol. 38, no. 8, pp. 2539-2546, 2020.
- [J6] **H. Wu**<sup>+</sup>, H. D. Wang<sup>+</sup>, C. Shu, C. S. Choy, and C. Lu, "BOTDA fiber sensor system based on FPGA accelerated support vector regression," *IEEE Transactions on Instrumentation and Measurement*, vol. 69, no. 6, pp. 3826-3837, 2019.
- [J5] **H. Wu**, L. Wang, Z. Zhao, C. Shu, C. Lu, "Support vector machine based differential pulse-width pair Brillouin optical time domain analyzer," *IEEE Photonics Journal*, vol. 10, no. 4, pp. 1-11, 2018.
- [J4] **H. Wu**, L. Wang, Z. Zhao, N. Guo, C. Shu, C. Lu, 'Brillouin optical time domain analyzer sensors assisted by advanced image denoising techniques,' *Optics Express*, vol. 26, no. 5, pp. 5126-5139, 2018.
- [J3] **H. Wu**, L. Wang, N. Guo, C. Shu, C. Lu, 'Support vector machine assisted BOTDA utilizing combined Brillouin gain and phase information for enhanced sensing accuracy,' *Optics Express*, vol. 25, no. 25, pp. 31210-31220, 2017.
- [J2] N. Guo, L. Wang, **H. Wu**, C. Jin, H. Y. Tam, C. Lu, 'Enhanced coherent BOTDA system without trace averaging,' *Journal of Lightwave Technology*, vol. 36, no. 4, pp. 871-878, 2017.
- [J1] **H. Wu**, L. Wang, N. Guo, C. Shu, C. Lu, 'Brillouin optical time-domain analyzer assisted by support vector machine for ultrafast temperature extraction,' *Journal of Lightwave Technology*, vol. 35, no. 19, pp. 4159-4167, 2017.

#### Conference Papers

- [C9] X. L. Shen, J. L. Li, Z. T. Wu, H. Dang, J. N. Chen, L. Y. Shao, H. H. Liu, P. P. Shum, **H. Wu**, K. Zhu, . "Compressed-domain Data Classification for Distributed Acoustic Sensing System." *IEEE Asia Communications and Photonics Conference (ACP)*, pp. 108-110, 2022.
- [C8] **H. Wu**, H. Wang, C. Shu, C. Choy and C. Lu, "Brillouin Optical Time Domain Analyzer Fiber Sensor Based on FPGA Accelerated Support Vector Regression," *Optical Fiber Communication Conference (OFC)*, Th2A. 18, San Diego, USA, 2019.
- [C7] **H. Wu**, L. Wang, Z. Zhao, C. Shu and C. Lu, "Processing Differential Brillouin Gain Spectrum by Support Vector Machine in DPP-BOTDA," *Pacific Rim Conference on Lasers and Electro-Optics (CLEO-PR)*, Th2L. 4, Hong Kong, China, 2018. (**Best Paper Award**)
- [C6] **H. Wu**, L. Wang, Z. Zhao, C. Shu and C. Lu, "Performance Comparison and Analysis of Non-local Means and Wavelet Denoising for BOTDA Sensor," *Optical Fiber Communication Conference (OFC)*, W2A. 15, San Diego, USA, 2018.
- [C5] **H. Wu**, L. wang, N. Guo, C. Shu and C. Lu, "Support Vector Machine for Temperature Extraction from Brillouin Phase Spectrum," *Asia Communications and Photonics Conference (ACP)*, Guangzhou, China, 2017.
- [C4] L. Wang, H. Wu, N. Guo, C. Shu and C. Lu, "Ultrafast Temperature Extraction Using Support Vector Machine based Data Classifier for BOTDA Sensors," *European Conference on Optical Communication (ECOC)*, Gothenburg, Swden, 17733614, 2017.
- [C3] **H. Wu**, B. Zheng and C. Shu, "Widely Tunable, Single-longitudinal Mode Brillouin/Erbium-doped Fiber Laser," *OptoElectronics and Communications Conference (OECC) held jointly with International Conference on Photonics in Switching (PS) (OECC/PS)*, 16424704, Niigata, Japan, 2016.
- [C2] Y. Zhang, Y. Zhou, H. Wu, D. Zhu and S. Pan. "An Optically Controlled Beamforming Network Using Phase Shifter based on Single Sideband Polarization Modulation," *Asia Communications and Photonics Conference (ACP)*, AW4E.6, Beijing, China, 2013.
- [C1] G. Chen, H. Wu and S. Pan, "A UWB over Fiber System based on a Tunable Single Passband Microwave Photonic Filter," *Asia Communications and Photonics Conference (ACP)*, AW4E. 3, Beijing, China, 2013.

\*: corresponding author

+: contribute equally

## **PROJECTS**

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- Distributed pressure sensors based on phase-sensitive OTDR interrogation scheme, May 2023 – present
- Consultancy study on distributed fiber optic system for leak detection for water mains in Anderson Road Quarry Development Site, Jan. 2023 – present
- Novel Mining Conveyor Monitoring System based on Quasi-Distributed Optical Fiber Accelerometer Array and Self-supervised Learning, Jan. 2022 – Jul. 2023

## **TALKS**

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### **Harnessing the power of light: the journey of distributed optical fiber sensors**

Chongqing University summer visit to PolyU, July 2023.

### **Optical fiber sensing applications in real-time assets health monitoring for building structures**

Webinar on Application of Automation and Technology in Construction Materials Testing,

Organized by Hong Kong Council for Testing and Certification (HKCTC), funded by Innovation and Technology Commission (ITC), Feb 2023.

## **PROFESSIONAL SERVICES**

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**Journal Reviewer:** Optics Express, Photonics Journal, Journal of Lightwave Technology, Optics and Lasers in Engineering, Electronic Letters, Optics Letters

**Consultant:** Water Supplies Department, The Government of Hong Kong SAR

## **TEACHING & TEACHING ASSISTANT**

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### **Teaching**

EIE 515 Advanced Optical Communication Systems, 2023/2024 (upcoming)

### **Teaching Assistant**

- ELEG3303 Fundamental of Photonics, Fall 2014
- ELEG3320 Introduction to Optical Communication, Spring 2015
- ENGG1100 Introduction to Engineering Design, Fall 2015
- ELEG3320 Introduction to Optical Communication, Spring 2016
- ENGG1100 Introduction to Engineering Design, Fall 2016
- ELEG3601 Introduction to Electric Power Systems, Spring 2017
- ELEG3320 Introduction to Optical Communication, Fall 2017
- ELEG3601 Introduction to Electric Power Systems, Fall 2018