

AARON C. DAVIS

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Education

Ph.D. in Mechanical Engineering, Purdue University August 2019 – May 2025 (expected) GPA 3.49/4.0

Advisors: Dave Cappelleri, Luis Solorio, Craig Georgen

B.S. in Mechanical Engineering, Brigham Young University April 2019 GPA 3.74/4.0

Advisors: Brian Jensen, Richard Vanfleet

Research Experience

Post-doctorate Associate ▶ Prof. Luis Solorio Group

Purdue Department of Biomedical Engineering ▶ Starting May 2025

Conducting mechanical analysis of cells and tissues for cancer models.

Graduate Research Assistant ▶ Prof. Dave Cappelleri Group

Purdue Department of Mechanical Engineering ▶ August 2019–Present

Designed and tested several magnetic microrobots for drug delivery and micromanipulation utilizing smart materials and micro 3D printing. Resulting in three first author conference papers, two other conference presentations, and two other journal articles.

Lab Research ▶ Prof. Brian Jensen Group

BYU Department of Mechanical Engineering ▶ August 2016–April 2019

Designed and built a micro gas chromatographic column. Developed and implemented a process for thermal gradient column microfabrication based on vertical through-wafer silicon etching and wafer-bonding. Resulting in one journal article and one conference presentation.

Undergraduate Intern ▶ Sandia National Laboratories Advanced Fuzing Technologies

Sandia National Laboratories ▶ May 2018– August 2018, May 2019– August 2019

Worked as part of a team on production of weapons components. Designed and built testers for piezoelectric sensors, electrical switches, and voltage isolation circuits for certifying new components and monitoring old equipment.

Teaching Experience

Ward A. Lambert Graduate Fellow ▶ Fluid Mechanics

Purdue Department of Mechanical Engineering ▶ August 2024–May 2025

Currently apprenticed under Professor Ivan Christov. Have prepared and delivered two course lectures in preparation for teaching all lectures to a student section for a semester. Responsible for preparing lectures, homework, quizzes, and exams.

Teaching Assistant ▶ Mechanics of Materials

Purdue Department of Mechanical Engineering ▶ August 2021–December 2021

Developed and graded homework problems. Held TA office hours to help students with homework and studying.

Teaching Assistant ► Introductory Newtonian Physics

BYU Department of Physics ► January 2019–April 2019

Lead recitation section of 20 students including example problems, answering questions, and reviewing concepts.

Missionary Volunteer ► Kobe Japan

Church of Jesus Christ of Latter-Day Saints ► April 2013–April 2015

Trained, held meetings, and created progress reports for 20 to 24 other volunteers regularly. Interacted with many different people every day and learned the importance of communication and active listening.

Publications

- **A. C. Davis**, M. M. Howard, L. Solorio, D. J. Cappelleri. Wireless pick-and-place Bioassembly of cell spheroids using microrobot gripper. (in preparation)
- **A. C. Davis**, S. Zhang, A. Meeks, D. Sakhrani, L. C. Sanjuan Acosta, D. E. Kelley, E. Caldwell, L. Solorio, C. J. Goergen, D. J. Cappelleri. Novel design of 3D printed tumbling microrobot for in vivo targeted drug delivery. **Advanced Materials** (Submitted)
- O. Shindell, **A. C. Davis**, D.J. Cappelleri. Micromanipulation System for Microscale Magnetic Component Alignment and Assembly. **IEEE International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS)**. (2024) (short paper)
- **A. C. Davis**, M. M. Howard, E. Z. Freeman, L. Solorio, and D. J. Cappelleri. Mobile Microrobot Grippers for Cell Spheroid Micromanipulation. **2024 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS)**. (2024)
- Y. Yang, L. Tan, **A. C. Davis**, and D. J. Cappelleri. Design, Fabrication, and Characterization of a Helical Multi-Material MicroRobot with a Detachable Payload (HMMR-DP). **2024 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS)**. (2024)
- **A. C. Davis**, E. Z. Freeman, and D. J. Cappelleri. Magnetic Mobile Micro-Gripping MicroRobots (MM μ GRs) with Two Independent Magnetic Actuation Modes. **2024 IEEE International Conference on Robotics and Automation (ICRA)**. (2024)
- **A. C. Davis**, and D. J. Cappelleri, (2023). Design and Control of Microscale Dual Locomotion Mode Multi-Functional Robots (μ DMMFs). **2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, 2687–2692. (2023)
- L. Tan, **A. C. Davis**, and D. J. Cappelleri, “Smart Polymers for Microscale Machines,” **Advanced Functional Materials**, vol. 31, no. 9, 2021, doi: 10.1002/adfm.202007125. (2021)
- L. O. Mair *et al.*, “Soft Capsule Magnetic Millirobots for Region-Specific Drug Delivery in the Central Nervous System,” **Frontier Robotics AI**, vol. 8, no. July, pp. 1–12, 2021, doi: 10.3389/frobt.2021.702566. (2021)
- P. D. Schnepf, **A. Davis**, B. D. Iverson, R. Vanfleet, R. C. Davis, and B. D. Jensen, “Closed-Loop, Axial Temperature Control of Etched Silicon Microcolumn for Tunable Thermal Gradient Gas Chromatography,” **Journal of Microelectromechanical Systems**, vol. PP, pp. 1–10, 2019, doi: 10.1109/JMEMS.2019.2953152. (2019)

Presentations

- “Active mobile microrobots for drug delivery and micro manipulation” Guest lecturer Purdue ME597 2023
- “Tumbling mobile microrobots for drug delivery and diagnostics” MARSS conference July 2022
- “Etched Silicon Microcolumn for Tunable Thermal Gradient Gas Chromatography” AVS conference October 2018

Mentorship

Graduate Students

- ▶ Olliver Shindell, Purdue University (2023 –)
- ▶ Yang Yang, Purdue University (2023 –)

Undergraduate Students

- ▶ Iris Gong, Purdue University (2024 –)
- ▶ Emma Caldwell, Purdue University (2023 –)
- ▶ Emmet Freeman, Purdue University (2023 – 2024)
- ▶ Henry Davis, Brigham Young University (2018 – 2019)
- ▶ James Harkness, Brigham Young University (2018 – 2019)