

# Jie Huang

Assistant Professor

Department of Electrical and Computer Engineering  
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## EDUCATION

Clemson University May 2013 – July 2015  
**Ph.D. Candidate Electrical Engineering**  
Dissertation: *Read fiber optic interferometers in microwave domain for sensing application*  
Advisor: Dr. Hai Xiao

Missouri University of Science and Technology Aug 2010 – May 2012  
**M.S. Electrical Engineering**  
Thesis: *Coaxial cable Bragg grating*  
Advisor: Dr. Hai Xiao

Tianjin University (P.R. China) Aug 2005 – July 2009  
**B.S. Opto-electronics Information Engineering**  
Senior design project: *Time domain optical coherence tomography for teeth imaging*  
Advisor: Dr. X. Steve Yao

## PROFESSIONAL EXPERIENCES

Missouri University of Science and Technology  
Department of Electrical and Computer Engineering Aug 2015 – Present  
**Assistant Professor at Lightwave Technology Lab**

Clemson University May 2013 – July 2015  
Department of Electrical and Computer Engineering  
Center for Optical Materials Science and Engineering Technologies (COMSET)  
**Graduate Research Assistant at Photonics Technology Lab**

Missouri University of Science and Technology  
Department of Electrical and Computer Engineering Aug 2010 – May 2013  
**Graduate Research Assistant at Photonics Technology Lab**

## CURRENT AND FUTURE RESEARCH THRUST AREAS

- Optical fiber based microwave-photonic sensors
- Novel ceramic coaxial cable sensing network for oil industry and down-hole environments.
- Ultrafast laser machining, processing and characterization of micro/nano structures, materials and devices
- Sensors and instrumentation for applications in harsh environments (high pressure and temperature)
- Optical biomedical imaging and sensing (Optical coherence tomography and Photoacoustic tomography/spectroscopy)

## RESEARCH EXPERIENCES

### **i. Novel Microwave-photonic based Fiber Optic Sensors Projects involved**

1. DOE DE-FE0012272 “Additive Manufacturing of Smart Parts with Embedded Sensors for In-Situ Monitoring in Advanced Energy Systems” 10/2013-09/2016
2. NSF CMMI-1335163 “Optical Carrier Based Microwave Interferometry for Spatially Continuous Distributed Monitoring of Structural Health” 09/2013-08/2016

3. NSF CMMI-1200787 “Spider Orb-Web Inspired Cognitive, Fault-Tolerant Fiber Optic Sensor Network for SHM under Harsh Conditions” 06/2012-05/2015

- Read fiber optic interferometers in microwave domain for sensing application – optical carrier based microwave interferometry (OCMI)
- Additive manufacturing of smart parts with embedded microwave-photonic sensors
- Fabrication of polymer optical waveguide based on additive manufacturing for sensing
- Spatially continuous distributed fiber optic sensing technology in structural health monitoring
- Signal-crystal sapphire fiber based sensors for high temperature harsh environment sensing
- Polymer optical fiber based sensing network for structural crack detection
- Microwave-photonic system based distributed cavity ring-down spectroscopies for gas sensing

**ii. Traditional Fiber Optic Sensors and Devices**  
**Projects involved**

1. DOE DE-FE0001127 “Micro-Structured Sapphire Fiber Sensors for Simultaneous Measurements of High Temperature and Dynamic Gas Pressure in Harsh Environments” 10/2009-09/2014
  2. ARO W911NF-10-2-0077 “Locate and Track Explosive Threats using Wireless Sensors and Networks” 08/2010-07/2013
- Multi-parameters measurement through hybrid optical fiber structures
  - Integrated nano-porous zeolite material for chemical vapor trace detection
  - Fs-laser micro-machined photonic micro/nano materials, structures, devices and sensors
  - Design and fabricate different types of passive fiber optic sensors for various sensing applications: Fiber Bragg grating, long period fiber grating, fiber inline Fabry-Perot interferometer, micro-resonators, and singlemode-multimode-singlemode (SMS) fiber structures
  - Actively mode-locked fiber ring laser for sensing application

**iii. Coaxial Cable based Sensors**  
**Projects involved**

1. DOE DE-FE0012272 “Robust Ceramic Coaxial Cable Down-Hole Sensors for Long-Term In Situ Monitoring of Geologic CO<sub>2</sub> Injection and Storage” 10/2012-09/2015
  2. IEEE – I&M Society Graduate Fellowship Award “Novel Coaxial Cable Interferometric Sensors for Distributed Measurement of Large Strain in Structural Health Monitoring” 09/2012-08/2013
  3. NSF CMMI-1100185 “Novel Coaxial Cable Bragg Grating Sensors for Large Strain Measurement in SHM” 06/2012-05/2015
- Design and fabricate coaxial cable Bragg grating for structural health monitoring
  - Design and fabricate different types of coaxial cable devices: Coaxial cable Fabry-Perot interferometer, coaxial cable ring resonator, and coiled coaxial cable resonators
  - Truly distributed coaxial cable Fabry-Perot interferometers for structural health monitoring
  - Ceramic coaxial cable based distributed high temperature sensors for harsh environment applications

**HONORS & AWARDS**

- 2<sup>nd</sup> place at the poster competition, Materials and Optics, Clemson University April 2015
- 3<sup>rd</sup> place at the poster competition, CCOMC Conference, Anderson, SC Fall 2014
- IEEE Instrumentation & Measurement Society Graduate Fellowship Award 2012-2013
- Professional enrichment grant at Clemson University Fall 2013
- *Council of Graduate Students* Travel Grant at Missouri S&T May 2012

- Outstanding Student Leadership Award at Tianjin University

Fall 2008

## **PROFESSIONAL SERVICES**

### **Professional Affiliations**

- Member, Optical Society of America (OSA)
- Member, Institute of Electrical and Electronic Engineers (IEEE)
- Member, Society of Photo-Optical Instrument Engineers (SPIE)
- Member, IEEE Instrumentation and Measurement Society (IEEE-IMS)
- Member, Omicron Delta Kappa (ODK), the National Leadership Honor Society
- Invited Member, Phi Kappa Phi, the National Leadership Honor Society

### **Referee**

- Optics Letters
- Optics Express
- Optical Material Express
- Photonics Technology Letters
- Journal of the Optical Society of America A
- Journal of the Optical Society of America B
- Applied Optics
- Sensors and Actuators A: Physical
- Sensors and Actuators B: Chemical
- Review of Scientific Instrument
- Measurement Science and Technology
- Optical Engineering
- Sensors
- Journal of Physics D: Applied Physics
- Applied Physics Express
- IEEE Sensors journal
- IEEE Transactions on Instrumentation and Measurement
- IEEE Transactions on microwave theory and techniques
- Chinese optics letters

## **JOURNAL PUBLICATIONS**

### **2015**

1. J. Huang, H. Xiao, "Distributed coaxial cable Fabry-Perot interferometers for structural health monitoring," manuscript under review.
2. J. Huang, L. Hua, H. Xiao, "modeling of optical carrier based microwave interferometry for sensing application," manuscript under review.
3. L. Hua, Y. Song, J. Huang, H. Xiao, "Microwave interrogated large core fused silica fiber Michelson interferometer for strain sensing," *Applied Optics*, Accepted.
4. J. Huang, X. Lan, Y. Li, Y. Song, L. Hua, H. Xiao, "Microwave interrogated sapphire fiber Michelson interferometer for high temperature sensing," *IEEE Photonics Technology Letters*, In Press.
5. H. Wang, L. Yuan, C. Kim, J. Huang, Y. Ma, H. Xiao, "Integrated Chemical Vapor Sensor Based on Thin Wall Capillary Coupled Porous Glass Microsphere Optical Resonator", *Sensors and Actuators B: Chemical*, Accepted.

### **2014**

6. J. Huang, X. Lan, M. Luo, H. Xiao, "Spatially continuous distributed fiber optic sensing using optical carrier based microwave interferometry," *Optics Express*, vol. 22, pp. 18757-18769, 2014.
7. J. Huang, T. Wei, T. Wang, J. Fan, and H. Xiao, "Control of Critical Coupling in a Coiled Coaxial Cable Resonator," *Review of Scientific instrument*, vol. 85, pp. 016405RSI, 2014.

8. J. Huang, X. Lan, A. Karl, H. Wang, L. Yuan, H. Xiao, "Temperature Compensated Refractometer based on a Cascaded SMS/LPFG Fiber Structure," *Sensors and Actuators: B-Chemical*, vol. 198, pp. 384-387, 2014.
9. J. Huang, T. Wei, J. Fan and H. Xiao, "Coaxial cable Bragg grating assisted microwave coupler," *Review of Scientific Instruments*, vol.85, pp. 014703, 2014.
10. X. Wen, J. Huang, H. Xiao, M. Yang, "ZnO-coated SMS structure interrogated by a fiber laser for chemical sensing," *Measurement Science and Technology*, accepted, 2014.
11. Y. Zhang, J. Huang, X. Lan, L. Yuan, and H. Xiao, "Simultaneous measurement of temperature and pressure with cascaded EFPI and IFPI Sensors," *Optical Engineering*, vol. 53, pp. 067101, 2014.
12. L. Yuan, X. Lan, J. Huang, H. Wang, L. Jiang, and H. Xiao, "Comparison of silica and sapphire fiber SERS probes fabricated by a femtosecond laser," *IEEE Photonics Technology Letters*, vol. 26, pp. 1299-1302, 2014.
13. S. Wu, T. Wei, J. Huang, H. Xiao and J. Fan, "Modeling of Coaxial Cable Bragg Grating by Coupled Mode Theory," *IEEE Transactions on Microwave Theory and Techniques*, vol. pp, no. 99, pp. 1-9, 2014.
14. L. Yuan, J. Huang, X. Lan, H. Wang, L. Jiang, Hai Xiao, "All-in-fiber optofluidic sensor fabricated by femtosecond laser assisted chemical etching," *Optics Letters*, vol. 39, pp. 2358-2361, 2014.
15. X. Lan, B. Cheng, Q. Yang, J. Huang, H. Wang, Y. Ma, H. Shi, H. Xiao, "Reflection based extraordinary optical transmission fiber optic probe for refractive index sensing," *Sensors and Actuators B-Chemical*, vol. 193, pp. 95-99, 2014.
16. A. Kaur, S. E. Watkins, J. Huang, L. Yuan, and H. Xiao, "Micro-cavity Strain Sensor for High Temperature Applications," *Optical Engineering*, vol. 53, pp. 017105, 2014.

## 2013

17. J. Huang, T. Wang, L. Hua, J. Fan, H. Xiao, M. Luo, "A Coaxial Cable Fabry-Perot Interferometer for Sensing Applications," *Sensors*, vol. 13, pp.15252-15260, 2013.
18. J. Huang, L. Hua, X. Lan, T. Wei, H. Xiao, "Microwave assisted reconstruction of optical interferograms for distributed fiber optic sensing," *Optics Express*, vol. 21, pp. 18152-18159, 2013.
19. Y. Zhang, L. Yuan, X. Lan, A. Kaur, J. Huang, and H. Xiao, "High temperature fiber optic Fabry-Perot interferometric pressure sensor fabricated by femtosecond laser," *Optics Letters*, vol. 38, pp. 4609-4612, 2013.
20. H. Wang, L. Yuan, J. Huang, X. Lan, C.W. Kim, L. Jiang, H. Xiao, "Computational Modeling and Experimental Study on Optical Microresonators Using Optimal Spherical Structure for Chemical Sensing," *Advanced Chemical Engineering Research*, vol. 2, pp. 45-50, 2013.
21. H. Wang, X. Lan, J. Huang, L. Yuan, L., C.-W. Kim, H. Xiao, "Fiber pigtailed thin wall capillary coupler for excitation of microsphere WGM resonator," *Optics Express*, vol. 21, pp. 15834-15839, 2013.
22. B. Cheng, X. Lan, J. Huang, X. Fang, H. Xiao, "Flexible fabrication of long-period fiber grating devices based on erasing effect by controlled Co2 laser pulse exposure," *Microwave and Optical Technology Letters*, vol. 55, pp. 1735-1738, 2013.
23. X. Lan, Q. Han, J. Huang, H. Wang, Z. Gao, A. Kaur, H. Xiao, "Turn-around Point Long-period Fiber Grating Fabricated by CO2 Laser for Refractive Index Sensing," *Sensors and Actuators B-Chemical*, vol. 177, pp. 1149-1155, 2013.

## 2012

24. J. Huang, X. Lan, H. Wang, L. Yuan, T. Wei, Z. Gao, H. Xiao, "Polymer optical fiber for large strain measurement based on multimode interference," *Optics Letters*, vol. 37, pp. 4308-4310, 2012.
25. J. Huang, X. Lan, T. Wei, Q. Han, Z. Gao, Z. Zhou, H. Xiao, "Radio Frequency Interrogated Actively Mode-locked Fiber Ring Laser for Sensing Application," *Optics Letters*, vol. 37, pp. 494-496, 2012.
26. J. Huang, X. Lan, A. Kaur, H. Wang, L. Yuan, H. Xiao, "Reflection based Phase Shifted Long Period Fiber Grating for Simultaneous Measurement of Temperature and Refractive Index," *Optical Engineering*, vol. 52, pp. 014404, 2013.
27. J. Huang, T. Wei, S. Wu, X. Lan, J. Fan, H. Xiao, "Coaxial Cable Bragg Grating Sensors for Structural Health Monitoring," *International Journal of Pavement Research and Technology*, vol. 5, pp. 338-342, 2012.

28. L. Yuan, T. Wei, Q. Han, H. Wang, J. Huang, L. Jiang, H. Xiao, "Fiber Inline Michelson Interferometer Fabricated by a Femtosecond Laser," *Optics Letters*, vol. 37, pp. 4489-4491, 2012.
29. Q. Han, X. Lan, J. Huang, A. Kaur, T. Wei, Z. Gao, and H. Xiao, "Long-period grating inscribed on concatenated double-clad and single-clad fiber for simultaneous measurement of temperature and refractive index," *IEEE Photonics Technology Letters*, vol. 24, pp. 1130 – 1132, 2012.
30. X. Lan, J. Huang, Q. Han, T. Wei, Z. Gao, H. Jiang, J. Dong, H. Xiao, "Fiber Ring Laser Interrogated Zeolite Coated SMS Structure for Trace Chemical Detection," *Optics Letters*, vol. 37, pp. 1998-2000, 2012.
31. T. Wei, J. Huang, X. Lan, Q. Han, H. Xiao, "Optical Fiber Sensor based on Radio Frequency Mach-Zehnder Interferometer," *Optics Letters*, vol. 37, pp. 647-649, 2012.

## 2011

32. T. Wei, S. Wu, J. Huang, H. Xiao, J. Fan, "Coaxial Cable Bragg Grating," *Applied Physics Letters*, vol. 99, pp. 113517, 2011.
33. X. Lan, Q. Han, T. Wei, J. Huang, H. Xiao, "Turn-Around-Point Long-Period Fiber Gratings Fabricated by CO<sub>2</sub> Laser Point-by-Point Irradiations," *IEEE Photonics Technology Letters*, vol. 23, pp. 1664-1666, 2011.

## CONFERENCE PRESENTATIONS

1. J. Huang, L. Hua, Y. Li, H. Xiao, "Spatially Continuous Fully Distributed Microwave and Photonic Sensors for Structural Health Monitoring", (*Invited Presentation*) SAMPE Baltimore, May. 2015.
2. J. Huang, X. Lan, H. Wang, L. Yuan, H. Xiao, "Optical carrier based microwave interferometers for sensing application," SPIE DSS, Baltimore, May. 2014.
3. L. Yuan, X. Lan, J. Huang, H. Xiao, "Femtosecond Laser Processing of Glass Materials for Assembly-Free Fabrication of Photonic Microsensors", Advances in Science and Technology, 2014.
4. H. Wang, X. Lan, J. Huang, L. Yuan, H. Xiao, "Fiber pigtailed thin wall capillary coupler for excitation of microsphere WGM resonator in chemical sensing," SPIE DSS, Baltimore, May. 2014
5. L. Yuan, X. Lan, J. Huang, H. Wang, B. Cheng, J. Liu, H. Xiao, "Miniaturized optical fiber Fabry-Perot interferometer fabricated by femtosecond laser irradiation and selective chemical etching," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2014.
6. L. Yuan, X. Lan, J. Huang, H. Xiao, "Femtosecond laser processing of glass materials for assembly-free fabrication of photonic microsensors", International conferences on modern materials & technology, Montecatini, Italy, 2014.
7. L. Chi, J. Huang, M. Huang, R E. Gerald II, K. Woelk, "Two CapPack Devices for Solution and Solid State NMR Applications," 55th Experimental Nuclear Magnetic Resonance Conference, March 23rd – 28th, 2014, Boston, Massachusetts, USA.
8. L. Chi, K. Woelk, R E. Gerald II, R J. Klingler, P. Novak, A R. Pfaff, M. Huang, J. Huang, E T. Satterfield and A. Mollhagen, "Cap-Pack Devices for Quantitative NMR/MRI Investigation," 2013 Chicago Area Discussion Group, November 9th, 2013, TCS Conference Center, Argonne National Lab, Chicago, Illinois, USA.
9. J. Huang, L. Hua, X. Lan, H. Xiao, "Fiber optic distributed sensing technology based on microwave reconstructed optical interferograms," (*Post-deadline Session Presentation*) OSA Frontiers in Optics, Orlando, FL, Oct. 2013.
10. J. Huang, X. Lan, H. Wang, L. Yuan, H. Xiao, "Multimode polymer optical fiber-based SMS structure for large-strain measurement," SPIE Smart structures/NDE, San Diego, CA, Mar. 2013.
11. L. Yuan, J. Huang, H. Wang, H. Xiao, "Cascaded fiber-optic intrinsic Fabry-Perot interferometers fabricated by femtosecond laser irradiation," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
12. J. Huang, X. Lan, H. Wang, L. Yuan, H. Xiao, "Radio frequency interrogation of a passively mode-locked fiber ring laser for sensing application," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
13. H. Wang, J. Huang, X. Lan, L. Yuan, H. Xiao, "Widely tunable fiber ring laser based on two cascaded long period fiber gratings with a core-mode blocker," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.

14. J. Huang, X. Lan, H. Wang, L. Yuan, H. Xiao, "Fiber optic sensor based on radio frequency Bragg grating," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
15. J. Huang, X. Lan, H. Wang, L. Yuan, H. Xiao, "Polymer optical fiber for sensing application based on multimode interference," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
16. X. Lan, J. Huang, H. Wang, H. Xiao, "Fabrication and applications of visible light long-period fiber grating," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
17. Z. Gao, X. Lan, J. Huang, H. Xiao, "Surface modified-ZSM-5 zeolite-coated long period fiber grating for ammonia detection in water," Proceeding of SPIE, Photonics West, San Francisco, CA, Feb. 2013.
18. T. Wei, J. Huang, X. Lan, Q. Han, H. Xiao, "Optical fiber sensor interrogation improved by active fiber loop," (*Invited Presentation*) SPIE Defense, Security and Sensing, Maryland, MD, Apr. 2012.
19. S. Wu, T. Wei, J. Huang, H. Xiao, J. Fan, "A study on Q-factor of CCBG sensors by coupled mode theory," SPIE Smart structures/NDE, San Diego, CA, Mar. 2012.
20. J. Huang, T. Wei, X. Lan, J. Fan, H. Xiao, "Coaxial cable Bragg grating sensors for large strain measurement with high accuracy", SPIE Smart structures/NDE, San Diego, CA, Mar. 2012.
21. X. Lan, Q. Han, J. Huang, X. Fang, T. Wei, Z. Gao, H. Xiao, "High order mode long-period fiber grating refractive index sensor based on intensity measurement," Proceeding of SPIE, Photonics West, San Francisco, CA, Jan. 2012.
22. X. Lan, J. Huang, Q. Han, Z. Gao, T. Wei, H. Xiao, "Fs laser fabricated D-shape fiber for surface enhanced Raman scattering substrate," OSA Fiber Lasers and Applications, San Diego, CA, Jan. 2012.
23. X. Lan, J. Huang, Z. Gao, T. Wei, Q. Han, H. Xiao, "Hydrogen sensor based on palladium coated SMS fiber structure," OSA Laser Applications to Chemical, Security and Environmental Analysis, San Diego, CA, Jan. 2012.
24. Q. Han, X. Lan, J. Huang, H. Xiao, "Refractive-index insensitive long-period fiber gratings point-by-point inscribed by CO<sub>2</sub> laser for fiber sensors and lasers," Proceeding of SPIE, Photonics West, San Francisco, CA, Jan. 2012.
25. J. Huang, X. Lan, T. Wei, Q. Han, Z. Gao, H. Xiao, "Zeolite thin film-coated fiber sensor for measuring chemical trace based on multimode interferometer," OSA Advantages in Optical Materials, San Diego, CA, Jan. 2012.
26. J. Huang, T. Wei, X. Lan, Y. Zhang, S. Wu, J. Fan, H. Xiao, "Coaxial cable Bragg grating sensors for large strain measurement," Proceeding of 57th Int'l Instrumentation Symposium, 20-24 June 2011, St. Louis, MO, USA.
27. Y. Zhang, E. Pienkowski, T. Wei, J. Huang, H. Xiao, "Concentrically symmetric hollow core interferometer for common path optical coherence tomography," Proceeding of 57th Int'l Instrumentation Symposium, 20-24 June 2011, St. Louis, MO, USA

## **PATENTS**

1. H. Xiao, J. Huang, X. Lan, "Optical carrier based microwave interferometric system and method," US Patent 20, 140, 340, 671 (2014).
2. H. Xiao, J. Huang, X. Lan, M. Luo, "Distributed microwave Fabry-Perot interferometers device and method for sensing applications," US Patent 20, 150, 036, 147 (2014).
3. L. Chi, RE. Gerald, J. Huang, AR. Pfaff, M. Huang, K. Woelk, "In situ NMR thermometer", U.S. provisional patent, EK 238099549 US, 2014.
4. J. Yu, X. Pi, J. Huang, "Sensor based on coaxial Bragg grid," CN103398730A, 2013.