

# Matthew Strong

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## EDUCATION

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### Stanford University

Stanford, CA

*PhD in Computer Science, Artificial Intelligence. Advisor: Monroe Kennedy, Jeannette Bohg*

*Sep 2023 – present*

### University of Colorado Boulder

Boulder, CO

*Bachelor of Science in Computer Science, Chinese Minor, 4.00 GPA*

*Aug. 2017 – May 2021*

## EXPERIENCE

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### Robotics/AI PhD Researcher, ARMLab - Stanford University

September 2023 – present

*ARMLab, Advised by Monroe Kennedy and Jeannette Bohg*

*Stanford, CA*

- PhD researcher in the Assistive Robotics and Manipulation Lab conducting research on dexterous robot manipulation.
- Building on top of the DenseTact sensor for perception and autonomy. Integrated visual-tactile data into 3D Gaussian Splatting.
- Performing research on EEG-assisted robot manipulator control in Human-Robot Interaction.

### Software Engineer - Customer Experience Platform (CXP)

September 2021 – August 2023

*Microsoft*

*Redmond, WA*

- Engineered AI-based solutions to improve the customer journey experience.
- Designed, developed, and deployed the consent for channel optimization feature for CXP.
- Developed Holdout for A/B test experimentation.

### Undergraduate Researcher - CU Boulder SBS Lab

January 2018 – present

*Sustainable Buildings and Systems Lab, Advised by Wangda Zuo*

*Boulder, CO*

- Developed an automatic energy building simulation pipeline for testing energy outputs of different building models in different climate zones.
- Devised multiple methods of building energy prediction with Generative Adversarial Networks.
- Core contributor of an open source release of 500+ EnergyPlus building models, supported by researchers at labs including NREL and Oak Ridge National Lab, as the culmination of a 4+ year research project.

### Undergraduate Researcher - HIRO Group

January 2020 – September 2021

*HIRO (Human Interaction and Robotics Group) Group, Advised by Alessandro Roncone*

*Boulder, CO*

- Devised a novel kinematic calibration algorithm to estimate the pose of a novel sensor unit on a robot manipulator. Validated on a real robot control example.
- Proposed a framework for bridging the gap between avoidance and contact, informed by onboard sensors for collaborative robotics.
- Constructed an effective method for probabilistic fusion of external depth data and onboard proximity data to reduce occlusions in a robot's nearby space.

### Software Engineer Intern - Journey Optimization using RL

May 2020 – August 2020

*Microsoft, Customer Experience Platform (CXP)*

*Remote - Broomfield, CO*

- Deployed a real-time analytics service for retrieving customer data.
- Designed and developed a feature from scratch called journey optimization, which intelligently guides a customer through the "customer journey", using reinforcement learning.

### CTO and Co-Founder - Udana Systems

February 2018 – May 2020

*Udana Systems*

*Boulder, CO*

- Co-Founded company targeted towards drone delivery for small to medium sized businesses.
- Designed and developed robotics tech stack, using ROS, MavROS, Gazebo, PyTorch, and more.
- Developed machine learning pipeline for computer vision based models.

### Software Engineer Intern - Global Search

May 2019 – July 2019

*Microsoft, Dynamics 365 for Talent*

*Redmond, WA*

- Designed and developed the Global Search feature for Microsoft Dynamics 365 for Talent.
- Worked with .NET, Angular, and XML in order to successfully deploy an end-to-end feature.

## AWARDS

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- Microsoft Special Stock Award** July 2023
- The most prestigious bonus given to employees at Microsoft. Only a few individuals were nominated out of the 200+ employees in my organization.
- RSS Inclusion Fellow** June 2021
- Accepted as an RSS (Robotics: Science and Systems) Inclusion Fellow, an expenses-paid program for upcoming robotics researchers attending RSS.
- Chancellor's Recognition Award** May 2021
- An award given to students that maintain a 4.0 GPA throughout all of college.
- Active Learning Award** April 2021
- Award given to outstanding students in service, professional, and research experiences.
- College of Arts and Sciences: Class of 2021 Amazing Student** April 2021
- For my minor in Chinese, I received an outstanding student award for the Class of 2021 in the College of Arts of Arts and Sciences (1 of 30 out of 4500+ students).
- College of Engineering Research Award** April 2021
- Only one other CS student from CU has received this award in its 20+ year history.
- CRA Outstanding Undergraduate Researchers 2021 – Honorable Mention** December 2020
- The most prestigious award for CS undergraduate researchers in North America.
- UROP Research Grant: Null Space Control for Collaborative Robotics** August 2020 – August 2021
- Received \$1500 research grant from CU Boulder's Undergraduate Research Opportunities Program (UROP) to perform research on null space control.
- Sewall Scholar** August 2017 – May 2021
- The top merit scholarship at CU Boulder.
- Engineering Merit Scholarship** August 2017 – May 2021
- Received based on high school academic performance.
- BOLD Scholarship** August 2017 – May 2021
- Received diversity scholarship based on high school achievement.
- National Merit Scholar** August 2017
- Selected to receive National Merit Scholarship on basis of outstanding high school achievement.
  - Given to <1% of high school seniors in the US.

## PUBLICATIONS

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### **Touch-GS: Visual-Tactile Supervised 3D Gaussian Splatting**

*Submitted to International Conference on Robotics and Systems 2024.*

Aiden Swann\*, **Matthew Strong\***, Won Kyung Do, Gadiel Sznaier Camps, Mac Schwager, Monroe Kennedy III

### **SHIRO: Soft Hierarchical Reinforcement Learning**

*Arxiv.*

Kandai Watanabe, **Matthew Strong**, Omer Eldar

### **Individualized Empirical Baselines for Evaluating the Energy Performance of Existing Buildings**

*Science and Technology for the Built Environment.*

Yingli Lou, Yunyang Ye, Yizhi Yang, Wangda Zuo, Gang Wang, **Matthew Strong**, Satish Upadhyaya, Chris Payne

## Evaluating Performance of Different Generative Adversarial Networks for Large-Scale Building Power Demand Prediction

*Energy and Buildings.*

Yunyang Ye, **Matthew Strong**, Yingli Lou, Cary Faulkner, Wangda Zuo, Satish Upadhyaya.

## Volumetric Data Fusion of External Depth and Onboard Proximity Data For Occluded Space Reduction

*4th Workshop on Proximity Perception in Robotics at IROS 2021.*

**Matthew Strong\***, Caleb Escobedo\*, Alessandro Roncone.

## Contact Anticipation for Physical Human–Robot Interaction with Robotic Manipulators using Onboard Proximity Sensors

*International Conference on Robotics and Systems 2021.*

Caleb Escobedo, **Matthew Strong**, Mary West, Ander Aramburu, Alessandro Roncone

## Self-Contained Kinematic Calibration of a Novel Whole-Body Artificial Skin for Collaborative Robotics

*International Conference on Robotics and Systems 2021.*

Kandai Watanabe, **Matthew Strong**, Mary West, Caleb Escobedo, Ander Aramburu, Krishna Chaitanya, Alessandro Roncone.

## Enabling Close Proximity Human Robot Collaboration via Distributed, Self-Calibrating Robotic Skin

*BS Thesis at CU Boulder. Committee: Alessandro Roncone, Bradley Hayes, Christoffer Heckman*

**Matthew Strong.**

## Development of New Baseline Models for U.S. Medium Office Buildings Based on Commercial Buildings Energy Consumption Survey Data

*Science and Technology for the Built Environment Volume 26, 2020.*

Yunyang Ye, Yingli Lou, **Matthew Strong**, Satish Upadhyaya, Gang Wang, Wangda Zuo.

## SERVICE/LEADERSHIP

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### Microsoft BAP Early-in-Career

2023

- One of the founding members of a newly revamped Early-in-Career group.
- Leader of the Dynamics 365 Early-in-Career group
- Planned events, including single-handedly starting a AMA with the Corporate Vice President of the org.

### HackCU

August 2018 – May 2021

- Led HackCU's tech team, organizing the largest hackathon in the Rocky Mountain region.
- Managed whole tech stack during 500+ person hackathon.
- Developed hacker sites and APIs accessed by thousands of people across the nation and globe.
- Handled 1000+ hacker applications.

### Slingshot Mentor and Founding Member

June 2020 – September 2021

- Served as a founding member for students from top high schools interested in CS at Slingshot, a **Techstars-backed startup** co-founded by students from top tech companies.
- Organized learning sessions about robotics, research, and machine learning for high school students.
- Onboarded startups out of Y-Combinator, Techstars, Berkeley, Stanford, and more.

<b>Discrete Structures Tutor</b>	January 2019 – May 2019
<ul style="list-style-type: none"> <li>• Mentored student in discrete structures.</li> <li>• Set homework and test-prep deadlines, and prepared practice problems.</li> </ul>	
<b>SASE (Society of Asian Scientists and Engineers) Leadership</b>	January 2018 – May 2018
<ul style="list-style-type: none"> <li>• Served as Co-Marketing Director and managed social media pages.</li> </ul>	

## MEMBERSHIP

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<b>Microsoft BAP EIC Group</b>	March 2022– August 2023
<b>Colorado Data Science Team</b>	August 2019 – December 2020
<b>SHPE (Society of Hispanic Professional Engineers)</b>	August 2019 – May 2021
<b>SASE (Society of Asian Scientists and Engineers)</b>	August 2017 – August 2019

## INVITED TALKS

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<b>HackCU Workshop Invited Speaker: An Introduction to AI</b>	March 2024
<ul style="list-style-type: none"> <li>• Gave a talk on an introduction to AI at HackCU.</li> </ul>	
<b>HackCU Workshop Invited Speaker: A Gentler Introduction to Robotics</b>	March 2022
<ul style="list-style-type: none"> <li>• Invited to conduct a workshop on how to get started with algorithm robotics at HackCU.</li> </ul>	
<b>Invited Speaker at the PhD Forum: 4th Workshop on Proximity Perception in Robotics</b>	August 2021
<ul style="list-style-type: none"> <li>• Only undergraduate invited to speak at the forum.</li> </ul>	
<b>Slingshot Interview Series: Getting Involved in Robotics</b>	August 2021
<ul style="list-style-type: none"> <li>• Invited by Techstars-backed startup to be interviewed on my experience with robotics, how I improved, and what others can learn from me.</li> </ul>	

## REVIEWER

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<b>IEEE Robotics and Automation Letters (RA-L)</b>	2023
<b>IEEE International Conference on Robotics and Automation (ICRA)</b>	2023
<b>IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)</b>	2022