Armin Hadzic

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Research Interests

Developing unsupervised learning methods to address challenges in open vocabulary segmentation and latent information representation, especially across multiple modalities (e.g., imagery, text, and point clouds). More generally, I am interested in **deep learning, computer vision, reinforcement learning, NLP, remote sensing** and **artificial intelligence**.

Education

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

Awards..

Computer Science Outstanding MS Student 2020.

Dean's List Fall 2010 to Spring 2013.

Professional Experience

Research..

Computer Vision Research Scientist   **2021-Present**
DZYNE TECHNOLOGIES INC.   *Fairfax, VA*
- Developed methods for research efforts in pose estimation [2], generative super-resolution image synthesis [3], depth estimation, and multi-modal fusion [1, 2].
- Researched and developed scalable supervised and unsupervised learning methods for clustering LiDAR, and segmenting overhead and ground-level imagery.
- Led or contributed to writing 9 proposals (SBIR, STTR, BAA), securing $3M in funding from IARPA, NGA, etc.

Computer Vision Researcher   **2020-2021**
JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY   *Laurel, MD*
- Designed neural network bias reduction methods for skin disease classification and segmentation [4, 7].
- Developed methods for optimizing multi-agent swarm control systems based on computational neuroscience [5, 6].
- Integrated geospatial products into artificial neural networks for high resolution building damage classification, structure localization, and green house gas regression [9].

Research Assistant   **2018-2020**
UK COMPUTER VISION LAB   *Lexington, KY*
- Advised by Professor Nathan Jacobs.
- Designed multi-modal neural networks [8, 10] to leverage point clouds and satellite imagery to estimate free-flow speeds of roads from a birds-eye-view.
- 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.
- Developed methods for regressing population of displaced communities for disaster relief efforts, utilizing overhead imagery and deep neural networks [11].

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 [12] 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

Conferences..

[1] Connor Greenwell, Jon Crall, Matthew Purri, Kristin Dana, Nathan Jacobs, Armin Hadzic, Scott Workman, and Matt Leotta. "WATCH: Wide-Area Terrestrial Change Hypercube". In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*. 2024, pp. 8277–8286.

[2] Scott Workman and Armin Hadzic. "Probabilistic Image-Driven Traffic Modeling via Remote Sensing". In: *European Conference on Computer Vision (ECCV)*. 2024.

[3] 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.

[4] 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.

[5] 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.

[6] Armin Hadzic, Gordon Christie, Jeffrey Freeman, Amber Dismer, 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.

[7] 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, LaTeX, Assembly, Shell script
Deep Learning Frameworks	PyTorch, Scikit-Learn, Keras, Tensorflow
Operating Systems	Unix/Linux, Windows, OSX, Android
Development Environments & Tools	Linux Toolchain, Slurm, 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, 2025
  - Outstanding Reviewer 2024
○ ECCV: 2022, 2024
○ ICCV: 2023
○ ICLR: 2024
○ NeurIPS: 2023, 2024
○ WACV Round 1 and 2: 2023, 2024, 2025
○ CVPR Workshop EARTHVISION: 2022, 2023