

# Daniel Bruder

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University of Michigan  
Mechanical Engineering  
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## Education

### **University of Michigan**

Ph.D., Mechanical Engineering, exp 2020  
Fields: Robotics and Control  
M.S., Mechanical Engineering, 2018

### **Harvard University**

B.S., Engineering Sciences, 2013  
Honors: Magna Cum Laude

## Research

### **Mechanical Engineering Dept, University of Michigan**

Graduate Student Researcher  
Project: Design, modeling, and control of soft robots

### **School of Engineering and Applied Sciences, Harvard University**

Undergraduate Student Researcher  
Project: Design of mitral valve repair surgical device

## Teaching

### **Mechanical Engineering Dept, University of Michigan**

Graduate Student Instructor, Robot Kinematics and Dynamics, 2017  
Graduate Student Instructor, Designs in Nature and Engineering, 2016

### **School of Engineering and Applied Sciences, Harvard University**

Design Specialist, Capstone Design Course, 2012-2013

### **Physics Dept, Harvard University**

Teaching Assistant, Laboratory Electronics: Analog and Digital Circuit Design, 2011

### **Mathematics Dept, Harvard University**

Course Assistant, Calculus, Series, and Differential Equations, 2009-2010  
Course Assistant, Functions and Calculus, 2009

Awards and Fellowships	<b>Richard and Eleanor Towner Prize for Outstanding Ph.D. Research</b> University of Michigan, 2019
	<b>NextProf Nexus Travel Grant</b> Georgia Institute of Technology, 2019
	<b>Best Systems Paper Finalist, Best Student Paper Finalist</b> Robotics: Science and Systems Conference, 2019
	<b>RSS Pioneers Travel Grant</b> Robotics: Science and Systems Conference, 2019
	<b>NSF Graduate Research Fellowship</b> National Science Foundation, 2017-2020
	<b>Honorable Mention, Ford Foundation Fellowship</b> National Academies of Sciences, Engineering, and Medicine, 2017
Languages and Skills	English (native), Spanish (basic) Matlab, L <sup>A</sup> T <sub>E</sub> X, Solidworks, Python, Mathematica, HTML
Publications	<b>Journal Papers</b>
	[J1] D. Bruder, X. Fu, B. Gillespie, C. D. Remy, and R. Vasudevan. Data-driven control of soft robots using koopman operator theory. 2019a ( <i>In Preparation, IEEE Transactions on Robotics</i> )
	[J2] D. Bruder, A. Sedal, R. Vasudevan, and C. D. Remy. Force generation by parallel combinations of fiber-reinforced fluid-driven actuators. <i>IEEE Robotics and Automation Letters</i> , 3(4):3999–4006, Oct 2018. ISSN 2377-3766. doi: 10.1109/LRA.2018.2859441
	[J3] A. Sedal, D. Bruder, J. Bishop-Moser, R. Vasudevan, and S. Kota. A continuum model for fiber-reinforced soft robot actuators. <i>Journal of Mechanisms and Robotics</i> , 10(2):024501, 2018
	<b>Conference Papers</b>
	[C1] S.M. Danforth, M. Kohler, D. Bruder, A.R. Davis Rabosky, and T.Y. Moore. Emulating duration and curvature of coral snake anti-predator thrashing behaviors using a soft-robotic platform. 2020. ( <i>Submitted</i> )

- [C2] D. Bruder, B. Gillespie, C. D. Remy, and R. Vasudevan. Modeling and control of soft robots using the koopman operator and model predictive control. In *Proceedings of Robotics: Science and Systems*, Freiburg/Breisgau, Germany, June 2019b. doi: 10.15607/RSS.2019.XV.060
- [C3] D. Bruder, C. D. Remy, and R. Vasudevan. Nonlinear system identification of soft robot dynamics using koopman operator theory. In *Robotics and Automation (ICRA), 2019 IEEE International Conference on*. IEEE, 2019c
- [C4] D. Bruder, A. Sedal, J. Bishop-Moser, S. Kota, and R. Vasudevan. Model based control of fiber reinforced elastofluidic enclosures. In *Robotics and Automation (ICRA), 2017 IEEE International Conference on*, pages 5539–5544. IEEE, 2017
- [C5] A. Sedal, D. Bruder, J. Bishop-Moser, R. Vasudevan, and S. Kota. A constitutive model for torsional loads on fluid-driven soft robots. In *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pages V05AT08A016–V05AT08A016. American Society of Mechanical Engineers, 2017

### **Workshop and Meeting Presentations**

- [P1] D. Bruder. Modeling and Control of Soft Robots Using the Koopman Operator. *Engineering Research Symposium, University of Michigan*. 2019
- [P2] D. Bruder, R. Vasudevan. Leveraging Data to Model and Control Soft Robots. *Robotics: Science and Systems Pioneers*. 2019
- [P3] T. Y. Moore, D. Bruder, A. Davis Rabosky, R. Vasudevan. Decoupling Coupled Anti-Predator Signals with a Bio-Inspired Snake Robot. *Society for Integrative and Comparative Biology Annual Meeting*. 2019
- [P4] D. Bruder, A. Sedal, R. Vasudevan, and C. D. Remy. Model-Based Method for Estimating the Workspace of Soft Manipulators. *Workshop on Soft Robot Modeling and Control at IROS*. 2018
- [P5] D. Bruder, A. Sedal, R. Vasudevan, and C. D. Remy. Model-Based Control of Parallel Combinations of Soft Actuators. *Midwest Robotics Workshop (poster)*. 2018
- [P6] R. B. Gillespie, C. D. Remy, D. Bruder, A. Sedal. Don't Bite the Hand that Feeds You: Soft Robots For Eldercare. *Toyota Research Institute Annual Meeting*. 2018

- [P7] D. Bruder, A. Sedal, J. Bishop-Moser, S. Kota, and R. Vasudevan. Model Based Control of Fiber Reinforced Elastofluidic Enclosures. *Midwest Robotics Workshop (poster)*. 2017
- [P8] D. Bruder, R. Vasudevan, C.D. Remy. Design and Modeling of Soft Robotic Arm Modules. *Toyota Research Institute Annual Meeting (poster)*. 2017

## References

Ram Vasudevan  
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