

# Tyler N. Morrison

Graduate Research Assistant | PhD Student

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## Education



### The Ohio State University

Ph.D. Mechanical Engineering – Year 2

- GPA: 4.00/4.00
- Distinguished University Fellow
- Department of Mechanical Engineering Supplementary Award

Columbus, OH, USA

Aug. 2017 — May 2022 (est.)



### The University of Tulsa

B.S. Mechanical Engineering

- GPA: 4.00/4.00
- Chapman Presidential Scholar
- Vision Scholar

Tulsa, OK, USA

Aug. 2013 — May 2017

## Experience

### Design, Innovation and Simulation Lab (DISL)

The Ohio State University,  
Columbus, OH

Graduate Research Assistant

August 2017 — Present

- Modeled, tested, and analyzed variable stiffness robotic arm links for use in physical human-robot interaction.
- Developed software for, planned, and conducted experiments for interdisciplinary research on attention to preview in human drivers.
- Mentored high school, undergraduate, and MS student research projects.
- Administered and maintained lab server and rapid-prototyping equipment.

### NSF Interfaces and Surfaces REU

Clemson University, Clemson, SC

REU Research Assistant

May 2016 — August 2016

- Conducted numerical simulations of hydrogel membranes under illumination.
- Modeled and implemented code for numerical simulation of magnetically heated gels with cooling effects.
- Mentored incoming MS student on simulation software and high-performance computing.

### Biological Robotics at Tulsa Lab (BRAT Lab)

The University of Tulsa, Tulsa, OK

Undergraduate Research Assistant

May 2015 — July 2017

- Pursued independent research on grasping and manipulation with quadruped robots.
- Developed optimal foot-shuffle algorithm for quadruped stabilization under disturbances and body-position constraints.
- Developed interactive software to model quadruped kinematics and tip-over stability.

### The Tulsa Children's Museum

Tulsa, OK

Mechanical Engineering Senior Project

October 2016 — May 2017

- Team designed and built a 15 foot steel auger ball-lift system for an exhibit at the children's museum.
- Elected project MVP. Our project was voted second best by our class.
- Video of the project before it was installed in the museum: <https://youtu.be/jlq1ikz-zHM>

### Mechanical Department, Aviation and Federal Division, Burns and McDonnell

Kansas City, MO

Mechanical Engineering Intern

Summer 2015

- Assisted in designing HVAC and plumbing systems at Tinker Air Force Base, Portland International Airport, the Sampson School at Guantanamo Bay Naval Base, and the Kansas City National Security Campus.

## Peer-Reviewed Journal Articles

**Tyler Morrison**, Chunhui Li, Xu Pei, Hai-Jun Su. *Design and Stiffness Modeling of a Novel Rotating Beam Link for Variable Stiffness Robotic Arms*. 2019. «In Review».

**Tyler Morrison**, Emanuele Rizzi, Omer Turkkan, Richard Jagacinski, Hai-Jun Su, Junmin Wang. *Drivers' Spatio-Temporal Attentional Distributions Are Influenced by Vehicle Dynamics and Displayed Point of View*. Human Factors. 2019. «In Press».

Richard Jagacinski, Emanuele Rizzi, Benjamin Bloom, Omer Turkkan, **Tyler Morrison**, Hai-Jun Su, Junmin Wang. *Drivers' Attentional Instability on a Winding Roadway*. IEEE Transactions on Human-Machine Systems. 2019. «Published». DOI: 10.1109/THMS.2019.2906612

Oksana Savchak, Konstantin Kornev, **Tyler Morrison**, Olga Kuksenok. *Controlling Deformations of Gel-based Composites by Electromagnetic Signals within GHz Frequency Range*. Soft Matter. 2018. «Published». DOI: 10.1039/C8SM01207E

## Conference Papers

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**Tyler Morrison**, Chunhui Li, Xu Pei, Hai-Jun Su. *A Novel Rotating Beam Link for Variable Stiffness Robotics Arms*. IEEE International Conference on Robotics and Automation. *Montreal, CA*. May 2019. «In Press».

## Selected Research Presentations

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Richard Jagacinski, Emanuele Rizzi, Benjamin Bloom, O. Anil Turkkan, **Tyler Morrison**, Hai-Jun Su, Junmin Wang. *The shape of attention when tracking a winding roadway*. Midwest Cognitive Science Conference. *Columbus, OH*. May 2019. «Oral».

Xianpai Xeng, **Tyler Morrison**, Hai-Jun Su. *Mechanical Solutions to Variable Stiffness Robotic Arms*. IEEE ICRA Workshop on Physical Human-Robot Interaction. *Montreal, CA*. May 2019. «Poster + Oral».

**Tyler Morrison**, Joshua Schultz. *Optimal shuffles to prevent quadruped tipover during cooperation*. Robotics: Science and Systems Workshop on Design and Control of Small Legged Robots. *Pittsburgh, PA, USA*. June 2018. «Poster + Oral».

Oksana Sachak, Yao Xiong, **Tyler Morrison**, Konstantin Kornev, Olga Kuksenok. *Magnonics in hydrogels: modeling and magnetomechanical effects in GHz frequency range*. MRS Spring Meeting: Computer-Based Modeling and Experiment for the Design of Soft Materials Symposium. *Phoenix, AZ, USA*. April 2017. «Oral».

## Selected Honors & Awards

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### Graduate

2017 **Distinguished University Fellow**, The Ohio State University

*Columbus, OH, USA*

2017 **Department Supplementary Fellowship Award**, The Ohio State University

*Columbus, OH, USA*

### Undergraduate

2017 **College of Engineering and Natural Sciences Steven J. Bellovich Medal**, The University of Tulsa

*Tulsa, OK, USA*

2017 **Sidney Born Award in Mechanical Engineering**, The University of Tulsa

*Tulsa, OK, USA*

2017 **Senior Project – Most Valuable Team Member**, The University of Tulsa, Mechanical Engineering Dept.

*Tulsa, OK, USA*

2017 **Nominee for National Barry Goldwater Scholarship**, The University of Tulsa

*Tulsa, OK, USA*

## Graduate Coursework

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|-----------------|--|
| <b>Design</b>   | Advanced Kinematics and Mechanisms, Optimal Design of Structures, Form Synthesis and Analysis    |
| <b>Control</b>  | Lumped Parameter Systems, Digital Control Engineering, Design and Control of Mechatronic Systems |
| <b>Analysis</b> | Intermediate Numerical Methods   |
| <b>Robotics</b> | Mechanical Control of Robotics, Design of Smart Products   |

## Skills and Experience

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|-------------------------------------|--|
| <b>Programming</b>                  | Mathematica, MATLAB, Python, Java, C/C++, LaTeX, Git |
| <b>Modeling and Design Software</b> | Solidworks, Revit, AutoCAD, Adobe Illustrator        |
| <b>Simulation</b>                   | ANSYS, ABAQUS, Solidworks Simulation                 |
| <b>Hardware</b>                     | Arduino, Raspberry Pi                                |
| <b>Rapid Prototyping</b>            | 3D-Printing, Laser Cutting, Plasma Cutting           |

## Additional Experience

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### The University of Tulsa Mechanical Engineering Department

Student Grader

- Mechanics of Materials (ME 3023)
- Instrumentation and Measurement (ME 3053)

Tulsa, OK, USA

Spring 2016 — Spring 2017

### Mechanical Department, Aviation and Federal Division, Burns and McDonnell

Kansas City, MO, USA

Mechanical Engineering Intern

Summer 2015

- Assisted in designing HVAC and plumbing systems at Tinker Air Force Base, Portland International Airport, The Sampson School At Guantanamo Bay Naval Base

### Navitas ESCO

Olathe, KS, USA

Jobsite Administrative Assistant

Summer 2014

## Other Presentations

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Abdulhamid Aljaber, Sultan Al-Nabhani, Nick Criser, Brian Hall, Joel Kapp, **Tyler Morrison**, Drake Norman, Alex Price, Tommy Weissert. *The Tulsa Children's Museum Petroleum Exhibit Ball Lift*. The University of Tulsa Senior Projects. **Tulsa, OK, USA**. April 2017. «Oral».

Brian Hall, **Tyler Morrison**, Alex Price. *The Tulsa Children's Museum Auger Ball Lift*. The University of Tulsa Department of Mechanical Engineering Advisory Board Meeting. **Tulsa, OK, USA**. March 2017. «Oral».

**Tyler Morrison**, Joshua Schultz. *Algorithms for Shuffling Foot Placements to Maintain Stability of a Quadruped Robot Engaged in a Cooperative Task*. The University of Tulsa Student Research Colloquium Mechanical: Engineering Session. **Tulsa, OK, USA**. March 2017. «Oral».

**Tyler Morrison**, Olga Kuksenok. *Numerical Simulations of NIPA Gel Membranes Exposed to Heat and Light*. Clemson Undergraduate Research Symposium. **Clemson, SC, USA**. July 2016. «Poster».

**Tyler Morrison**, Joshua Schultz. *Investigation into Coordinated Gaits of Quadruped Robots Engaged in Grasping and Manipulation with Applications in Search and Rescue*. The University of Tulsa Student Research Colloquium: Mechanical Engineering Session. **Tulsa, OK, USA**. March 2016. «Oral».

## Extracurricular Activity

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### Tau Beta Pi

Tulsa, OK, USA

Involved Member of Oklahoma Beta Chapter

2015 — 2017

- Helped lead initiation of new members and organize induction ceremonies and fellowship activities.

### Mathematical Association of America Putnam Competition

Tulsa, OK, USA

University of Tulsa Team Member and Individual Competitor

2014, 2015

- Personal best score of 11, ranks in top 21% of mathematicians in North America. (World-wide median score is zero points).

### Boy Scouts of America

Kansas City, KS, USA

Eagle Scout

2001 — 2013

- Eagle Scout service project: leading and organizing a project to build bookshelves for a library system at a home for troubled children.
- Member of U.S. BSA delegation to the 2011 World Scout Jamboree in Sweden.

## Attended Conferences

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- Robotics: Science and Systems; June 26-30, 2018; Pittsburgh, PA, USA
- IEEE International Conference on Robotics and Automation; May 20-24, 2019; Montreal, QC, CA

## Peer-Review Assistance

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- IROS 2018, Mechanism and Machine Theory, RobotSoft 2020