

Cheng Guo

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Research Interests

Research focused on **machine learning AI and computer vision**, developing methods for **clustering, human-in-the-loop approaches, and bioinformatics**, with applications to **animal identification and related domains**.

Education

Colorado State University	2019 – Expected Fall 2025
Ph.D.in Computer Engineering	USA
University of Jinan	2011 – 2015
B.S. in Electrical Engineering and Automation	China

Research Experience

Research Assistant	Colorado State University	2024 – 2025
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A human-in-the-loop solution for individual leopard identification in unlabeled camera trap images

- Developed a human-in-the-loop approach for individual animal identification.
- Addressed the challenge of distinguishing similarity between images of the same and different.
- Proposed an extension of the silhouette score to improve internal cluster validation further.

Research Assistant	Colorado State University	2019 – 2024
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Automated identification of individual leopards in unlabeled camera trap images

- Developed a fully automated individual identification algorithm in small-scale, unlabeled datasets.
- Designed a novel adaptive clustering algorithm incorporating a post-clustering verification.
- Proposed an extension of the silhouette score for effective internal cluster validation.

Project	Colorado State University	2018
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Robot arm kinematics and motion optimization via damped least squares (DLS)

- Implemented mouse-tracking for arbitrary articulated objects using DLS to improve accuracy.
- Enabled user-defined joint count and link lengths with interactive target section via GUI.
- Configured planar robots to follow user-specified target positions with high accuracy.

Bachelor Dissertation	University of Jinan	2014 – 2015
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Error analysis of point-based spatial mapping

- Applied clustering and Monte Carlo to optimize marker localization for robot-assisted surgery.
- Improved estimation of fiducial localization error and enhanced accuracy of spatial registration.
- Developed an optimization strategy for selecting marker combinations, providing quantitative safety indicators.

Teaching Experience

Teaching Assistant	Colorado State University	2022
Course: Introduction to Robot Programming/Simulation (ECE455)		
<ul style="list-style-type: none">• Guided students in MATLAB-based robot programming through lectures and hands-on support.• Supervised and evaluated course projects, providing feedback to improve implementation.• Led review sessions and offered tutoring to reinforce course concepts and support student learning.		

Work Experience

Research & Development Internship	China
Shandong Ganzhi Intelligent Engineering Co.,	2013 – 2015
<ul style="list-style-type: none">• Designed and implemented system framework for RFID-based warehouse management platform.• Developed and programmed the majority of core modules in C++ with SQL dataset support.• Built a graphical user interface (GUI) to support multi-function warehouse operations.• Collected customer feedback and incorporated interactive software optimization.	

Publications

- **C. Guo**, A. Miguel, A. Maciejewski. Automatic identification of individual African leopards in unlabeled camera trap images. *IEEE Transactions on Automation Science and Engineering*, vol. 22, pp. 2460–2471, 2025.
- **C. Guo**, A. Miguel, A. Maciejewski. A human-in-the-loop solution for individual leopard identification in unlabeled camera trap images. *IEEE Transactions on Automation Science and Engineering*, under review.

Honors and Awards

Travel Grant Award, <i>International Conference on Robotics and Automation</i>	2025
Travel Grant Award, <i>Colorado State University</i>	2025
iREDEFINE Professional Development Award, <i>NSF-sponsored Workshop, USA</i>	2022
Walter Scott, Jr. Graduate Fellowship, <i>Colorado State University</i>	2019

Service and Leadership

Associate Editor	
IEEE International Conference on Systems, Man, and Cybernetics (SMC)	2021 – Present
Reviewer	
IEEE International Conference on Systems, Man, and Cybernetics(SMC)	2022
16th International Conference on Informatics in Control, Automation and Robotics	2019

Media Coverage

- “Doctoral candidate’s machine learning assists in African leopard tracking”
THE ROCKY MOUNTAIN COLLEGIAN 2025
- “Graduate student-led research uses machine learning to help track endangered leopards”
SOURCE, Colorado State University 2025

- “Research Spotlight: Five questions with ECE graduate student Cheng Guo”
SOURCE, College of Engineering, Colorado State University

2023

Skills

- **Programming:** Python, MATLAB, R, C++, SQL
- **Methods:** Machine learning AI, clustering, image processing, statistical analysis
- **Application:** Computer Vision, bioinformatics, animal identification