

# Kyle Buettner

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## EDUCATION

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

## RESEARCH EXPERIENCE

<b>University of Pittsburgh – Pittsburgh, USA</b> <i>Ph.D. Student Researcher, Intelligent Systems</i> <b>Advisor:</b> Adriana Kovashka	<i>Sep 2021 – Present</i>
<ul style="list-style-type: none"><li>• Explored strategies to enhance the robustness of object detection models during self-supervised pretraining</li><li>• Experimented with various datasets (COCO, VOC, ImageNet) and models (Faster R-CNN, ResNets, MoCo-v2)</li><li>• Submitted publication (in review) highlighting novel strategies to build visual robustness into contrastive learning</li><li>• Currently investigating the role of visual and linguistic contextual biases in vision-language pretraining</li></ul>	
<i>M.S. Student Researcher, Electrical &amp; Computer Engineering</i> <b>Advisor:</b> Alan George	<i>Sep 2019 – Apr 2021</i>
<ul style="list-style-type: none"><li>• Served as representative member of NSF SHREC (Center for Space, High-Performance, and Resilient Computing) to Intel Neuromorphic Research Community</li><li>• Conducted research highlighting strategies to optimize spiking neural network accuracy and energy efficiency on Intel Loihi neuromorphic chip</li><li>• 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</li><li>• Received award for top computer engineering project at SHREC 2019 undergraduate research expo; Project: <i>FPGA Acceleration of BLASTn Word-Matching</i> (using Vivado HLS, OpenCL, Xilinx cards)</li><li>• Completed conference publication and M.S. thesis (see publications)</li></ul>	

## INTERNSHIPS

<b>GatherAI – Pittsburgh, USA</b> <i>Machine Learning Intern</i>	<i>May 2021 – Aug 2021, May 2022 – Present</i>
<ul style="list-style-type: none"><li>• Engineered and deployed an image filtering and stitching pipeline that led to <i>&gt;3x reduction</i> in error of box counting analytics delivered to customers</li><li>• Contributed to CV-based functionality that expanded drone-gathered metrics offered to customers (TiHi)</li><li>• Frequently experimented with various vision tasks and models (object detection, semantic segmentation)</li></ul>	
<b>UPMC Enterprises – Pittsburgh, USA</b> <i>Software Engineering Intern</i>	<i>June 2018 – Aug 2018</i>
<ul style="list-style-type: none"><li>• Designed NLP word cloud tools for visualization of electronic health record domain ontologies to enhance the productivity of the knowledge engineering department (process time moved from hours to <i>minutes</i>)</li></ul>	
<b>EQT Corporation – Pittsburgh, USA</b> <i>Reservoir Engineering Intern</i>	<i>May 2017 – Aug 2017</i>
<ul style="list-style-type: none"><li>• Designed economic decline curve model in Excel, increasing analytics available to engineering department</li></ul>	

## LEADERSHIP AND TEACHING ROLES

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### Pitt School of Computing & Information Outreach – Pittsburgh, USA

*Video Game Design Volunteer*

*Oct 2021 – Present*

- Taught Scratch video game programming to elementary school kids on Saturday mornings as part of the University of Pittsburgh's neighborhood commitment program
- Performed analysis of Kahoot question performance to evaluate and improve learning outcomes of students

### University of Pittsburgh – Pittsburgh, USA

*Teaching Assistant in Various Courses*

*Sep 2015 – Present*

- Dependable Computer Architecture, Business Calculus, Precalculus, Intermediate Programming using Java

### West Mifflin Soccer – West Mifflin, USA

*Coach*

*Aug 2018 – Aug 2021*

- Served as assistant soccer coach at high school level for 4+ years, running practices and offseason workouts
- Coached teams of kids ages 6-12 in youth soccer league (various seasons)

## PUBLICATIONS

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- 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 Floating-Point Ops: 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

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**Graduate Coursework:** Artificial Intelligence, Machine Learning, Theory of Computation, Information Storage and Retrieval, Various Computer Architecture Courses (Dependable, Parallel, GPU, and Neuromorphic)

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

## NOTABLE PROJECTS

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### 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 COVID-19 corpus
- Designed UI through Tkinter, implemented indexing through Whoosh library, used NLTK for text processing

### Paint-By-Numbers Canvas Generator

*Spring 2021*

- Developed image processing pipeline for creation of a "paint-by-numbers" canvas
- Used OpenCV to perform color quantization, median filtering, edge detection, and contour detection
- Parallelized operations on GPUs using PyCUDA

## SKILLS

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**Programming:** Python, C++, C, Java, MATLAB, OpenMP, MPI, CUDA, OpenCL, VHDL, UNIX/Linux

**AI, Computer Vision and NLP Libraries:** TensorFlow, PyTorch, OpenCV, Scikit-Learn, Pandas, NumPy, Matplotlib, NLTK, SpaCy, Whoosh, Nengo, SNN-Toolbox, Detectron2, MMDetection

**Software Engineering:** Git, Jupyter Notebook, Agile, Scrum

*Last Updated: 5-14-2022*