Brian K. Johnson, Ph.D.

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US citizen able to obtain security clearance

SUMMARY

- Successfully led multi-year collaborative robotics projects while mentoring students
- Breadth of experience in control systems, signal processing, machine learning, computer vision, design and fabrication

EXPERIENCE

Postdoctoral Research Scientist **Nov. 2022 – present**
Max Planck Institute for Intelligent Systems *Stuttgart, Germany*

- Led research projects in user-interactive robots and electrostatic soft actuators.
- Developed hardware and software for a visual-haptic device.
- Trained LSTM sequence models for real-time sensor estimation.
- Designed components for a soft robotic lower back exosuit.
- Organized scientific conferences and managed laboratory equipment.

National Science Foundation Graduate Research Fellow **Aug. 2018 – Aug. 2022**
Advanced Medical Technologies Laboratory *Boulder, CO*

- Implemented real-time discrete control of a 100-actuator, 100-sensor nonlinear interactive soft robot.
- Designed and evaluated novel control algorithms for dynamic multi-object manipulation tasks.
- Integrated resistive, capacitive, and magnetic soft sensors into robots.
- Wrote successful grant proposals to secure research funding totaling $150k.

Structural Dynamics R&D Intern **Jun. 2017 – Aug. 2018**
Sandia National Laboratories, U.S. Dept. of Energy *Albuquerque, NM*

- Performed multi-input/multi-output analysis on mechanical vibration tests.
- Developed signal processing algorithms to filter harmonic noise from test data.
- Published an open-access technical report on signal filtering.

Technical Specialist Intern **Jun. – Aug. 2016**
Lockheed Martin Rotary and Mission Systems *Owego, NY*

- Tested VH-92 helicopter flight hardware under thermal, vibration, and shock environments.
- Analyzed stresses in flight rack panels and stiffeners for FAA certification.

SKILLS

Programming: Python/PyTorch/Pandas, Open-CV, MATLAB, Git, LaTeX, C++, Julia

Software: Microsoft Office, SolidWorks/3D CAD, photo/video editing, vector graphics tools

Equipment: 3D printer, laser cutter, machine mill/lathe, oscilloscope, NI-DAQ, Arduino/Teensy

EDUCATION

Ph.D. Mechanical Engineering | University of Colorado Boulder **Aug. 2022**

M.S. Mechanical Engineering | University of Colorado Boulder **May 2020**

B.S. Mechanical Engineering | Cornell University, *summa cum laude* **Dec. 2017**

AWARDS AND GRANTS

CU Boulder Beverly Sears Research Grant **2022**

National Science Foundation Graduate Research Fellowship **2019**
National Science Foundation

National Defense Science and Engineering Graduate Fellowship **2019**
Alternate Awardee; Department of Defense

Dean's Graduate Innovation Assistantship **2018**
College of Engineering, University of Colorado Boulder

PUBLICATIONS

A. Shagan*, **B.K. Johnson***, et al., "Transparent electrostatic arrays for surface haptic displays," *in preparation*.

B.K. Johnson, J.S. Humbert, M.E. Rentschler, "An artificial potential field approach for velocity control and object manipulation on shape displays," *under review*.

B.K. Johnson*, M. Naris*, et al., "A multifunctional soft robotic shape display with high-speed actuation, sensing, and control," *Nature Communications* **14**, 4516. (2023)

V. Sundaram*, K. Ly*, **B.K. Johnson**, et al., "Embedded magnetic sensing for feedback control of soft HASEL actuators," *IEEE Transactions on Robotics* **39**, 808-822. (2022)

K. Ly, N. Kellaris, D. McMorris, **B.K. Johnson**, et al., "Miniaturized circuitry for capacitive self-sensing and closed-loop control of soft electrostatic transducers," *Soft Robotics* **8**, 673-686. (2021)

B.K. Johnson, et al., "Identification and control of a nonlinear soft actuator and sensor system," *IEEE Robotics and Automation Letters* **5**, 3783-3790. (2020)

B. Johnson, J.S. Cap, "Removal of stationary sinusoidal noise from random vibration signals," *Sandia National Lab*, SAND-2018-1900. (2018)

*equal contribution

SELECT PRESENTATIONS

"Transparent Actuating Displays for On-Screen Localized Haptic Interactions," *Robotic Materials 2024 Retreat* [Symposium], Berchtesgaden, DE. (Oct. 10, 2024) **Best Presentation award**

"A multifunctional soft robotic shape display with high-speed actuation, sensing, and control," *EuroEAP 2023* [Poster presentation], Bristol, UK. (Jun. 7, 2023)

"Control and Object Manipulation on Robotic Shape Displays," *Robotics Summer Seminar* [Symposium], University of Colorado Boulder, Colorado, USA. (Jun. 24, 2022)

"Soft Robot System Development Using HASELs," *Center for STEM Learning* [Symposium], University of Colorado Boulder, Colorado, USA, (Nov. 1, 2021)

"Identification and Control of a Nonlinear Soft Actuator and Sensor System," *RoboSoft 2020* [Paper presentation], Yale University, Connecticut, USA. (May 15, 2020)

PERSONAL INTERESTS

Aviation (Private Pilot) | Chinese language | Piano | Photography | Science fiction