

# Blake E. Zimmerman

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As a recent graduate from the University of Utah with a doctoral degree in Biomedical Engineering, I have experience in computational applications. I am passionate about machine learning, computational optimization, applied mathematics, and image processing. I am looking for employment that will continue applying and developing my creative problem solving skills in computational sciences and machine learning applications.

## Education

**Ph.D. Biomedical Engineering, GPA: 3.906**

December 2020

*University of Utah*

*Salt Lake City, UT*

**M.S. Bioengineering**

December 2018

*University of Utah*

*Salt Lake City, UT*

**B.S. Biomedical Engineering, GPA: 3.808**

May 2016

*University of Utah*

*Salt Lake City, UT*

### Selected Courses:

- |                              |                                |                                       |
|------------------------------|--------------------------------|---------------------------------------|
| – Mathematics of Imaging     | – Programming for Engineers    | – Introduction to Topology            |
| – Image Processing           | – Computational Methods        | – Medical Imaging Systems             |
| – Introduction to Bioimaging | – Introduction to Optimization | – Advanced Magnetic Resonance Imaging |
| – Ultrasound                 | – Classical Control Systems    | – Proposal Writing & Presentation     |

## Skills

**Languages & Libraries:** Python,  $\text{\LaTeX}$ , MATLAB, PyTorch, Tensorflow, Git, Bash, CMake, C/C++

**Operating Systems:** Linux (Ubuntu, openSUSE, CentOS), Windows, macOS

**Applications:** Adobe Premier Pro, Adobe Illustrator, Blender, Solidworks, MS Office Suite, GSuite, Visual Studio Code, Amira, 3D Slicer, Paraview, Seg3D

**Lab Skills:** Automated digital imaging, soft tissue sectioning, non-primate surgery, oscilloscopes, bioelectrical instrumentation, signal analysis, confocal and bright-field microscopy

**Prototyping:** Soldering, 3D printing, plastic casting

**Professional:** Strong verbal and written communication skills, excellent presentation abilities, superb group collaboration and team skills, outstanding project and time management.

## Relevant Experience

### • Utah Center for Advanced Imaging Research (UCAIR)

Salt Lake City, UT

*Postdoctoral Researcher*

*December 2020 – Present*

*Graduate Research Assistant to Allison H. Payne*

*May 2018 – December 2020*

- Applied machine learning techniques to clinically targeted biomedical applications.
- Designed and implemented novel histology workflow for quantitative imaging applications.
- Developed standard operating procedures for transferring histology procedures.
- Communicated results and collaborated on grant proposals.

### • Scientific Computing and Imaging (SCI) Institute

Salt Lake City, UT

*Graduate Research Assistant to Sarang C. Joshi*

*January 2016 – December 2020*

- Accelerated computational projects with GPU clusters and distributed Linux computing.
- Designed and implemented diffeomorphic image registration algorithms for multi-modality images.
- Machine learning projects including image super resolution using convolution neural networks.

- Initiated and coordinated deep learning meetings for students and faculty.
- Animated and produced [video summary](#) for effective communication of image registration projects.

- **Department of Biomedical Engineering**

Salt Lake City, UT

*Teaching Assistant for Biosystems Analysis, Computational Methods*

Fall 2016, Spring 2017

- Managed office hours to reinforce course content from lectures and assignments.
- Guided and instructed student groups in their development of introductory computational projects.
- Provided constructive feedback to students on lab report documents.
- Led laboratory exercises and communicated student evaluations to professors.

- **Bard Access Systems**

Salt Lake City, UT

*Imaging Research and Development Intern*

January 2015 – January 2016

*Field Assurance Engineer Intern*

May 2014 – December 2014

- Traveled to implement product design changes at remote manufacturing facilities.
- Designed and led component qualification operations for product development.
- Communicated and implemented standard operating procedures and reports according to FDA standards.
- Coordinated with component suppliers and manufacturing teams to ensure product success.
- Wrote professional reports to communicate identified failure mode analysis on implanted medical devices.

- **Orthopedic Research Lab**

Salt Lake City, UT

*Undergraduate Research Assistant*

May 2013 – May 2014

- Segmented and built 3D models of human hips from CT images and perform real-life motion experiments.
- Generated mesh structures of hip joint cartilage for finite element analysis during motion animations.
- Communicated scientific results with poster and oral presentations in professional conference settings.

## Open Source Projects

- **CAMP**

[GitHub Repository](#)  
[Documentation](#)

*Computational Anatomy and Medical imaging using PyTorch*

- Wrote core techniques, including data i/o, as building blocks other research projects.
- Contributed GPU-accelerated implementations of medical image registration algorithms.
- Documented functions and examples, including coordinate system conventions for medical images.
- Developed 3D deformable surface registration for triangular mesh objects.
- Implemented volume-preserving deformable registration to reflect physiological tissue deformations.

## Selected Contributions:

[Google Scholar](#), [arXiv](#)

1. **Zimmerman, B. E.**, Johnson, S. L., Odéen, H. A., Shea, J. E., Winkler, N. S., Factor, R. E., Joshi, S. C., & Payne, A. H. (2020). Towards Acute, Non-contrast Assessment of Magnetic Resonance Guided Focused Ultrasound Thermal Therapies. *In Preparation*.
2. **Zimmerman, B. E.**, Johnson, S. L., Odéen, H. A., Shea, J. E., Factor, R. E., Joshi, S. C., & Payne, A. H. (2020). Histology to 3D In Vivo MR Registration for Volumetric Evaluation of MRgFUS Treatment Assessment Biomarkers. *Scientific Reports*, Manuscript submitted for publication.
3. **Zimmerman, B. E.**, Johnson, S., Odéen, H., Shea, J., Foote, M. D., Winkler, N., Sarang Joshi, & Payne, A. (2020). Learning Multiparametric Biomarkers for Assessing MR-Guided Focused Ultrasound Treatments. *IEEE Transactions on Biomedical Engineering*.
4. Johnson, S. L., **Zimmerman, B. E.**, Shea, J. E., Odéen, H. A., Winkler, N. S., ., Factor, R. E., Merrill, R., Hadley, R., Joshi, S. C., & Payne, A. H. (2020). Assessment of Acute Thermal Lesions after MRgFUS Ablation with Longitudinal Volumetric MRI Registration [Submitted: *Journal of Hyperthermia*]
5. Foote, M. D., **Zimmerman, B. E.**, Sawant, A., & Joshi, S. C. (2019, June). Real-time 2d-3d deformable registration with deep learning and application to lung radiotherapy targeting. In *International Conference on Information Processing in Medical Imaging* (pp. 265-276). Springer, Cham.

## Honors and Awards

Undergraduate Research Opportunities Program Student Research Award (\$1200)

Spring 2014

Dean's List

Fall 2011 – Spring 2016

Eagle Scout Award

2009

## Volunteer Experience

- **Graduate Student Activities Committee**

Bioengineering Department

*Member*

*Sep. 2015*

- Hosted incoming graduate students for recruitment weekend, including poster sessions, faculty interviews, and a ski day.
- Participated in planning for department activities and the Utah Bioengineering Conference.

- **Lowell Bennion Community Service Center's Project Youth**

*Campus Host*

*Apr. 2015*

- Welcomed hundreds of local 6th graders to the University of Utah campus for a day.
- Led a small group of students during and between interactive lectures to encourage college attendance.

## Interests

**Academic:** Machine Learning, Applied Mathematics, Image Registration, Image Processing

**Sports:** Skiing, mountain biking, rock climbing, ice climbing, mountaineering, trail running, river rafting, and more.

**Computers:** GPU coding, networking, home automation, web development.