

# Matthew Strong

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## EDUCATION

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### University of Colorado Boulder

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

Boulder, CO

*Aug. 2017 – May 2021*

## EXPERIENCE

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

*Microsoft*

September 2021 – present

*Bellevue, WA*

- Engineering AI-based solutions to improve the customer journey experience.
- Architecting ML pipelines to draw from RL models for predicting which messages to send to customers.
- Designed, developed, and deployed the consent for channel optimization feature for CXP.

### Undergraduate Researcher - CU Boulder SBS Lab

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

January 2018 – present

*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

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

January 2020 – September 2021

*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, funded by a university research grant.
- Constructed an effective method for probabilistic fusion of external depth data and onboard proximity data to reduce occlusions in a robot's nearby space.
- Theoretically motivated entropy in Hierarchical Reinforcement Learning, empirically demonstrating more efficient learning on simulated robotic locomotion tasks.

### Software Engineer Intern - Journey Optimization using RL

*Microsoft, Customer Experience Platform (CXP)*

May 2020 – August 2020

*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

*Udana Systems*

February 2018 – May 2020

*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

*Microsoft, Dynamics 365 for Talent*

May 2019 – July 2019

*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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- 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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### **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. Accepted.*

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. Accepted.*

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. Accepted.*

**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. Accepted.*

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. Accepted.*

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. Accepted.*

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

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## **SERVICE/LEADERSHIP**

### **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.

### **Discrete Structures Tutor** January 2019 – May 2019

- Mentored student in discrete structures.
- Set homework and test-prep deadlines, and prepared practice problems.

### **SASE (Society of Asian Scientists and Engineers) Leadership** January 2018 – May 2018

- Served as Co-Marketing Director and managed social media pages.

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## **MEMBERSHIP**

**Colorado Data Science Team** August 2019 – December 2020

**SHPE (Society of Hispanic Professional Engineers)** August 2019 – May 2021

**SASE (Society of Asian Scientists and Engineers)** August 2017 – August 2019

## INVITED TALKS

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