

Heather L. Borgard**Education**

- 2023 PhD in Biomedical Engineering (*No Degree*), University of California, Davis
- 2017-2020 MSc in Biomedical Engineering, University of British Columbia, Vancouver, Canada
- Thesis: *Predicting Occlusal Force and Area through a Simulation of Mastication and Controlled Study*
- 2011-2015 BS in Biomedical Engineering, Arizona State University, Tempe, AZ
- Capstone: *Universal Bioreactor for Tissue Engineering of Hollow Organs*

Professional Experience

- 2022-2023 Senior Bioinformatics Systems Analyst
University of California Santa Cruz / Santa Cruz, CA
- Developed and maintained bioinformatic workflows from genomic sequencing to data analysis for large-scale projects including single-cell DNA sequencing.
 - Designed data models and scripts for consistent, accurate, and repeatable implementation
- 2022-2023 Research Associate (Informatician I)
Oregon Health & Science University / Portland, OR
- Developed machine learning models in Python and R using EHR data to predict patient appointment attendance and cancellations for OHSU hospital system
 - Researched how baseline recordings affect data quality using national and local registries of ophthalmological data
- 2020-2022 Bioinformatics Core Program Manager
Research Corporation of University of Hawaii / Honolulu, HI
- Supported bioinformatics researchers and students by handling administrative processes and helping receive several internal and external grant funding
- 2017-2020 Graduate Research Assistant
University of British Columbia / Vancouver, Canada
- Predicted postoperative functional outcomes following mandibular reconstruction surgery through patient-specific computer simulations of mastication
- 2018-2019 Animal Care Technician
University of British Columbia / Vancouver, Canada
- Delivered superior animal care for labs within in a large research facility
- 2015-2017 Research Assistant
Midwestern University / Glendale, AZ
- Oversaw multiple research projects comparing animal models of the larynx to functional analysis of vocalization leading to two publications
- 2015-2017 Physical Therapy Rehab Technician

Banner Health / Sun City, AZ

- Aided physical therapists with treatment plans and led a weekly Parkinson's patient therapy class

2014-2015

Biomedical Product Development

Arizona State University / Tempe, AZ

- Conducted a capstone project with the Mayo Clinic of Arizona to develop a hollow organ bioreactor stimulating vocal cell proliferation

Awards and Scholarships

2018

Volunteer of the Month

Let's Talk Science Award

2018

Faculty of Applied Science Graduate Award

UBC Scholarship

2011-2015

Regents High Honors Endorsement

ASU Scholarship

2014-2015

Dean's List

*ASU***Technical Skills**Programming Languages: R (8 years), Python (5 years), C++ (6 years), Matlab (5 years), Java (2 years)Software: Amira, Avizo, Blender, SPSS, SolidWorks, UnityMedical Image Analysis: CT, MRI, DTIMachine Learning: PyTorch, Scikit-Learn, TensorFlow, NumPyNGS bioinformatics pipelines: Oxford Nanopore, Hi-C**Publications**

Gao Z., Xu J., Jijiwa M., Nasu M., **Borgard H.**, Gong T., Chen S., Fu Y., Deng Y. (2022 accepted). Comprehensive landscape of tRNA-derived fragments in lung cancer. *Molecular Therapy Journal of Hematology & Oncology*.

Guo R., Chen Y., **Borgard H.**, Jijiwa M., Nasu M., He M., & Deng Y. (2020). The Function and Mechanism of Lipid Molecules and Their Roles in The Diagnosis and Prognosis of Breast Cancer. *Molecules* (Basel, Switzerland), 25(20), 4864. <https://doi.org/10.3390/molecules25204864>; PMCID: PMC7588012; PMID: 33096860

Borgard H., Abdi A.H., Prisman E., Fels S. (2020) Creation of Categorical Mandible Atlas to Benefit Non-Rigid Registration. In: Ateshian G., Myers K., Tavares J. (eds) *Computer Methods, Imaging and Visualization in Biomechanics and Biomedical Engineering. CMBBE 2019. Lecture Notes in Computational Vision and Biomechanics*, vol 36. Springer, Cham. https://doi.org/10.1007/978-3-030-43195-2_50

Wu X, Sánchez CA, Lloyd J, **Borgard H.**, Fels S, Paydarfar JA, Halter RJ. (2020). Estimating tongue deformation during laryngoscopy using hybrid FEM-multibody model and intraoperative tracking:

a cadaver pilot study. Proc. SPIE 11315, Medical Imaging 2020: Image-Guided Procedures, Robotic Interventions, and Modeling, 113151E. <https://doi.org/10.1117/12.2550471>

Borgard, H.L., Baab, K., Pasch, B. et al. (2020). The Shape of Sound: a Geometric Morphometrics Approach to Laryngeal Functional Morphology. *J Mammal Evol* 27, 577–590 <https://doi.org/10.1007/s10914-019-09466-9>

Wu X, Fels S, Paydarfar JA, Halter RJ, Sanchez CA, Kahng PW, Rees CA, Ponukumati AS, Eisen EA, Pastel DA, **Borgard H**, Lloyd JE. (2019). Multi-modal Framework for Image-guided Trans-oral Surgery with Intraoperative Imaging and Deformation Modeling. *Annu Int Conf IEEE Eng Med Biol Soc.* 2019 Jul; 2019:6975-6978. doi: 10.1109/EMBC.2019.8857322

Abdi, A.H., **Borgard, H.**, Abolmaesumi, P. & Fels, S.. (2019). AnatomyGen: Deep Anatomy Generation From Dense Representation With Applications in Mandible Synthesis. *Proceedings of The 2nd International Conference on Medical Imaging with Deep Learning*, in PMLR 102:4-14

Riede, T., **Borgard, H. L.**, & Pasch, B. (2017). Laryngeal airway reconstruction indicates that rodent ultrasonic vocalizations are produced by an edge-tone mechanism. *Royal Society Open Science.* <https://doi.org/10.1098/rsos.170976>

Presentations

- 2019 *Creation of Categorical Mandible Atlas to Benefit Non-Rigid Registration.* Computer Methods, Imaging and Visualization in Biomechanics and Biomedical Engineering Symposium. New York City, NY, August 2019
- 2019 *A Validated Study on the Prediction of Masticatory Function Post HNC Reconstructive Surgery Using a Subject-Specific Biomechanical Computer Model.* Biomedical Engineering Graduate Association Symposium, University of British Columbia, Vancouver, Canada, March 2019
- 2017 *Airway Reconstruction in Vocal Organs.* Kenneth A. Suarez Research Day, Midwestern University, Glendale, AZ, April 2017
- 2016 *Of Tinamou, Vulture, and Hummingbird Vocal Function and Morphology.* Southwest Brain Cognition and Vocal Behavior Meeting, University of Arizona, Tucson, AZ, August 2016
- 2015 *Universal Bioreactor for Tissue Engineering of Large Hollow Organs for Regenerative and Reparative Medicine.* Biomedical Engineering Symposium, Arizona State University, Tempe, AZ, April 2015.

Teaching Experience

Graduate Teaching Assistant, University of British Columbia

Graded and advised students in courses with 20-30 students

Spring 2019, EECE 518 – *Human Interface Technologies*

Fall 2018, BMEG 557 - *Statistical Methods for Evaluating Medical Technologies*

Teaching Assistant, Arizona State University

Graded and advised students in courses with over 30 students

Fall 2014, BME 382, *Biomedical Product Design and Development*

Spring 2014, BME 300– *Bioengineering Product Design*

Fall 2013, FSE 294 – *Special Topics in Engineering*

Graduate Course Projects

- 1/2018-4/2018 Labyrinth Nature Walk in VR for Stress Reduction Therapy
Human Interface Technologies (EECE518) / Vancouver, Canada
- Developed a virtual reality environment that was targeted to reduce stress and enhance pedestrians' walking experience through a natural, labyrinth meditation
- 1/2018-4/2018 Deep Reinforcement Learning for Simple Motor Arm
Sensiomotor Computation (CPSC 530P) / Vancouver, Canada
- Created an optimal learning control paradigm for an inverse model of biomechanical systems
- 9/2017-12/2017 DTI Fiber Tracking of the Human Tongue
Medical Imaging (EECE 544) / Vancouver, Canada
- Analyzed DTI muscle fiber data of the human tongue and compared with other studies that measured muscle fiber lengths and trajectories

Volunteer Work

- 3/2021-9/2021 Grant Writer
Overt Foundation
- Performed research and crafted proposals to obtain funding for a NPO reducing the financial burden and stigma surrounding mental health treatment
- 2017-2019 Teacher Partnership Volunteer
Let's Talk Science, University of British Columbia
- Designed science curriculum for elementary and middle schools by leading hands-on science activities
- 2013-2015 ProC.U.R.E Volunteer
Project C.U.R.E.
- Repaired, cleaned, packaged medical devices for delivery to underserved areas
- 2013-2014 EMT Volunteer
Student Emergency Medical Services (SEMS), Arizona State University
- Provided direct patient care on the ASU campus as a first responder
- 2012-2013 Research Volunteer
Haynes Lab, Arizona State University
- Performed DNA/RNA isolation utilizing real time PCR methods

Languages

English (Native)

Mandarin (Intermediate)