

Brian K. Johnson

AI/ML Scientist

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SUMMARY

I'm a highly motivated research scientist with international experience applying AI, machine learning, and analytical tools to solve complex problems across industry, academia, and government domains. My previous work has been published in top scientific journals and presented at international conferences.

EXPERIENCE

Research Scientist

Nov 2022 – Nov 2024

Max Planck Institute for Intelligent Systems

Stuttgart, Germany

- Managed research team of 5 members using Agile methods to advance state-of-the-art research in computer vision/self-attention-based haptic robotic systems.
- Created a zero-shot visual saliency algorithm using DINO (vision transformer) and ResNet-based models.
- Trained LSTM PyTorch model for time series forecasting of a voltage sensor at 20 kHz sample rate.
- Organized and chaired multi-day scientific conference with 30+ presenters.

NSF Graduate Researcher

Aug 2018 – Aug 2022

Advanced Medical Technologies Laboratory

Boulder, CO

- Implemented distributed, real-time (200 Hz) predictive control of a robotic system by leveraging nonlinear mathematical modeling, sensor fusion, and Kalman filtering.
- Designed a multi-agent gradient descent algorithm applying OpenCV for object detection/manipulation tasks.
- Secured research funding totaling \$150k through grant proposal writing.
- Published work in top scientific journal achieving 12k accesses and 98th percentile article popularity.

Research and Development Intern

June 2017 – Aug 2018

Sandia National Laboratories

Albuquerque, NM

- Applied principal component analysis (PCA) on multimodal data to measure vibration safety margins.
- Developed algorithm demonstrating harmonic noise reduction up to 90% on test data using matrix-inverse and Laplace, Z-transform methods.

PROJECTS

Text simplification for online Chinese content

(ML, NLP, LM, ETL)

- Developed end-to-end lexical simplification pipeline using NER, POS tagging, and embedding similarity to increase text readability of HTML pages for Chinese language learners.
- Fine-tuned generative BART model for summarization via hyperparameter optimization using 500k sentence pairs from People's Daily Corpus, achieving SARI simplification score of 34.9, close to state of the art.

Automated job/resume matching service

(Web scraping, ETL, NLP)

- Built multi-threaded ETL pipeline to scrape job data from the web using BeautifulSoup, requests, and rotating proxies. Applied hybrid search combining fastText, keywords, and filters to match jobs to resumes.
- Deployed Docker image to AWS Lambda to scrape data and output job recommendations via REST API to increase job search effectiveness and speed.

SKILLS

Languages: Python, C++, HTML, Julia, SQL

Platforms: AWS cloud, MATLAB, Jupyter, Linux, git, github, LaTeX

Packages: PyTorch, Pandas, scikit-learn, TensorFlow, NLTK, OpenCV, matplotlib, seaborn

EDUCATION

Ph.D. Mechanical Engineering , University of Colorado Boulder	2022
M.S. Mechanical Engineering , University of Colorado Boulder	2020
B.S. Mechanical Engineering , Cornell University, <i>summa cum laude</i>	2017

PUBLICATION HIGHLIGHTS

- B.K. Johnson**, J.S. Humbert, M.E. Rentschler, "A gradient descent 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)
- 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

AWARDS

Beverly Sears Graduate Research Grant	2022
National Science Foundation Graduate Research Fellowship <i>National Science Foundation</i>	2019
National Defense Science and Engineering Graduate Fellowship <i>Alternate Awardee; Department of Defense</i>	2019
Dean's Graduate Innovation Assistantship <i>College of Engineering, University of Colorado Boulder</i>	2018

PERSONAL INTERESTS

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