

# Kyle Buettner

Pittsburgh, PA, USA | Email: [buettnerkr@gmail.com](mailto:buettnerkr@gmail.com) | Phone: 412-973-9166 | LinkedIn: [kyle-robert-buettner](https://www.linkedin.com/in/kyle-robert-buettner) | GitHub: [krbuettner](https://github.com/krbuettner) | Website: <https://krbuettner.github.io/> | [Google Scholar](https://scholar.google.com/citations?user=krbuettner) (5 publications, 36 citations as of 1/18/24)

## RESEARCH INTERESTS

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- Vision-language modeling, model robustness under domain shift, foundational AI models, object detection, data-efficient and parameter-efficient training, prompt learning

## EDUCATION

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### University of Pittsburgh – Pittsburgh, USA

Doctor of Philosophy, Intelligent Systems

*Sep 2021 – Apr 2025 (Expected)*

Master of Science, Electrical and Computer Engineering

*Sep 2019 – Apr 2021*

- **Graduate GPA:** 3.99/4.00

- **Coursework:** Artificial Intelligence, Machine Learning, Natural Language Processing, Vision-Language Modeling, Theory of Computation, Statistical Methods, Information Retrieval, Computer Architecture

Bachelor of Science, Computer Engineering

*Sep 2015 – Apr 2019*

- **Undergraduate GPA:** 3.94/4.00

- **Coursework:** Computer Vision, Digital Design, Software Engineering, Algorithms

- **Award:** Honorable Mention for Top Computer Engineering Student

## INDUSTRY EXPERIENCE

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### GatherAI – Pittsburgh, USA

*Machine Learning Intern*

*May 2021 – Aug 2021; May 2022 – Aug 2022*

- Enhanced company's drone-derived insight offerings through R&D on new vision pipeline (+20% accuracy inc. for beta)
- Devised an image filtering pipeline that resulted in  $>3x$  reduction in error for customer-facing inventory analytics
- Orchestrated full model lifecycles, with frequent error analysis and manual annotation ( $>1k$  size) for detection/segmentation

### UPMC Enterprises – Pittsburgh, USA

*Software Engineering Intern on the NLP Team*

*June 2018 – Aug 2018*

- Engineered visualization tool for EHR domain ontologies (process time for knowledge dept. moved from hours to minutes)

### EQT Corporation – Pittsburgh, USA

*Reservoir Engineering Intern*

*May 2017 – Aug 2017*

- Created decline curve modeling tool with Excel for predictive analysis of region-based economics

## RESEARCH EXPERIENCE

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### University of Pittsburgh – Pittsburgh, USA

*Ph.D. Student Researcher, Intelligent Systems*

*Sep 2021 – Present*

**Advisor:** Adriana Kovashka

- **Current Project:** prompt adaptation of vision-language models for robustness across geographies
- **Notable Past Projects:** object detection robustness following contrastive pretraining, measuring and enhancing the use of attribute information in vision-language pretraining, modeling climax of video advertisements
- **Accomplishments:** 1st author WACV24, 1st author AAAI23 PracticalDL workshop, 2nd author BMVC18
- Pretrained/finetuned powerful models (BERT, CLIP, Faster R-CNN) on large-scale datasets ( $>100k$  size - COCO, ImageNet)
- Projects frequently entailed prompt engineering (chain-of-thought, exemplar design) with large-language models (ChatGPT)

*M.S. Student Researcher, Electrical & Computer Engineering*

*Sep 2019 – Apr 2021*

**Advisor:** Alan George

- **M.S. Thesis:** Analyzing energy, latency, and accuracy of neural networks for heartbeat classification across AI hardware (neural hardware such as Google Coral Edge TPU, neuromorphic hardware such as Intel Loihi)
- **Accomplishments:** 1st author ISVLSI21, 3rd author HPEC20
- Served as NSF SHREC (Space, High-Performance, and Resilient Computing) rep to Intel Neuromorphic Research Community

## SKILLS

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- **Areas:** Artificial Intelligence, Computer Vision, Natural Language Processing, Machine Learning, Deep Learning, Statistics, Large Language Models, Prompt Engineering, Software Development, High-Performance Computing
- **Programming Languages:** Python, R, C++, C, Java, MATLAB, CUDA, OpenCL, OpenMP, MPI, VHDL, Linux

- **Machine Learning Libraries:** PyTorch, TensorFlow, OpenCV, SciKit-Learn, SpaCy, NLTK, Pandas, NumPy, Matplotlib, Whoosh, Nengo, SNN-Toolbox, Detectron2, MMDetection, NetworkX
- **Software Engineering:** Git, Jupyter Notebook, Agile, Scrum

## PEER-REVIEWED PUBLICATIONS

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- Buettner, Kyle and Adriana Kovashka. "Investigating the Role of Attribute Context in Vision-Language Models for Object Recognition and Detection." To appear, *Winter Conference on Applications of Computer Vision (WACV)*, January 2024.
- Buettner, Kyle and Adriana Kovashka. "Contrastive View Design Strategies to Enhance Robustness to Domain Shifts in Downstream Object Detection." *AAAI Workshop on Practical Deep Learning in the Wild*, 2023.
- Buettner, Kyle and Alan D. George. "Heartbeat Classification with Spiking Neural Networks on the Loihi Neuromorphic Processor." *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, 2021.
- Langerman, David, Alex Johnson, Kyle Buettner, and Alan D. George. "Beyond FLOPs: CNN Performance Prediction with Critical Datapath Length." *IEEE High Performance Extreme Computing Conference (HPEC)*, 2020.
- Ye, Keren, Kyle Buettner, and Adriana Kovashka. "Story Understanding in Video Advertisements." *British Machine Vision Conference (BMVC)*, 2018.

## LEADERSHIP AND TEACHING ROLES

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*Computer Vision Instructor, Pitt HexAI Research Laboratory – Pittsburgh, USA* *July 2023*

- Volunteered in the 2023 IEEE Mini Summer Camp on Object Detection/Localization in Medical Images using AI
- Delivered various lessons to high-school students about the fundamentals of object detection/localization

*Video Game Design Instructor, Pitt School of Computing & Information Outreach – Pittsburgh, USA* *Oct 2021 – July 2022*

- Taught Scratch video game design lessons to kids as part of neighborhood commitment program
- Composed 6-week Python curriculum to provide practical computer science skills

*Sports Coach, West Mifflin Soccer – West Mifflin, USA* *Aug 2018 – Aug 2021*

- Served as soccer coach in community, running practices and offseason workouts (at youth and high school levels)

*Teaching Assistant in Various Courses, University of Pittsburgh – Pittsburgh, USA* *Sep 2016 – Present*

- Dependable Computer Architecture, Business Calculus, Precalculus, Java, Human-Robot Interaction, Machine Learning

## NOTABLE PROJECTS

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[COVID-19 Search Engine Prototype](#) *Spring 2022*

- Contributed to design of information retrieval system to search for relevant info about COVID-19 pandemic
- Leveraged query likelihood statistical language model and Boolean model for text matching with COVID-19 corpus
- Designed UI through Tkinter, implemented indexing through Whoosh library, used NLTK for text processing

[Paint-By-Numbers Canvas Generator](#) *Spring 2021*

- Engineered image processing pipeline with OpenCV and Python for creation of a "paint-by-numbers" canvas
- Evaluated GPU/PyCUDA acceleration of color quantization, median filtering, and edge/contour detection (*2.6x app speedup*)

*Last Updated: 1-18-2024*