Yihao Geng

✉ Yhgeng@umich.edu   in Linkedin   ⌂ Portfolio

Education

University of Michigan	Jan 2023 – Dec 2024
Bachelor of Science Engineering in Computer Science, College of Engineering	*GPA:3.74/4.0*	*Ann Arbor, Michigan*

Pennsylvania State University	Aug 2020 – Dec 2022
Bachelor of Science in Biological Engineering, Schreyer Honors College	*GPA:3.9/4.0*	*State College, Pennsylvania*

Publications

- [1] X. Bu, **Y. Geng**, S. Yin, L. Luo, C. A. Aubin and T. Y. Moore, "Release Chamber Enables Suction Cup to Delaminate and Harvest Fluid," 2025 IEEE 8th International Conference on Soft Robotics (RoboSoft), Lausanne, Switzerland, 2025, pp. 1-6, doi: 10.1109/RoboSoft63089.2025.11020908.
  Best Student Paper Finalist; Best Paper Award in Benchmarking and Reproducibility

- [2] J. Liao*, X. Bao*, **Y. Geng*** , M. S. C. Freitas, S. W. Lee, Z. Bai, J. Zhang, J. Liao, J. Zheng, A. Shariff, M. Yunusa, M. Tavakoli, M. Mastrangeli, C. Aubin, C. Majidi, and M. Sitti, *"Field-Effect Elastocapillary Actuators"*, (in preparation)
  (* *Contributed Equally.*)

Presentations

Yihao Geng, Liyan Luo, "*Release Chamber Enables Suction Cup to Delaminate and Harvest Fluid*," **Robotics Undergraduate Research Symposium**, University of Michigan, Ann Arbor, 2024.

Work Experience

Zoetic Robotics Lab	Feb 2024 – Present
Undergraduate Research Assistant, Supervised by Dr. Cameron Aubin	*Ann Arbor, Michigan*

- **Control Mechanism of Suction Cups [1]**
  Collaborated with lab members to study control mechanisms for suction cups with integrated energy harvesting features.
  - * Manufactured suction cups and designed standardized experiments to test performance under various conditions.Iteratively refined the structural design based on the test results.
  - * Conducted tensile tests to characterize suction performance.
  - * Filmed and edited video demonstrations.
  - * The resulting publication was recognized as a **Best Student Paper Finalist** and received the **Best Paper Award in Benchmarking and Reproducibility** at *2025 IEEE 8th International Conference on Soft Robotics (RoboSoft).*

- **Amphibious Screw-Propelled Micro Robot**
  Collaborated with lab members on the design and experimental validation of a cm-scale amphibious screw-propelled robot exhibiting advanced multimodal mobility on sand and in water, addressing the challenging regime of small-scale locomotion.
  - * **Design:** Developed SolidWorks assemblies and established a robust workflow for part replacement and parametric tuning. Established a **design-of-experiments (DOE)** framework using Taguchi methods to identify optimal screw parameters. Designed and assembled a standardized test platform to evaluate robot performance.
  - * **Simulation:** Conducted **Discrete Element Method (DEM)** simulations in Ansys Rocky to evaluate screw geometries, improving predictive accuracy against physical tests. Implemented **Smoothed Particle Hydrodynamics (SPH)** simulations to model fluid–structure interaction, identified computational bottlenecks, and recommended transition to CFD approaches (later adopted by collaborators).
  - * **Manufacturing:** Conducted full-stack manufacturing of 3D-printed robots integrating mechanical, electronic, and control systems, and validated simulations through real-world testing.

- **Field-Effect Elastocapillary Actuators [2]**
  Co-first author on the design, fabrication, and testing of the actuators. Project undergoing IP transition and manuscript in preparation; involved in developing novel muscle-like actuators using advanced materials and field-effect elastocapillary mechanisms.
  - * Developed a complete experimental framework, including actuator prototypes and testing platforms.

* Refined mechanical design and fabricated all actuators involved in testing.
* Iterated through multiple chemical formulations to optimize actuator response and achieve desired performance.
* Designed specialized tools to streamline testing procedures and improve reliability.
* Trained and supervised new lab members on chemical synthesis, device assembly, and testing workflows.

- **Lab Infrastructure Building**
  Contributed to developing laboratory infrastructure to support ongoing research and member training.
    * Designed and developed the lab's official webpage, improving accessibility and research visibility.
    * Created a user-friendly interface ensuring up-to-date representation of lab research and achievements.
    * Assisted in purchasing, assembling, and testing various new pieces of equipment.
    * Built a custom cabinet to streamline the post-processing of 3D printed parts.
    * Trained new lab members on Formlabs 3D printing techniques and best practices.

Russell E. Horn Sr. Learning Center   Oct 2021 – June 2022
Part-time Tutor   *Middletown, Pennsylvania*
- Collaborated with other tutors to provide peer support for course materials and learning strategies for various subjects, including Math, Economics, Physics and Biology.

Campus Experience

Computer Science
- **Computer Vision** Collaborated with a team to develop a convolutional neural network enhancing the resolution of light-field camera images. Utilized epipolar geometry and channel attention models, resulting in superior image quality and effectiveness across multiple datasets, outperforming many existing methods.
- **Information Retrieval & Web Search** Developed BeautyMatch, a search and recommendation engine for beauty products, as part of a team project. Leveraged a hybrid retrieval model using TF-IDF vectorization and cosine similarity to provide tailored recommendations. Achieved high precision, significantly enhancing user satisfaction.
- **VR & AR development** Developed Great Lakes Explore, an educational VR program implementing realistic environmental systems, animal animation and educational features in one month.
- **Machine Learning** Mastered algorithms like SVMs, linear regression, and decision trees. Implemented optimization methods, including gradient descent and stochastic gradient descent, and techniques to handle overfitting and regularization. Applied collaborative filtering, matrix factorization, MLE, and EM for probabilistic models.

Robotics
- Collaborated with nursing professionals to conduct usability studies, guiding the design of an innovative robotic system for patient transport. Spearheaded the system's conceptualization, focusing on enhancing efficiency and safety in patient care. Presented the design and its practical applications to class.
- Led a team in the development and implementation of a cost-effective light guide system for robotic control, significantly enhancing precision and efficiency in automation processes while reducing overall expenses.

Achievements
- Dean's list, University Honors, President's Freshman Award, James B. Angell Scholar, T.&B. Pinkerton OpenDoors Scholarship
- *2025 IEEE 8th International Conference on Soft Robotics (RoboSoft)* - Best Student Paper Finalist
- *2025 IEEE 8th International Conference on Soft Robotics (RoboSoft)* - Best Paper Award in Benchmarking and Reproducibility

Technical Skills

Languages & Software: Ansys Rocky, C, C++, MATLAB, Python, R, SolidWorks, Unity, Unreal Engine
Technologies & Frameworks: Bootstrap, Beautiful Soup, HTML, Instron Test, Matplotlib, NumPy, Pandas, PyTorch, SciPy, TensorFlow, 3D Printing (DLS,FDM,SLA)
Relevant Course Work: Computer Vision, Computer Security, Cryptography, Data Structures & Algorithms, Engineering Thermodynamics, Function & Development of Organisms, Informational Retrieval and Web Search, Machine Learning, Sensors & Signals, Statics, Virtual Reality & Augmented Reality