

Jonathan Keane

jtkeane8@gmail.com | (847) 323-2297 | <https://jkeane4210.github.io/> | github.com/JKeane4210

EDUCATION

M.S. Machine Learning | Milwaukee School of Engineering | GPA: 4.00 | June 2023 - December 2024
B.S. Computer Science | Milwaukee School of Engineering | GPA: 4.00 | August 2020 - December 2023

RESEARCH INTERESTS

I want to understand **why AI models learn specific solutions** when not specified mathematically. By understanding how these models think better, we can make them safer/more capable in the future. As a result, I am interested in AI interpretability, NLP for language understanding, and RL for reasoning.

RESEARCH EXPERIENCE

Master's Capstone | Published in ICMLA 2025

January 2024 – August 2024

Project Objective: Train reinforcement learning (RL) agents with reward decomposition for the social deduction game *Coup* to identify/eliminate lying in agents ([Paper](#)).

- Implemented *Coup* environment in Python, along with a league play-based training process for agents.
- Created custom agent neural network in PyTorch with LSTM for representing hidden information, based on similar RL agents used for playing poker.
- Proposed novel technique called strategy masking that would use decomposed reward predictions to isolate lying behavior and systematically remove it to encourage agent honesty.
- Performed literature review to learn about explainability/interpretability techniques in RL environments.

Undergraduate Research | Published in MICS 2023 (Oral)

September 2022 – May 2023

Project Objective: Build an understanding of the state-of-the-art Transformer model, design an experiment to understand/improve the state-of-the-art model further, and write/publish a paper describing results.

- Performed literature review to understand the architecture and internal mechanisms of a Transformer.
- Proposed an experiment to improve upon the state-of-the-art model, and adjusted Python repository's code for training model with experimental adjustments.
- Presented research paper in regional conference in and MSOE's ROSIE Supercomputer Challenge, sponsored by NVIDIA, winning 1st prize, \$5000, and 2 NVIDIA GPUs ([Article](#)).

MENTORING EXPERIENCE

MSOE AI Club Research Mentor

September 2025 – Present

Project Objective: Train a music transformer for generating music and apply recent interpretability research from Anthropic to understand how transformers represent music internally.

- Mentored four undergraduates, teaching them about transformers and AI interpretability research.
- Currently guiding each group member through creating a music transformer, aiding the group with meetings discussing AI concepts or tools for working more effectively on a supercomputer.

MSOE AI Club Research Mentor | Published in MICS 2025 (Oral)

September 2024 – May 2025

Project Objective: Create a computer vision system to extract individual player statistics based on game footage.

- Mentored five undergraduates, teaching them about common computer vision techniques.
- Created framework for creating SAM 2 prompts from finetuned YOLO player predictions to create individual player video segmentations.
- Trained a CNN in TensorFlow for key point detection and applied homography to field images.

Result: Team presented research at conference and competed in MSOE's ROSIE Supercomputer Challenge, sponsored by NVIDIA, winning 3rd prize, \$3000, 2 NVIDIA GPUs, and a NVIDIA Jetson Nano.

Raider Stats Soccer Tracking Website Mentor/Developer January 2024 – Present

Project Objective: Create website to track MSOE soccer practice results and promote team competition.

- Mentored 5 undergraduate students to learn more about databases, websites, and deployment.
- Used AWS resources (Amplify, S3, Elastic Container Registry, API Gateway, Lambda, RDS) to host a website written in React and backend API services written in Python.
- Developed custom database schema in Postgres SQL and login system with JWTs for secure API access.

Result: Website has been successfully used by the MSOE men's soccer team for 4 seasons and the men's soccer coach is actively requesting more features for using the website more.

WORK EXPERIENCE

Data Scientist | Direct Supply | Milwaukee, WI March 2023 – Present

Project Objective: Create custom product search tool to combine AI-based search techniques with existing database of product relationships.

- Worked within a team to develop product search system that became a **trade secret** in the company.
- Created method for enhancing dense embedding searches based on existing product relations.

Project Objective: Create menu planning tool to assist senior living facilities in expediting menu creation.

- Developed a procedure to allow for smooth flipping of dense embeddings to newer embeddings models.
- Created a comprehensive evaluation system for several key workflows in system to evaluate different LLM options efficiently, communicating results in a series of white papers to share with other data scientists.

NCAA STUDENT ATHLETE EXPERIENCE

MSOE NCAA Men's Soccer Team | Captain, Study Tables Lead Tutor August 2020 – November 2023

- During fall season, balanced 2-hour daily practice and game travel (20 hrs/wk) with full-class schedule.
- As study tables lead tutor, organize weekly 2-hour sessions for younger students to come in and work on homework/get tutoring help. Tutored teammates in calculus/math, programming, and physics.

AWARDS

Class Respondent – Milwaukee School of Engineering	December 2023
Finalist - ICPC North American Championship	May 2023
1 st Place – ROSIE Supercomputer Competition (sponsored by NVIDIA)	May 2023
1 st Place – Midwest Instruction and Computing Symposium Programming Competition	April 2023
3 rd Place – ICPC North Central North American Regional	February 2022
Finalist - ICPC North American Championship	May 2022
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LEADERSHIP | CO-CURRICULAR INVOLVEMENT | COMMUNITY SERVICE

MSOE Competitive Programming Team September 2020 – May 2023

FIRST FTC Robotics Mentor | MSOE STEM Center December 2023 – March 2024

Walnut Way Servant Leadership Project | MSOE Honors Program September 2020 – May 2021

TECHNICAL SKILLS

Programming Languages: Python, SQL, CUDA C/C++, C#, Java, React/JavaScript

Software Tools: Git, Docker, AWS, Databricks, Slurm, Jupyter, Unity Game Engine, Webscraping (Selenium)

AI Techniques/Libraries: PyTorch, TensorFlow, Transformers, Embedding Models, Reinforcement Learning, Sparse Autoencoders (SAEs), LSTMs, RNNs, CNNs, DQN/Q-Learning, Self-Play, League Play, PPO

Other: Spanish (Advanced)