Charlotte Guertler, PhD

Senior Scientist
Makerspace Assoc. Director
Engineering Consultant

charlotteguertler.github.io

orcid: 0000-0003-0605-0239

LinkedIn: Charlotte Guertler

charlotte.guertler@wustl.edu

About me

Charlotte is a mechanical engineer with experience in biomechanics, imaging, 3D bioprinting, and material characterization. In addition to her brain biomechanics research, Charlotte is the associate director of a university engineering design makerspace, and a consultant for a biotech startup. She is excited to leverage her extensive research, design, and fabrication experience in biomedical industry.

Skills

R&D
Animal/human studies, MR imaging, MR elastography (MRE), diffusion tensor imaging (DTI), focused ultrasound, simulation and analysis of waves in solids

Engineering Software
COMSOL, SolidWorks, Autodesk Fusion 360, Tinkercad

Programming Languages
MATLAB, Python, C++, Visual Basic, R, Mathematica, ExpressPCB, Arduino, LabView

Building, fabrication, prototyping
3D printing, laser cutting, machining & fabrication, welding, woodworking, sandblasting & powder coating, injection molding, vacuum forming

Publishing Software
Adobe Illustrator, Adobe Photoshop, CorelDRAW, Inkscape, LaTeX

Education

2019 PhD — Washington University in St. Louis
Mechanical Engineering & Materials Science

2017 MS — Washington University in St. Louis
Mechanical Engineering & Materials Science

2014 BS — Yale University
Mechanical Engineering, ABET accredited

Research and Work Experience

Postgraduate

2021-pres. Senior Scientist — Washington University in St. Louis
Supervisor: Dr. Philip Bayly
Investigate tissue biomechanics and anisotropy using MR elastography (MRE), ultrasound, and bioprinting
Responsibilities: conduct research, supervise students, manage projects, write publications and proposals

2021-pres. Associate Director — Spartan Light Metal Products Makerspace
Supervisor: Dr. Ruth J. Okamoto
Design and manage curriculum, vision, and operations for university-wide makerspace

2021-pres. Engineering Consultant — DeepSight Technology
Supervisor: John Chong
Design, prototyping, and fabrication of ultrasound phantoms, demos, and experimental setups

2019-21 Staff Research Scientist — Washington University in St. Louis
Supervisor: Dr. Philip Bayly
Investigate brain biomechanics and anisotropy using MR elastography (MRE), ultrasound, and bioprinting

Graduate

2015-19 Graduate Student Researcher — Washington University in St. Louis
Supervisor: Dr. Philip Bayly
Use MRE, ultrasound, and finite element analysis to assess mechanical properties and anisotropy

2014 Graduate Student Researcher — Washington University in St. Louis
Supervisor: Dr. Spencer Lake
Investigate the effects of hernia mesh on the mechanical properties of the abdominal wall

Undergraduate

2011-14 Undergraduate Research Assistant — Yale GRAB Lab
Supervisor: Dr. Aaron Dollar
Research on movement and grasp of human hand by modeling human hand movements

2013 Engineering Intern — Infineon Technologies
Supervisor: Andrea Stich
Member of pre-assembly team for semiconductors; clean room certified; worked on one management project

2012 Engineering Intern — Merck Research Laboratories
Supervisor: William Lee
Designed enclosure and setup of ligand identification system for Merck research laboratory

Publications

* authors contributed equally

2022 Estimation of the mechanical properties of a transversely isotropic material from shear wave fields via artificial neural networks
Hou Z*, Guertler CA*, Okamoto RJ, Chen H, Garbow JR, Kamilov US, Bayly PV
Journal of the Mechanical Behavior of Biomedical Materials | 10.1016/j.jmbbm.2021.105046

2021 A heterogenous, time harmonic, nearly incompressible transverse isotropic finite element brain simulation for MR elastography
McGarry M, Van Houten E, Guertler C, Okamoto R, Smith D, Sowinski D, Johnson C, Bayly P, Weaver J, Paulsen K
Physics in Medicine and Biology | 10.1088/1361-6560/ab9a84

2020 Estimation of anisotropic material properties of soft tissue by MRI of ultrasound-induced shear waves
Guertler CA, Okamoto RJ, Ireland J, Pacia C, Garbow JR, Chen H, Bayly PV
Journal of Biomechanical Engineering | 10.1115/1.4046127

2020 Multi-excitation MR elastography of the brain: wave propagation in anisotropic white matter
Smith D, Guertler CA, Okamoto RJ, Romano A, Bayly PV, Johnson CL
Journal of Biomechanical Engineering | 10.1115/1.4046199

2018 Mechanical properties of porcine brain tissue in vivo and ex vivo estimated by MR elastography
Guertler CA, Okamoto RJ, Schmidt JL, Badachhape AA, Johnson CL, Bayly PV
Journal of Biomechanics | 10.1016/j.jbiomech.2018.01.016

2017 Validation of single c-arm fluoroscopic technique for measuring in vivo abdominal wall deformation
Kahan LG, Guertler C, Blatnik JA, Lake SP
Journal of Biomechanical Engineering | 10.1115/1.4037073

2015 Patterned compliance in robotic finger pads for versatile surface usage in dexterous manipulation
Bullock IM, Guertler C, Dollar AM
IEEE International Conference on Robotics and Automation | 10.1109/ICRA.2015.7139545

2013 Grasp frequency and usage in daily household and machine shop tasks
Bullock IM, Zheng JZ, De La Rosa S, Guertler C, Dollar AM
IEEE Transactions on Haptics | 10.1109/TOH.2013.6

2012 Mushy-layer dynamics in micro and hyper gravity
O'Rourke JG, Riggs AJE, Guertler CA, Miller PW, Padhi CM, Popelka MM, Wells AJ, West AC, Zhong J, Wettlaufer JS
Physics of fluids | 10.1063/1.4760256

Patents

2018 Store-Easy Automotive wheelchair storage device.
Patent US9937088B2
Guertler C, D'Souza AW, Milgrom R, Hong T, Xiao Y, Nadell S

2009 Method and System for Treating Hypotension.
Patent US20110098580
Mikhail M and Guertler C

Awards

2018 Association of Women Faculty Graduate Student Award
2016 Imaging Sciences Pathway Fellowship
2016 First Place (StoreEasy Wheelchair Storage Device) - Bio Entrepreneurship Core's Bench to Business
2015 Sling Health Demo Day Finalist
2013 Connecticut Space Grant College Consortium Student Project Grant

Selected Conference Presentations

2021 Imaging of focused ultrasound-induced shear waves to probe mechanical anisotropy of tissue.
Guertler CA, Okamoto RJ, Garbow JR, Chen H, Bayly PV
Design of Medical Devices

2020 Multi-Excitation methods for MR Elastography of the in vivo porcine brain
Guertler CA, Crandall CL, Okamoto RJ, Johnson CL, Bayly PV
Summer Biomechanics, Bioengineering, and Biotransport

2019 Estimation of anisotropic material properties by MRI of ultrasound-induced waves
Guertler CA, Okamoto RJ, Garbow JR, Chen H, Bayly PV
Society of Engineering Science

2018 Contributions of shear and tensile anisotropy to mechanical properties of the porcine brain estimated by MR elastography
Guertler CA, Okamoto RJ, Johnson CL, Bayly PV
World Congress of Biomechanics

2017 Mechanical Properties of Porcine Brain Tissue *In Vivo* and *Ex Vivo* Estimated by MR Elastography
Guertler CA, Okamoto RJ, Schmidt JL, Badachhape AA, Johnson CL, Bayly PV
Summer Biomechanics, Bioengineering, and Biotransport Conference

2017 Comparison of Mechanical Properties of Porcine Brain Tissue In Vivo and Ex Vivo using MR Elastography
Guertler CA, Okamoto RJ, Schmidt JL, Badachhape AA, Johnson CL, Bayly PV
International Society for Magnetic Resonance in Medicine

2016 Diffusion Tensor Imaging and MR Elastography of the Mini-Pig Brain In Vivo
Guertler CA, Okamoto RJ, Cerjanic A, McGarry M, Johnson CL, Bayly PV
Biomedical Engineering Society

2011 Mushy Layer Dynamics in Micro and Hyper Gravity
O'Rourke JG, Riggs AJE, Guertler CA, Miller PW, Padhi CM, Popelka MM, Wells AJ, West AC, Zhong J, Wettlaufer JS
Physics of Fluids Conference

Activities and Leadership

2020 Designer and Volunteer — Maker Task Force, Washington University in St. Louis/Barnes Jewish Hospital
Designed and produced over 1,000 face shields and other PPE equipment to address COVID-19 hospital shortages

2019-pres. Volunteer — CHAMP Therapy Dog Team
Trained certified therapy dog and volunteer at local hospitals and schools

2017-19 Chief Operations Officer — Sling Health, student-run biotechnology incubator
Board member in charge of organizing and running design reviews for student projects, establishing biotech and healthcare mentors, and managing Sling Health operations

2015-17 Facilities Manager — Sling Health, student-run biotechnology incubator
Supervisor of facilities used by team members

2014 Project Leader — Sling Health, student-run biotechnology incubator
Team lead designing and building an automated wheelchair vehicle storage device for manual wheelchair users

2014-17 Vice President — Spectra, Graduate Student Imaging Society
Vice president of imaging science program

2012-14 President — Yale NASA Microgravity University
President of Yale chapter of NASA Microgravity University

2011-13 Team Leader — Yale NASA Microgravity University
Project leader of Yale's chapter of NASA Microgravity University

2011-14 Splash at Yale — Yale University
Undergraduate group teaching short courses to middle and high school students

Extracurricular Projects

2014-17 Project Leader — Automotive Wheelchair Storage Device, Sling Health
Created and patented device for automated manual wheelchair storage

2013 Designer and Fabricator — Ear Nose Throat Surgical Device for Yale Medical School Surgeon
Low-cost replacement for Da Vinci Robot in the performance of back-of-throat and skull base ENT surgeries

2013 Designer and Fabricator — Microgravity Object Scale
scale measures objects in 1-5 kg in microgravity conditions

2012 Designer and Fabricator — NASA Microgravity University
Solidification of Fluids and the Formation of Mushy Layers
designed zero-G experiment, built experimental rig, and conducted experiment

2011 Designer and Fabricator — NASA Microgravity University
Behavior of Two-Dimensional Rayleigh-Taylor Instability in Various Gravities
designed zero-G experiment, built experimental rig, and conducted experiment

Teaching

2014-17 Outreach Educator | Imaging Science Outreach | St. Louis Science Center
2014-15 Graduate Teaching Assistant | Materials Science Lab | Washington University in St. Louis
2011-14 Lecturer | The Science of Ice Cream | Yale Splash

References

Philip V Bayly, PhD
The Lee Hunter Distinguished Professor of Mechanical Engineering
Chair, Mechanical Engineering & Materials Science
Washington University in St. Louis
pvb@wustl.edu; 314-935-6081

Ruth J. Okamoto, DSc.
Teaching Professor Mechanical Engineering & Materials Science
Director, Spartan Light Metal Products Makerspace
Washington University in St. Louis
rjo@wustl.edu; 314-935-6068

Curtis L. Johnson, PhD
Assistant Professor Biomedical Engineering
University of Delaware
clj@udel.edu; 302-831-4098

Joel R. Garbow, PhD
Professor of Radiology
Washington University in St. Louis
garbow@wustl.edu; 314-362-9949

John Chong, PhD
Head of Engineering and Product Strategy
DeepSight Technology
jchong@deepsightinc.com