# LAURA FLEIG

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## EDUCATION

**University of California, San Diego**                                          La Jolla, CA
Bachelor of Science in Cognitive Science (Machine Learning & Neural Computation)    *Sept 2021 – June 2025*
Minor in Mathematics
Cumulative GPA: 4.0

## RESEARCH EXPERIENCE

**Honors Thesis Student**                                          *May 2024 – Present*
Department of Cognitive Science, UC San Diego | *Advisor: Dr. Virginia de Sa*
- Lead a research project integrating Facial Expression Recognition with Large Language Models to help virtual agents better understand the user's affective state, particularly in educational settings.
- Build multi-modal vision-language machine learning models that fuse video and text input.
- Honors thesis (in preparation): "Towards Multimodal Affective Intelligence in Educational AI: Facial Expression Recognition for Large Language Models"

**Undergraduate Research Assistant**                                          *Sept 2023 – Present*
Department of Music, UC San Diego | *Advisors: Dr. Shlomo Dubnov, Dr. Ross Greer*
- Investigate human-robot interaction in musical settings, focusing on nonverbal communication between musicians and a robotic conducting agent, as part of an ongoing research project.
- Programmed a camera-based robotic interface capable of detecting specific gestures from musicians and responding with appropriate movements, using Python for gesture detection and C++ for pitch analysis, enabling real-time interaction.
- Led literature review and contributed substantially to system design and two research papers.

**Undergraduate Research Assistant**                                          *Aug 2024 – Present*
Department of Electrical & Computer Engineering, UC San Diego | *Advisor: Dr. Mohan Trivedi*
- Contribute to a multi-year project aimed at classifying drivers' alcohol impairment levels using multi-modal data.
- Assist in data preparation and preprocessing for machine learning experiments, working with multi-camera footage, thermal imaging, and driving behavior metrics.

## PUBLICATIONS

1. Greer, R., **Fleig, L.**, Dubnov, S. *Creativity and Visual Communication from Machine to Musician: Sharing a Score through a Robotic Camera.* EAI ArtsIT Conference Proceedings, 13th EAI ArtsIT Conference 2024, New York University, Abu Dhabi, Nov 2024. Publication pending.
2. Greer, R., **Fleig, L.**, Dubnov, S. *ImproVision Equilibrium: Towards Multimodal Musical Human-Machine Interaction.* Under review.
3. Greer, R., Viborg Andersen, M., Gopalkrishnan, A., Rattigan, J., **Fleig, L.**, Marcotte, T., Trivedi, M. *Multimodal Machine Vision Analysis of Driver Activity and Driving Performance Under the Influence of Alcohol.* Manuscripts under preparation.

## LEADERSHIP & PROFESSIONAL EXPERIENCE

**Student Developer**                                          *April 2024 – Sept 2024*
Laboratory for Emerging Intelligence, UC San Diego
- Contributed to an interdisciplinary project developing an AI-driven learning hub for higher education, piloted in 2 UC San Diego classes and scheduled for rollout to ~600 students in Fall 2024.
- Designed and developed LLM-based interactive math modules for the AI tutor, supporting incoming students with math placement test preparation; improved platform usability through prompt engineering, creating rubrics to evaluate performance, UI/UX testing, and code review to identify and integrate classroom workflows.

**Undergraduate Teaching Assistant**                                        *Sept 2023 – June 2024*
Department of Cognitive Science, UC San Diego
● Introduction to Statistical Analysis (300 students; Fall 2023) & Introduction to Python (600 students; Spring 2024)
● Responsibilities included leading weekly discussion sections, holding weekly office hours, grading exams and coding labs, proposing exam questions, creating review materials, and monitoring an online discussion platform.

**President**                                                               *Sept 2021 – Present*
Symphonic Student Association, UC San Diego
● *President, 2024-Present:* Lead a student-run classical music organization for undergraduates and graduates; responsibilities include managing a 19-member board in weekly meetings, collaborating with the music department and other organizations, and organizing concerts, field trips, and social events, including an annual concert at UC San Diego's 2850-seat amphitheater.
● *Audio/Video Chair, 2022-2024:* Responsible for photography and videography of events and concerts, video editing, and managing the organization's YouTube channel.

## RELEVANT PROJECTS

**Clustering CLIP Embeddings**                                             *Sept 2024 – Dec 2024*
Final project for *COGS 118B–Introduction to Machine Learning*
● Investigated semantic relationships in CLIP image embeddings using hierarchical clustering analysis on the CIFAR-10 dataset, examining how the model preserves categorical information across images.

**Evaluation of Supervised Machine Learning Algorithms for Healthcare Classification**        *Sept 2024 – Dec 2024*
Final project for *COGS 118A–Supervised Machine Learning Algorithms*
● Led empirical evaluation comparing Random Forests, SVMs, and Neural Networks on healthcare classification tasks across three disease datasets (heart disease, breast cancer, Parkinson's), implementing a rigorous testing framework with multiple train-test splits and performance metrics.

**Exploring Convolutional Neural Networks for Facial Expression Recognition**        *Jan 2024 – March 2024*
Final project for *ECE 176–Deep Learning and Applications*
● Designed and evaluated four progressively complex CNN architectures with squeeze-and-excite attention mechanisms for facial expression recognition, implementing comprehensive data augmentation and semi-supervised learning techniques.

**Transcript Assistance Tool**                                            *Sept 2023 – Dec 2023*
Final project for *LIGN 167–Deep Learning for Natural Language Understanding*
● Built web application for improving lecture video accessibility using OpenAI's Whisper API for synchronized transcription and GPT-4 for real-time translation, summarization, and explanation of selected transcript segments.
● Invited to Student Developer position (above) following project completion.

## ADDITIONAL

**Technical Skills**:
● Programming Languages: Python, R, C++
● Machine Learning/Computer Vision: TensorFlow, PyTorch, Scikit-LearnOpenCV, MMPose
● Data Analysis & Visualization: NumPy, Pandas, Matplotlib, Seaborn
**Languages:** English (native); German (native); French (conversational proficiency)
**Awards:** Provost Honors (2021-2024)
**Activities:** Muir Musical (piano/keyboard; rehearsal pianist), Cognitive Science Student Association
**Interests:** Reading, classical music, musical theater