BILIGE "BILLY" YANG

9 Hillhouse Ave, Mason Room 118 ⋄ New Haven, CT 06511
Email: billy.yang@yale.edu. Updated: Sept 20th, 2024.

EDUCATION

Yale University — New Haven, CT
Ph.D. Mechanical Engineering — July 2019 - present
M.S. Mechanical Engineering — Dec 2020
Advisor: Dr. Rebecca Kramer-Bottiglio
Thesis: Responsive Material Architectures for Morphological Adaptation in Soft Machines

Swarthmore College — Swarthmore, PA
B.S. Engineering: GPA: 3.97/4.00 — May 2019
Advisor: Dr. Matt Zucker

University College London — London, United Kingdom
Department of Mechanical Engineering (semester abroad) — Sept 2017 - Dec 2017

WORK EXPERIENCE

Kramer Group, Yale University — New Haven, CT
Graduate Research Assistant — *July 2019 - current*

- Focus: Create materials, systems, and algorithms for shape-changing soft robots.
- Projects: 1. Jamming-enabled dexterous soft actuators & surfaces. 2. Shape changing robots for multi-domain maneuvers. 3. Phase changing particulate-based variable stiffness composite.
- Applications include human-robot interaction, assistive and wearable robots, haptic interfaces for virtual/augmented reality, and amphibious robots.
- Advised by: Prof. Rebecca Kramer-Bottiglio.
- Thesis committee: Profs. Brian Scassellati, Ian Abraham, and Madhusudhan Venkadesan.

Anyware Robotics — Fremont, CA
Robotics Engineer Intern — *May 2023 - Aug 2023*

- Developed the company's third-generation mobile base for a container-unloading robot
- Led the design of patented robotic add-ons that won the company contracts with leading 3PLs
- Programmed the embedded systems for the teleoperation of the mobile base
- Coordinated with supply chain vendors in different countries for rapid prototyping

Meta — Redmond, WA
Research Scientist Intern — *May 2022 - Aug 2022*

- Researched and developed novel haptics devices for human-computer interaction
- Fabricated and tested prototypes for proof-of-life demonstrations
- Programmed virtual reality (VR) environments for hardware-software integration

Swarthmore College — Swarthmore, PA
Undergraduate Research — *May 2016 - May 2019*

- Summer 2016: Programmed a 2D finite element analysis web application for truss design in JavaScript
- 2017: Fabricated a thrust stand to determine the propulsive efficiency of coaxial fixed-pitched rotors
- 2018: Designed a mechanically-actuated soft fluidic elastomer actuator gripper to mount on a Fetch robot
- Advised by Prof. Faruq Siddiqui, Prof. Carr Everbach, and Prof. Matt Zucker

GRANTS AND FUNDING

Office of Naval Research, USA ($92,305 per year)	2021 - current
National Science Foundation, USA ($80,000 per year)	2020 - 2021

FELLOWSHIPS, AWARDS, AND HONORS

Yale School of Engineering and Applied Science Fellowship ($34,000)	Aug 2019
Lippincott Fellowship ($5,000)	May 2019
Thomas B. McCabe Award - outstanding engineering student in the graduating class (2 per year)	May 2019
Tau Beta Pi - Stabile Scholar ($2,000)	Sept 2018
Baltimore/Broad Summer Research Fellowship ($4,500)	May 2018
The C. V. Starr Scholarship ($60,000)	Dec 2017
The John W. Perdue Memorial Prize - highest GPA engineering major entering junior class	July 2017
Halpern Engineering Design Fellowship ($4,500)	May 2017
Robin M. Shapiro '78 Summer Research Fellowship ($4,500)	May 2016
Swarthmore Asian Scholarship ($60,000)	Dec 2015 and Dec 2016

PUBLICATIONS

Journal Publications

1. **B. Yang**, A. M. Nasab, S. Woodman, E. Thomas, L. Tilton, M. Levin, R. Kramer-Bottiglio, Self-Amputating and Interfusing Machines. *Advanced Materials*, 2024.
2. R. Baines, **B. Yang**, L. A. Ramirez, and R. Kramer-Bottiglio, Kirigami layer jamming. *Extreme Mechanics Letters*, 2023.
3. **B. Yang**, R. Baines, D. Shah, S. Patiballa, E. Thomas, M. Venkadesan, R. Kramer-Bottiglio. Reprogrammable Soft Actuation and Shape-Shifting via Tensile Jamming. *Science Advances*, Vol. 7, No. 40, p. eabh2073, 2021.
4. D. Shah, **B. Yang,**, S. Kriegman, M. Levin, J. Bongard, and R. Kramer-Bottiglio, Shape changing robots: bioinspiration, simulation, and physical realization. *Advanced Materials.* 2021.
5. A. Mohammadi, T. L. Buckner, **B. Yang**, R. Kramer-Bottiglio, Effect of Filler Aspect Ratio on Stiffness and Conductivity in Phase-Changing Particulate Composites. *Advanced Materials Technologies*, 2021.

Conferences Publications

1. J. Sun, B. Lin, L. Ramirez, E. Figueroa, R. Baines, **B. Yang**, E. Marroquin, and R. Kramer-Bottiglio, Performance Enhancement of a Morphing Limb for an Amphibious Robotic Turtle. *IEEE International Conference on Soft Robotics (Robosoft)*, 2024
2. **B. Yang**, B. Stephens-Fripp, P. Agarwal, S. Chan. N. Usevitch, A. Stanley, and Y. Qu. Wearable 3D Shape Display for Dynamic Interfaces Rendering. *IEEE World Haptics Conference (WHC)*, 2023
3. A. Parsa, M. Goyal, M. Lambo, **B. Yang**, J. Bongard, and R. Kramer-Bottiglio, Evolving variable stiffness fiber patterns for multi-shape robotic sheets. *IEEE International Conference on Soft Robotics (Robosoft)*, 2023
4. **B. Yang**, J. Powers, J. Bongard, and R. Kramer-Bottiglio, Shape matching: evolving fiber constraints on a pneumatic bilayer. *IEEE International Conference on Soft Robotics (Robosoft)*, 2021

Talks/Presentations

1. **B. Yang**, J. Powers, J. Bongard, and R. Kramer-Bottiglio, Shape matching: evolving fiber constraints on a pneumatic bilayer. *IEEE International Conference on Soft Robotics (Robosoft)*, April 2021
2. **B. Yang**, "Responsive Material Architecture for Morphological Adaptation in Soft Machines", *Yale University School of Engineering - Thesis Prospectus*, 2021.

3. **B. Yang**, B. Shih, and M. Tolley, Large actuation network with pneumatic multiplexing, *Sigma Xi Student Research Poster Session*, Swarthmore PA, Sept 2018.

4. **B. Yang**, F. Siddiqui. TrussWise - Truss analysis software research. *Sigma Xi Student Research Poster Session*, Swarthmore PA, Sept 2016.

Organized Workshops

1. J. Sun, **B. Yang**, L. Ramirez, J. Bongard, and R. Kramer-Bottiglio, Shape Morphing in Soft Robots: Debates, Challenges and Future Directions, *IEEE International Conference on Soft Robotics (Robosoft)*, San Diego CA, April 2024.

SELECTED PRESS AND MEDIA COVERAGE

Jamming-Enabled Dexterous Soft Actuators & Surfaces
Wonderful Engineering, "This New Robot Can Replicate Nature By Using A Bundle Of Fibers", Oct 6th, 2021.
TechXplore, "Using bundles of fibers, robots mimic nature", Oct 4th, 2021.
Yale Daily News, "Yale researchers use tensile jamming to create more dexterous robots", Oct 13th, 2021.

Shape Changing Robots for Multi-Domain Maneuvers
Forbes (London)/ TechCrunch, "Meet the Soft Robots That Can Amputate Limbs and Fuse with Other Robots", July 13th, 2024.
IEEE Spectrum, "Soft Robot Can Amputate and Reattach Its Own Legs", July 13th, 2024.
Interesting Engineering, "With lizard-like self-amputation, Yale robot detaches arms and fuses at will", July 14th, 2024.
CT Insider, "Meet ART: Yale's new amphibious robotic turtle that will document life off Connecticut's coast", May 12th, 2024.
Wevolver, "Self-amputating and interfusing machines (video excerpt)", Jun 14th 2024.

PROFESSIONAL ACTIVITIES

Membership
IEEE Robotics and Automation Society (RAS)

Peer Review

Journals
Soft Robotics
Smart Materials and Structures
Sensors and Actuators: A. Physical
IEEE Robotics and Automation Letters
IEEE Transactions on Robotics
Scientific Reports

Conferences
IEEE International Conference on Robotics and Automation
IEEE International Conference on Soft Robotics
Modeling, Estimation, and Control Conference

MENTORING

- Luis Ramirez. Yale University, MS Mechanical Engineering. "Efficient multi-environment locomotion with an adaptive morphogenetic robotic turtle." July 2021 - current.
- Brandon Lin. Yale University, BS Mechanical Engineering. "Performance enhancement of a morphing limb for an amphibious robot." Sept 2023 - current.
- Esteban Figueroa. Yale University, BS Electrical Engineering. "Miniaturization of Electronics for onboard control of soft robots." Sept 2023 - current. → *Firefly Aerospace.*
- Erick Marroquin. Yale University, BS Electrical Engineering. "Embedded Programming for visual SLAM on an

amphibious robot." Sept 2023 - current.
- Christina Young. Yale University, BS Mechanical Engineering. "Soft tactile sensing as feedback for quadruped robot." Sept 2022 - May 2023.
- Cecilia Russell. Yale University, BS Mechanical Engineering. "Flexible sealing of articulated robot joints" Sept 2022 - May 2023. → *Rocket Lab.*
- Matt Albritton. Yale University, BS Computer Science & Mechanical Engineering. "Autonomous Buoyancy Control for Underwater Robotics." Sept 2022 - May 2023. → *SpaceX.*
- Medha Goyal. Yale University, MS Mechanical Engineering & Materials Science. "Evolving variable stiffness fiber patterns for multi-shape robotic sheets." Sept 2021 - May 2023.
- Liana Tilton. Washington University in St. Louis, BS in Electrical Engineering. "Control and actuation of soft quadruped." May 2021 - August 2021. → *Tesla.*
- Andonny Garcia. Yale University, BS Mechanical Engineering. "Waterproofing Flexible High-DOF Joint for Amphibious Turtle Robot." Jan 2021 - August 2021. → *Temple Allen Industries.*
- Eugene Thomas. Yale University, BS Mechanical Engineering. "Tensile Jamming Fibers." Sept 2020 - May 2022. → *John Deere.*

TEACHING EXPERIENCE

Department of Mechanical Engineering & Materials Science, Yale University New Haven, CT
MENG 287: Intermediate Mechanical Design Teaching Fellow *Jan 2024 - May 2024*

· Led weekly design sessions where students go through design iterations, and provided feedback and support.
· Engaged with teaching staff and coordinated teaching resources and grading.

Department of Mechanical Engineering & Materials Science, Yale University New Haven, CT
MENG 493: Intro to Soft Robotics Teaching Fellow *Jan 2021 - May 2021*

· Graded assignments where students conducted journal reviews.
· Led lab sessions, and provided support to students in their lab projects.

Department of Mechanical Engineering & Materials Science, Yale University New Haven, CT
MENG 185: Mechanical Design Teaching Fellow *Aug 2020 - Dec 2020*

· Gave lectures on Computer-Aided Design (CAD) and software tools for mechanical engineering designs.
· Led lab sessions, and provided support to students throughout their semester-long design projects.

Engineering Department, Swarthmore College Swarthmore, PA
E11 Electrical Circuit Analysis Teaching Assistant *Sept 2018 - Dec 2018*

· Led weekly problem sessions to clarify concepts in circuit analysis, provided explanations to hard assignments
· Gathered feedback from students to improve the course
· Course by: Prof. Lynne Molter

Engineering Department, Swarthmore College Swarthmore, PA
E29 Embedded Systems Lab Grader *Jan 2018 - May 2018*

· Met with student groups weekly to gauge the progress on their lab projects. Graded and provided feedback on finished work
· Course by: Prof. Maggie Delano

Engineering Department, Swarthmore College Swarthmore, PA
E14 Experimentation for Engineering Design Teaching Assistant *Jan 2018 - May 2018*

· Led weekly problem sessions to clarify concepts in engineering statistics. Demonstrated solving hard assignments.
· Guided students through Python Jupyter Notebook programming tasks
· Course by: Prof. Arthur E. McGarity

SERVICE, OUTREACH, AND CONTRIBUTION TO PROMOTING DIVERSITY

Tau Beta Pi - Engineering Honors Society Swarthmore, PA
PA-K Chapter, President *April 2018 - May 2019*

· Coordinate the nomination, election, and initiation of eligible members
· Attend district conference to connect with student leaders from other chapters in Pennsylvania

Chester High School Solar Car Project Chester, PA
Volunteer *Sept 2016 - May 2019*

· Chester is a low-income, predominantly African-American neighborhood in suburban Philadelphia
· Mentored students on a solar car building project to teach about STEM and higher education