# Zijing Zhang

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## Education

Cornell University, Ithaca, NY *August 2019 – (Expected) August 2024*
Ph.D. student, Electrical and Computer Engineering (GPA: 3.87)
Thesis Advisor: Edwin C. Kan

Huazhong University of Science and Technology, Wuhan, China *September 2015- June 2019*
Bachelor of Engineering, Optoelectronic Information Science and Engineering (GPA: 3.91/4.0)

## Publications

[1] **Zijing Zhang**, P. Sharma, T. B. Conroy, V. Phongtankuel and E. C. Kan, "Objective scoring of physiologically induced dyspnea with non-invasive RF respiratory sensors", 2nd review, *IEEE Transactions on Biomedical Engineering*

[2] **Zijing Zhang,** P. Sharma, J. Zhou, X. Hui and E. C. Kan, "Furniture-integrated respiration sensors by notched transmission lines," *IEEE Sensors Journal*, doi: 10.1109/JSEN.2020.3028970, 2020.

[3] X. Hui, J. Zhou, P. Sharma, T. B. Conroy, **Zijing Zhang** and E. C. Kan **"**Wearable RF near-field cough monitoring by frequency-time deep learning", submitted to *IEEE Sensors Journal*

[4] **Zijing Zhang**, et al., "Wideband and continuously-tunable fractional photonic Hilbert transformer based on a single high-birefringence planar Bragg grating," *Optics Express*, vol. 26, pp. 20450-20458, 2018.

[5] **Zijing Zhang**, et al., "Design of a broadband achromatic dielectric meta-lens for linear polarization in the near-infrared spectrum," *OSA Continuum*, vol. 1, pp. 882-890, 2018.

[6] **Zijing Zhang**, et al., "Micro-machining for TE/TM mode phase matching in high-birefringence planar waveguide and implementation in continuously-tunable fractional Hilbert transform," *Intl. Photonics & Optoelectronics Mtg., OSA Tech. Dig.*, OT4A.2, 2018.

[7] H. Sun, W. Zhou, **Zijing Zhang** and Z. Wan. "A MEMS variable optical attenuator with ultra-low wavelength-dependent loss and polarization-dependent loss," *Micromachines*, vol. 9, no. 12, p. 632, 2018.

## Research Experiences

1. Respiratory pattern monitoring with RF near-field coherent sensing (NCS) *Cornell University, Jan. 2020-present*
   - Developed a non-invasive respiration sensor integrated into furniture that can be invisible to the user to enhance comfort and convenience. The sensor was modified from an RF coaxial cable with a designed notch.
   - Captured the cardiopulmonary waveforms and derived the breath rate and heart rate with variations in positions.
   - Implemented the sensor to detect simulated respiratory disorders including central and obstructive sleep apnea.
   - Performed a human study ($N$=10) that confirmed the validity of the sensing system and signal processing.
2. Objective scoring of dyspnea with touchless wearable RF sensors *Cornell Univ., Sept. 2020-present*
   - Designed a testing protocol to perform human study ($N$=32) on simulated dyspnea by the exertion and facemasks.
   - Implemented algorithms to identify various features embedded in breathing waveforms to predict the objective dyspnea score in comparison with the self-report scores.
   - Designed a learning model of decision tree and random forest to evaluate the objective dyspnea score.
3. 3D imaging by ambient radio signals using the inverse method and machine learning *Cornell Univ., Oct. 2019-present*
   - Employed ambient low-cost passive RFID tags for the shape and size of human body and feet in a closet-like space.
   - Developed a CNN model that can reconstruct the 3D image of an object by the simulation of CST Microwave Studio.
4. Varifocal dielectric meta-lens based on diffractive Moire elements *Georgia Tech, June-Oct. 2018*
   - Formulated the concept to incorporate the Moire elements into nanoscale meta-lens design; fabricated the meta-lens in the clean room; measured the imaging qualities

## Internship Experience

Signal Processing Intern in Analog Devices *Analog Devices, Wilmington, MI May –Aug. 2021*
Sensor hardware and associated signal processing

## Awards

CSC Scholarship (Chinese Government Scholarships) for outstanding undergraduate students *Sept. 2017*
Meritorious Prize (First Prize) in Mathematical Contest in Modeling of America *Feb. 2018*
Excellent Graduation Thesis in Huazhong University of Science and Technology *June 2019*

## Skills

**Programming and tools:** MATLAB; Python; C/C++; CST Microwave Studio; PyTorch; LabVIEW.