

Phillip M. Grice

Curriculum Vitae

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Education

- 2010–2017 **Ph.D. – Robotics**, Georgia Institute of Technology, Atlanta, GA, USA.
2006–2010 **Sc.B. – Biomedical Engineering & Latin**, Brown University, Providence, RI, USA, *cum laude*, departmental honors.

Dissertation

- Title *Assistive Mobile Manipulation for Users with Severe Motor Impairments*
Adviser Charles C. Kemp, Ph.D.
Description I developed and evaluated an assistive robotic system that can enable individuals with profound motor impairments to perform self-care and household tasks, with a focus on accessible design and complex, real-world system integration.

Experience

- 2017–Present **Robotics Scientist**, BOSSA NOVA ROBOTICS, Pittsburgh, PA, USA.
Helping to bring robots out of labs and into the everyday world.
- 2010–2017 **Graduate Research Assistant**, GEORGIA TECH, Atlanta, GA, USA.
CORE STUDY AREAS: Perception, Controls, Human-Robot Interaction
I designed and evaluated an assistive mobile manipulation system for individuals with severe motor impairments that enabled a >5x average score improvement on a standardized manipulation test. While developing this system, I incorporated regular, expert user feedback in a rapid, iterative design process to improve functionality and usability. I also led the development and technology transfer of Autobed, a Raspberry Pi-based module enabling web-based control of a home hospital bed. I built a novel, wearable safety sensor (the Wouse) to detect wincing, using machine learning for real-time data processing. I have integrated complex research systems on multiple real robots and designed and conducted evaluations on these systems. I have communicated my work in numerous peer-reviewed publications and public presentations to both technical and non-technical audiences.
- 2008–2010 **Undergraduate Researcher**, BROWN UNIVERSITY, Providence, RI, USA.
I designed and tested a novel, optically-powered nerve cuff for functional electrical stimulation. I performed the full design and evaluation process from mechanical and electrical design to biocompatibility and *in vivo* testing in a small animal model, and presented my results to students and faculty in a public seminar.

- 2010 **E2S2I Summer Intern**, AIR FORCE INSTITUTE OF TECHNOLOGY,
May–July Wright-Patterson AFB, OH, USA.
I made system improvements to a ground-based prototype of the space-based hyperspectral Chromotomography Experiment (CTEx), improving optical image quality and ease of use, and establishing a workflow for subsequent data processing. I presented my results to students and faculty, including active-duty military, in a public seminar.
- 2009 **Directed Energy Summer Intern**, AIR FORCE INSTITUTE OF TECHNOLOGY,
May–August Wright-Patterson AFB, OH, USA.
I developed a novel model of Terahertz radiation propagation through brownout conditions after performing multiple bench-top experiments. I then incorporated my experimentally-derived model into an existing software product for atmospheric radiation transmission. I presented my results both at a public seminar, and at the annual Directed Energy Professional Society Annual Meeting.
- 2008 **Directed Energy Summer Intern**, AIR FORCE INSTITUTE OF TECHNOLOGY,
May–August Wright-Patterson AFB, OH, USA.
I led the development and calibration of a camera-based system for high-temperature BRDF acquisition, including optical and mechanical design and software development for image processing and data analysis. I presented my results both at a public seminar, and at the annual Directed Energy Professional Society Annual Meeting.

Skills

- Expertise User-centered Research, Complex System Integration (Hardware & Software), Human-Robot Interaction, Design of Experiments, Data Analysis, Interface Design, Web Technologies
- Languages Python, Javascript, HTML5 & CSS3, Arduino, C/C++, Bash, MATLAB, LabVIEW
- Software ROS, jQuery/jQueryUI, OpenRAVE, PCL, OpenCV, git/GitHub, svn, AWS, L^AT_EX, Linux
- Hardware Electronics Prototyping, Soldering, PCB Design (Eagle), CAD (SolidWorks), 3D printing

Awards

- 2016 National Network for Manufacturing Innovation (NNMI): Georgia Tech Student Poster Competition – 2nd Place
- 2016 Residential Care Facilities for the Elderly Authority of Fulton County Scholar Award
- 2015 Residential Care Facilities for the Elderly Authority of Fulton County Scholar Award
- 2014 Residential Care Facilities for the Elderly Authority of Fulton County Scholar Award
- 2012 National Science Foundation – Graduate Research Fellowship Program Fellow
- 2011 George Family Foundation – George Fellowship
- 2010 Georgia Institute of Technology – President’s Fellowship
- 2010 Tau Beta Pi
- 2006 Eagle Scout

Publications

Journals

- Under Review **In-home and Remote Use of Robotic Body Surrogates by People with Profound Motor Deficits.** PM Grice and CC Kemp.
- 2013 **Robots for Humanity: A Case Study in Assistive Mobile Manipulation.** TL Chen, M Ciocarlie, S Cousins, **PM Grice**, K Hawkins, K Hsiao, CC Kemp, C-H King, DA Lazewatsky, A Leeper, H Nguyen, A Paepcke, C Pantofaru, WD Smart, L Takayama. *IEEE Robotics and Automation Magazine (RAM), Special Issue on Assistive Robotics*. Vol. 20. March 2013.
- 2012 **A Technique to Measure Optical Properties of Brownout Clouds for Modeling Terahertz Propagation.** ST Fiorino, JA Deibel, **PM Grice**, MH Novak, J Spinoza, L Owens, S Ganti. *Applied Optics*. 51(16):3605-3613. June 2012.

Conferences

- Under Review **An Assistive Robotic System with a Robotics Bed and a Mobile Manipulator.** A Kapusta, **PM Grice**, HM Clever, Y Chitalia, D Park, CC Kemp. *Under Review*
- 2016 **Autobed: Open Hardware for Accessible Web-Based Control of an Electric Bed.** **PM Grice**, Y Chitalia, M Rich, HM Clever, CC Kemp. *Rehabilitation Engineering and Assistive Technology Society of North America, 2016 Annual Conference*. Washington, DC, USA. July 13, 2016.
- 2014 **Assistive Mobile Manipulation for Self-Care Tasks Around the Head.** KP Hawkins, **PM Grice**, TL Chen, C-H King, CC Kemp. *2014 IEEE Symposium on Computational Intelligence in Robotic Rehabilitation and Assistive Technologies*. Orlando, FL. December 2014.
- 2013 **Whole-Arm Tactile Sensing for Beneficial and Acceptable Contact During Robotics Assistance.** **PM Grice**, MD Killpack, A Jain, S Vaish, J Hawke, CC Kemp. *Rehabilitation Robotics (ICORR), 2013 IEEE International Conference on*. June 2013.
- 2012 **Robots for Humanity: User-Centered Design for Assistive Mobile Manipulation.** TL Chen, M Ciocarlie, S Cousins, **PM Grice**, K Hawkins, K Hsiao, CC Kemp, C-H King, DA Lazewatsky, A Leeper, H Nguyen, A Paepcke, C Pantofaru, WD Smart, L Takayama. *Intelligent Robots and Systems (IROS), 2012 IEEE/RSJ International Conference on*. pp. 2434-2435. October 2012.
- 2012 **The Wouse: A Wearable Wince Detector to Stop Assistive Robots.** **PM Grice**, A Lee, H Evans, CC Kemp. *21st IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*. pp. 165-172. September 2012.
- 2010 **Lab Measurements to Support Modeling Terahertz Propagation in Brownout Conditions.** ST Fiorino, **PM Grice**, MJ Krizo, RJ Bartell, JD Haiducek, SJ Cusumano. *SPIE Defense, Security, and Sensing*. April 2010.
- 2009 **Modeling THz Propagation in Brownout Conditions.** **PM Grice**. 12th Annual Directed Energy Symposium. San Antonio, TX. November 3, 2009.

2008 **Image Based BRDF Acquisition. PM Grice.** *11th Annual Directed Energy Symposium.* Honolulu, HI. November 18, 2008.

[Presentations & Workshops](#)

2017 **7 Day In-home Evaluation: Mobile Manipulator Robot. PM Grice, HM Clever.** *TechSAge State of the Science Conference.* Atlanta, GA, USA. March 27, 2017.

2016 **Assistive Mobile Manipulation: Designing for Operators with Motor Impairments. PM Grice, CC Kemp.** *Socially & Physically Assistive Robotics for Humanity, RSS 2016 Workshop.* Ann Arbor, MI, USA. May 18, 2016.

2014 **A System for Reaching in Unknown Clutter that Integrates Model Predictive Control, Learning, Haptic Mapping, and Planning. T Bhattacharjee¹, PM Grice¹, A Kapusta¹, MD Killpack¹, D Park¹, CC Kemp.** *IROS 2014 Workshop: 3rd Workshop on Robots in Clutter: Perception and Interaction in Clutter.* September 18, 2014. ¹Listed Alphabetically.

2012 **Robots for Humanity: Developing Assistive Mobile Manipulation. PM Grice, TL Chen, M Ciocarlie, S Cousins, K Hawkins, K Hsiao, C-H King, D Lazewatsky, A Leeper, H Nguyen, A Paepcke, C Pantofaru, W Smart, L Takayama, CC Kemp.** *2012 Biomedical Engineering Society Annual Meeting – Assistive Technology & Robotics in Rehabilitation Engineering.* October 2012.

2009 **Modeling THz Propagation in Brownout Conditions. PM Grice.** *Directed Energy Education Workshop.* San Antonio, TX, USA. November 6, 2009.

2008 **2008 AFIT DE Summer Intern Program. M Houle, B McClung, PM Grice.** *Directed Energy Education Workshop.* Honolulu, HI. November 21, 2008.

[Internal Presentations](#)

2016 **Assistive Mobile Manipulation for Users with Severe Motor Impairments. PM Grice.** *Defense of Ph.D. Dissertation.* Atlanta, GA. June 12, 2017.

2016 **Whole-arm Tactile Sensing for Beneficial and Acceptable Contact During Robotics Assistance. PM Grice.** *National Network for Manufacturing Innovation (NNMI): Georgia Tech Student Poster Competition.* Atlanta, GA. March 29, 2016.

2015 **Assistive Mobile Manipulation for Users with Severe Motor Impairments. PM Grice.** *Dissertation Proposal, Robotics Ph.D. Program, Georgia Institute of Technology.* Atlanta, GA. July 31, 2015.

2014 **A System for Reaching in Unknown Clutter that Integrates Model Predictive Control, Learning, Haptic Mapping, and Planning. PM Grice.** *Robo-Grads Student Seminar, Institute for Robotics and Intelligent Machines.* Atlanta, GA. September 25, 2014.

2012 **Robots for Humanity: Developing Assistive Mobile Manipulation. PM Grice.** *Graduate and Post-doc (GaP) Seminar, Institute for Bioengineering and Biosciences.* Atlanta, GA. October 17, 2012.

- 2011 **Robots for Humanity: An Accessible Interface for Mobile Manipulation by the Motor Impaired.** PM Grice, TL Chen, H Nguyen, CC Kemp. *RIM Keeps You on the Edge*, Center for Robotics and Intelligent Machines. Atlanta, GA. April 28, 2011.
- 2010 **An Optically Powered Nerve Cuff for Functional Electrical Stimulation.** PM Grice. *Undergraduate Research Honors Symposium*. Brown University. Providence, RI. April, 2010.

Teaching & Mentorship

- 2016 **Research Mentor** *Yuuna Hoshi* - Undergraduate Researcher
Summer
- 2014 – 2015 **Research Mentor** *Megan Rich* - Undergraduate Researcher
- 2013 – 2014 **Research Mentor** *Yen Huang* - Undergraduate Researcher
- 2013 **Teaching Assistant** BMED 3110 - Quantitative Engineering Physiology Lab. I
Spring
- 2012 **Teaching Assistant** BMED 3110 - Quantitative Engineering Physiology Lab. I
Fall
- 2012 **Research Mentor** *Anjana Kallarackal* - Undergraduate Researcher
Fall
- 2011 **Instructor** Robotics Merit Badge, BSA Troop 231
November