Andrew P. Sabelhaus

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EDUCATION

PHD. MECHANICAL ENGINEERING — University of California, Berkeley
Thesis (tentative): *Control and Design of Quadruped Robots with Actuated Tensegrity Spines* — Expected May 2019

M.S. MECHANICAL ENGINEERING — University of California, Berkeley
Thesis: *Mechanism and Sensor Design for SUPERball, a Cable-Driven Tensegrity Robot* — Dec. 2014

B.S. MECHANICAL ENGINEERING — University of Maryland, College Park
(With Minor in Computer Science) — May 2012

GRANTS + FUNDING + AWARDS

- NASA Space Technology Research Fellowship. $75,000/yr, 4 years. Title: *Trajectory Tracking in Nonlinear, High-Order, Underactuated Robotic Systems.* 2015-2019.
- CITRIS Tech for Social Good Development Grant. $5,000. Title: *Laika, The Robot Transport for Disaster Relief.* University of California Center for Information Technology Research in the Interest of Society (CITRIS), 2018.
- NSF Graduate Research Fellowship. National Science Foundation. $32,000/yr, 3 years. 2012-2015

PUBLICATIONS

10. Modular Elastic Lattice Platform for Rapid Prototyping of Tensegrity Robots. Chen, L-H.; Daly, M.C.; Sabelhaus, A.P.; Janse van Vuuren, L.A.; Garnier, H.J.; Verdugo, M.I.; Tang, E.; Spangenberg, C.U.; Ghahani, F.; Agogino, A.K.; Agogino, A.M.; ASME International Design Engineering Technical Conferences (IDETC) / 41st Mechanisms and Robotics Conference, Aug 2017.
9. Model-Predictive Control of a Flexible Spine Robot. Sabelhaus, A.P.; Akella, A.K.; Ahmad, Z.A.; SunSpiral, V.; American Control Conference (ACC), May 2017.
8. DNA-Structured Linear Actuators. Zampaglione, K.; Sabelhaus, A.P.; Chen, L.; Agogino, A.M.; Agogino, A.K.; ASME International Design Engineering Technical Conferences (IDETC) / 40th Mechanisms and Robotics Conference, Aug 2016.
7. Mechanism Design and Simulation of the ULTRA Spine, a Tensegrity Robot. Sabelhaus, A.P.; Ji, H.; Hylton, P.; Madaan, Y.; Yang, C.; Friesen, J.; SunSpiral, V.; Agogino, A.M.; ASME International Design Engineering Technical Conferences (IDETC) / 39th Mechanisms and Robotics Conference, Aug 2015.
6. System Design and Locomotion of SUPERball, an Untethered Tensegrity Robot. Sabelhaus, A.P.; Bruce, J.; Caluwaerts, K.; Manovi, P.; Fallah Firoozi, R.; Dobi, S.; Agogino, A.M.; SunSpiral, V.; IEEE International Conference on Robotics and Automation (ICRA), May 2015.
5. Design and Control of Compliant Tensegrity Robots through Simulation and Hardware Validation. Caluwaerts, K.; Despraz, J.; Iscen, A.; Sabelhaus, A.P.; Bruce, J.; Schrauwen, B.; SunSpiral, V.; Journal of the Royal Society Interface, Sept. 2014.
4. Hardware Design and Testing of SUPERball, a Modular Tensegrity Robot. Sabelhaus, A.P.; Bruce, J.; Caluwaerts, K.; Chen, Y.; Lu, D.; Liu, Y.; Agogino, A.K.; SunSpiral, V.; Agogino, A.M.; The 6th World Conference on Structural Control and Monitoring (6WCSCM), July 2014
3. SUPERball: Exploring Tensegrities for Planetary Probes. Bruce, J.; Sabelhaus, A.P.; Chen, Y.; Lu, D.; Morse, K.; Milam, S.; Caluwaerts, K.; Agogino, A.M.; SunSpiral, V.; 12th International Symposium on Artificial Intelligence, Robotics, and Automation in Space (i-SAIRAS), June 2014
2. Design and Evolution of a Modular Tensegrity Robot Platform. Bruce, J.; Caluwaerts, K.; Iscen, A.; Sabelhaus, A.P.; SunSpiral, V.; IEEE International Conference on Robotics and Automation (ICRA), May 2014

1. TinyTeRP: A Tiny Terrestrial Robotic Platform with Modular Sensing. Sabelhaus, A.P.; Mirsky, D.; Hill, L.M.; Bergbreiter, S.; IEEE International Conference on Robotics and Automation (ICRA), May 2013

PUBLICATIONS UNDER REVIEW + WORKS-IN-PROGRESS

- Design, Simulation, and Testing of Laika, a Quadruped Robot with a Flexible Actuated Spine. Sabelhaus, A.P.; Janse van Vuuren, L.A.; Joshi, A.; Zhu,E.; Garnier, H.J.; Sover, K.A.; Navarro, J.; Agogino, A.K.; SunSpiral, V.; Agogino, A.M. *Under review.*
- Model-Predictive Control with Reference Input Tracking for Tensegrity Spine Robots. Zhao, H.; Sabelhaus, A.P.; Daly, M.C.; Tang, E.; Zhu, E.; Akella, A.K.; Ahmad, Z.A.; SunSpiral, V.; Agogino, A.M. *In preparation.*
- A Smooth Dynamics Model for Cable Slackness in Cable-Driven Robots. Sabelhaus, A.P. *In preparation.*
- Quadruped Robot Spines Require Torsion for Foot-Lifting. Sabelhaus, A.P. *In preparation.*

PATENTS

- DNA Structured Linear Actuator. Agogino, A.; Zampaglione, K.; Chen, L-H.; Sabelhaus, A.; US Patent Application Number: PCT/US2016/032899. Under Review.
- Elastic Lattices for Design of Tensegrity Structures and Robots. Chen, L-H.; Agogino, A.; Daly, M.; Sabelhaus, A.P.; Agogino, A.K.; Provisional Patent.

PRESENTATIONS + WORKSHOPS + POSTERS

- Laika, The Quadruped Robot with a Tensegrity Spine. Bay Area Robotics Symposium (BARS), Oct. 2018. Presentation and Poster.
- Trajectory Tracking Control of a Flexible Spine Robot. NASA/ESA Conference on Adaptive Hardware and Systems: Structurally Adaptive Tensegrity Robots Workshop, July 2017. Presentation and Poster.
- DNA-Structured Linear Actuators. SKTA Innopartners IP Redux Event, Apr 2016. Presentation.
- ULTRA Spine Project. Bay Area Robotics Symposium (BARS), Oct 2015. Presentation and Poster.
- Robotics, Mechatronics, and Intelligent Systems. Osher Lifelong Learning Institute, Feb 2014. Invited Talk.
- Mechatronic Design of Tensegrity Robotic Systems for Dynamic Locomotion. NASA Ames Research Center Autonomous Systems Lab Poster Symposium, Aug 2013. Poster.
- TinyTeRP: A Tiny Terrestrial Robotic Platform. International Symposium on Distributed Autonomous Robotic Systems (DARS), Nov 2012. Poster.

TEACHING

- ME135/235, Design of Microprocessor-Based Mechanical Systems. Graduate Student Instructor (GSI, similar to teaching assistant.) Department of Mechanical Engineering, UC Berkeley, spring 2018.

REVIEWER FOR JOURNALS AND CONFERENCES

Drew has served as a reviewer for the following journals and conferences:

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.
- IEEE Robotics and Automation Letters (RA-L), 2017.
- IEEE International Conference on Robotics and Automation (ICRA), 2017.
- American Control Conference (ACC), 2017-2018.
- ASME International Design Engineering Technical Conference (IDETC), 2016-2017.
- International Journal of Space Structures, 2017.
- IEEE Conference on Control Technology and Applications (CCTA), 2017.

MENTORSHIP + ADVISING

Drew has mentored or advised the following students in an official capacity:

Graduate Student Researchers:

- Holly Stein, M.Eng 2018
- Nigel Mevana, M.Eng 2018
- Jonathan Marr, M.Eng 2018
- Lara Janse van Vuuren, M.Eng 2017
- Shirley (Huajing) Zhao, M.Eng 2017
- Robel Teweldebirhan, M.Eng 2017
- Asher Saghian, M.Eng 2017
- June (Shu Jun) Tan, M.Eng 2017
- Kyle Zampaglione (project mentoring), M.S. 2015
- Patrick Hylton, M.Eng 2015
- ChanWoo Yang, M.Eng 2015
- Yakshu Madaan, M.Eng 2015
- Yangxin Chen, M.Eng 2014
- Dizhou Lu, M.Eng 2014
- Margaret (Yuejia) Liu, M.Eng 2014

Undergraduate Student Researchers:

- Angela Wang, B.S. 2020
- Jesus Navarro, B.S. 2018
- Kimberly Sover, B.S. 2019
- Lua Varner, B.S. 2018
- Hunter Garnier, B.S. 2018
- Akhilesh Mishra, B.S. 2018
- Ankita Joshi, B.S. 2017
- Jorge Vizcayno, B.S. 2016
- Heeyeon Kwon, B.S. 2016
- Zeerek Ahmad, B.S. 2015
- Roya Fallah Firoozi, B.S. 2014
- Sarah Dobi, B.S. 2015
- Katie Gessler (while at U. Maryland)

DIVERSITY + OUTREACH + SERVICE WORK

Professional organization and departmental service work:

- ASME Diversity and Inclusion Strategic Commitee (DISC), Advisor. American Society of Mechanical Engineers (ASME). Revised ASME policy P-15.11, PS16-02, and Statement on Diversity and Inclusion to include protections for transgender ASME members. June 2016 - Ongoing.
- ASEE LGBTQ Virtual Community of Practice, Member. American Society for Engineering Education. Organizing for LGBTQ safe space workshops in engineering. March 2018 - Ongoing.
- Graduate Student Search Committee, Member. UC Berkeley Mechanical Engineering Faculty Searches. Led committee in interviewing and recommending faculty candidates. Spring 2017 - Spring 2018.
- Graduate Peer Advisor. UC Berkeley Mechanical Engineering - Equity, Diversity, and Inclusion Initiative. Created and assessed various programs serving under-represented students. Aug 2014 - May 2015.
- Coordinator, Chapter Leadership Programs. Out in Science, Technology, Engineering, and Mathematics (oSTEM) Incoporated. Led team in developing resources for LGBTQ student leaders. July 2012 - April 2013.

Student organization service work:

- Secondary Advisor. Out in Science, Technology, Engineering, and Mathematics (oSTEM) at UC Berkeley. Berkeley, CA, Aug 2012 - April 2014.
- Founder and Facilitator. Queer Council at the University of Maryland. College Park, MD, May 2011 - April 2012.
- Chapter President. Out in Science, Technology, Engineering, and Mathematics (oSTEM) at Maryland. College Park, MD, Nov 2010 - April 2012.

Workshops presented:

- Facilitation Frameworks for LGBTQ College Students. Out in Science, Technology, Engineering, and Mathematics Incorporated (oSTEM) National Conference, Nov 2013.
- Topics in Queer Student Leadership: Assessment, Transitions, and Goal-Driven Planning. National Gay and Lesbian Task Force (NGLTF) Creating Change Conference, Jan 2013. Also presented at Midwest Bisexual, Lesbian, Gay, Transgender, and Allies College Conference (MBLGTACC), Feb 2013.

Other professional preparation:

- Question, Persuade, Refer: Gatekeeper. Trained in responding to mental health crises in students. UC Berkeley Health Center, March 2018.