



Charlotte Guertler, PhD

Senior Scientist
Makerspace Associate Director
Engineering Consultant



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About me

Charlotte is a mechanical engineer with experience in biomechanics, imaging, 3D bioprinting, material characterization, and project management. In addition to her brain biomechanics research, she is associate director of an engineering design makerspace, and a consultant for a biotech startup. Charlotte 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 Mechanical Engineering & Materials Science Certificate in Imaging Science & Engineering	Washington University in St. Louis
2017	MS Mechanical Engineering & Materials Science	Washington University in St. Louis
2014	BS Mechanical Engineering, ABET accredited	Yale University

Research and Work Experience

Postgraduate

2021-pres.	Senior Scientist Supervisor: Dr. Philip Bayly Investigate tissue biomechanics and anisotropy using MR elastography (MRE), ultrasound, and bioprinting Responsibilities: conduct research, advise and supervise PhD, masters, and undergraduate students, manage projects, write publications and proposals	Washington University in St. Louis
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2021-pres.	Associate Director Supervisor: Dr. Ruth J. Okamoto Design and manage curriculum, vision, and operations for university-wide makerspace	Spartan Light Metal Products Makerspace
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2021-pres.	Engineering Consultant Supervisor: John Chong Design, prototyping, and fabrication of ultrasound phantoms, demos, and experimental setups	DeepSight Technology
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2019-21	Staff Research Scientist Supervisor: Dr. Philip Bayly Investigate brain biomechanics and anisotropy using MR elastography (MRE), ultrasound, and bioprinting	Washington University in St. Louis
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Graduate

2015-19	Graduate Student Researcher Supervisor: Dr. Philip Bayly Use MRE, ultrasound, and finite element analysis to assess mechanical properties and anisotropy	Washington University in St. Louis
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2014	Graduate Student Researcher Supervisor: Dr. Spencer Lake Investigate the effects of hernia mesh on the mechanical properties of the abdominal wall	Washington University in St. Louis
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Undergraduate

2011-14	Undergraduate Research Assistant Supervisor: Dr. Aaron Dollar Research on movement and grasp of human hand by modeling human hand movements	Yale GRAB Lab
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2013	Engineering Intern Supervisor: Andrea Stich Member of pre-assembly team for semiconductors; clean room certified; worked on one management project	Infineon Technologies
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2012	Engineering Intern Supervisor: William Lee Designed enclosure and setup of ligand identification system for Merck research laboratory	Merck Research Laboratories
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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, Badachhapa 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 <i>Design of Medical Devices</i>
2020	Multi-Excitation methods for MR Elastography of the in vivo porcine brain Guertler CA, Crandall CL, Okamoto RJ, Johnson CL, Bayly PV <i>Summer Biomechanics, Bioengineering, and Biotransport</i>
2019	Estimation of anisotropic material properties by MRI of ultrasound-induced waves Guertler CA, Okamoto RJ, Garbow JR, Chen H, Bayly PV <i>Society of Engineering Science</i>
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 <i>World Congress of Biomechanics</i>
2017	Mechanical Properties of Porcine Brain Tissue <i>In Vivo</i> and <i>Ex Vivo</i> Estimated by MR Elastography Guertler CA, Okamoto RJ, Schmidt JL, Badachhapa AA, Johnson CL, Bayly PV <i>Summer Biomechanics, Bioengineering, and Biotransport Conference</i>
2017	Comparison of Mechanical Properties of Porcine Brain Tissue <i>In Vivo</i> and <i>Ex Vivo</i> using MR Elastography Guertler CA, Okamoto RJ, Schmidt JL, Badachhapa AA, Johnson CL, Bayly PV International Society for Magnetic Resonance in Medicine
2016	Diffusion Tensor Imaging and MR Elastography of the Mini-Pig Brain <i>In Vivo</i> Guertler CA, Okamoto RJ, Cerjanic A, McGarry M, Johnson CL, Bayly PV <i>Biomedical Engineering Society</i>
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 <i>Physics of Fluids Conference</i>

Activities and Leadership

2020	Designer and Volunteer Designed and produced over 1,000 face shields and other PPE equipment to address COVID-19 hospital shortages	Maker Task Force, Washington University in St. Louis/Barnes Jewish Hospital
2019-pres.	Volunteer Trained certified therapy dog and volunteer at local hospitals and schools	CHAMP Therapy Dog Team
2017-19	Chief Operations Officer Board member in charge of organizing and running design reviews for student projects, mentoring students in design, fabrication, and presentation, establishing biotech and healthcare mentors, and managing Sling Health operations	Sling Health, student-run biotechnology incubator
2015-17	Facilities Manager Supervisor of facilities used by team members	Sling Health, student-run biotechnology incubator
2014	Project Leader Team lead designing and building an automated wheelchair vehicle storage device for manual wheelchair users	Sling Health, student-run biotechnology incubator
2014-17	Vice President Vice president of imaging science program	Spectra, Graduate Student Imaging Society
2012-14	President President of Yale chapter of NASA Microgravity University	Yale NASA Microgravity University
2011-13	Team Leader Project leader of Yale's chapter of NASA Microgravity University	Yale NASA Microgravity University
2011-14	Splash at Yale Undergraduate group teaching short courses to middle and high school students	Yale University

Extracurricular Projects

2014-17	Project Leader Created and patented device for automated manual wheelchair storage	Automotive Wheelchair Storage Device, Sling Health
2013	Designer and Fabricator Low-cost replacement for Da Vinci Robot in the performance of back-of-throat and skull base ENT surgeries	Ear Nose Throat Surgical Device for Yale Medical School Surgeon
2013	Designer and Fabricator scale measures objects in 1-5 kg in microgravity conditions	Microgravity Object Scale
2012	Designer and Fabricator Solidification of Fluids and the Formation of Mushy Layers designed zero-G experiment, built experimental rig, and conducted experiment	NASA Microgravity University
2011	Designer and Fabricator Behavior of Two-Dimensional Rayleigh-Taylor Instability in Various Gravities designed zero-G experiment, built experimental rig, and conducted experiment	NASA Microgravity University

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
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Ruth J. Okamoto, DSc.
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Director, Spartan Light Metal Products Makerspace
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Head of Engineering and Product Strategy
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