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

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

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

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

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)

- 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

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

Service and Leadership

Associate Editor

IEEE International Conference on Systems, Man, and Cybernetics (SMC)	2021 – Present

Reviewer

Journal of computational mathematics and data science	2024
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