

# Gabriella M. Shull

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## EDUCATION

### M.S. in Biomedical Engineering,

- University of Minnesota, Twin Cities, Minneapolis, Minnesota, USA Aug 2016 – Present
  - Minor: Neuroengineering
  - Cumulative GPA: 3.89 / 4.00

### B.S. in Biomedical Engineering,

- State University of New York, Binghamton, Binghamton, New York, USA Aug 2013 – May 2016
  - Minor in computational biosystems, and medical devices
  - Graduated with College Honors, Magna Cum Laude.
  - Cumulative GPA: 3.54 / 4.00

## RESEARCH EXPERIENCE

### Biosensing and Biorobotics Research Group, Dept. of Mechanical Engineering, UMN

- Graduate Research Student Jan 2017 – Present
- Thesis project: Computer vision guided robotic cell microinjector
  - Developed robotic microinjector to inject single cells in the developing neocortex with sub micron resolution using computer vision through microscope images.
- Actuatable woven neural probes
  - I developed electrode arrays for chronic intracortical recording, functionalized electrodes with shape memory alloys, and demonstrated their use *in vivo*. I gained experience in PCB design, electroplating, fabrication, and characterization.
- Adviser: Prof. Suhasa Kodandaramiah

### Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany

- Visiting Graduate Research Student Jun 2017 – Aug 2017, May 2018 – Jun 2018
  - Tested the automated microinjector in collaborators lab and gained experience working with a cross disciplinary team in an unfamiliar environment.
  - The system I built increased yield of microinjection by 46x relative to manual microinjection which allows new scientific questions to be explored through the use of this tool.
  - Advisers: Prof. Wieland Huttner and Dr. Elena Taverna

### Cellular Preservation Services Incorporated Biotechnology, Owego, NY

- Team Leader, Engineer Aug 2015 – May 2016
  - Led a team of engineers to develop a thermoregulatory balloon device for surgical cryoablation procedures, and tissue engineered model to test device. We won an award for this work and presented at a regional conference.
  - I made the overall design of the hardware, and connected electronic components into closed loop control system using microcontroller programming.
  - Optimized my leadership skills through discretizing project objectives into concrete goals, identifying team members strengths, and managing the project under frequent corporate deadlines.
  - Supervisor: Dr. Kristi Snyder

### Organs-on-Chip Lab, Dept. of Biomedical Engineering, SUNY Binghamton

- Undergraduate Research Student Mar 2014 – May 2016
  - Developed and characterized novel *in vitro* model of gastrointestinal epithelium and investigated the influence of nanoparticle ingestion on gut barrier function.
  - Discovered that a common food additive alters gene expression and cell viability, and that the presence of beneficial bacteria mitigates these effects.
  - Adviser: Prof. Gretchen Mahler

### Institute for Nanotechnology, Dept. of Chemistry, Northwestern University

- REU Student Jun 2015 – Aug 2015
  - Synthesized di-copper complex to minimize  $T_2$  relaxation time for use as a MRI contrast agent in the brain.
  - Adapted to unfamiliar field/lab, and developed a desire to use nanotechnology to interface with the brain.
  - Advisers: Prof. David Harris, Kang Du.

## LEADERSHIP EXPERIENCE

### Hive Mine LLC, Minneapolis, MN

- Co-founder, Owner Dec 2017 – Present
  - Created small business to create cryptocurrency mining farm.
  - Gained experience in acquiring \$50k in investment, creating business documents, working with accountants, lawyers, insurance agents, and land lords.

## **Interdisciplinary Studio for Learning and Design (ISLAND), SUNY Binghamton**

- **President of External Affairs, Co-Founder, Web Master** Aug 2015 – May 2016
  - Created a student organization to host design challenges using projects that benefit the community locally, and globally including participation in design competitions.
  - Ran workshops teaching MATLAB, Arduino, and R and oversaw development of the website.

## **Biomedical Engineering Society (BMES) Student Chapter, SUNY Binghamton**

- **Vice President** Aug 2014 – May 2016
  - Pioneered the growth of the chapter from 8 to 58 students.
  - Created a mentorship program to connect upper level students/grads to underclassmen in order to ensure sustained student success across their careers, and created lab tour event to connect students with research.
  - Created outreach event to engage young students underrepresented in STEM in experiments.

## **COMMUNITY OUTREACH**

### **The Science for All Outreach Program, UMN**

- **Webmaster, Volunteer** Aug 2017 – Present
  - Provide middle school students with tangible understanding of STEM concepts via experiments (e.x. I made an EMG controlled race car and had the students race one another via EMG)

### **Medical Devices Center, UMN**

- **Graduate Team Leader, Volunteer** Aug 2016 – May 2017
  - Mentored a group of undergraduate students to develop a surgical catheter device for Dr. Marcos Molina, MD.
  - Presented our work at a prominent surgical conference.

## **SKILLS**

**Languages** - Spanish (intermediate), English (native)

**Programming** - Python, MATLAB, C++, Eagle PCB Designer, Solidworks, ANSYS, Arduino, R, Java Script, Adobe Photoshop/Illustrator, MS Word/Excel/PowerPoint.

**Characterization** - 2-photon/confocal/fluorescent/wide field microscopy, EIS, IHC, qPCR, SEM

**Fabrication** - chemical synthesis, electroplating, fine-soldering, paralyene-C deposition, platinum sputtering

**In Vitro** - 3D bioprinting, mammalian/bacteria cell culture, single cell microinjection

**In Vivo** - automated patch clamp, extracellular recording, mouse craniotomy/surgery, virus injection

**Machining** - 3D printing, CNC milling, laser cutting

## **FELLOWSHIPS**

- **National Science Foundation Graduate Research Fellowship** awarded in Apr 2018  
Awarded to students "with demonstrated potential to enhance the vitality of the US science and engineering enterprise".
- **NSF IGERT Fellowship in Neuroengineering** Aug 2016 - Aug 2017  
University of Minnesota, Twin Cities  
Awarded to graduate students engaged in interdisciplinary approaches to neuroengineering.
- **Small Scale Systems Integration Center Undergraduate Fellowship** Jan 2016 - May 2016  
SUNY Binghamton  
Won this to fund my independent research project.
- **NSF Research Experience for Undergraduate Fellowship** Jun 2015 - Aug 2015  
Chemistry Department, Northwestern University  
Competitive research fellowship awarded to students with high potential for impact in future career.
- **Howard Hughes Medical Institute Undergraduate Research Fellowship** Jun 2014 - Aug 2014  
SUNY Binghamton  
Awarded to students engaged in interdisciplinary research projects.

## **AWARDS**

- **Second Place (out of 30 teams),** Nov 2017  
Blockchain for Social Impact Hackathon, Brooklyn, NY.  
For developing ethereum blockchain based platform to incentivise ex felons to engage in therapy.
- **Second Place (out of 7 teams),** Oct 2017  
Code Switch Hackathon, St. Paul, MN  
For developing ethereum blockchain based platform for community building.
- **NSF IGERT Travel Award,** Jun 2017  
University of Minnesota, Twin Cities  
Awarded for international travel for collaboration.
- **Best Biomedical Engineering Senior Capstone Project,** May 2016  
Biomedical Engineering Department, SUNY Binghamton  
Won best capstone project out of 9 teams in department.

- **Undergraduate Travel Award (won award twice),**  
Biomedical Engineering Department, SUNY Binghamton  
Travel costs to present research were covered by this award.

Sep 2014, Aug 2015

- PUBLICATIONS** [1] J. Richter, G. Shull, J. Fountain, Z. Guo, L. Musselman, A. Fiumera, and G. Mahler, "Titanium dioxide nanoparticle exposure alters metabolic homeostasis in a cell culture model of the intestinal epithelium and *Drosophila melanogaster*," *Nanotoxicology*, pp. 1-17, Mar 2018.
- PATENTS** [1] G. Shull, W. Huttner, E. Taverna, S. Kodandaramaiah, "Robotic Platform for HighThroughput Single Cell Gene Manipulation in Intact Tissue," Provisional Patent 20180069. Filed September 6, 2017 with U.S. Patent and Trademark Office.
- INVITED TALKS** [1] G. Shull, "The Autoinjector" Design of Medical Devices Conference. Minneapolis, MN April 2018
- PEER REVIEWED CONFERENCE PRESENTATIONS AND PAPERS** [1] G. Shull, J. J. Hu, J. Buschnyj, H. Koon, J. Abel, S.B. Kodandaramaiah, "Shape Memory Alloy Actuatable Woven Neural Probes," *Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, San Antonio, Texas, USA, Sep 2018.
- [2] R.G. Smith, R. A. Johnson, G. Shull, D. Sorby, C. J. Modl, A. Panoskaltis-Mortari, T. M. Kowalewski, "Towards Robotic Bioprinting Directly ont Moving, Stretching Anatomy," *Hamlyn Symposium on Medical Robotics*, South Kensington, London, UK, Jun 2018.
- [3] G. Shull, C. Haffner, W. Huttner, S. Kodandaramiah, E. Taverna, "The Autoinjector: An Image Guided Robot for Single Cells Microinjection," *Neuromodulation Symposium*, Minneapolis, Minnesota, USA, Apr 2018.
- [4] G. Shull, C. Haffner, W. Huttner, S. Kodandaramiah, E. Taverna, "Image Guided Robot for Microinjectioninton Single Cells in Organotypic Slices of Mouse Telencephalon," *Institute for Engineering in Medicine Annual Symposium*, Minneapolis, Minnesota, USA, Nov 2017.
- [5] G. Shull, C. Haffner, W. Huttner, S. Kodandaramiah, E. Taverna, "A robot for high throughput analysis of neural stem cells in intact tissue," *EMBO Conference: Gene regulatory mechanisms in neural fate decisions*, Alicante, Spain, Sep 2017.
- [6] M. Molina, G. Shull, G. Jacobs, T. Woodcock, C. Phillips, D. Srishyla, "Keeping the staple line safe: re-engineering the nasogastric tube and the use of direct visual guidance for its safe deployment," *Society of American Gastrointestinal and Endoscopic Surgeons Annual Meeting*, Houston, Texas, USA. Mar 2017.
- [7] G. Shull, J. Richter, G Mahler, "TiO<sub>2</sub> Nanoparticle Exposure Alters Glucose Transport and Expression inan In Vitro model of the Intestinal Epithelium," *42nd Annual Northeast Biomedical EngineeringConference (NEBEC)*, Binghamton, New York, USA. Apr 2016.
- [8] G. Shull, D. Liacona, N. Martucci, I. Wang, K. Snyder, "Thermoregulatory Balloon Device and Tissue Engineered Model for Thermal Ablation Applications," *42nd Annual Northeast Biomedical EngineeringConference (NEBEC)*, Binghamton, New York, USA. Apr 2016.
- [9] G. Shull, J. Richter, G Mahler, "Nanoparticle Ingestion Affects Glucose Transport in in Vitro Model of the Intestinal Epithelium," *Biomedical Engineering Society Annual Meeting (BMES)*, Tampa, Florida, USA. Oct 2015.
- [10] J. Richter, G. Shull, G Mahler, "TiO<sub>2</sub> Nanoparticle Ingestion Alters Glucose Absorption in an in Vitro Model of the Intestinal Epithelium," *41st Annual Northeast Biomedical Engineering Conference (NEBEC)*, Troy, New York, USA. Apr 2015.
- [11] G. Shull, J. Richter, G Mahler, "The Effects of Nanoparticle Ingestion on Glucose Transport and Uptake in the Gut Microbiome," *Biomedical Engineering Society Annual Meeting (BMES)*, San Antonio, Texas, USA. Oct 2014.

**CONTACT REFERENCES**

**Prof. Suhasa B. Kodandaramaiah**

- Assistant Professor, Department of Mechanical Engineering, University of Minnesota, Twin Cities
- Relationship - Masters thesis PI (2016 - 2018)
  - Email - suhasabk@umn.edu
  - Phone - 612-626-1307

**Dr. Elena Taverna**

Researcher, Department of Evolutionary Genetics, Max Planck Institute for Evolutionary Anthropology

- Relationship - Collaborator for masters thesis (2017 - 2018)
- Email - elena\_taverna@eva.mpg.de
- Phone - +49-(0) 341 3550 555

**Prof. Gretchen Mahler**

Associate Professor, Department of Biomedical Engineering, SUNY Binghamton

- Relationship - Undergraduate PI (2014 - 2016)
- Email - gmahler@binghamton.edu
- Phone - 607-777-5238