Caleb Escobedo

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EDUCATION

University of Colorado Boulder Boulder, CO
PhD in Computer Science - Advised by Alessandro Roncone *Aug. 2019 – Present*

Trinity University San Antonio, TX
Bachelor of Science in Computer Science *Jan. 2017 – May 2019*

University of Wisconsin Madison, WI
  Aug. 2013 – May 2016

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Colorado Boulder August 2019 – Present
HIRO (Human Interaction and Robotics Group) *Boulder, CO*
- Lead for robotic skin project focused on increasing whole-body robot perception in close-proximity human interaction scenarios.
- Created systems for multi-modal sensor fusion to combine external and onboard data streams for learning based robot action policies.
- Developed collision avoidance and contact anticipation controllers for robot manipulators.

Research Scientist Intern August 2022 – December 2023
Samsung Artificial Intelligence Center *New York, NY*
- Created and deployed custom acoustic sensors on multiple robot platforms leading to three publications, two patents, and multiple internal business opportunities.

Research Intern December 2017 – June 2019
FlashScan3D *San Antonio, TX*
- Developed C++ libraries for 3D camera calibration and biometric fraud detection.
- Implemented image processing techniques for feature extraction of fingerprint and iris scans.

Undergraduate Researcher, Trinity University January 2018 – June 2019
Advised by Dr. Matthew Hibbs *San Antonio, TX*
- Investigated musical style transfer in a symbolic domain using cycle-consistent adversarial networks.
- Developed a MIDI (Musical Instrument Digital Interface) to binary representation file converter in C++.

McNair Summer Research, Trinity University May 2018 – July 2018
Advised by Dr. Albert Jiang *San Antonio, TX*
- Implemented Optimistic Adam, a type of Optimistic Mirror Decent in PyTorch and evaluated the performance on image style transfer applications.

AWARDS

Ralph J. Slutz Student Excellence Award Outstanding PhD Student Fall 2023
University of Colorado Boulder

NSF GRFP Honorable Mention Spring 2020

Charels Babbage and Ada Lovelace Computing Award Fall 2019
Trinity University top graduating senior in computer science.

Ronald E. McNair Scholar Post-Baccalaureate Achievement Program Spring 2018

Martin Lange Award Fall 2017
Trinity University top student in theoretical computer science.

GenTact Toolbox: A Computational Design Pipeline to Procedurally Generate Context-Driven 3D Printed Whole-Body Tactile Skins

IEEE International Conference on Robotics and Automation 2025.

Carson Kohlbrenner, **Caleb Escobedo**, S. Sandra Bae, Alexander Dickhans, and Alessandro Roncone

A Machine Learning Approach to Contact Localization in Variable Density Three-Dimensional Tactile Artificial Skin

NeurIPS Workshop on Touch Processing: From Data to Knowledge 2024.

Carson Kohlbrenner, Mitchell Murray, Yutong Zhang, **Caleb Escobedo**, Thomas Dunnington, Nolan Stevenson, Nikolaus Correll, Alessandro Roncone

CAT-RRT: Motion Planning that Admits Contact One Link at a Time

IEEE/RSJ International Conference on Robotics and Systems 2023.

Nataliya Nechyporenko, **Caleb Escobedo**, Shreyas Kadekodi, Alessandro Roncone

AmbiSense: Acoustic Field Based Blindspot-Free Proximity Detection and Bearing Estimation

IEEE/RSJ International Conference on Robotics and Systems 2023.

Siddharth Rupavatharam, Xiaoran Fan, **Caleb Escobedo**, Daewon Lee, Larry Jackel, Richard Howard, Colin Prepscius, Daniel Lee, Volkan Isler

AcouSkin: Full Surface Contact Localization Using Acoustic Waves

IEEE/RSJ International Conference on Robotics and Systems 2023.

Adarsh Kumar Kosta, Alexis Burns, Siddharth Rupavarharam, **Caleb Escobedo**, Daewon Lee, Richard Howard, Larry Jackel, Volkan Isler.

SonicFinger: Pre-touch and Contact Detection Tactile Sensor for Reactive Pregrasping

IEEE International Conference on Robotics and Automation 2023

Siddharth Rupavatharam*, **Caleb Escobedo***, Daewon Lee, Colin Prepscius, Larry Jackel, Richard Howard, Volkan Isler

A Framework for the Systematic Evaluation of Obstacle Avoidance and Object-aware Controllers

IEEE/RSJ International Conference on Robotics and Systems 2022.

Caleb Escobedo, Nataliya Nechyporenko, Shreyas Kadekodi, Alessandro Roncone.

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

IEEE/RSJ International Conference on Robotics and Systems 2021.

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

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.

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

IEEE/RSJ International Conference on Robotics and Systems 2021.

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

Musical Style Transfer in a Symbolic Domain

BS Thesis at Trinity University 2019.

Caleb Escobedo.

Patents

Sonicfinger: Low-cost, Compact, Proximity and Contact Sensor for Reactive Positioning

Samsung Electronics Co Ltd, US Patent App US20240100705A1, 2024.

Siddharth Rupavatharam, Richard Howard, Daewon Lee, Lawrence Jackel, **Caleb Escobedo**, Ibrahim Volkan Isler.

Ultrasonic Piezoelectric Transceiver Sensor for Full Surface Contact Localization

Samsung Electronics Co Ltd, US Patent App US20240295882A1, 2024.

Adarsh K. Kosta, Alexis M. Burns, **Caleb Escobedo**, Siddharth Rupavatharam, Richard E. Howard, Lawrence Jackel, Daewon Lee, Ibrahim Volken Isler.

Mentorship, Service, and Teaching

Mentored Students

1. Guilherme Valgas Schmidt [BS]
2. Rahul Ravi Shetty [MS]
3. Alexander Gholmieh [BS]
4. Carson Kohlbrenner [BS and MS] now at University of Colorado Boulder [PhD]
5. Mitchell Murray [PhD]
6. Noah Liska [BS]
7. Alex Dickhans [HS] now at University of Colorado Boulder [BS]
8. Anujay Sharma [MS]
9. Caleb Kumar [BS]
10. Zoya Khan [HS] now at University of Southern California [BS]
11. Shreyas Kadekodi [BS and MS] now at University of California San Diego [PhD]
12. Matthew Strong [BS] now at Stanford University [PhD]
13. Joseph David Galloway II [BS] now at University of Arizona [MS]
14. Ander Aramburu Fernandez [MS]
15. Byungjin (BJ) Kim now at University of Michigan [MS]
16. Mitchell D Scott [BS]

17. Abhilash Jahagirdar [MS]
18. Garrett Pierson [BS]
19. Eleanor Sarder [BS]
20. William Wang [BS]

Reviewer
- IEEE International Conference on Robotics and Automation (ICRA 2021, 2022, 2023, 2025)
- IEEE/RSJ International Conference on Robotics and Systems (IROS 2021, 2022, 2023, 2024, 2025)
- Robotics Science and Systems (RSS 2022)
- The International Journal of Robotics Research (IJRR 2025)

Workshop Organization
- Robotics Science and Systems 2025: Navigating Contact Dynamics in Robotics: Bridging the gap between Modeling, Sensing, and Contact-aware Control.
- Robotics Science and Systems 2022: Close-Proximity Human-Robot Collaboration: Challenges and Opportunities

Treasurer of Computer Science Grad Student Association, University of Colorado	Fall 2020
Introduction to Artificial Intelligence TA, University of Colorado	Spring 2022
Algorithms TA, University of Colorado	Fall 2021
Algorithms TA, University of Colorado	Spring 2021
Algorithms Instructor, University of Colorado	Summer 2020
Algorithms TA, Trinity University	Fall 2018
Data Abstraction TA, Trinity University	Fall 2018
Biochemistry TA, University of Wisconsin	Fall 2016
Food Sustainability Instructor, University of Wisconsin	Fall 2015

PRESENTATIONS

Intuitive Computing Laboratory at Johns Hopkins University	Summer 2024

- Dynamic Robot Arm Movement and Close–Proximity Sensing Systems.

IEEE at University of Denver	Spring 2024

- Dynamic Robot Arm Movement and Close–Proximity Sensing Systems.

Trinity University Computer Science Colloquium	November 2021

- Physical Human-robot Interaction Through Control, Perception, and AI.

International Conference on Robotics and Systems	August 2021

- Contact Anticipation for Physical Human-Robot Interaction with Robotic Manipulators using Onboard Proximity Sensors.

4th Workshop on Proximity Perception in Robotics PhD Forum at IROS	August 2021

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

Robotics Summer Student Seminar - University of Colorado	June 2021

- Contact Anticipation for Physical Human-Robot Interaction with Robotic Manipulators using Onboard Proximity Sensors.

Trinity University Undergraduate Research Conference	March 2019

- Musical Style Transfer in a Symbolic Domain.

University of New Mexico McNair Scholars Research Conference	October 2018

- Cycle-Consistent Adversarial Networks with Optimistic Adam.