

# Yutong (Irina) Zhu

✉ yzhu158@jh.edu

🌐 <https://yutong-zhu.github.io/>

☎ 949-245-9784

📍 Baltimore, MD, USA

## Education

Baltimore, MD, USA Sep 2022 – Apr 2024	<b>M.S.E. in Chemical and Biomolecular Engineering</b> , Johns Hopkins University <i>Essay-Based Track</i> <i>Advisor: Denis Wirtz and Ashley Kiemen</i>
Toronto, ON, Canada Sep 2017 – Apr 2022	<b>B.A.Sc. in Engineering Science</b> , University of Toronto <i>Biomedical Systems Engineering Major</i> <i>Engineering Business Minor</i>

## Research Experience

Baltimore, MD, USA Sep 2022 – Ongoing	<b>Wirtz/Kiemen Lab, Johns Hopkins University</b>   Graduate Research Student <i>Co-supervised by Prof. Denis Wirtz and Prof. Ashley Kiemen, Digital Pathology Laboratory</i> <ul style="list-style-type: none"><li>• Conducted literature review on female gynecological studies to identify potential research gaps.</li><li>• Developed and optimized ResNets-based deep learning for precise segmentation of specialized tissue types within the reproductive system of female mice at different ages.</li><li>• Designed computational algorithms for processing and registering histological images, generating three-dimensional (3D) maps at the single-cell resolution.</li><li>• Conducted qualitative and quantitative analysis on the reconstructed 3D volumes across varied age populations.</li><li>• Designed and performed <i>in vitro</i> experiments to validate findings through a staining-based approach at regions of interest.</li><li>• Mentored junior students to facilitate their learning and contribute to the project.</li></ul>
Toronto, ON, Canada Sep 2021 – Apr 2022	<b>Sone Lab, University of Toronto</b>   Undergraduate Research Student <i>Supervised by Prof. Eli Sone, Biological and Bioinspired Materials Laboratory</i> <ul style="list-style-type: none"><li>• Investigated bioinspired materials with a focus on bioadhesives by researching and reviewing adhesion mechanisms utilized by freshwater mussels.</li><li>• Performed extractions of tissues containing adhesive proteins from the phenol gland, bulk plaque, thread, and footprint of freshwater mussels.</li><li>• Designed and characterized chemical buffers for protein extraction, purification, and storage.</li><li>• Conducted and optimized a sequential process involving separation, concentration, and purification of proteins using centrifugal filtration, SDS-PAGE, and high-performance liquid chromatography.</li><li>• Examined the localization profile and post-translational modifications of adhesive proteins in freshwater mussels through diverse staining techniques.</li></ul>
Toronto, ON, Canada Jan 2021 – Sep 2021	<b>Garton Lab, University of Toronto</b>   Research Assistant <i>Supervised by Prof. Michael Garton, Synthetic Biology Laboratory</i> <ul style="list-style-type: none"><li>• Researched and assessed existing approaches for recombinase-mediated cassette exchange.</li><li>• Computationally designed plasmids, primers, and restriction enzymes using software Benchling.</li><li>• Applied molecular biology techniques, including bacterial cell culturing, molecular cloning, and DNA purification, for the construction and isolation of target plasmids.</li><li>• Conducted transfection experiments with human cell lines to establish a library of landing pad cell lines targeting AAVS1 and pSH231 safe harbor sites, optimizing gene cassette exchange efficiency.</li><li>• Validated successful gene cassette exchange in landing pad cells through fluorescence-labeled plasmids and DNA sequencing.</li></ul>
Toronto, ON, Canada May 2019 – Aug 2019	<b>McGuigan Lab, University of Toronto</b>   Research Assistant <i>Supervised by Prof. Alison McGuigan, Tissue Architecture and Microenvironment Design Laboratory</i> <ul style="list-style-type: none"><li>• Evaluated existing tissue mimic systems and proposed improvements and modifications.</li><li>• Developed and characterized a Scaffold-supported Platform for Organoid-based Tissues (SPOT) compatible with generic 96/384-well plate format using AutoCAD, SolidWorks, and G-code.</li><li>• Generated designs with varied shapes, sizes, thicknesses, and selected the optimal design through quantitative comparisons.</li><li>• Conducted validation tests with fluorescence-expressing pancreatic cell lines and patient-derived organoids to assess seeding uniformity and chemotherapeutic response across and within wells.</li></ul>

## Publications and Presentations

---

- 2023
1. Braxton\*, A. M., Kiemen\*, A. L., Grahn, M. P., Forjaz, A., Parksong, J., Babu, J. M., Lai, J., Zheng, L., Niknafs, N., Jiang, L., Cheng, H., Song, Q., Reichel, R., Graham, S., Damanakis, A. I., Fischer, C. G., Mou, S., Metz, C., Granger, J., Liu, X.-D., Bachmann, N., **Zhu, Y.**, Liu, Y., Almagro-Pérez, C., Jiang, A. C., Yoo, J., Kim, B., Du, S., Foster, E., Hsu, J. Y., Rivera, P. A., Chu, L. C., Liu, F., Fishman, E. K., Yuille, A., Roberts, N. J., Thompson, E. D., Scharpf, R. B., Cornish, T. C., Jiao, Y., Karchin, R., Hruban, R. H., Wu, P., Wirtz\*, D. & Wood\*, L. D. Three-dimensional genomic mapping of human pancreatic tissue reveals striking multifocality and genetic heterogeneity in precancerous lesions. *Nature [Under Review]*, PMID: 36747709 (2023).
  2. Kiemen, A. L., Dequiedt, L., Shen, Y., **Zhu, Y.**, Matos-Romero, V., Forjaz, A., Campbell, K., Dhana, W., Cornish, T., Braxton, A. M., Wu, P., Fishman, E. K., Wood, L., Wirtz, D. & Hruban, R. H. PanIN or IPMN? Grossly visible pancreatic precancers can mimic the histologic appearance of microscopic lesions. *American Journal of Surgical Pathology [Under Review]* (2023).
  3. **Zhu, Y.**, Grahn, M. P., Khetarpal, A., Crawford, A., Wirtz, D. & Kiemen, A. L. Three-dimensional and multi-organ mapping of the female mouse reproductive system as a function of age. *Annual ChemBE Research Poster Session, Johns Hopkins University* (2023).
- 2022
4. Li, N. T., Wu, N. C., Cao, R., Cadavid, J. L., Latour, S., Lu, X., **Zhu, Y.**, Mijalkovic, M., Roozitalab, R. & McGuigan, A. P. An off-the-shelf multi-well scaffold-supported platform for tumour organoid-based tissues. *Biomaterials*, PMID: 36343611 (2022).

## Technical Skills

---

**Programming:** MATLAB, Python, C, Java, R, G-code

**Tools and Packages:** Pandas, NumPy, SciKit Learn, Git, Matplotlib, PyTorch, TensorFlow

**Biomedical Design and Computation:** ImageJ, ImageScope, Benchling, AutoCAD, Solidworks, Simulink

**Biomedical Experimentation:** Tissue/ Bacterial Cell Culture, Animal Experimentation (Mice), Microscopy (Staining; Fluorescence, Confocal, Atomic Force), Molecular Biology (Cloning, PCR, qPCR, SDS-PAGE, Transfection), Purification (HPLC, Mini/Midi/Maxipreps)

## Honors, Awards and Grants

---

- 2022-  
2023
- Cervical Cancer SPORE Grant, Department of Pathology, Johns Hopkins Medicine**  
A Specialized Program of Research Excellence (SPORE) in cervical cancer with a multimillion-dollar grant from the National Cancer Institute (NCI) to explore groundbreaking cervical cancer research, prevention, and treatment.
- 2020-  
2022
- Faculty of Applied Science and Engineering Dean's Honors List, University of Toronto**  
The Dean's Honors List recognizes excellence in student's academic records of the year.
- 2017
- Faculty of Applied Science and Engineering Admission Scholarship, University of Toronto**  
Awarded to students entering the first year of any Engineering program based on outstanding academic achievement in the prerequisite courses.

## Leadership and Extracurricular

---

- Toronto, ON, Canada  
Jan 2022 – Aug 2022
- SpiderSmart Learning Centre** | English Tutor
- Conducted personalized one-on-one tutoring sessions for new immigrants, with a focus on enhancing English reading and writing skills.
  - Developed customized tutoring plans based on individual English proficiency levels.
- Toronto, ON, Canada  
Nov 2021 – Aug 2022
- Uask Education, YOU & WEN Consulting Inc.** | Online Tutor
- Tutored secondary school students in mathematics, calculus, chemistry, and biology.
  - Developed lesson plans, assignments, and test materials in preparation for each class.
  - Answered questions and explained homework problems in detail to aid student understanding.
- Toronto, ON, Canada  
Nov 2018 – Aug 2020
- Association of Chinese Engineers, University of Toronto** | Student Club Vice President
- Led efficient team operations by routine meeting organization, streamlined time management, and effective task assignment.
  - Created compelling social media and blog content for events and advertisements.
  - Designed promotional products with distinct graphical elements and communicated with manufacturers for delivery of end products.
- Toronto, ON, Canada  
Sep 2019 – May 2020
- University of Toronto Aerospace Team** | "HERON" Biological Payload Design Subteam
- Engineered *C. albicans* to express green fluorescence (GFP) with specific genes and developed statistical methods to quantify gene expression.
  - Evaluated the risk of infection based on gene expression following long-term space missions.