




Nathan Justus, Ph.D.

 Roboticist

 DrJust.us

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Education

- 2020 – 2024  **Ph.D., Robotics - Oregon State University**, Corvallis OR.
Laboratory for Robotics and Applied Mechanics
Thesis Title: *The Geometry of Passive and Constrained Locomotion.*
- 2018 – 2020  **M.Sc., Robotics - Oregon State University**, Corvallis OR.
Laboratory for Robotics and Applied Mechanics
Thesis Title: *Validation of a Novel Stereo Vibrometry Technique for Spiderweb Signal Analysis*
- 2012 – 2016  **B.Sc., Aerospace Engineering - University of Oklahoma**, Norman OK.

Work History

- 2018 – 2024  **Graduate Research Assistant - Oregon State University**, Corvallis OR
Laboratory for Robotics and Applied Mechanics - Advisor: Dr. Ross Hatton
 - Implemented realtime embedded control pipelines on physical deployed robot systems
 - Specialized in software development, analysis, and optimization for robotic dynamics
 - Applied geometric algorithms to enable teleoperation and automation of robot motion
 - Collaborated with researchers nationwide to coordinate, perform, and report experiments
 - Multidisciplinary work with professional arachnologists, musicians, and aquatic biologists
- 2016 – 2018  **Flight Controller - NASA - Johnson Space Center**, Houston TX
Mission Control for the International Space Station
Communications RF On-board Networks Utilization Specialist (CRONUS)
 - Facilitated testing and deployment of software tools both on the ground and onboard the ISS
 - Experienced in system diagnostics and recovery using telemetry from deployed systems
 - Trained in efficient engineering communication during high stress mission challenges
 - Founded and led development of an ISS wiki to consolidate useful technical information
- 2014 – 2015  **Aerospace Engineer Intern - Tinker Air Force Base**, Oklahoma City OK
Maintenance Engineering for the Pratt & Whitney F100 Jet Engine
 - Analyzed and categorized engine performance across the nation's fleet of F15 and F16 aircraft
 - Assisted in the troubleshooting of aircraft failures from engine data
 - Worked routine part procurement for engine repair and maintenance

Skills

- Robotics  Software design, embedded systems, robotic kinematics and dynamics, controller design, motion planning and optimization, elastic dynamics, perception, stochastic sensing, system identification, computer vision, machine learning, robot deployment
- Mathematics  Geometric mechanics, differential geometry, stochastic models, nonlinear controls, planning algorithms, optimization techniques
- Coding  MatLab, Python, C, C++, Linux
- Technologies  ROS, OpenSim, PyTorch, TensorFlow, OpenCV, SolidWorks

Research Publications

Journal Papers

- 1 **N. Justus** and R. Hatton, "Optimal gaits for inertia-dominated swimmers with passive elastic joints," *Physical Review E*, vol. 109, no. 3, Mar. 2024, ISSN: 2470-0053.
- 2 R. Krugner, C. Espindola, **N. Justus**, and R. L. Hatton, "Web vibrations in intraspecific contests of female black widow spiders, *latrodectus hesperus*," *Environmental Entomology*, vol. 52, no. 2, W. Morrison, Ed., pp. 169–174, Feb. 2023.
- 3 O. Wiezel, S. Ramasamy, **N. Justus**, Y. Or, and R. L. Hatton, "Geometric analysis of gaits and optimal control for three-link kinematic swimmers," *Automatica*, vol. 158, p. 111 223, Dec. 2023.
- 4 R. L. Hatton, **N. Justus**, Z. Brock, *et al.*, "The geometry of optimal gaits for inertia-dominated kinematic systems," *IEEE Transactions on Robotics*, vol. 38, no. 5, pp. 3279–3299, Oct. 2022.
- 5 **N. Justus**, R. Krugner, and R. L. Hatton, "Validation of a novel stereo vibrometry technique for spiderweb signal analysis," *Insects*, vol. 13, no. 4, p. 310, Mar. 2022.

Conference Proceedings

- 1 C. Sparks, **N. Justus**, R. Hatton, and N. Gravish, "Amoeba-inspired swimming through isoperimetric modulation of body shape," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, Oct. 2022.

Engineering Projects

Salp	📌	Developed a physics simulator and soft actuation mechanism for a robotic jellyfish chain
SCRAM	📌	Ran motion optimization for a nationwide collaboration studying flexible robot motion
Spiderharp	📌	Led deployment for a large musical robotic spiderweb that is played like a harp
Spiderwebs	📌	Developed computer vision tools for spiderweb signal analysis
Rover	📌	Founded and was chief engineer for a team that won a NASA rover design challenge

Professional References

Dr. Ross Hatton	📌	Masters and PhD Advisor, Oregon State University Ross.Hatton@oregonstate.edu	2018–2024
Dr. Joseph Davidson	📌	Committee Member and Mentor, Oregon State University Joseph.Davidson@oregonstate.edu	2018–2024
Daniel Forrestel	📌	Manager and Mentor, NASA-JSC daniel.forrestel-1@nasa.gov	2016–2018
Todd Quasny	📌	ISS Training Mentor, NASA-JSC todd.quasny-1@nasa.gov	2016–2018