



## Charlotte Guertler, PhD

Mechanical Engineer  
Aerospace and Biomechanics



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## About me

Charlotte is a mechanical engineer specializing in biomechanics and aerospace. She has experience in finite element analysis, mechanics, imaging, design, 3D bioprinting, material characterization, and project management. She is currently a mechanical engineering analyst at L3Harris. Previously, Charlotte was a Senior Scientist in brain biomechanics research and the associate director of the engineering design makerspace at Washington University and consulted for a neuroscience startup. Charlotte is excited to leverage her extensive analysis, research, design, and fabrication experience in R&D engineering.

## Skills

### R&D

Finite element analysis, animal/human studies, MR imaging, MR elastography (MRE), focused ultrasound

### Engineering Software

Femap, COMSOL, SolidWorks, Autodesk Fusion 360, Tinkercad

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

2023-pres.	Mechanical Engineering Analyst Supervisor: Dave Calabrese and Kayla Mastovich Finite element analysis of static, dynamic, and optical survival and performance for the telescope of weather satellite pre-production.	L3Harris
2022	Engineering Consultant Supervisor: Julia Whitehead Product development of neuroscience-based infant language training device.	RAPT Ventures, Inc.
2021-22	Senior Scientist Supervisor: Dr. Philip Bayly Demonstrate immediate changes in brain mechanical properties post-mortem using MRE and create 3D bioprinted hydrogels with tunable anisotropy. Responsibilities: conduct research, supervise PhD, masters, and undergraduates, manage projects, write publications and proposals	Washington University in St. Louis
2021-22	Engineering Consultant Supervisor: John Chong Design, prototype, and fabricate novel ultrasound phantoms, demos, and experimental setups	DeepSight Technology
2019-22	Associate Director Supervisor: Dr. Ruth J. Okamoto Design and manage curriculum, vision, and operations for university-wide makerspace	Spartan Light Metal Products Makerspace
2019-21	Staff Research Scientist Supervisor: Dr. Philip Bayly Develop novel anisotropic analysis for MR imaging of harmonic ultrasound-induced motion (MR-HUM) using machine learning and FEA and show effects of aging on anisotropy in brain using MRE.	Washington University in St. Louis
2015-19	Graduate Student Researcher Supervisor: Dr. Philip Bayly Demonstrate mechanical property differences between in vivo and ex vivo brain, develop novel imaging method: MR imaging of harmonic ultrasound-induced motion (MR-HUM), and investigate anisotropy using finite element analysis.	Washington University in St. Louis

## 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

Dave Calabrese  
Senior Systems Engineer, Optical Payload Engineering  
General Atomics  
Previously: Mechanical Engineering Manager at L3Harris  
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## Publications

\* authors contributed equally

- 2024 Post-mortem changes of anisotropic mechanical properties in the porcine brain assessed by MR elastography  
Wang S, Eckstein KN, Guertler CA, Johnson CL, Okamoto RJ, McGarry MDJ, Bayly PV  
*Brain Multiphysics* | 10.1016/j.brain.2024.100091
- 2023 Mechanical stiffness and anisotropy measured by MRE during brain development in the minipig  
Wang S, Guertler CA, Okamoto RJ, Johnson CL, McGarry MDJ, Bayly PV  
*Neuroimage* | 10.1016/j.neuroimage.2023.120234
- 2023 Measurement of relative motion of the brain and skull in the mini-pig in-vivo  
Kailash KA, Guertler CA, Johnson CL, Okamoto RJ, Bayly PV  
*Journal of Biomechanics* | 10.1016/j.jbiomech.2023.111676
- 2023 Design and characterization of 3-D printed hydrogel lattices with anisotropic mechanical properties  
Yoon D, Ruding M, Guertler CA, Okamoto RJ, Bayly PV  
*Journal of the Mechanical Behavior of Biomedical Materials* | 10.1016/j.jmbbm.2023.105652
- 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 heterogeneous, 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, Badachhane 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