

Winona Richey

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RESEARCH INTERESTS

Image Guided Surgery • Computer Vision • Finite Element Modeling • Machine Learning

EDUCATION

2017-Present	Doctor of Philosophy, <i>Biomedical Engineering</i> , Vanderbilt University, Nashville, TN
2013- 2017	Bachelor of Science, <i>Biomedical Engineering with Secondary Major in Computer Science</i> , Tulane University, New Orleans, LA

EXPERIENCE

2017 - Present	<i>Biomedical Modeling Lab</i> , with Dr. Michael Miga; Vanderbilt University, Nashville, TN <ul style="list-style-type: none">• Dissertation Title: “<i>Computer vision-driven image guided breast conserving surgery</i>”• Establishing an integrated system for data collection and visualization for breast conserving surgery (BCS) using stereo cameras and computer vision• Developing a novel model-based correction of breast deformation using preoperative MR data and sparse intraoperative data• Integrating computer vision-based digitization and model-based correction approaches within a BCS image guidance approach
2016 - 2017	<i>Biomedical Engineering Lab</i> , with Dr. Doug Chrisey; Tulane University, New Orleans, LA <ul style="list-style-type: none">• Thesis Title: “<i>Matrix assisted pulsed laser evaporation direct write (MAPLE-DW) automated transfer validation: a machine learning approach</i>”• Designed experiments and software for detection of 3D bioprinting cell transfers using image processing and machine learning
2016	<i>NSF sponsored REU: Center for Research in Computer Vision</i> , with Dr. Ulas Bagci; University of Central Florida, Orlando, FL <ul style="list-style-type: none">• Implemented hand crafted features, combined with deep learning features for lung nodule detection in CT scans

PUBLICATIONS

1. **W. L. Richey**, J. S. Heiselman, M. Luo, I. M. Meszoely, and M. I. Miga, "Impact of deformation on a supine-positioned image guided breast surgery approach," *International Journal of Computed Assisted Radiology and Surgery*. In Review.
2. J. S. Heiselman, **W. L. Richey**, S. L. Taylor, and M. I. Miga, "Improving accuracy of image-to-physical laparoscopic liver registration via reconstruction of intrahepatic pressure changes from abdominal insufflation," in *Medical Imaging 2021: Image-Guided Procedures, Robotic Interventions, and Modeling*, 2021, vol. 11598, p. 115980W: International Society for Optics and Photonics.

3. **W.L. Richey**, J.S. Heiselman, M. Luo, I. M. Meszoely, and M. I. Miga, "Textual fiducial detection in breast conserving surgery for a near-real time image guidance system," in Medical Imaging 2020: Image-Guided Procedures, Robotic Interventions, and Modeling, 2020, vol. 11315, p. 113151L: International Society for Optics and Photonics.
4. **W. L. Richey**, M. Luo, S. E. Goodale, L. W. Clements, I. M. Meszoely, and M. I. Miga, "A system for automatic monitoring of surgical instruments and dynamic, non-rigid surface deformations in breast cancer surgery," in Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling, 2018, vol. 10576, p. 105761H: International Society for Optics and Photonics.
5. N. Khosravan, **W. L. Richey**, U. Bagci. "How Deep Can Hand Crafted Features Be?" In IEEE International Engineering in Medicine and Biology Conference (EMBC). 2018.
6. S. C. Sklare, **W. L. Richey**, B. T. Vinson, and D. B. Chrisey, "Directed self-assembly software for single cell deposition," International Journal of Bioprinting, vol. 3, no. 2, 2017.

AWARDS

- 2019-Present *T32 Graduate Fellowship Award: Vanderbilt Institute for Surgery and Engineering Training Program for Surgical and Interventional Engineering, National Institutes of Health National Institute of Biomedical Imaging and Bioengineering T32EB021937*
- 2020 *Finalist: Vanderbilt Institute of Surgery and Engineering Symposium, top 5 poster presentations*
- 2018 *Honorable Mention: National Science Foundation Graduate Research Fellowship, top 30%*
- 2018 *Honorable Mention: Ford Foundation Graduate Research Fellowship, top 30%*
- 2017 *Vanderbilt Engineering Graduate Fellowship, \$5000, Vanderbilt University*
- 2017 *Tulane 34 Award, Tulane University*
- For leadership, service and academic excellence; presented to 34 graduates across undergraduate, graduate, law, and medical schools
- 2017 *Leaders in Service Award; Tulane University*
- For improving the community through service-learning courses and student leadership
- 2013-2017 *Presidential Scholarship, 50% of tuition, room and board; Tulane University*

CONTRIBUTED TALKS

1. Textual fiducial detection in breast conserving surgery for a near-real time image guidance system. *SPIE Medical Imaging*. 2020
2. A Novel Guidance System for Breast Conserving Surgery. *Vanderbilt Ingram Cancer Center Breast Cancer Research Program Retreat*. 2020
3. Computer Vision Driven Image Guided Breast Conserving Surgery. *Research in Progress Seminar, Vanderbilt Institute of Surgery and Engineering*. 2020
4. Computer Vision Tracking in an Image Guidance System for Breast Cancer Lumpectomy. *Research in Progress Seminar, Vanderbilt Institute of Surgery and Engineering*. 2019
5. A system for automatic monitoring of surgical instruments and dynamic, non-rigid surface deformations in breast cancer surgery. *SPIE Medical Imaging*. 2018

LEADERSHIP and SERVICE

2017 - Present	<i>Women of Vanderbilt Institute of Surgery and Engineering</i> ; Nashville, TN <ul style="list-style-type: none">• Planning Committee, 2017-2019; Founding President 2019-2020, Steering Committee 2020-Present• Started and formalized the group to foster community, discuss translational research, and promote the success of women in STEM• Coordinate monthly events including invited speakers, mentorship groups, K-12 outreach, gender inequality discussions
2017 – Present	<i>Glenclyff High School STEM Outreach</i> ; Nashville, TN <ul style="list-style-type: none">• Biomedical Engineering Graduate Student Alliance Outreach Chair, 2018-2019, 2020-Present; monthly lectures and hands-on activities• Developed and led events; introductions to Vanderbilt research areas and a discussion panel on college, research, and STEM
2017-2020	<i>Vanderbilt Center for Science Outreach, Tutor</i> <ul style="list-style-type: none">• Tutored computer science, chemistry and pre-calculus
2019	<i>Vanderbilt Biomedical Engineering Graduate Recruitment Coordinator</i> <ul style="list-style-type: none">• Organized the invitation weekend for prospective students
2017-2018	<i>Vanderbilt Students Volunteering for Science, Team Leader</i> <ul style="list-style-type: none">• Led weekly science lectures and hands-on activities
2015-2017	<i>Tulane Center for Public Service, Leader of Service Learning Assistants</i> <ul style="list-style-type: none">• Provide logistical support to Senior Program Coordinator for service learning; manage mentoring and co-training of 27 service learning assistants; organize speakers/special events; aid in hiring• Coordinated communication between community partners, Tulane professors and service learning students; managed logistics and facilitated class discussions, reflections and workshops
2016-2017	<i>Tulane Academic Success Center</i> <ul style="list-style-type: none">• Supervised team of 20 tutors; restructured of team meetings to focus on teaching pedagogy; tutor chemistry, physics, calculus, and engineering courses (all levels offered)