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Engineering & Scientific Consulting

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Professional Profile

Dr. Thalman is trained in systems engineering and mechatronic robotics, with an emphasis on wearables, mechanical/material characterization, and engineering design. She has a diverse skillset that expands across fields of textile and wearable technology design, human/robot interaction, biomechanics, and electrical design. At Exponent, Dr. Thalman utilizes her expansive background and hands-on training to focus her work toward assisting clients in failure analysis, testing, and review of the safety and designs of commercial products, electrical vehicles, and battery/energy storage systems.

With a background focused on wearable technologies, Dr. Thalman's skillsets revolve around advancing the design of commercial and industrial products to enhance safety, comfort, and ease of use for the end-user. Dr. Thalman is skilled in mechanical characterization of systems and materials, FEA analysis, data analysis and visualization, CAD design, and system instrumentation. She also has knowledge in PCB design and manufacturing, and the use of motion capture systems to evaluate biomechanical behaviors in people, as well as the movement of dynamic engineering systems.

Dr. Thalman was a National Science Foundation Graduate Research Fellow in the Ira A. Fulton Schools of Engineering at Arizona State University, where she developed a textile-based soft robotic ankle-foot orthosis (AFO) for lower-body rehabilitation purposes, aimed at assisting stroke survivors to achieve a more symmetric gait after suffering hemiparesis after a stroke. Her research was focused on designing pneumatically powered soft actuators, mechanically programmed to achieve and execute specific motions and stiffness profiles to assist users during walking. She designed the soft AFO using textiles, which she optimized and characterized through FEA and evaluated on a variety of users. Her design was awarded first place in the 2020 IEEE WearRAcon Innovation Challenge.

Academic Credentials & Professional Honors

Ph.D., Systems Engineering, Arizona State University, 2021

M.S., Systems Engineering, Arizona State University, 2018

B.S.E., Engineering, Arizona State University, 2016

National Science Foundation, NSF Graduate Research Fellowship Program (GRFP) (2017 – 2020)

Dean's Fellowship (Arizona State University) (2021)

Winner of IEEE WearRAcon 2020 Innovation Challenge

IMPACT Award – ASU (2016)

Prior Experience

Apple Inc., Design Validation Engineer, Biomechanics Research Center, Aug 21' – May 23'

Raytheon Missile Systems, Product Test Engineering, May 16' – Aug '17

Intel Inc., Engineering Intern, May '15 – May 16'

Patents

Thalman, C., Baye-Wallace, L. and Lee, H., Arizona Board of Regents of ASU, 2023. Hip exosuit to assist hip flexion and extension. U.S. Patent Application 17/938,491.

Polygerinos, P., Thalman, C. and Lam, Q., Arizona Board of Regents of ASU, 2021. Assisted lifting devices. U.S. Patent 11,103,991.

Lee, H., Thalman, C., Hertzell, T. and Debeurre, M., 2021. Soft actuator ankle support assembly. U.S. Patent Application 17/348,149.

Polygerinos, P., Hsu, J., Moore, S. and Thalman, C., 2019. Soft dynamic ankle-foot orthosis exosuit for gait assistance with foot drop. U.S. Patent Application 16/396,409.

Polygerinos, P., Adams, W., Thalman, C. and Elsaad, H., Arizonaboard Of Regents On Behalf Of Arizona State University, 2021. Water pipe inspection robot and method of traversing a water pipe. U.S. Patent 11,209,114.

Publications

Thalman, C.M., Lam, Q.P., Nguyen, P.H., Sridar, S. and Polygerinos, P., 2018, October. A novel soft elbow exosuit to supplement bicep lifting capacity. In 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (pp. 6965-6971). IEEE.

Thalman, C. and Artemiadis, P., 2020. A review of soft wearable robots that provide active assistance: Trends, common actuation methods, fabrication, and applications. Wearable Technologies, 1, p.e3.

Thalman, C.M., Baye-Wallace, L. and Lee, H., 2021, September. A soft robotic hip exosuit (SR-HExo) to assist hip flexion and extension during human locomotion. In 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (pp. 5060-5066). IEEE.

Mishra, S., Yang, D., Thalman, C., Polygerinos, P. and Zhang, W., 2018, September. Design and control of a hexacopter with soft grasper for autonomous object detection and grasping. In Dynamic Systems and Control Conference (Vol. 51913, p. V003T36A003). American Society of Mechanical Engineers.

Thalman, C.M. and Lee, H., 2020, May. Design and validation of a soft robotic ankle-foot orthosis (sr-afo) exosuit for inversion and eversion ankle support. In 2020 IEEE International Conference on Robotics and Automation (ICRA) (pp. 1735-1741). IEEE.

Thalman, C.M., Hsu, J., Snyder, L. and Polygerinos, P., 2019, May. Design of a soft ankle-foot orthosis exosuit for foot drop assistance. In 2019 International Conference on Robotics and Automation (ICRA) (pp. 8436-8442). IEEE.

Baye-Wallace, L., Thalman, C.M. and Lee, H., 2022. Entrainment during human locomotion using a

lightweight soft robotic hip exosuit (SR-HExo). IEEE Robotics and Automation Letters, 7(3), pp.6131-6138.

Thalman, C.M., Debeurre, M. and Lee, H., 2021. Entrainment during human locomotion using a soft wearable ankle robot. IEEE Robotics and Automation Letters, 6(3), pp.4265-4272.

Nguyen, P.H., Sridar, S., Amatya, S., Thalman, C.M. and Polygerinos, P., 2019, April. Fabric-based soft grippers capable of selective distributed bending for assistance of daily living tasks. In 2019 2nd IEEE International Conference on Soft Robotics (RoboSoft) (pp. 404-409). IEEE.

Thalman, C., Baye-Wallace, L. and Lee, H., Arizona Board of Regents of ASU, 2023. Hip exosuit to assist hip flexion and extension. U.S. Patent Application 17/938,491.

Thalman, C.M., Hertzell, T., Debeurre, M. and Lee, H., 2022. Multi-degrees-of-freedom soft robotic ankle-foot orthosis for gait assistance and variable ankle support. Wearable technologies, 3, p.e18.

Debeurre, M., Thalman, C.M., Hertzell, T. and Lee, H., Soft robotic AFO for active stroke rehabilitation. Team SR-AFO: Wearracon 2020 Innovation Challenge Competition Application.

Thalman, C.M., Hertzell, T., Debeurre, M. and Lee, H., 2020, October. The multi-material actuator for variable stiffness (mavs): Design, modeling, and characterization of a soft actuator for lateral ankle support. In 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (pp. 8694-8700). IEEE.

Thalman, C.M., Hertzell, T. and Lee, H., 2020, May. Toward a soft robotic ankle-foot orthosis (sr-afo) exosuit for human locomotion: Preliminary results in late stance plantarflexion assistance. In 2020 3rd IEEE International Conference on Soft Robotics (RoboSoft) (pp. 801-807). IEEE.

Adams, W., Sridar, S., Thalman, C.M., Copenhaver, B., Elsaad, H. and Polygerinos, P., 2018, April. Water pipe robot utilizing soft inflatable actuators. In 2018 ieee international conference on soft robotics (robosoft) (pp. 321-326). IEEE.

Presentations

“Soft robotic AFO for active stroke rehabilitation.” Team SR-AFO: IEEE Wearracon 2020 Innovation Challenge Competition, Scottsdale, AZ, USA

“A Novel Soft Elbow Exosuit to Supplement Bicep Lifting Capacity.” IEEE Wearracon 2018 Innovation Challenge Competition, Scottsdale, AZ, USA

“Design of a Soft Ankle-Foot Orthosis Exosuit for Foot Drop Assistance” Presented at the 2019 IEEE International Conference on Robotics and Automation (ICRA)