Zhen Chen

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URI at Schneider Electric, 132 Fairgrounds Road, West Kingston, RI 02892

Qualifications

- **Ph.D.** candidate in **Electrical Engineering**, specialized in **measurement and instrumentation**, fiber distributed sensors and sensing systems (**OFDR**), and sub-THz laser wavelength modulation and control (**OPLL**);

- In-depth understanding of **LIDAR** systems, **FMCW, interferometry** measurement, optoelectronics devices (transceivers, **EOM**, **PIN**, **APD**, TIA, CPL, WDM), and **lasers** (**fiber lasers**, DFBs, VCSELs, ECLs, broadband);

- Extensive lab experience in optoelectronics **instruments** and **device characterization**, **Matlab** modeling and instrument control, **optical system-level design and prototyping**, MCU/FPGA **real-time control system** (PLL);

- Comprehensive knowledge in RF/analog circuit design (op-amp, AGC, PFD, AD/DA, mixer), MCU/FPGA embedded system design (C++, **Verilog**), digital signal processing, PCB layout, and laser micromachining;

- Motivated engineer and researcher with a good publication track-of-record (**17** publications including **12 first-author** articles, **4 patent applications** acknowledged with 3 URI Intellectual Property Awards);

- Strong technical communication abilities, scientific writing, and problem-solving skills.

Education

Ph.D. Candidate	Electrical Engineering (all-but-dissertation), Aug. 2017 (expected)
	University of Rhode Island (URI), Kingston, RI, 02881
Master of Science	Electronic Engineering, 2013
	Hong Kong University of Science & Technology (HKUST), Clear Water Bay, Hong Kong
Bachelor of Science	Optics and Optical Science, 2012
	Nanjing University of Science & Technology (NUST), Nanjing, 210094, China

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List of Used Electrical and Optical Testing Instruments (Selected)

- Tektronix DPO72504D **Oscilloscope** (100 GSa/s)
- Agilent 33220A Func/Arb Waveform **Generator** (20 MHz)
- Agilent 54855A Infiniium **Oscilloscope** (20 GSa/s)
- BK Precision 5491B Digital Multimeter
- Agilent N3383A **PNA Series Network Analyzer** (9 GHz)
- Advantest R3272 **Spectrum Analyzer** (26 GHz)
- Agilent 85093 Network Analyzer E-Calibration (9 GHz)
- Picoscope 6403D **Data Acquisition** (5 GSa/s)
- Hewlett-Packard 4294A Impedance Analyzer (110 MHz)
- NI USB-6251 Data Acquisition (1.25MSa/s)
- Lucent 263KN **980nm Pump Laser**
- Fitel 1402PME 1480 Pump Laser
- INO C-Band FAD-180 **EDFA**
- JDSU 935/201 10mW **DFB Laser**
- Alcatel 1905 LMI 30mW DFB Laser
- Lucent D2525P 10mW DFB Laser
- Optilab VCSEL-1550-SM **VCSEL** (10 Gb/s)
- RayCan RC320221-FFPa VCSEL (2.5 GHz)
- Optical Zonu **High-Speed Transceiver (6 GHz)**
- Santec TSL 710 **Tunable Laser** (SCL Band)
- Lucent 2623NA **Electro-Optical Modulator** (10 GHz)
- New Focus 1414 Photodetector (25 GHz)
- ILX LightWave FPM-8210 **Fiber Optic Power Meter**
- Anritsu MS9710B **Optical Spectrum Analyzer**
- ThorLab PDB 420C **Balanced Photodetector** (75 MHz)
- ThorLab PDA10CS Photodetector (17 MHz max)
- ILX LightWave LDC-3744B Laser Diode Controller
- Ericsson FSU-925 Fiber Fusion Splicer
- Newport ESP 300/301, PM 500-C Motion Controller with Linear Stages and Actuators
- SYNRAD CO_2 laser

Research Project Experience

Dissertation Research Projects:

■ Sweep Velocity-Locked High-Coherent Laser Sources, Apr. 2016 – <u>present</u>

Developed **FPGA-based** digital real-time-controlled sweep laser sources (**DFBs, VCSELs**) using the **optical phase-locked loop (OPLL)** techniques for fiber-optic **distributed sensing** and **LIDAR ranging** applications.

■ Sub-Terahertz Range Fiber-Optic Devices for **Distributed Sensing Applications**, Dec. 2013 – Jul. 2015

Designed ultra-weak fiber grating sensors interrogated by optical **frequency modulated continuous wave (FMCW)** for high-accuracy fiber-optic distributed strain and temperature sensing applications.

Collaborative Research Projects:

■ Smart City Monitoring Using Massive Parallel **Fiber-Optic Sensor Networks**, Oct. 2014 – <u>present</u>

Designed and constructed lab-scale gas pipeline testing platforms with fiber distributed temperature sensor networks to investigate advanced parallel computing architectures and machine learning algorithms for **smart city** research.

■ Shock Wave Diagnostics Using **Laser Velocimetry**, Sep. 2013 – Oct. 2015

Constructed photon Doppler velocimetry (PDV) testing platforms for shock wave diagnostics and improved the conventional PDV system using a radio frequency modulator, **reducing instrument cost by ~ $30,000.**

■ Low-Cost Fiber-Based **Cyber Physical Systems** for Advanced Security Applications, Dec. 2013 – Dec. 2014

Investigated the regular low-cost communication-grade optical fibers as a physical identification (FiberID) and developed fiber-based cyber physical systems for advanced security applications (authentication and identification).

Awards and Honors (URI)

2017   University of Rhode Island Research Foundation **Intellectual Property Award** Recipient;

2016   University of Rhode Island Research Foundation **Intellectual Property Award** Recipient;

2015   University of Rhode Island Graduate School Enhanced Graduate Research Award Recipient;

2015   University of Rhode Island Research Foundation **Intellectual Property Award** Recipient;

2014   University of Rhode Island Toray Plastics America Graduate Fellowship Recipient.

Teaching Assistant Experience (URI)

■ ELE 322 Electromagnetic Fields I – Spring 2014   ■ ELE 339 Electronics I Laboratory – Fall 2013

■ ELE 423 Electromagnetic Fields II – Fall 2013/2014   ■ ELE 344 Electronics II Laboratory – Spring 2014

■ ELE 402 Laser, Fiber & Communication Systems Laboratory – Fall 2014

Review for Journals

■ Optics Letters ■ Applied Optics ■ Optical Engineering ■ IEEE Internet of Things Journals ■ IEEE Sensors Journal ■ IEEE Transactions on Signal and Information Processing over Networks;

Patent Applications (URI)

2016   Innovation related to linear swept-laser sources for fiber-optic sensing and **LIDAR sensing** applications;

2016   Innovation related to coaxial cable devices for distributed strain and **3D shape sensing** applications;

2015   Innovation related to fiber-optic sensors for distributed chemical sensing applications;

2014   Innovation related to physical unclonable functions with optical fibers for cyber security applications.

Full List of Publications

List of Journal Publications [5-20]

[20] G. Hefferman, **Z. Chen** and T. Wei, 'Extended-bandwidth frequency sweeps of a distributed feedback laser using combined injection current and temperature modulation', *Review of Scientific Instruments (under review)*;

[19] **Z. Chen**, G. Hefferman and T. Wei, 'A sweep velocity-controlled VCSEL pulse laser to interrogate sub-THz-range fiber sensors', *Photonics Technology Letters, IEEE (under review)*;

[18] **Z. Chen**, G. Hefferman and T. Wei, 'A FPGA-controlled sweep velocity-locked laser pulse generator', *Optical Engineering, SPIE (under review)*;

[17] B. Tang, **Z. Chen**, G. Hefferman, T. Wei, H. He and Q. Yang, 'Incorporating Intelligence in Fog Computing for Big Data Analysis in Smart Cities', *IEEE Transactions on Industrial informatics, IEEE,* vol., pp., Mar. 8, 2017;

[16] **Z. Chen**, G. Hefferman and T. Wei, 'Digitally controlled chirped pulse laser for sub-terahertz-range fiber structure interrogation', *Optics Letters*, vol. 42, no. 5, pp. 1007 – 1010, Mar. 1, 2017;

[15] **Z. Chen,** G. Hefferman, T. Wei, 'Terahertz-range weak reflection fiber optic structures for sensing applications', *Journal of Selected Topics in Quantum Electronics, IEEE*, vol. 23, no. 2, pp. 1-6, Mar.-Apr., 2017 *(invited)*;

[14] **Z. Chen**, G. Hefferman, L. Yuan, Y. Song and T. Wei, 'Terahertz grating-based two-axis optical fiber inclinometer', *Optical Engineering, SPIE*, vol. 55, no. 2, pp. 026106, Jan. 12, 2016;

[13] **Z. Chen**, G. Hefferman and T. Wei, 'A low bandwidth DFB laser-based interrogator for terahertz-range fiber Bragg grating sensors', *Photonics Technology Letters, IEEE*, vol. 29, no. 4, pp. 365-368, Jan. 2, 2017;

[12] **Z. Chen**, R. Rettinger, G. Hefferman, J. Smith, J. Oxley and T. Wei, 'Microwave modulated photon Doppler velocimetry', *Photonics Technology Letters, IEEE*, vol. 28, no. 3, pp. 327-330, Dec. 21, 2015;

[11] **Z. Chen**, G. Hefferman and T. Wei, 'Multiplexed oil level meter using a thin core fiber cladding mode exciter', *Photonics Technology Letters, IEEE*, vol. 27, no. 21, pp. 2215-2218, Nov.1, 2015;

[10] **Z. Chen**, G. Hefferman, L. Yuan, Y. Song and T. Wei, 'Ultra-weak waveguide modification with intact buffer coating using femtosecond laser pulses', *Photonics Technology Letters, IEEE*, vol. 27, no. 16, pp. 1705-1708, Aug.15, 2015;

[9] G. Hefferman, **Z. Chen**, L. Yuan and T. Wei, 'Phase-shifted terahertz fiber Bragg grating for strain sensing with large dynamic range', *Photonics Technology Letters, IEEE*, vol. 27, no. 15, pp. 1649-1652, Aug. 1, 2015;

[8] **Z. Chen**, G. Hefferman and T. Wei, 'Multiplexed displacement fiber sensor using thin core fiber exciter', *Review of Scientific Instruments*, vol. 86, no. 06, pp. 065004, Jun. 8, 2015;

[7] **Z. Chen**, L. Yuan, G. Hefferman and T. Wei, "Terahertz Fiber Bragg Grating for Distributed Sensing," *Photonics Technology Letters, IEEE*, vol. 27, no. 10, pp. 1084-1087, May 15, 2015;

[6] **Z. Chen**, L. Yuan, G. Hefferman and T. Wei, "Ultraweak intrinsic Fabry–Perot cavity array for distributed sensing," *Optics Letters*, vol. 40, no. 3, pp. 320-323, Jan. 20, 2015;

[5] G. Hefferman, **Z. Chen**, and T. Wei, "Two-slot coiled coaxial cable resonator: Reaching critical coupling at a reduced number of coils." *Review of Scientific Instruments*, vol. 85, no. 11, pp. 115106, Nov. 19, 2014.

List of Conference Publications [1-4]

[4] **Z. Chen**, G. Hefferman and T. Wei, 'A rapid demodulation method for optical carrier based microwave interferometer', 2016 SPIE Commercial + Scientific Sensing and Imaging (SI16C), vol., no. 9852, pp. 27, Apr. 17-21, 2016;

[3] B. Tang, **Z. Chen**, G. Hefferman, T. Wei, H. He and Q. Yang, 'A Hierarchical Distributed Fog Computing Architecture for Big Data Analysis in Smart Cities', the Fifth ASE International Conference on Big Data, vol., no. 28, pp. 1-6, Oct. 7-9, 2015;

[2] J. Kane, B. Tang, **Z. Chen**, J. Yan, T. Wei, H. He and Q. Yang, 'Reflex-Tree: A Biologically Inspired Parallel Architecture for Future Smart Cities', 2015 International Conference on Parallel Processing (ICPP), vol., no., pp. 360-369, Sep. 1-4, 2015;

[1] **Z. Chen**, Y. Zeng, G. Hefferman, Y. Sun and T. Wei, "FiberID: molecular-level secret for identification of things," 2014 IEEE International Workshop on Information Forensics and Security (WIFS), vol., no., pp. 84-88, Dec. 3-5, 2014.