Benjamin D. Killeen

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Summary

A Ph.D. Student at Johns Hopkins University, I am interested in intelligent surgical systems based on explorative computer vision and deep reinforcement learning that directly improve patient outcomes. I am a member of the Advanced Robotics and Computationally Augmented Environments (ARCADE) research group and the Computational Interaction and Robotics Laboratory (CIRL).

Education

Ph.D., Computer Science, Johns Hopkins University, Baltimore, MD, USA. 08/2019 - present
With Mathias Unberath and Gregory D. Hager.

B.A., Computer Science with Honors (Physics Minor), University of Chicago, Chicago, IL, USA. 09/2015 - 06/2019
Thesis: Starting from Scratch: Deep Learning for Novel Scientific Image Analysis
With Gordon Kindlmann.

Research Experience

Research assistant, Department of Computer Science, Johns Hopkins University, Baltimore, MD, USA. 08/2020 - present
With Mathias Unberath, Gregory D. Hager.

Research Assistant, Laboratory for Computational Sensing and Robotics, Johns Hopkins University, Baltimore, MD, USA. 08/2019 - 06/2020
With Gregory D. Hager, Mathias Unberath, and Russel Taylor.
Recipient: LCSR Fellowship for Outstanding Incoming Ph.D. Students.

Research assistant, Department of Computer Science, University of Chicago, Chicago, IL, USA. 03/2018 - 08/2019
With Gordon Kindlmann.

Professional Experience

Computer Vision / AI Intern, Applied Research, Intuitive Surgical Inc., Sunnyvale, CA, USA. 06/2020 - 07/2020
With Omid Mohareri.

Software Development Intern, Cognitive Computing, Epic Systems, Verona, WI, USA. 06/2018 - 08/2018
Research Intern, IBM Research - Almaden, San Jose, CA, USA. 06/2017 - 08/2017
With Geoffrey Burr.

Selected Honors

Best Graduate Project Award, Computer Integrated Surgical Systems and Technology course, Johns Hopkins University, USA. 05/2020
COVID-19 Dataset Award, Kaggle. 04/2020
For our county-level dataset in [M-1].

Intuitive Surgical Best Project Award, Deep Learning course, Johns Hopkins University, USA. 12/2019
Project: Enriching Unsupervised Feature Learning via Intermediate Subtasks.
With Michael Peven, Shaoyan Pan, and Matthew Pittman.

Publications

My publication list is also available on Google Scholar. Asterisk (*) indicates equal contribution.

Peer-reviewed Journal Articles

A. Hundt, **B. Killeen**, H. Kwon, C. Paxton, GD Hager. "Good Robot!": Efficient Reinforcement Learning for Multi-Step Visual Tasks with Sim to Real Transfer. IEEE Robotics and Automation Letters, vol. 5, no. 4, pp. 6724–6731, Oct. 2020. doi: 10.1109/LRA.2020.3015448. J-2

S. Ambrogio, P. Narayanan, H. Tsai, R. M. Shelby, I. Boybat, C. di Nolfo, S. Sidler, M. Giordano, M. Bodini, N. Farinha, **B. Killeen**, C. Cheng, Y. Jaoudi, G. W. Burr. Equivalent-accuracy accelerated neural-network training using analogue memory. Nature, vol. 558, no. 7708, p. 60, Jun. 2018. doi: 10.1038/s41586-018-0180-5. J-1

Peer-reviewed Conference Papers

C. Gao, X. Liu, W. Gu, **B. D. Killeen**, M. Armand, R. Taylor, M. Unberath. Generalizing Spatial Transformers to Projective Geometry with Applications to 2D/3D Registrationc. MICCAI, 2020, arxiv:2003.10987. C-2

X. Liu, Y. Zhang, **B. Killeen**, M. Ishii, G. Hager, R. Taylor, M. Unberath. Extremely Dense Point Correspondences using a Learned Feature Descriptor. Proceedings of the IEEE/CVF Conference on C-1

Computer Vision and Pattern Recognition, pp. 4847-4856, 2020.

Preprints

X. Liu*, **B. D. Killeen***, A. Sinha, M. Ishii, G. Hager, R. Taylor, M. Unberath. Neighborhood Normalization for Robust Geometric Feature Learning. Submitted to The IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2021. M-3

J. Y. Wu*, **B. D. Killeen***, P. Nikutta, M. Thies, A. Zapaishchykova, S. Chakraborty, M. Unberath. Changes in Reproductive Rate of SARS-CoV-2 Due to Non-pharmaceutical Interventions in 1,417 U.S. Counties. medRxiv preprint, Jun. 2020, doi: 10.1101/2020.05.31.20118687. M-2

B. D. Killeen*, J. Y. Wu*, K. Shah, A. Zapaishchykova, P. Nikutta, A. Tamhane, S. Chakraborty, J. Wei, T. Gao, M. Thies, M. Unberath. A County-level Dataset for Informing the United States' Response to COVID-19. arXiv preprint, 2020, arXiv:2004.00756. M-1

Patents

G. W. Burr and **B. D. Killeen**. 2020. Efficient Processing of Convolutional Neural Network Layers Using Analog-memory-based Hardware. 20200117986, filed March 25, 2019, and issued April 16, 2020, uspto.report/patent/app/20200117986. P-1

Selected Press

Dziarkach, Andrei. **"Details with Andrei Dziarkach."** Voice of America. November 21, 2020 Accessed November 26, 2020. golosameriki.com/a/detali/5671254.html. 2020

BBC. **"Dog Training Technique Helps Robot Learn and Other News."** BBC News. October 30, 2020. Accessed October 31, 2020. bbc.com/news/av/technology-54645279.

Rosen, Jill. **"Dog Training Methods Help JHU Teach Robots to Learn New Tricks."** The Johns Hopkins University Hub. The Johns Hopkins University, October 26, 2020. hub.jhu.edu/2020/10/26/positive-reinforcementfor-robots.

Teaching

Assistant Teaching

Machine Learning and Large Scale Data Analysis, Department of Computer Science, University of Chicago, Chicago, IL, USA 03/2019 - 06/2019

With Prof. Yali Amit.
Wrote supplementary course material and held weekly lab sessions.

Selected review: "Ben was incredibly patient during office hours and always responsive to student questions. In addition, he often presented demos during office hours or showed easier ways to handle the homework assignments; both were very helpful."

More reviews available at benjamindkilleen.com/teaching/2019-spring-lsda

Grading

Department of Computer Science, University of Chicago, Chicago, IL, USA 01/2019 - 08/2019

- **Scientific Visualization**
- **Introduction to Computer Science I**
- **Introduction to Computer Science II**

Tutoring

Topics in Computer Science, Machine Learning, Baltimore, MD, USA. 06/2020 - present

I tutor young people (middle- and high-school age) who are interested in CS and ML.
More info at benjamindkilleen.com/teaching/2020-tutoring.

Supervision

Max Judish, Johns Hopkins University, Baltimore, MD, USA. 01/2021 - present

Shreya Chakraborty, Johns Hopkins University, Baltimore, MD, USA. 08/2020 - present

Philipp Nikutta, Johns Hopkins University, Baltimore, MD, USA. 12/2019 - 03/2020

Service

Graduate Student Committee Representative, Laboratory for Computational Sensing and Robotics, Baltimore, MD, USA. 2020 - present

Volunteer Instructor, CompileHer, Chicago, IL, USA. 2019

Peer Review

- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2021

- Nature Scientific Data 2020

Selected Coursework

Graduate

Vision as Bayesian Inference
Reliable Software Systems
Theory of Computation
Parallel Programming
Nonlinear Optimization II

Computer Integrated Surgery II
Computer Integrated Surgery I
Deep Learning

Undergraduate

Unsupervised Learning*
Computer Vision
Machine Learning and Large Scale Data Analysis
Operating Systems
Honors Combinatorics
Honors Algorithms
Honors Discrete Mathematics
Scientific Visualization
Programming Languages
Networks and Distributed Systems
Quantum Mechanics I \& II
Intermediate Mechanics
Electronics
Wizards

GPA: 3.81

*Graduate level.

Memberships

IEEE Graduate Student Member

2020 - present

Extracurricular

In my spare time, I enjoy running, climbing, cycling, and visual art. I also pursue creative writing:
Creative nonfiction: benjamindkilleen.com/blog
Science Fiction: manuscript available by request.

Metadata

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