Wenchao Zhou

CONTACT INFORMATION

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EDUCATION

Ph.D., Mechanical Engineering Aug. 2009 ~ Oct. 2013
Georgia Institute of Technology, Atlanta, GA
Dissertation: Interface Dynamics in Inkjet Deposition
Advisor: Professor David W. Rosen

M.S., Mechanical Engineering Sept. 2006 ~ July, 2009
Xi'an Jiaotong University**,** Xi'an, China
Thesis: Capacitive Micromachined Ultrasonic Transducer based on Post-CMOS process
Advisors: Professor Zhuangde Jiang

B.S., Mechanical Engineering Sept. 2002 ~ July, 2006
Huazhong University of Science and Technology, Wuhan, China
Thesis: Design and Simulation of a 3-D Laser Scanner of Shoe Last

EMPLOYMENT

University of Arkansas, Fayetteville, AR, Sept. 2015 ~

- Assistant Professor and 21st Century Endowed Professorship

University of Arkansas, Fayetteville, AR, Aug. 2014 ~

- Assistant Professor in advanced manufacturing

University of Tennessee, Knoxville, TN, Jan. 2014 ~ July 2014

- Research Associate, jointly appointed by Oak Ridge National Lab

AlpZhi Inc. (a spin-off from Georgia Tech), Atlanta, GA, July 2013 ~ June 2014

- Chief Research Engineer leading the development of a microlens fabrication technology based on 3D printing

Oak Ridge National Laboratory, Oak Ridge, TN, May 2012 ~ Aug. 2012

- HERE research fellow on additive manufacturing technology for electronics

Shenzhen Institute of Advanced Technology, Chinese Academy of Science, Shenzhen,

China, Aug. 2007 ~ Sept. 2008

- Visiting student on Capacitive Micromachined Ultrasonic Transducer
- Assistant administrator of Integrated Circuit Research Center

Huazhong University of Science and Technology, Wuhan, China, Jan. 2004 ~ June 2006

- Dean's assistant on college website development, operation and maintenance

Shenzhen Leadwell Technology CO.,LTD, Shenzhen, China, May 2005 ~ Aug. 2005

- Mechanical engineer on developing a hydraulic system for injection molding machine

GRANTS

- SBIR Phase I: Exposure Controlled Projection Lithography for Fabrication of Physical Shaped GRIN Optics, PI: **Wenchao Zhou**, National Science Foundation, $178,769.00
- Drop-on-Demand Printing at Megahertz Frequency, PI: **Wenchao Zhou**, University of Arkansas, $75,000
- Bypassing the Limit of Sintering Temperature for Printed Electronics with an Microheater Array, PI: **Wenchao Zhou**, Oak Ridge Associated Universities, $10,000

SERVICE

- ASME Manufacturing Engineering Division Executive Committee
- National Science Foundation Panel Reviewer for Manufacturing Machines and Equipment (MME) program and Engineering and Systems Design (ESD) program.
- Additive Manufacturing Standard Committee organized by America Makes & ANSI Additive Manufacturing Standardization Collaborative

SELECTED HONORS AND AWARDS

- **2016 Ralph E. Powe Junior Faculty Enhancement Award**, Oak Ridge Associated Universities, May 2016
- **21st Century Endowed Professorship**, University of Arkansas, Sept. 2015
- **Highly Commended Award for the 2013/14 Emerald Engineering Outstanding Doctoral Research in Additive Manufacturing** (Sponsored by Emerald Group Publishing)
- **2013 Chinese Government Award for Outstanding Oversea Students** (Global competition among the graduate students in all majors)
- **Best Presentation Award**, The Twenty Forth Annual International Solid Freeform Fabrication Symposium, Aug. 2013
- **Higher Education Research Experiences (HERE) Fellowship Award**, Oak Ridge National Lab, April, 2012

- **Best Paper Award**, International Conference on Advanced Research in Virtual and Rapid Prototyping 2011, Sept. 2011
- **Graduate Fellowship**, Xi'an Jiaotong University, Sept. 2006
- **The Most Influential Person in college**, Huazhong University of Sci&Tech, 2004
- **University Academic Excellence Award**, Huazhong University of Sci&Tech, 2004
- **Best Student Leader Award**, Huazhong University of Sci&Tech, Dec. 2003

PUBLICATIONS

Journal Papers

- Austin VanHorn, Wenchao Zhou, Design and optimization of a high temperature microheater for inkjet deposition, International Journal of Advanced Manufacturing Technology, DOI: 10.1007/s00170-016-8440-8 (2016)
- **Wenchao Zhou**, Frederick A. List III, Chad E. Duty, and Sudarsanam S. Babu, "Fabrication of Conductive Paths on a Fused Deposition Modeling Substrate using Inkjet Deposition", Rapid Prototyping Journal 22.1 (2016).
- **Wenchao Zhou**. "Lattice Boltzmann simulation of coalescence of multiple droplets on non-ideal surfaces." Physical Review E 92.5 (2015): 053307.
- Hassan Rezayat, **Wenchao Zhou**, Akawat Siriruk, Dayakar Penumadu, S Suresh Babu, "Structure-Mechanical Property Relationship in Fused Deposition Molding", Materials Science and Technology 2015; 31(8), 895-903.
- **Wenchao Zhou**, Frederick A. List III, Chad E. Duty, and Sudarsanam S. Babu, "Sintering Kinetics of Inkjet Printed Conductive Silver Lines on Insulating Plastic Substrate", Metallurgical and Materials Transactions B, 2015; 46(3), 1542-1547
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, " *Lattice Boltzmann Simulations of Multiple Droplet Interaction Dynamics* ", Physical Review E, vol. 89.3, pp. 033311, 2014. (Selected into the "Kaleidoscope" on the journal website)
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, " *Shape Evolution of Multiple-droplet Interaction upon Impinging on a Solid Surface* ", Rapid Prototyping Journal, in press, 2014.
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*What controls dynamics of droplet shape evolution upon impingement on a solid surface?*", AIChE Journal, vol. 59, pp. 3071–3082, 2013
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W.

Rosen, " *Droplet Impingement Dynamics in Ink-Jet Deposition*", Journal of Virtual and Physical Prototyping, vol. 7, pp. 49-64, 2012

- Ting Yu, **Wenchao Zhou**, Peng Xu, Fengqi Yu, and Qin Qian, "*Theoretical investigation on the dynamic performance of CMUT for design optimization* ", Acta Mechanica Solida Sinica, vol. 26, pp. 99-110, 2013
- Drew Loney, **Wenchao Zhou**, David W. Rosen, F. Levent Degertekin, Andrei G. Fedorov, "*Acoustic Analysis of a Horn-based Ultrasonic Ejector for Viscous Fluid Atomization*", Journal of Applied Physics. Under Review.
- Drew Loney, **Wenchao Zhou**, David W. Rosen, F. Levent Degertekin, Andrei G. Fedorov, "*Analysis of Fluid Ejectability and Design Methodology for Horn-based Ultrasonic Atomizers using a Coupled Electro-Mechanical Model*, Journal of Applied Physics. Under Review.

Conference Papers

- **Wenchao Zhou**, Lattice Boltzmann Simulation of Multiple Droplet Interaction on Non-ideal Surfaces for Inkjet Deposition, 26th International Solid Freeform Fabrication Symposium, Austin, Texas, August 10-12, 2015
- Austin Van Horn**, Wenchao Zhou***, Design and Optimization of a High Temperature Microheater for Inkjet Deposition, 26th International Solid Freeform Fabrication Symposium, Austin, Texas, August 10-12, 2015
- Jiyu Cai, Austin Vanhorn, Casey Mullikin, Jennifer Stabach, Zach Alderman, and **Wenchao Zhou***, 4D Printing of Soft Robotic Facial Muscles, 26th International Solid Freeform Fabrication Symposium, Austin, Texas, August 10-12, 2015
- John Miers, **Wenchao Zhou***, Inkjet Printing at Megahertz Frequency, , 26th International Solid Freeform Fabrication Symposium, Austin, Texas, August 10-12, 2015
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*On a Three-Dimensional Lattice Boltzmann Model of Droplet Impingement for Ink-Jet Deposition*", 6th International Conference on Advanced Research in Virtual and Rapid Prototyping, Leiria, Portugal, October 1-5, 2013.
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*Lattice Boltzmann Simulations of Multiple Droplet Interactions During Impingement on the Substrate*", 24th International Solid Freeform Fabrication Symposium, Austin, Texas, August 12-14, 2013. (**Best Presentation Award**).
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W.

Rosen, "*Shape Characterization for Droplet Impingement Dynamics in Ink-jet Deposition*", ASME 2012 International Design Engineering Technical Conference & Computers and Information in Engineering Conference IDETC/CIE-2012, Chicago, Illinois, August 12-15, 2012.

- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*Shape evolution of droplet impingement dynamics in Ink-Jet manufacturing*", 22nd International Solid Freeform Fabrication Symposium, Austin, Texas, USA, August 8-10, 2011.
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*Droplet Impact Dynamics in Ink-Jet Manufacturing*", 5th International Conference on Advanced Research in Virtual and Rapid Prototyping, Leiria, Portugal, September 28-October 1, 2011 (**Best Paper Award**).
- David W. Rosen, F. Levent Degertekin, Andrei G. Fedorov, Drew Loney, **Wenchao Zhou**, "*Drop-on-demand deposition of complex fluids for 3D manufacturing"*, NSF CMMI Research & Innovation Conference "Engineering for Sustainability and Prosperity", Atlanta, GA, USA, January 4-7, 2011.
- **Wenchao Zhou**, Dazhong Wu, Xiaoyu Ding, David W. Rosen, "*Customer Co-design of Computer Mouse for Mass Customization without Causing Mass Confusion*", 2010 International Conference on Manufacturing Automation, Hong Kong, China, Dec. 13-15, 2010, pp.8-15.
- **Wenchao Zhou**, Drew Loney, Andrei G. Fedorov, F. Levent Degertekin, David W. Rosen, "*Impact Of Polyurethane Droplets on a Rigid Surface for Ink-Jet Printing*", 21st International Solid Freeform Fabrication Symposium, Austin, Texas, USA, August 9-11, 2010. pp. 524-538.
- Drew A. Loney, **Wenchao Zhou**, David W. Rosen, F.Levent Degertekin, Andrei G. Fedorov, "*Acoustic Analysis of Viscous Fluid Ejection Using Ultrasonic Atomizer*", 21st International Solid Freeform Fabrication Symposium, Austin, Texas, USA, August 9-11, 2010. pp. 168-180.
- **Wenchao Zhou**, Ting Yu and Fengqi Yu, "*Calculation of equivalent parameters in CMUT 1-D theoretical model*", 2008 IEEE International Ultrasonics Symposium, Beijing, China, Nov. 2-5, 2008.
- **Wenchao Zhou**, Ting Yu and Fengqi Yu, "*A 1-D Theoretical Receiving Model of CMUT*", 2008 International Conference on Intelligent Computation Technology and Automation, IEEE Computer Society, Changsha, Hunan, P.R. China, Oct. 22-25,

2008.

- **Wenchao Zhou**, Ting Yu and Fengqi Yu, "*A 1-D Lumped Theoretical Model for CMUT*", IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Xi'an, P.R. China, July 2-5, 2008.

SELECTED INVITED TALKS

- 3D Printing–Future of Manufacturing: The Fourth Wave of Human Civilization, Kansas State University, 2016
- Advances in 3D Printing, IEEE Ozark Section Meeting, 2016
- Interface Dynamics in Inkjet Deposition and Beyond, University of Illinois at Urbana-Champaign, 2014
- Interface Dynamics in Inkjet Deposition and Beyond, University of Maryland, 2014
- Interface Dynamics in Inkjet Deposition and Beyond, University of Utah, 2014

RESEARCH EXPERIENCE

4D Printing of Soft Robotics

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing 4D printing process using dielectric elastomers

Megahertz Inkjet Printer

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing inkjet printer that can potentially print ~100 times faster than current inkjet printers

High Temperature Microheater Development

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing high temperature microheaters for inkjet applications

High Speed Powder Feeding System

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing high speed powder feeding system for powder-bed based 3D Printing Processes

4D Nano Printer

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing 4D printer that can print with precision at sub-micron level

Low-cost Multi-material Inkjet 3D Printer

Principle investigator, The AM^3 Lab, August 2014 ~ Now

- Developing low-cost 3D inkjet printer that is capable of print both structural and electronics materials simultaneously.

Exposure Controlled Projection Lithography for Fabrication of Physical Shaped GRIN Optics

Principle investigator (NSF SBIR project), Alpzhi Inc., July 2013 ~ July 2014

- Developed new materials for GRIN optics
- Developed optical system for refractive index profile measurement
- Developed new fluorescence imaging technique to visualize the diffusion process of material additives and quantify their diffusion and polymerization rates experimentally
- Hold weekly meeting with team to monitor progress and plan for next week

Inkjet printing for 3-D Manufacturing

Graduate research assistant (PhD Thesis), Georgia Tech, Aug. 2009 ~ July 2013

- Developed a novel nozzle technology to overcome limitations of commercial nozzles
- Fabricated our developed nozzle plates in cleanroom using MEMS fabrication methods
- Developed a numerical model for droplet impact dynamics and validated the model
- Developed a novel metric to quantify droplet shape to study droplet shape evolution
- Developed understanding of what controls the interface evolution for a single droplet
- Developed a novel numerical solver to study multiple droplets deposition process

Make conductive lines on polymer substrate with inkjet printing

Research fellow, Oak Ridge National Lab, May 2012 ~ Aug. 2012

- Developed surface processing techniques for textured polymer substrates
- Identified the problems for non-conductivity of printed lines on the polymer substrates
- Found out different engineering solutions for the non-conductivity problems
- Improved conductivity by studying effects of different process parameters
- Conducted experiments to understand the physics of droplet drying process

Parallelization of a 2D viscous compressible Navier-Stokes solver

Team leader (High Performance Computing class), Georgia Tech, Aug. 2011~ Dec. 2011

- Developed a solver to simulate super-sonic flow around a simplified airfoil using C++
- Parallelized the numerical solver with MPI and OpenMP and speed up by 3.66x

Customer co-design of computer mouse for mass customization

Team leader, Georgia Tech, Jan. 2010 ~ May 2010

- Geometric modeling of the computer mouse with engineering design parameters
- Developed a CAD software to provide customers a simple interface to design
- Developed a manufacturing module to generate both CNC tool path and STL file

Capacitive micromachined ultrasonic transducer based on post-CMOS process

Research assistant (Master thesis), Shenzhen Institute of Advanced Technology, Chinese Academy of Science, Jan. 2010 ~ May 2010

- Developed a simplified analytical model for the acoustics of the transducer
- Modeling the coupling of structural mechanics, acoustics, and fluid dynamics
- Optimized the design parameters with FEM model and our analytical model
- Developed the micro-fabrication processes and designed the layouts with L-Edit
- Simulated the fabrication processes with commercial software CoventorWare

Design and simulation of a 3-D laser scanner of shoe last/mold

Research assistant (Undergraduate thesis), HUST, Sept. 2005 ~ June 2006

- Simulated the laser scanning process and obtained scanned images of a shoe last
- Calibrated the cameras by scanning calibration blocks
- Developed a new algorithm to process the calibration images to calibrate the cameras
- Processed the scanned images of the shoe last and obtained 3D point cloud
- Reconstructed the 3D shoe last with the obtained point cloud

TEACHING EXPERIENCE

Instructor, Additive Manufacturing

Department of Mechanical Engineering, University of Arkansas, Fayetteville

Instructor Evaluation: 4.56 out of 5 (Spring 2016)

Instructor, Fluid Mechanics, Fall 2014

Department of Mechanical Engineering, University of Arkansas, Fayetteville

Instructor Evaluation: 4.10 out of 5 (Fall 2015)

SKILLS

- Software: Matlab, COMSOL, ANSYS, Solidworks/Unigraphics, Mathematica, LAMMPS
- Programming languages: Matlab M; C; Fortran; C++; Java
- Hardware: Cleanroom fabrication equipments, including Spinner, PECVD, Sputter, Profilometer, SEM, RIE, ICP, Mask aligner, microscope, etc. Stereolithography

machine Viper, Objet Eden 250, etc.

CERTIFICATIONS

- Software Designer, Ministry of Personnel and Ministry of Info Industry of China, 2005
- Programmer, China Ministry of Info Industry & Japan Ministry of Econ. & Trade, 2003