# Ethan Seefried

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## Education

- **Colorado State University, Fort Collins, CO** *Expected: May 2026*
  *Doctor of Philosophy: Computer Science* GPA: 3.93
- **Colorado State University, Fort Collins, CO** *May 2024*
  *Masters of Science: Computer Science*
- **Colorado State University, Fort Collins, CO** *May 2022*
  *Bachelor of Science: Computer Science*
- **Colorado State University, Fort Collins, CO** *May 2022*
  *Bachelor of Science: Physics*

## Peer-Reviewed Publications & Presentations

- **Peer-Reviewed Publications** *August 2023-Present*
  ***Graduate Student Researcher*** Fort Collins, CO
  - ISMAR24: **Seefried, Ethan**, et al. "Perceiving and Learning Color as Sound in Virtual Reality." International Symposium on Mixed and Augmented Reality. (2024, Poster)
  - HCII: International Conference on Human Computer Interaction: **Seefried, Ethan**, et al. "Learning Foreign Language Vocabulary Through Task-Based Virtual Reality Immersion." International Conference on Human-Computer Interaction. Cham: Springer Nature Switzerland, 2024.
  - Synthetic Data for Computer Vision Workshop@ CVPR 2024: **Seefried, Ethan**, et al. "Balancing Quality and Quantity: The Impact of Synthetic Data on Smoke Detection Accuracy in Computer Vision." Synthetic Data for Computer Vision Workshop@ CVPR 2024. 2024.
  - ICMI: 25th ACM International Conference on Multimodal Interaction: Fitzgerald, Jack & **Seefried, Ethan** & Yost, James & Pallickara, Sangmi & Blanchard, Nathaniel. (2023). Paying Attention to Wildfire: Using U-Net with Attention Blocks on Multimodal Data for Next Day Prediction. 470-480. 10.1145/3577190.3614116.
  - Bradford, M., **Seefried, E.**, Krishnaswamy, N., & Blanchard, N. (2024). Thematic Analysis of Foreign Language Learning in a Virtual Environment.

- **Poster Presentations** *August 2023-Present*
  ***Graduate Student Researcher***
  - **Synthetic Data for Computer Vision Workshop CVPR 24:** Balancing Quality and Quantity: The Impact of Synthetic Data on Smoke Detection Accuracy in Computer Vision
  - **ICMI: 25th ACM International Conference on Multimodal Interaction:** Paying Attention to Wildfire: Using U-Net with Attention Blocks on Multimodal Data for Next Day Prediction
  - **HCII 2025:** Learning Foreign Lan- guage Vocabulary Through Task-Based Virtual Reality Immersion
  - **Computer Science Graduate Research Symposium:** Fine Grained Opacity Predictions Utilizing Synthetic Data

## Research Experience

- **Colorado State University** *August 2022 - Present*
  ***Graduate Research Assistant: Computer Vision Lab*** Fort Collins, CO
  - **Instant Nerfs: Rendering Buildings and Amorphous Objects**
    - Collected and leveraged real-world data from CSU to render 3D models of buildings using instant NeRFs.
    - Conducted experiments to evaluate the trade-off between rendering quality and frame quantity, using fewer frames.
    - Investigated the effectiveness of multi-camera setups compared to single-camera setups for rendering amorphous objects like smoke.
  - **4D Gaussian Splatting**
    - Fine-tuned 4D Gaussian models in an attempt to generate real-time 4D models for Unity
    - Experimented with different techniques to miniaturize a 4D Gaussian Splatting Model

    - Studied the impact of Hexplanes compared to Spherical Harmonics
  - **Millikan's Oil Drop Using Computer Vision**
    - Theorized computer vision techniques to predict velocity of charged particles viewed through a microscope
    - Supervised an REU student during the summer of 2024, leading to the achievement of the "Best Poster" award
    - Collected a dataset of 200 charged particles with an error rate of 2%
  - **Synthetic Data Generation via Game Engines**
    - Designed virtual industrial settings in Unreal Engine 5 and NVIDIA Omniverse to synthetically generate smoke
    - Implemented novel computer vision models to detect smoke in real-world data
    - Explored the balance between the quantity and quality of synthetic data required for detecting amorphous objects
  - **CSU101**
    - Constructed a dataset for Computer Vision education, consisting of image classification and object detection labels
    - Led and trained a team of eight researchers in data collection and annotation techniques
    - Publicly deployed and curated the CSU101 dataset on Kaggle
  - **Perceiving Colors as an Auditory Sense**
    - Designed a fully virtual environment to teach colors as a physical phenomenan
    - Conducted studies on chromesthesia by teaching participants to represent colors in virtual reality
    - Developed a custom Stroop test to compare visual and auditory sensory processing
  - **Utilizing Virtual Reality and Task Based Learning to Teach a Foreign Language**
    - Designed a VR kitchen environment and task to teach Spanish to English speakers
    - Statistically analyzed separate groups of participants to identify core learning modalities
    - Led a team of 5 students in data collection and VR design principles
  - **Smoke School Dataset Collection**
    - Curated the only publicly known smoke dataset containing opacity labels
    - Designed an experimental setup to collect and annotate 716 GB of smoke releases for opacity predictions of smoke
    - Led a team of 4 graduate students on building a novel machine learning architecture to identify and estimate the opacity of smoke
  - **Wildfire Prevention**
    - Published a class project in one month with 2 other graduate students to predict the spread of a wildfire over the course of 24 hours
    - Simplified a custom architecture to run 300% faster, while maintaining similar accuracy to larger models
    - Conducted experiments to identify key features that lead to wildfire spread
  - **Computer Vision Reading Group**
    - Conducted a weekly reading group consisting of 6 graduate students and 4 undergraduate students
    - Studied modern literature to assign and review papers to further research across the computer vision lab
    - Scheduled weekly presentations on relevant topics in computer vision and adjacent fields

- **Colorado State University** *August 2021 - July 2022*
  ***Undergraduate Research Assistant: Computer Vision Lab*** Fort Collins, CO
  - **Collaborative Group Work Analysis**
    - Designed a portable system to efficiently record voice and video of participants in a classroom environment without disruption
    - Developed a multi-camera script to record a 360 degree view ensuring all students were recorded
  - **Ringelmann Smoke Prediction**
    - Collaborated with a graduate student to develop a prototype machine learning model, aimed at predicting Ringelmann numbers for real-world oil and gas site emissions
    - Utilized Unreal Engine to generate high-fidelity synthetic data, enriching the training dataset for the Ringelmann model

- **Colorado State University** *August 2019 - January 2020*
  ***Undergraduate Research Assistant: CSU Lasers Lab, Physics*** Fort Collins, CO
  - **Laser Component Design**
    - Independently taught SolidWorks CAD software, enabling the design and fabrication of specialized components for integration into the CSU Advanced Laser system
    - Engineered and constructed an adjustable camera stand, specifically tasked with capturing high-precision images of the main chamber for advanced laser research

## Teaching Experience

- **Colorado State University** *Spring 2024*
  ***CS 455/555: Distributed Systems*** Fort Collins, CO
  - **Teaching Assistant**
    - Scheduled and conducted demos for students to explain their code and reasoning
    - Designed quizzes and tests for two seperate course sections
    - Guided students through class projects involving machine learning and working with large datasets

- **Colorado State University** *Fall 2022 & Fall 2024*
  ***CS 462: Virtual Worlds*** Fort Collins, CO
  - **Teaching Assistant**
    - Conducted weekly office hours, providing supplementary instruction in game design and offering targeted homework assistance to enhance student understanding and performance
    - Guided students in mastering essential tools such as Blender and Unity, facilitating their proficiency in critical applications for game development
    - Evaluated and graded 120 final projects, assessing games developed in Unity for their design intricacy and functional execution

## Professional Experience

- **United States Marine Corps** *April 2013 - April 2017*
  ***Heavy Equipment Operator*** Okinawa, Japan
  - **Leadership & Teamwork**
    - Led a team of 50 Marines, managing daily schedules and supervising operations to ensure optimal efficiency and mission readiness
    - Charged with safely moving 10 million dollars' worth of equipment on a daily basis
    - Enhanced time management and organizational skills through adherence to a rigorous daily schedule from 5 AM to 5 PM, optimizing productivity and efficiency

## Relevant Coursework

**Computer Vision:** Image Computation, Introduction to Artificial Intelligence, Introduction to Machine Learning, Big Data, Intro to Statistics, Linear Algebra
**Natural Language Processing:** Introduction to Natural Language Processing, Algorithms
**HCAI:** 3d User Interfaces, Perceptual Elements in Extended Reality, Introduction to Computer Science Research
**Mathematics & Physics:** Calculus 3, Differential Equations, Quantum Mechanics, Classical Mechanics, Optics, Electricity and Magnetism, Thermodynamics, Advanced Physics Lab, Modern Physics

## Relevant Class Projects

- **Colorado State University** *January 2020 - May 2023*
  ***Undergraduate and Graduate Projects*** Fort Collins, CO
  - **Athletics: Velocity Prediction**
    - Implemented the SWIN transformer in a machine learning model to analyze RGB video data, successfully predicting the velocity of athletes during box jumps
    - Applied cross-fold validation methods to overcome the limitations of a small dataset, achieving an accuracy of approximately 40%
    - Demonstrated the potential of advanced AI techniques in sports performance analysis
  - **Software Engineering: Trip Planner**
    - Led a team of 5 developers building a trip planning website utilizing Javascript, SQL, Java and ReactStrap
    - Charged with writing test cases to bring total code coverage from 50% to 80%
    - Completed a functional trip builder where users could select anywhere in the world and receive an optimized plan for the shortest route between countries via airports

## Technical Skills and Interests

**Programming Languages:** Python, Java, C, C++, SQL
**Frameworks:** Pytorch, Tensorflow, Keras, Pytorch Distributed
**Operating Systems & Technologies:** Linux, Mac OS, Windows, Git/Github, LaTex
**Computer Science Interests:** Computer Vision, Natural Language Processing, Virtual Reality, Human Computer Interactions

## Leadership Activities

- **Vice President & Co-Founder,** CSU Computer Vision Club *December 2023 - Present*
- **Vice President,** Society of Physics Students *August 2021 - May 2022*

## Achievements & Awards

- **Awards** CSU Graduate Student Grant *Fall 2023*
- **Achievement** Deans List *Spring 2022*

## Volunteer Experience

- **United States Marine Corps** *July 2013*
  ***Volunteer*** Springfield, MO
  - **Flooded City: Home Rebuilding**
    - Volunteered to restore homes that had been significantly damaged by flooding
    - Removed debris from yards and river banks, that posed significant danger