Kyle Buettner

Email: buettnerkr@gmail.com | *LinkedIn:* kyle-robert-buettner |*GitHub:* krbuettner | *Website:* https://krbuettner.github.io/

PROFILE

- Machine learning researcher currently studying computer vision, domain robustness, contrastive learning, and multimodal learning as part of Ph.D. in Intelligent Systems (Applied AI) at the University of Pittsburgh
- Over 3 years of experience contributing as part of AI-focused companies and machine learning research groups

INDUSTRY EXPERIENCE

GatherAI – Pittsburgh, USA

Machine Learning Intern *May 2021 – Aug 2021, May 2022 – Aug 2022*

- Engineered and deployed an image filtering and merging pipeline that led to *>3x reduction* in error of box counting analytics captured from drones and delivered to customers
- Significantly contributed to vision-based TiHi functionality to expand logistics-based metrics offered to customers
- Maintained, evaluated, and frequently deployed improved machine learning models to production
- Regularly experimented with and labeled data for vision tasks (object detection, instance/semantic segmentation)

UPMC Enterprises – Pittsburgh, USA

Software Engineering Intern *June 2018 – Aug 2018*

- Designed NLP word cloud tools for visualization of electronic health record domain ontologies to enhance the productivity of the company's knowledge engineering department (*process time moved from hours to minutes*)

EQT Corporation – Pittsburgh, USA

Reservoir Engineering Intern *May 2017 – Aug 2017*

- Designed economic decline curve model in Excel, increasing analytics available to engineering department

SKILLS

- **Areas:** Artificial Intelligence, Computer Vision, Machine Learning, Deep Learning, Natural Language Processing, Domain Robustness, Multimodal Learning, Software Development, High-Performance Computing
- **Programming Languages:** Python, C++, C, Java, MATLAB, OpenMP, MPI, CUDA, OpenCL, VHDL, Linux
- **AI, Computer Vision, and NLP Libraries:** TensorFlow, PyTorch, OpenCV, SciKit-Learn, Pandas, NumPy, Matplotlib, NLTK, SpaCy, Whoosh, Nengo, SNN-Toolbox, Detectron2, MMDetection, NetworkX
- **Software Engineering:** Git, Jupyter Notebook, Agile, Scrum

RESEARCH EXPERIENCE

University of Pittsburgh – Pittsburgh, USA

Ph.D. Student Researcher, Intelligent Systems *Sep 2021 – Present*

Advisor: Adriana Kovashka

- Empirically analyzed self-supervised, contrastive view design strategies to enhance object detection robustness to abstract, corruption-based, and contextual domain shifts (publication in preparation)
- Currently investigating the usefulness of context in multimodal (vision-language) pretraining with captions
- Gained significant familiarity with state-of-the-art datasets (COCO Objects/Captions, VOC, ImageNet) and models (Faster R-CNN, ResNets, BERT, MoCo-v2)
- Enhanced methods for story understanding in video advertisements with feature exploration for climax and sentiment prediction models, improving state-of-the-art as 2nd author on BMVC paper (see publications)

M.S. Student Researcher, Electrical & Computer Engineering *Sep 2019 – Apr 2021*

Advisor: Alan George

- Served as representative member of NSF SHREC (Center for Space, High-Performance, and Resilient Computing) to Intel Neuromorphic Research Community
- Conducted research highlighting strategies to optimize spiking neural network accuracy and energy efficiency on Intel Loihi neuromorphic chip

- Provided novel energy and latency comparisons between 1D-CNN-based heartbeat classifiers on Intel Loihi, Intel Neural Compute Stick 2, and Google Edge TPU neural network devices
- Received award for top computer engineering project at SHREC 2019 undergraduate research expo; Project: *FPGA Acceleration* of *BLASTn Word-Matching* (using Vivado HLS, OpenCL, Xilinx cards)
- Contributed to multiple conference publications and completed M.S. thesis (see publications)

EDUCATION

University of Pittsburgh – Pittsburgh, USA *Sep 2021 – Present*
Doctor of Philosophy, Intelligent Systems GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA *Sep 2019 – Apr 2021*
Master of Science, Electrical and Computer Engineering GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA *Sep 2015 – Apr 2019*
Bachelor of Science, Computer Engineering GPA: 3.94/4.00
Honorable Mention for Top Computer Engineering Student

LEADERSHIP AND TEACHING ROLES

Pitt School of Computing & Information Outreach – Pittsburgh, USA
Video Game Design Volunteer *Oct 2021 – July 2022*
- Taught Scratch video game programming to elementary and middle school kids on Saturday mornings as part of the University of Pittsburgh's neighborhood commitment program
- Developed curriculum to code a platformer video game and provided students an introduction to Python

University of Pittsburgh – Pittsburgh, USA
Teaching Assistant in Various Courses *Sep 2016 – Present*
- Dependable Computer Architecture, Business Calculus, Precalculus, Intro to Java, Special Topics(Cognitive Science)

West Mifflin Soccer – West Mifflin, USA
Coach *Aug 2018 – Aug 2021*
- Served as assistant soccer coach at high school level, running practices and offseason workouts
- Coached teams of kids ages 6-12 in youth soccer league (various seasons)

PUBLICATIONS

- 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.
- Buettner, Kyle. A Case Study in Practical Neuromorphic Computing: Heartbeat Classification on the Loihi Neuromorphic Processor. Master's Thesis. University of Pittsburgh, 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.

COURSEWORK

Graduate Coursework: Artificial Intelligence, Machine Learning, Theory of Computation, Information Storage and Retrieval, Various Computer Architecture Courses (Dependable, Parallel, GPU, and Neuromorphic), Applied Statistics
Undergraduate Coursework: Computer Vision, Digital Design, Software Engineering, Algorithms

NOTABLE PROJECTS

Covid-19 Search Engine Prototype *Spring 2022*
- Contributed to design of information retrieval system in searching for relevant info about COVID-19 pandemic
- Leveraged query likelihood statistical language model and Boolean model for text matching with CORD-19 corpus
- Designed UI through Tkinter, implemented indexing through Whoosh library, used NLTK for text processing