KRISTEN SUCH

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EDUCATION

The University of Colorado at Boulder

PhD of Robotics — *Expected Graduation December 2024*

- Research Theme: Long-Term data association for agricultural applications
- Advisor: Christoffer Heckman

M.S. of Mechanical Engineering — *Degree Conferred May 2022*

GPA**:** 3.45/4.0

The University of Chicago

B.S. of Computational and Applied Math — *Graduated June 2019*

GPA: 3.16/4.0

Honors: Dean's List, UAA All American, College Research Fellowship Recipient

WORK EXPERIENCE

University of Colorado Boulder

Graduate Research Assistant – Autonomous Robotics and Perception Group — *Boulder, May 2020 – present*

- **Language-Guided Seeding Interface**: Researched algorithms for language guided seeding and robot navigation. Implemented experiments to measure robustness in a custom Unreal Engine simulation pipeline which interfaced with a ROS autonomy stack. [1]
- **RestoreBot**: Developed a platform capable of navigating degraded grasslands and identifying optimal microsites to improve native plant establishment. Applied advanced image segmentation techniques using Mask RCNN to identify vegetation and microsites in field environments, significantly improving object recognition accuracy. Focused on refining segmentation to enhance binary classification for environmental feature detection. [2]

Graduate Research Assistant – Animal Inspired Movement and Robotics Laboratory — *Boulder, January 2020 – May 2020*

- Experimented on wolf spiders with the motivation of characterizing locomotion under different gravitational loads using high-speed videography. Performed analysis of spider video data using DeepLabCut. Advised by Kaushik Jayaram.

Graduate Research Assistant – Soft Matter Mechanics Group — *Boulder, August 2019 – December 2019*

- Studied and developed models of active matter dynamic networks for the sake of deducing fundamental laws of swarming networks such as those observed in fire-ant aggregations or clusters of cells. Advised by Franck Vernerey. [4]

Illinois Institute of Technology

Undergraduate Research Assistant — *Chicago, December 2017 – May 2019*

- **JAMoEBA**: Prototyped modular subunits for a boundary-constrained soft robotic system which can manipulate external objects in 2 dimensions or navigate through narrow corridors using vacuum jamming. The project was in collaboration with Matthew Spenko (IIT) and Heinrich Jaeger (U. Chicago) in response to the NSF C3 SoRo grant solicitation (Continuum, Compliant, and Configurable Soft Robotics Engineering).

IBM

Summer Research Intern – Nanoscale Fabrication Group — *San Jose, June 2018-August 2018*

- Altered and improved on previous sensor interfaces to allow for modularity of gas sensors on an Electronic Nose project. The Electronic Nose was an exploratory research project which was aimed at training an AI model to create unique fingerprints for odors for identification in industrial regulation and medical applications.

PUBLICATIONS

[1] H. Biggie, P. Cooper, D. Albin, K. Such, and C. Heckman, *CogExplore: Contextual Exploration with Language-Encoded Environment Representations*. 2024. [Online]. Available: https://arxiv.org/abs/2406.17180 (Under Review)

[2] K. Such, H. Biggie, C. Heckman. (2023) Restorebot: Towards an Autonomous Robotics Platform for Degraded Rangeland Restoration. Presented at ISER. Available: https://doi.org/10.48550/arXiv.2312.07724

[3] Dagan, O., Cinquini, T. L., Morrissey, L., Such, K., Ahmed, N. R., and Heckman, C., "Towards Decentralized Heterogeneous Multi-Robot SLAM and Target Tracking", doi:10.48550/arXiv.2306.04570

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[4] R.J. Wagner, K. Such, E. Hobbs, F.J. Vernerey. Treadmilling and dynamic protrusions in fire ant rafts. J R Soc Interface. 2021 Jun;18(179):20210213. doi: 10.1098/rsif.2021.0213.

OUTREACH

- St. Vrain Valley VEX Robotics Head Referee (Elementary and Middles school students) 2019-2021
- Annual Innovation Center for St. Vrain Valley robotics lab tours (2021-2024)

SKILLS

- Programming Languages/Frameworks: Expert: Python, ROS, MATLAB, Git · Proficient: C++
- Navigation and Mapping Experience: RTK GPS, GNSS based navigation, semantic image segmentation, object detection, and visual, lidar, and inertial localization and mapping algorithms (SLAM), full-stack integration.
- AI and Mathematical Expertise: sequence modeling and trajectory transformers, reinforcement learning, Strong mathematics background with significant experience in linear algebra, Bayesian probability, Markov Decision processes, and numerical optimization.