DAVID LEVINE

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EDUCATION

University of Pennsylvania, School of Engineering & Applied Science, Philadelphia, PA
Ph.D. in Mechanical Engineering & Applied Mechanics (expected 2023)

University of Pennsylvania, School of Engineering & Applied Science, Philadelphia, PA
Master's of Science & Engineering (M.S.E), Mechanical Engineering & Applied Mechanics, 2021

Cornell University, College of Engineering, Ithaca, NY
Bachelor of Science (B.S.), Mechanical and Aerospace Engineering, 2017

HONORS AND AWARDS

University of Pennsylvania:

- GAANN Fellowship (Graduate Assistance in Areas of National Need Fellowship), Fundamentals of Advanced Manufacturing, September 2017-August 2020
- Outstanding TA Award, Mechanical Engineering & Applied Mechanics Department, Fall 2020

Cornell University:

- Graduated *cum laude* in May 2017
- Dean's Honor List (6 Semesters)
- John McMullen Dean's Scholarship (In recognition for future leadership and service to the community)
- Albert R. George Student Project Team Award (as a member of the Violet Nanosatellite Project Team), Spring 2015

RESEARCH EXPERIENCE

Graduate Research Assistant 2020-present
Turner and Pikul Research Labs, University of Pennsylvania
Philadelphia, PA
Advisers: Dr. Kevin Turner and Dr. James Pikul

- Developing electroadhesive materials with increased blocking force to size ratios to enable compact integration onto VR controllers
- Increasing operating electroadhesive lifetimes to preclude unwanted haptic interface failures
- Reducing operating voltages for electroadhesive functionality in concert with wearable, low-cost tactile sensors and batteries currently being used in VR/AR controllers
- Improving the maximum blocking force and cycle life of electroadhesives by manipulating stress distributions, adhesion, and friction at interfaces through geometric and materials engineering
- Completed a widespread review of materials with electroprogrammable stiffness

Graduate Research Assistant 2017-2019
Sung Robotics Lab, University of Pennsylvania
Philadelphia, PA
Advisor: Dr. Cynthia Sung

- Developed an origami-inspired, tendon-driven soft robotic swimmer for exploratory applications
- Designed a parametric model to visualize the kinematics of a non-rigid origami pattern
- Implemented the magic ball pattern into 1-D jet-swimmers with an elastomeric skin for hydraulic propulsion
- Experimentally quantified the energy storage of robots with varying fold pattern aspect ratio
- Designed experiments to quantify the effect of pattern variations on swimming performance
- Designed a novel, 3-D printed miniaturized clutch mechanism to autonomously self-inflate the robot's origami balloon body
- Mentored and supervised the research activities of one master's student, two undergraduate students, and one high-school student

Undergraduate Researcher 2016-2017
Organic Robotics Lab, Cornell University
Ithaca, NY
Principal Investigator: Dr. Robert Shepherd

- Designed a soft, tendon-driven, 6 degree-of-freedom prosthetic hand for bio-inspired grasping and object manipulation
- Packaged all motors and necessary electronics in a small form factor (within palm)
- Implemented low-cost elastomeric passive transmission system (EPT) to allow both high-force actuation under load & high-speed actuation without load
- Manufactured prosthetic hand via stereolithographic 3-D printing techniques (Carbon3D elastomeric & rigid polyurethane resins)
- Implemented infrared proximity sensors into system for fingertip force sensitivity and object detection
- Demonstrated hand's grasping capabilities via CRS Catalyst robot arm

Undergraduate Researcher 2016-2017
Space Systems Design Studio, Cornell University
Ithaca, NY
Principal Investigator: Dr. Mason Peck

- Developed a cryogenic spacecraft prototype for potential functionality at temperatures close to absolute zero
- Designed the characteristics of the spacecraft's power, structures and thermal subsystems
- Identified cryogenic analogs for current spacecraft technologies that would be best suited for the design prototype
- Created newfound strategies to integrate cryogenic technologies from other fields into the overall spacecraft design
- Implemented design constraints for a long-term interstellar mission to Proxima Centauri b

PUBLICATIONS

1) **D.J. Levine**, K.T. Turner & J.H. Pikul. "Materials with electroprogrammable stiffness." ***Advanced Materials*** *(2021).*
2) **D.J. Levine**, K.T. Turner & J.H. Pikul. "Enhancing electroadhesive clutch performance via geometric stiffness manipulation." *(2021, in preparation).*
3) C. Stabile*, **D.J. Levine***, G.M. Iyer*, C. Majidi & K.T. Turner. "A Mechanics-Based Framework for Versatile Robotic Grasping." *(2021, in preparation).*
4) Z. Yang, D. Chen, **D.J. Levine**, and C. Sung. "Origami-Inspired Robot that Swims via Jet Propulsion." ***IEEE Robotics and Automation Letters*** *(2021).*
5) K.W. O'Brien, P.A. Xu, **D.J. Levine**, C.A. Aubin, H.J. Yang, M.F. Xiao, L.W. Wiesner, R.F. Shepherd. "Elastomeric Passive Transmission for Autonomous Force-Velocity Adaptation Applied to 3D Printed Prosthetics." ***Science Robotics*** *(2018).*

TEACHING EXPERIENCE

Graduate Teaching Assistant, Statics & Mechanics of Materials 2018-2020
University of Pennsylvania
Philadelphia, PA
Professor: Dr. Kevin Turner (2018-2019), Dr. Robert Carpick (2020)

- Served as a TA for sophomore-level statics & mechanics of materials course for 3 semesters
- Co-led an active learning recitation section for 70 sophomore mechanical engineering students
- Designed lesson plans to encourage material retention and to reinforce key concepts
- Held weekly office hours to answer technical questions
- Graded exams and developed homework solutions

Graduate Teaching Assistant, Control Systems for Robotics 2018-2019
University of Pennsylvania
Philadelphia, PA
Professor: Dr. Vinutha Kallem

- Served as a TA for graduate-level robotic controls course for 1 semester
- Developed homework solutions for 30 robotics Master's & Ph.D. students in the GRASP (General Robotics Automation Sensing & Perception Lab)
- Designed lesson plans to encourage material retention and to reinforce key concepts
- Graded exams and held weekly office hours to answer technical questions

INDUSTRY EXPERIENCE

Production Intern, Dragon Flight Systems Integration & Test 2016
SpaceX
Hawthorne, CA

- Worked on the integration & test team responsible for production of the Dragon spacecraft
- Designed and updated test plans in support of the CRS-11 mission
- Designed test scripts in Python to automate and expedite Dragon checkouts before launch
- Successfully automated insertion loss & power testing for RF (radio) subsystem

Mechanical Design Intern 2015
NASA Goddard Space Flight Center, Observational Cosmology Laboratory
Greenbelt, MD
Principal Investigator: Dr. Stephen Rinehart

- Worked on BETTII (Balloon Twin Telescope for Infrared Interferometry)
- Designed and fabricated ground support equipment for alignment of BETTII's internal optics
- Designed and fabricated flight enclosures for delay line electronics

LEADERSHIP EXPERIENCE

Vice President, MEGA (Mechanical Engineering Graduate Association) 2018-2019

- Served as a graduate student leader for the MEAM department
- Connected MEAM graduate students and faculty to enrich academic and social lives
- Planned social activities and discussed improvements to graduate life with departmental faculty leadership

References from Research Statement:

[1] R. Hinchet, V. Vechev, H. Shea, & O. Hilliges. "Dextres: Wearable haptic feedback for grasping in VR via a thin form-factor electrostatic brake." In *Proceedings of the 31st Annual ACM Symposium on User Interface Software and Technology (2018).*

[2] R. Hinchet, H.Shea. "High Force Density Textile Electrostatic Clutch." *Advanced Materials Technologies (2020).*

[3] **D.J. Levine**, K.T. Turner & J.H. Pikul. "Materials with electroprogrammable stiffness." *(2020, in preparation).*

[4] K.W. O'Brien, P.A. Xu, **D.J. Levine**, C.A. Aubin, H.J. Yang, M.F. Xiao, L.W. Wiesner, R.F. Shepherd. "Elastomeric Passive Transmission for Autonomous Force-Velocity Adaptation Applied to 3D Printed Prosthetics." ***Science Robotics*** *(2018).*

[5] C. Stabile*, **D.J. Levine***, G.M. Iyer*, C. Majidi, & K.T. Turner. "A Mechanics-Based Framework for Versatile Robotic Grasping." *(in preparation).*

[6] **D.J. Levine**, K.T. Turner & J.H. Pikul. "Enhancing electroadhesive clutch performance via geometric stiffness manipulation." *(2020, in preparation).*