

# Armin Hadzic

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## Research Interests

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Developing unsupervised/self-supervised methods to address challenges in novel class discovery and latent information representation, especially across multiple modalities (e.g., imagery, audio, and point clouds). More generally, I am interested in **deep learning**, **computer vision**, **reinforcement learning**, **natural language**, and **artificial intelligence**.

## Education

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### University of Kentucky

2018-2020

*Master of Science in Computer Science, GPA – 4.0*

*Advisor: Nathan Jacobs*

Thesis: Estimating Free-Flow Speed with LiDAR and Overhead Imagery

### University of Kentucky

2016

*Bachelor of Science in Computer Engineering, GPA – 3.8*

Graduated Magna Cum Laude

### University of Kentucky

2009-2013

*Bachelor of Science in Electrical Engineering, GPA – 3.8*

Graduated Magna Cum Laude, Minor in Computer Science

Computer Science Outstanding MS Student 2020.

Dean's List Fall 2010 to Spring 2013.

## Professional Experience

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### Research.....

#### Computer Vision Research Scientist

2021-Present

DZYNE TECHNOLOGIES INC.

*Fairfax, VA*

- Researching and developing computer vision deep learning methods for overhead and ground-level imagery.
- Designed methods for addressing resolution mismatch between imagery and annotations in supervised learning.
- Led or contributed to writing 9 proposals (SBIR, STTR, BAA), winning one for a 5-year \$3M program.

#### Computer Vision Researcher

2020-2021

JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY

*Laurel, MD*

- Designed and implemented deep learning methods for applied research in computer vision, remote sensing, medical imaging, and neuroscience.
- Developed models robust to bias in classification of skin diseases, reducing skin tone bias by 7% while maintaining 85% accuracy.
- Integrated geospatial products into artificial neural networks for high resolution building damage classification, structure localization, and green house gas regression.

#### Research Assistant

2018-2020

UK COMPUTER VISION LAB

*Lexington, KY*

- Advised by Professor Nathan Jacobs.
- Designed multi-modal neural networks to leverage point clouds and satellite imagery to estimate free-flow speeds of roads.
- Developed Natural Language Processing (NLP) temporal convolutional and attention-based neural network models to estimate firm economic performance using public SEC text reports.

#### Machine Perception Intern

2019

JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY

*Laurel, MD*

- Advised by Ryan Mukherjee and Dr. Gordon Christie.
- Regressed population of displaced communities for disaster relief efforts, utilizing overhead imagery and deep neural networks.

#### Volunteer Machine Learning Research Assistant

2017-2018

UK COMPUTER VISION LAB

*Lexington, KY*

- Automated the US Road Assessment Program (usRAP) road safety assessment using a deep convolutional neural network to directly estimate roadway safety based on street-level panorama images, reducing evaluation time to milliseconds per image.
- Integrated the roadway safety estimator into a GPS vehicle routing system to enhance navigation with the capability to identify a balanced, safe and fast, driving route.

- Industry.....**
- Software Development Engineer** **2017-2018**  
 BELCAN ENGINEERING GROUP INC. *Lexington, KY*  
 ○ Developed, maintained, and tested a jet engine diagnostic and fault resolution system, saving over \$100,000 by automating engine maintenance diagnostics.  
 ○ Integrated and streamlined a legacy cross-platform build system with modern development tools, mitigating build errors and reducing development time.
- Embedded Software Engineer** **2016-2017**  
 BELCAN ENGINEERING GROUP INC. *Lexington, KY*  
 ○ Streamlined the user interface and reduced diagnostic time of jet engines by identifying, isolating, and purging Onboard Maintenance System inefficiencies and defects.
- Software Test Engineer** **2015-2016**  
 BELCAN ENGINEERING GROUP INC. *Lexington, KY*  
 ○ Designed and implemented Control and Diagnostic System Verification and Validation Tests for 4 P&W Turbofan Jet Engines.  
 ○ Discovered mission critical control logic, software, and documentation defects through root-cause analysis, informal testing, regression testing and system testing; leading to best in class, safe, and high performance jet engines.
- Software Engineering Co-op** **2013-2014**  
 TEMPUR SEALY INTERNATIONAL INC *Lexington, KY*  
 ○ Pioneered and developed a GUI and 3D topography mapping application to visually analyze large datapoint datasets, generating streamlined product testing, seamless user experience, and refined product quality.
- Software Engineering Intern** **2012**  
 JOHNSON CONTROLS INC *Florence, KY*  
 ○ Designed and implemented a software algorithm for streamlined Automated Guided Vehicle (AGV) routing, saving \$57,000 per year in scrap reduction and transportation costs.

## Publications

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- Conferences.....**
- [1] Scott Workman, Armin Hadzic, and M. Usman Rafique. "Handling Image and Label Resolution Mismatch in Remote Sensing". In: *IEEE Winter Conference on Applications of Computer Vision (WACV)*. January 2023.
  - [2] Haolin Yuan, John Aucott, Armin Hadzic, William Paul, Marcia Villegas de Flores, Philip Mathew, Philippe Burlina, and Yinzhi Cao. "EdgeMixup: Embarrassingly Simple Data Alteration to Improve Lyme Disease Lesion Segmentation and Diagnosis Fairness". In: *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. October 2023, pp. 374–384.
  - [3] Elise Buckley, Joseph D Monaco, Kevin M Schultz, Robert Chalmers, Armin Hadzic, Kechen Zhang, Grace M Hwang, and M Dwight Carr. "An interdisciplinary approach to high school curriculum development: Swarming Powered by Neuroscience". In: *Proceedings 2022 IEEE Integrated STEM Education Conference (ISEC)*. **Best Paper Award**. March 2022.
  - [4] Armin Hadzic, Gordon Christie, Jeffrey Freeman, Amber Dismar, Stevan Bullard, Ashley Greiner, Nathan Jacobs, and Ryan Mukherjee. "Estimation Displaced Populations from Overhead". In: *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*. September 2020.
  - [5] Weilian Song, Scott Workman, Armin Hadzic, Xu Zhang, Eric Green, Mei Chen, Reginald Souleyrette, and Nathan Jacobs. "FARSA: Fully Automated Roadway Safety Assessment". In: *IEEE Winter Conference on Applications of Computer Vision (WACV)*. March 2018.

- Journals.....**
- [1] Armin Hadzic, Grace M Hwang, Kechen Zhang, Kevin M Schultz, and Joseph D Monaco. "Bayesian optimization of distributed neurodynamical controller models for spatial navigation". In: *Array* (2022), p. 100218.
  - [2] William Paul, Armin Hadzic, Neil Joshi, Fady Alajaji, and Philippe Burlina. "TARA: Training and Representation Alteration for AI Fairness and Domain Generalization". In: *Neural Computation* (2022), pp. 1–38.

**Workshops**.....

[1] Mei Chen, Armin Hadzic, Weilian Song, and Nathan Jacobs. "Applications of Deep Machine Learning to Highway Safety and Usage Assessment". In: *Transportation Research Board Workshop*. (oral). January 2021.

[2] Ryan Mukherjee, Derek Rollend, Gordon Christie, Armin Hadzic, Sally Matson, Anshu Saksena, and Marisa Hughes. "Towards Indirect Top-Down Road Transport Emissions Estimation". In: *IEEE/ISPRS Workshop: Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION)*. **Best Paper Award**. June 2021.

[3] Armin Hadzic, Hunter Blanton, Weilian Song, Mei Chen, Scott Workman, and Nathan Jacobs. "RasterNet: Modeling Free-Flow Speed using LiDAR and Overhead Imagery". In: *IEEE/ISPRS Workshop: Large Scale Computer Vision for Remote Sensing Imagery (EARTHVISION)*. June 2020.

## Technical skills

Programming Languages	Python, C/C++, Verilog, Java, L <sup>A</sup> T <sub>E</sub> X, Assembly, Make
Libraries	PyTorch, Scikit-Learn, Keras, Tensorflow
Operating Systems	Unix/Linux, Windows, OSX, Android
Development Environments	Linux Toolchain, PyCharm, Visual Studio, Android Studio, Xilinx

## Service

- Technical Committee**.....
- 2021 University of Maryland Honor’s program Gemstone thesis defense.
- Program Committee/Reviewing**.....
- CVPR: 2023, 2024
  - ECCV: 2022, 2024
  - ICCV: 2023
  - ICLR: 2024
  - NeurIPS: 2023
  - WACV Round 1 and 2: 2023, 2024
  - CVPR Workshop EARTHVISION: 2022, 2023