

## EDUCATION

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<b>Postdoctoral Researcher</b>	2020-2021	Georgia Tech
<b>PhD Biomedical Engineering</b>	2019	Northwestern University
<b>MS Biomedical Engineering</b>	2017	Northwestern University
<b>BS Applied Science: Biomedical Engineering</b>	2012	University of North Carolina at Chapel Hill
<b>Kellogg Management Certificate</b>	2017	Northwestern University

## INDUSTRIAL EXPERIENCE

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<b>(Google) X (Biomedical Engineer)</b>	Mountain view, CA	2019-now
<b>Össur (Visiting Scholar)</b>	Reykjavik, Iceland	2018
<b>Walt Disney Imagineering, Disney Research (Intern)</b>	Burbank, CA	2014
<b>Institute for Human and Machine Cognition (Intern)</b>	Pensacola, FL	2013

## AWARDS AND HONORS

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<b>Northwestern Presidential Fellowship</b> –Most prestigious fellowship awarded to graduate students by Northwestern University	2018
<b>Finalist</b> –Wearacon 2017 Innovation Challenge	2017
<b>2<sup>nd</sup> place Student Paper Competition</b> –IEEE Engineering in Medicine and Biology Conference	2016
<b>Highest Honors</b> –University of North Carolina	2012
<b>Highest Distinction</b> –University of North Carolina	2012
<b>James H Crawford Jr. Award</b> –Most outstanding senior in BME, University of North Carolina	2012

## PEER REVIEWED PUBLICATIONS

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- ◆ **M. Shepherd**, D. Molinaro, G. Sawicki, A. Young. “Deep Learning Enables Exoboot Control to Augment Variable-Speed Walking.” *Robotics and Automation Letters* (in review)
  - ◆ **M. Shepherd**, T. Clites (co-first author), K. Ingraham, L. Wontorcik and E. Rouse. “Understanding preference in the design and control of lower-extremity prostheses.” *Journal of Neural Engineering and Rehabilitation*, 2021
  - ◆ H. Quraishi, **M. Shepherd**, L. McManus, J. Harlaar, D. Plettenburg and E. Rouse. “A passive mechanism for decoupling energy storage and return in ankle-foot prostheses: A case study in recycling collision energy,” *Wearable Technologies*, 2021.
  - ◆ **M. Shepherd**, D. Gunz, T. Clites, C. Lecomte, and E. Rouse. “Shape Optimization of Prosthetic Running Feet,” (in review, *IEEE Transactions on Biomedical Engineering*)
  - ◆ **M. Shepherd** and E. Rouse. “Comparing Prosthetist and Patient Preferences for Foot Stiffness,” *Nature Scientific Reports*, 2020

- ♦ **M. Shepherd**, A. Simon, J. Zisk, L. Hargrove. "Preferred Prosthetic Ankle-Foot Alignment for Level Ground and Ramp Walking," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2020.
- ♦ **M. Shepherd**, A. Azocar, M. Major and E. Rouse. "Amputee Perception of Prosthetic Ankle Stiffness During Locomotion," *Journal of NeuroEngineering and Rehabilitation*, 2018.
- ♦ **M. Shepherd** and E. Rouse. "The VSPA Foot: A Quasi-Passive Ankle-Foot Prosthesis with Continuously Variable Stiffness," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2017.
- ♦ **M. Shepherd** and E. Rouse. "Design and Validation of a Torque-Controllable Knee Exoskeleton for Sit-to-Stand Assistance," *IEEE Transactions on Mechatronics*, 2017.

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## REFEREED PROCEEDINGS

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- ♦ T. Clites, **M. Shepherd**, K. Ingraham, E. Rouse, "Patient Preference in the Selection of Prosthetic Joint Stiffness," *IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BIOROB)*, 2020.
- ♦ **M. Shepherd**, D. Gunz, C. Lecomte, E. Rouse, "Methods for Describing and Characterizing the Mechanical Behavior of Running-Specific Prosthetic Feet," *IEEE International Conference on Rehabilitation Robotics (ICORR)*, 2019.
- ♦ **M. Shepherd**, A. Azocar, M. Major, and E. Rouse. "The Difference Threshold of Ankle-Foot Prosthesis Stiffness for Persons with Transtibial Amputation," *IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BIOROB)*, 2018.
- ♦ **M. Shepherd** and E. Rouse. "Design of a Quasi-passive Ankle-foot Prosthesis with Biomimetic, Variable Stiffness," in *Proceedings of International Conference on Robotics and Automation (ICRA)*, 2017.
- ♦ **M. Shepherd** and E. Rouse. "Design and Characterization of a Torque-Controllable Actuator for Knee Assistance during Sit-to-Stand," in *Proceeding of Engineering Medicine and Biology (EMBC)*, 2016.
- ♦ T. Reissman, B Halsne, **M. Shepherd**, R. Lipschutz, and T. Kuiken. "Efficacy of flexible, conductive fabrics for electromyography," in *Proceedings of Myoelectric Controls Symposium (MEC)*, 2014.

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## PATENTS

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- ♦ **M. Shepherd** and E. Rouse. "Dual Path Biomimetic and Variable Stiffness Ankle System and Related Methods." U.S. Provisional Patent App. No 62/674,822, filed May 22, 2018
- ♦ **M. Shepherd** and E. Rouse. "Biomimetic and Variable Stiffness Ankle System and Related Methods" U.S. Provisional Patent App. No. 62/403,597, filed October 3, 2016.
- ♦ **M. Shepherd**, K. Kaveny, M. Peshkin, and T. Kuiken, "Safety Overload for Direct Skeletal Attachment" U.S. Pat. App. No. 15/495,923, Apr. 24, 2017.

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## GRANTS

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Title: "Deep Learning for Biological Torque Estimation for Enhancing Control of Wearable Exoskeletons." 2020  
Funding Source: Google X  
Amount: \$86000  
Role: Co-Investigator

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## FELLOWSHIPS

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**Northwestern University Presidential Fellowship**  
Covers stipend and tuition for graduate student research

9/1/2018—10/1/2019

**American Heart Association Predoctoral Fellowship**

Award No. 16PRE31160018

*“Robotic knee extension assistance to improve sit-to-stand performance in stroke patients”*

7/1/2016 — 6/30/2018

## INVITED TALKS

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- ♦ **M. Shepherd**, “Patient Preference in Lower Limb Prosthesis Prescription,” Orthotic and Prosthetic Innovative Technologies Conference, University of Michigan 2019
- ♦ **M. Shepherd**, “Amputee Perception of Prosthetic Ankle Stiffness During Locomotion,” Prosthetics and Orthotics Educational Series, Shirley Ryan AbilityLab 2018
- ♦ **M. Shepherd**, “Energy Storage and Return is not Maximal at the Preferred Prosthetic Ankle Stiffness,” Neuromechanics Seminar, University of Michigan. 2018
- ♦ **M. Shepherd**, L. Shepherd, R. Tuma, N. Nicholson, A. Henig, “*Limb Reassignment Surgery—Next Steps*,” Center for Biomedical Ethics and Humanities Summer Fusion Seminar 2016
- ♦ **M. Shepherd** and E. Earley, “*ProsthEthics*,” lecture for robot ethics course at University of Notre Dame 2015, 2017
- ♦ **M. Shepherd**, “A Balancing Standing Wheelchair Concept,” lecture for an Inventor Driven Design series at the Georgia Tech Rehabilitation Engineering and Applied Research Lab 2013

## PROFESSIONAL MEMBERSHIPS AND SERVICE

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- ♦ Member, IEEE Engineering in Medicine and Biology Society 2014-present
- ♦ Member, IEEE Robotics and Automation Society 2016-present
- ♦ Ad-hoc Reviewer, Robotics and Automation Letters 2016-present
- ♦ Ad-hoc Reviewer, IEEE Transactions on Mechatronics 2017-present
- ♦ Ad-hoc Reviewer, IEEE Transactions on Neural Systems and Rehabilitation Engineering 2017-present
- ♦ Ad-hoc Reviewer, BMJ Open 2021-present
- ♦ Ad-hoc Reviewer, Mechanism and Machine Theory 2020-present
- ♦ Ad-hoc Reviewer, Royal Society Open Science 2021-present
- ♦ Ad-hoc Reviewer, Journal of Biomechanics 2021-present
- ♦ Ad-hoc Reviewer, PLOS One 2021-present
- ♦ Mentor, Niles West High School STEM Mentorship Program 2016
- ♦ Co-teacher, Solidworks Workshops for graduate students 2015-2017
- ♦ Volunteer, Get-a-Grip elementary school education program 2014-2017