

# ALANA G. GONZALES

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## EDUCATION

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PhD Student in Optical Sciences, The University of Arizona, Tucson, AZ August 2023 – Present  
GPA: 3.85/4.0

Master of Science in Biomedical Engineering, Duke University, Durham, NC May 2022  
GPA: 3.97/4.0 | Graduate Certificate earned in Global Health

Bachelor of Science in Biomedical Engineering, *cum laude*, The University of Arizona, Tucson, AZ May 2020  
GPA: 3.69/4.0

Bachelor of Arts in 3-2 Engineering, Scripps College, Claremont, CA May 2020  
GPA: 10.67/12

Danish Institute for Study Abroad, Copenhagen, Denmark January 2017 - May 2017

## RESEARCH AND RELEVANT WORK EXPERIENCE

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**Graduate Researcher**, Wyant College of Optical Sciences August 2023 – Present  
Faculty Advisor: Jennifer Barton, PhD, Departments of Optical Sciences and Biomedical Engineering  
University of Arizona, Tucson, AZ

- 2023-2024 **DeMund Foundation Graduate Student Endowed Scholarship in Optical and Medical Sciences**
- 2024-2025 and 2025-2026 **Kenneth E. and Michele L. Moore Endowed Scholarship in Optical Sciences**
- Project: Developing an endoscopic imaging system for early detection of gastric cancer using optical coherence tomography (OCT), doppler OCT (DOCT), and optical coherence elastography (OCE)
- Designing and constructing optical system, including lens and piezoelectric scanning mechanism

**Associate Research Scientist**, SiPhox, Inc., Burlington, MA June 2022 – August 2023

- Developed point-of-care and at-home diagnostic assays with robust photonic chip technology
- Planned and carried out experiments, analyzed results, and made decisions to progress research

**Graduate Researcher**, Center for Global Women's Health Technologies July 2020 – May 2022  
Faculty Advisor: Nirmala (Nimmi) Ramanujam, PhD, Department of Biomedical Engineering  
Duke University, Durham, NC

- 2020-2021 Fitzpatrick Institute for Photonics (FIP) **John T. Chambers Fellowship**
- 2021-2022 Duke University **Biomedical Engineering Second Year Fellowship**
- Project: Tested the ability of a low-cost, image-guided ablative therapy for breast and cervical cancer to induce tumor necrosis and long-lasting immune responses in preclinical murine models
- Conducted longitudinal studies in mice to assess survival, tumor growth, and anti-tumor immune response following breast and cervicovaginal tumor ablation with *in vivo* bioluminescence imaging

## RESEARCH AND RELEVANT WORK EXPERIENCE, CONTINUED

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**Research Trainee**, Maximizing Access to Research Careers (MARC) Program May 2018 – May 2020  
Faculty Mentor: Jeong-Yeol Yoon, PhD, Department of Biomedical Engineering  
The University of Arizona, Tucson, AZ

- Project: Developed a novel optical biosensor using a paper-based lateral flow immunoassay and a smartphone-based fluorescence microscope for: 1) quantifying cancer cells in the blood at the point of care, 2) measuring plant genome sizes in the field, and 3) detecting norovirus in water samples
- Designed and built an imaging apparatus to improve the device ease-of-use and quality of smartphone fluorescence images using SolidWorks and 3D printing
- Created two graphical user interfaces for simple, automated processing of fluorescence images in MATLAB and Python, respectively

**Intern**, Massachusetts Institute of Technology Summer Research Program (MSRP) Summer 2019  
Faculty Mentor: Roger Kamm, PhD, Departments of Biological and Mechanical Engineering  
Massachusetts Institute of Technology, Cambridge, MA

- Project: Developed an *in vitro* cell culture model of T cell trafficking and migration to tumors
- Designed two experimental setups to model T cell adhesion and migration relative to human endothelial cells using a Transwell migration assay, 2D cell culture and fluorescence microscopy
- Wrote scripts in ImageJ and RStudio to analyze microscopy data

**EXROP Fellow**, Howard Hughes Medical Institute (HHMI) Summer 2017  
Exceptional Research Opportunities Program (EXROP)  
Faculty Mentor: Muhammad Zaman, PhD, Department of Biomedical Engineering  
Boston University, Boston, MA

- Project: Optimized a fluorescence assay for field-based quantification of antimalarial medicines
- Performed fluorescence measurements using spectrophotometry and a portable microfluidic device
- Improved the accuracy and precision of measurements by troubleshooting pharmaceutical sample preparation and signal acquisition parameters

**Student Researcher**, Danish Institute for Study Abroad (DIS) Science Research Practicum Spring 2017  
Faculty Mentor: Abigail Mackey, PhD, Institute of Sports Medicine  
Bispebjerg Hospital, Copenhagen, Denmark

- Project: Studied the effects of exercise-related injury on skeletal muscle and muscle fiber regeneration
- Quantified amounts of different fiber types in injured skeletal muscle tissue using fluorescence microscopy

## RESEARCH AND RELEVANT WORK EXPERIENCE, CONTINUED

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**Summer Fellow**, Medical Scientist Training Program Summer 2016

Summer Undergraduate Research Fellowship (MSTP-SURF)

Faculty Mentor: Karen Christman, PhD, Department of Bioengineering

University of California, San Diego, CA

- Project: Tested the efficacy of an extracellular matrix (ECM)-based hydrogel derived from porcine tissue as a delivery method for therapeutic microRNAs
- Fabricated the ECM-based hydrogel by decellularizing porcine tissue with appropriate reagents
- Measured the rate of release of microRNAs from the hydrogel using spectrophotometry
- Quantified degradation of microRNAs using PCR and gel electrophoresis

**Math Tutor**, Math Spot Tutor Center, Scripps College January 2015 – December 2016

- Led group and individual tutoring session for students in Scripps College math courses: Calculus I, II, and III and Differential Equations
- Provided students with resources for understanding and solving problems and improving their skills in mathematics

**Research Assistant**, Interdisciplinary Consortium on Advanced Motion Performance Summer 2015

Faculty Mentors: David Armstrong, PhD, DPM and Bijan Najafi, PhD, Department of Surgery

University of Arizona, Tucson, AZ

- Project: Conducted a Gait and Balance Assessment and Training Program in patients with or at risk for peripheral neuropathy using wearable sensor technology and virtual reality
- Collected exercise data using MATLAB and wearable motion sensors
- Obtained patient demographics and health history using IRB-approved surveys

## SENIOR CAPSTONE PROJECT

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**College of Engineering Interdisciplinary Capstone**, The University of Arizona, Roche Tissue Diagnostics

- Worked in a team of six senior undergraduate engineering students at the University of Arizona in collaboration with full-time engineers at Roche Tissue Diagnostics for the 2019-2020 academic year
- Project: Developed a liquid volume sensor to measure reagent volumes on the Roche HE 600 with high resolution, accuracy, and precision. The HE 600 is an instrument used for automatic hematoxylin and eosin diagnostic tissue stains, and we aimed to replace the current float sensor method with a capacitive volume sensor for monitoring reagent volumes in liquid reservoirs without making contact with the reagents.
- Contributed to the project by developing a graphical user interface in Python with PyQt for continuously reporting volumes of eight reagents in reservoirs on the HE 600

## PUBLICATIONS AND CONFERENCE PROCEEDINGS

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- **Gonzales, Alana G.**, Caitlin Ruhland, Graham Spicer, Stephen Mead, Massimiliano Di Pietro, Ashraf Sanduka, Photini F. S. Rice, Ryan H. W. Mitstifer, Sarah E. Bohndiek, Travis W. Sawyer, and Jennifer K. Barton. "Optical coherence tomography and elastography for ex vivo visualization of early gastric cancer," manuscript submitted to *Journal of Biomedical Optics* as of July 2025.
- Galvez, Dominique, Andrew Rocha, Alana Gonzales, Dilara Long, Photini Rice, Makayla Johnson, Ethan Tovar, Bo Lwin, Helen Varghese, Kongit Amaha, David Fishman, John Heusinkveld, and Jennifer K. Barton. "Improved endoscope for imaging and cell collection in the fallopian tubes," manuscript submitted to *Biophotonics Discovery (BIOS)* as of August 2025.
- Rocha, Andrew D., Dominique Galvez, **Alana Gonzales**, Eduardo Gonzalez, Matthias Schlich, David Vega, and Jennifer K. Barton. "Lens design strategies for miniature scanning fiber endoscopes," manuscript accepted for publication in *Optical Engineering* as of July 2025.
- **Gonzales, Alana**, Ruyuan Dong, Ryan Walton Mitstifer, Caitlin Ruhland, Travis Sawyer, Ghassan Mouneimne, and Jennifer K. Barton (2025). "Optical coherence tomography and elastography for the visualization of architecture and stiffness differences in soft- and stiff-conditioned murine mammary tumors," *Proc. SPIE 13306*, Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XXIII, 133060E.
- Rocha, Andrew D., Matthias Schlich, David Vega, Jennifer K. Barton, **Alana Gonzales**, Eduardo Gonzalez, and Dominique Galvez (2025). "Finite element and optical analysis of a miniature forward-scanning fiber endoscope", *Proc. SPIE PC13334*, Endoscopic Microscopy XX, PC1333403.
- Preston, Kyle, Guojun Chen, Cole Chapman, Sarat Gundavarapu, Ebrahim Aljohani, Armando Paredes Arroyo, Chi-Chen Lin, Alexander Vinitsky, **Alana Gonzales**, Ze Yin, Michael Dubrovsky, and Diedrik Vermeulen (2024). "Silicon Photonics-Powered Biosensing for Rapid Quantification of Blood Biomarkers," *Frontiers in Optics + Laser Science 2024 (FiO, LS)*, Technical Digest Series (Optica Publishing Group, 2024), paper FTu1D.1.
- Højfeldt, Grith, Trent Sorenson, **Alana Gonzales**, Michael Kjaer, Jesper L Andersen, and Abigail L Mackey (2023). "Fusion of myofibre branches is a physiological feature of healthy human skeletal muscle regeneration," *Skeletal Muscle*, vol. 13, 13.
- Aljohani, Ebrahim, Sarat Gundavarapu, Cole A. Chapman, Armando Paredes Arroyo, Guojun Chen, Chi-Chen Lin, Andrea Romig, Kyle Preston, Alexander Vinitsky, **Alana Gonzales**, Eric Hsu, Jordan Cobb, Yulia Rybakova, Michael Dubrovsky, and Diedrik Vermeulen (2023). "Silicon Photonics System for Low-Cost Rapid Quantification of Biomarkers in Blood," *2023 IEEE Silicon Photonics Conference (SiPhotonics)*, 1-2.

## PUBLICATIONS AND CONFERENCE PROCEEDINGS, CONTINUED

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- Nief, Corrine, **Alana Gonzales**, Erika Chelales, Júlia Sroda Agudogo, Brian T. Crouch, Smita Nair, and Nirmala Ramanujam (2022). “Targeting tumor acidosis and regulatory T cells unmasks anti-metastatic potential of local tumor ablation in triple-negative breast cancer,” *International Journal of Molecular Sciences*, vol. 23, 8479.
- Agudogo, Júlia, Corrine Nief, **Alana Gonzales**, Erika Chelales, Rebecca Previs, Jenna Mueller, Brian Crouch, and Nimmi Ramanujam (2022). “A novel point-of-care ethyl cellulose ethanol ablative therapy for the enhancement of paclitaxel in local recurrent cervical cancer treatment (308.5),” *Gynecologic Oncology*, vol. 166, supplement 1, S162.
- Nief, Corrine A., Júlia Sroda Agudogo, **Alana Gonzales**, Rebecca A. Previs, Smita K Nair, and Nimmi Ramanujam (2021). “Resetting the tumor microenvironment to favor anti-tumor immunity after local ablation,” *Journal of Clinical Oncology*, vol. 39, issue 15\_suppl, 2561.
- Agudogo, Júlia Sroda, Corrine Nief, Erika Chelales, **Alana Gonzales**, Jenna Mueller, Brian Crouch, Rebecca A. Previs, and Nimmi Ramanujam (2021). “A novel treatment for recurrent localized cervical cancer using point-of-care ethyl cellulose ethanol ablation with concurrent cytotoxic therapy,” *Journal of Clinical Oncology*, vol. 39, issue 15\_suppl, e17507.
- Chung, Soo, Lane E. Breshears, **Alana Gonzales**, Christian M. Jennings, Christina M. Morrison, Walter Q. Betancourt, Kelly A. Reynolds, and Jeong-Yeol Yoon (2021). “Norovirus detection in water samples at the level of single virus copies per microliter using a smartphone-based fluorescence microscope,” *Nature Protocols*, vol. 16, 1452-1475.
- Ulep, Tiffany-Heather, Ryan Zenhausern, **Alana Gonzales**, David S. Knoff, Paula A. Lengerke Diaz, Januario E. Castro, and Jeong-Yeol Yoon (2020). “Smartphone based on-chip fluorescence imaging and capillary flow velocity measurement for detecting ROR1+ cancer cells from buffy coat blood samples on dual-layer paper microfluidic chip,” *Biosensors and Bioelectronics*, vol. 153, 112042.

## CONFERENCE PRESENTATIONS

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- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Gastric Cancer and Dysplasia*, Poster presented at the SPIE Biophotonics Summer School, Hven, Sweden, June 2025.
- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Soft- and Stiff-Conditioned Breast Tumors*, Oral presentation at the International Society for Optics and Photonics (SPIE) Photonics West, San Francisco, CA, January 2025.

## CONFERENCE PRESENTATIONS, CONTINUED

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- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Gastric Cancer and Dysplasia*, Poster presented at the American Society of Clinical Oncology (ASCO) Gastrointestinal Cancers Symposium, San Francisco, CA, January 2025.
- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Soft- and Stiff-Conditioned Breast Tumors*, Poster presented at the IEEE-EMBS International Conference on Healthcare Innovations in Point of Care Technologies (HI-POCT), Tucson, AZ, September 2024.
- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Anaheim, CA, November 2019.
- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Biomedical Engineering Society (BMES) Annual Meeting, Philadelphia, PA, October 2019.
- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Massachusetts Institute of Technology Summer Research Program Poster Session, Cambridge, Massachusetts, August 2019.
- *Paper-based Vertical Assay for Detection of Metastatic Breast Circulating Tumor Cells*, Poster presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Indianapolis, IN, November 2018. **ABRCMS Presentation Award** earned for high presentation score.
- *Paper-based Vertical Assay for Detection of Metastatic Breast Circulating Tumor Cells*, Poster presented at the Undergraduate Research Opportunities Consortium (UROC)'s Research Conference, The University of Arizona, Tucson, AZ, August 2018.
- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Howard Hughes Medical Institute Annual EXROP Meeting, Chevy Chase, Maryland, May 2018.
- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Biomedical Engineering Society (BMES) Annual Meeting, Phoenix, AZ, October 2017.
- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Arizona Bioindustry Association (AZBio) Awards, Phoenix, Arizona, October 2017.
- *Efficacy of an Extracellular Matrix-Based Hydrogel as a Delivery Method for MicroRNAs*, Oral presentation at the University of California, San Diego's Summer Research Conference, San Diego, California, August 2016.

## SCHOLARSHIPS, FELLOWSHIPS, HONORS, AND AWARDS

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<b>Kenneth E. and Michele L. Moore Endowed Scholarship in Optical Sciences</b>	2024-2025 and 2025-2026
The University of Arizona Wyant College of Optical Sciences   \$2,750 discretionary award	
<b>DeMund Foundation Graduate Student Endowed Scholarship in Optical and Medical Sciences</b>	2023-2024
The University of Arizona Wyant College of Optical Sciences   Tuition and stipend for first-year studies	
<b>National Science Foundation Graduate Research Fellowship</b>	Awarded but unable to accept 2022
<b>BME Second Year Fellowship</b>	Duke University   Tuition and stipend for second-year studies 2021-2022
<b>Fitzpatrick Institute for Photonics (FIP) John T. Chambers Fellowship</b>	Duke University 2020-2021
\$10,000 discretionary award and \$1,000 professional travel funds	
<b>Raytheon Award for Best Overall Design (\$5,000)</b>	The University of Arizona May 2020
College of Engineering Craig M. Berge Design Day	
<b>Rincon Research Award for Best Presentation (\$1,500)</b>	The University of Arizona May 2020
College of Engineering Craig M. Berge Design Day	
<b>Global Health Competition Innovation Award</b>	The University of Arizona October 2019
<b>Academic Year Academic Distinction</b>	The University of Arizona 2018-2019
<b>ABRCMS Presentation Award</b>	High presentation score at 2018 ABRCMS meeting November 2018
<b>Dean's List</b>	The University of Arizona   3.8 GPA for more than 14 units Fall 2018, Spring 2019 and Fall 2019
<b>Dean's List Honorable Mention</b>	The University of Arizona   4.0 GPA for 12-14 units Spring 2018 and 2020
<b>Dean's List</b>	Scripps College   At least 3.67 GPA for 16+ credits Fall 2015 and Fall 2016
<b>Rebecca Barber Adams '61 Non-Profit Internship Grant</b>	Scripps College February 2015
<b>Donna Darnell '56 Scholarship</b>	Scripps College   Awarded for academic achievement December 2014

## CLUBS, ORGANIZATIONS, AND VOLUNTEER EXPERIENCE

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**President**, Optics for All (OFA) August 2025 – Present  
University of Arizona, Tucson, AZ

- Leading the executive board of OFA, a student-run club in the Wyant College of Optical Sciences which hosts social and cultural events, academic and professional development workshops, outreach events, and initiatives which promote diversity, equity, and inclusion in the field of optics

**Tutor**, Practical Optics Workshop (POW) August 2025 – Present  
University of Arizona, Tucson, AZ

- Planning and leading lessons on lens design software (Ansys Zemax OpticStudio and Synopsys CODE V) for students of all levels in the Wyant College of Optical Sciences

**Committee Member**, Graduate Recruitment Team (GeRT) August 2024 – Present  
University of Arizona, Tucson, AZ

- Organizing and facilitating PhD Graduate Recruitment Weekend for the Wyant College of Optical Sciences and engaging with prospective PhD students to aid them in their application and decision process

**Social Chair**, Optics for All (OFA) May 2024 – August 2025  
University of Arizona, Tucson, AZ

- Organized social events and initiatives to serve the optical sciences community, specifically providing a forum for students from underserved, underrepresented, and underinvested backgrounds

**Student Mentor**, Keep Engaging Youth in Science (KEYS) Research Internship June 2024 – August 2024  
University of Arizona, Tucson, AZ

- Mentored a high school student through a summer research project, teaching them how to use MATLAB programming to perform data analysis and providing guidance on scientific writing and presentation

**Pratt Liaison**, Out in Science, Technology, Engineering, and Mathematics (oSTEM) March 2021 – May 2022  
Duke University, Durham, NC

- Worked as a contact point between oSTEM and the Duke Pratt School of Engineering to enhance the experience of the LGBTQ+ community in STEM graduate departments at Duke

**Mentor**, Duke FIRSTS-Duke LIFE Mentoring Program September 2020 – May 2022  
Duke University, Durham, NC

- As a first-generation graduate student, I mentored first-generation undergraduate students at Duke interested in pursuing graduate studies in biomedical engineering



## CLUBS, ORGANIZATIONS, AND VOLUNTEER EXPERIENCE, CONTINUED

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**First Year Representative**, Duke Optical Students Chapter (DOSC) September 2020 – May 2021  
Duke University, Durham, NC

- Engaged current and incoming Duke students interested in optics with the Fitzpatrick Institute for Photonics and the Duke Optical Students Chapter through social media and outreach events

**Volunteer**, Molecular and Cellular Biology STEM Outreach and Recruitment January 2020 – May 2020  
University of Arizona, Tucson, AZ

- Educated youth in the Tucson community about topics in molecular and cellular biology through various events, lessons and demonstrations such as DNA extraction from human cheek cells
- Engaged in virtual outreach through the development of educational videos following the COVID-19 shutdown of schools

**Project Team Member**, Medical Device Club August 2019 – May 2020  
University of Arizona, Tucson, AZ

- Partnered with DialysFlex, Inc. to design and build a revolutionary flexible hemodialysis catheter to eliminate pain and complications caused to hemodialysis patients by traditional rigid steel access needles

**The Advance Undergraduate Institute (AUI)** March 14-16, 2019  
Stanford University, Stanford, CA

- Participated in a three-day intensive experience at Stanford University in which students are selected to participate based on their potential and interest in pursuing a PhD in the Biosciences
- After completing the three-day institute, joined the AUI network and am engaging with previous participants who are currently pursuing and/or enrolled in a PhD and/or MD/PhD program

**Scribe**, Theta Tau Professional Engineering Fraternity, Chi Chapter November 2018 – December 2019  
University of Arizona, Tucson, AZ

- Maintained written records for the chapter, including minutes of all chapter and Executive Council meetings
- Corresponded with regional and national officers

**Head of Philanthropy Committee**, Theta Tau Professional Engineering Fraternity August 2018 – May 2019  
University of Arizona, Tucson, AZ

- Organized and led philanthropy events for the fraternity throughout the year to give back to the community

**Student Teacher**, Science Bus August 2016 – December 2016  
The Claremont Colleges, Claremont, CA

- Taught local fourth and fifth grade students hands-on lessons on topics in science

## REFERENCES

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Jennifer Barton, PhD

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## REFERENCES, CONTINUED

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