Zander W. Blasingame

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Summary

I am a machine learning researcher focusing on developing *controllable* generative models. My research expertise is in generative modeling (diffusion, flows, and GANs), neural differential equations, stochastic processes, dynamical systems, and biometrics.

Education

Clarkson University

Ph.D. in Electrical and Computer Engineering	2020 - 2025

Thesis: On Guided and Reversible Solvers for Neural Differential Equations
Supervisor: Chen Liu

M.Sc. in Electrical and Computer Engineering	2018 - 2025
B.Sc. in Computer Engineering, with Great Distinction	2015 - 2018

Research & Industry Experience

Clarkson University	May 2025 - Present
Postdoctoral Research Assistant	*Potsdam, NY*

Clarkson University	2018 - 2025
Graduate Research Assistant	*Potsdam, NY*

- Published 15 papers, 8 first author, in highly competitive venues such as NeurIPS ($< 30\%$ acceptance rate)
- Optimized the performance of end-to-end optimization techniques for flow/diffusion models by using a greedy strategy to decrease the runtime complexity per optimization step from $\mathcal{O}(nd^2)$ to $\mathcal{O}(d^2)$
- Created an *algebraically reversible* solver for diffusion SDEs for improved stability in image editing applications and reduced computation overhead by dynamically calculating the Brownian motion
- Developed bespoke numerical solvers for efficiently performing backpropagation through the ODE/SDE solve of diffusion models with a reduction in memory usage from $\mathcal{O}(n)$ to $\mathcal{O}(1)$ whilst reducing the error in estimating the gradients by transforming the ODE into a non-stiff form
- Proposed a new family of face morphing attacks known as **Di**ffusion **M**orphs (**DiM**) which have become the state-of-the-art in face morphing attacks, with effectiveness against face recognition systems
- Developed an efficient GAN architecture for encoding images into the latent space by sharing the CNN backbone for the discriminator and encoder networks
- Designed a novel detection algorithm for face morphing attacks by using adversarial learning to train a better detection scheme

Clarkson University	2016 - 2018
Undergradute Research Assistant	*Potsdam, NY*

- Investigated probability density estimation using GAN inversion
- Created a novel GAN model to generate out of distribution data for anomaly detection
- Developed state-of-the-art machine learning algorithms to detect zero-day malware attacks using low-level hardware features

Griffiss Institute - Air Force Research Laboratory	Summer 2016
Engineering Intern	*Rome, NY*

University of New Hampshire InterOperability Laboratory	Summer 2014
Engineering Intern	*Durham, NH*

Pre-prints

[1] **Zander W. Blasingame** and Chen Liu. "A Reversible Solver for Diffusion SDEs". In: *ICLR 2025 Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy*. 2025. URL: https://openreview.net/forum?id=0gEFLVUL6n.

[2] **Zander W. Blasingame** and Chen Liu. "Greed is Good: Guided Generation from a Greedy Perspective". In: *ICLR 2025 Workshop on Frontiers in Probabilistic Inference: Learning meets Sampling*. 2025. URL: https://openreview.net/forum?id=o4yQzZ5qCW.

Peer-reviewed Conference & Journal Publications

[1] **Zander W. Blasingame** and Chen Liu. "AdjointDEIS: Efficient Gradients for Diffusion Models". In: *Advances in Neural Information Processing Systems*. Ed. by A. Globerson, L. Mackey, D. Belgrave, A. Fan, U. Paquet, J. Tomczak, and C. Zhang. Vol. 37. Curran Associates, Inc., 2024, pp. 2449–2483. URL: https://proceedings.neurips.cc/paper_files/paper/2024/file/04badd3b048315c8c3a0ca17eff723d7-Paper-Conference.pdf.

[2] **Zander W. Blasingame** and Chen Liu. "Fast-DiM: Towards Fast Diffusion Morphs". In: *IEEE Security & Privacy* 22.4 (2024), pp. 103–114. DOI: 10.1109/MSEC.2024.3410112 🗗.

[3] **Zander W. Blasingame** and Chen Liu. "Greedy-DiM: Greedy Algorithms for Unreasonably Effective Face Morphs". In: *2024 IEEE International Joint Conference on Biometrics (IJCB)*. [**Spotlight**]. 2024, pp. 1–11. DOI: 10.1109/IJCB62174.2024.10744517 🗗.

[4] **Zander W. Blasingame** and Chen Liu. "Leveraging Diffusion for Strong and High Quality Face Morphing Attacks". In: *IEEE Transactions on Biometrics, Behavior, and Identity Science* 6.1 (2024), pp. 118–131. DOI: 10.1109/TBIOM.2024.3349857 🗗.

[5] Richard E. Neddo, **Zander W. Blasingame**, and Chen Liu. "The Impact of Print-Scanning in Heterogeneous Morph Evaluation Scenarios". In: *2024 IEEE International Joint Conference on Biometrics (IJCB)*. 2024, pp. 1–10. DOI: 10.1109/IJCB62174.2024.10744441 🗗.

[6] Chutitep Woralert, Chen Liu, and **Zander Blasingame**. "Towards Effective Machine Learning Models for Ransomware Detection via Low-Level Hardware Information". In: *Proceedings of the 13th International Workshop on Hardware and Architectural Support for Security and Privacy*. HASP '24. Association for Computing Machinery, 2024, pp. 10–18. ISBN: 9798400712210. DOI: 10.1145/3696843.3696847 🗗. URL: https://doi.org/10.1145/3696843.3696847.

[7] Chutitep Woralert, Chen Liu, and **Zander Blasingame**. "HARD-Lite: A Lightweight Hardware Anomaly Realtime Detection Framework Targeting Ransomware". In: *IEEE Transactions on Circuits and Systems I: Regular Papers* 70.12 (2023), pp. 5036–5047. DOI: 10.1109/TCSI.2023.3299532 🗗.

[8] Chutitep Woralert, Chen Liu, **Zander Blasingame**, and Zhiliu Yang. "A Comparison of One-class and Two-class Models for Ransomware Detection via Low-level Hardware Information". In: *2023 Asian Hardware Oriented Security and Trust Symposium (AsianHOST)*. [**Oral**]. 2023, pp. 1–6. DOI: 10.1109/AsianHOST59942.2023.10409333 🗗.

[9] Chutitep Woralert, **Zander Blasingame**, and Chen Liu. "HARD-Lite: A Lightweight Hardware Anomaly Realtime Detection Framework Targeting Ransomware". In: *2022 Asian Hardware Oriented Security and Trust Symposium (AsianHOST)* (2022). [**Best Paper Nominee**].

[10] **Zander Blasingame** and Chen Liu. "Leveraging Adversarial Learning for the Detection of Morphing Attacks". In: *2021 IEEE International Joint Conference on Biometrics (IJCB)* (2021). [**Oral**], pp. 1–8. DOI: 10.1109/IJCB52358.2021.9484383 🗗.

[11] **Zander Blasingame**, Chen Liu, and Xin Yao. "Feature Creation Towards the Detection of Non-control-Flow Hijacking Attacks". In: *Artificial Neural Networks and Machine Learning – ICANN 2021*. Ed. by Igor Farkaš, Paolo Masulli, Sebastian Otte, and Stefan Wermter. [**Oral**]. Cham: Springer International Publishing, 2021, pp. 153–164. ISBN: 978-3-030-86362-3.

[12] Gildo Torres, Zhiliu Yang, **Zander Blasingame**, James Bruska, and Chen Liu. "Detecting Non-Control-Flow Hijacking Attacks Using Contextual Execution Information". In: *Proceedings of the 8th International Workshop on Hardware and Architectural Support for Security and Privacy*. HASP '19. Phoenix, AZ, USA: Association for Computing Machinery, 2019. ISBN: 9781450372268. DOI: 10.1145/3337167.3337168 ☑. URL: https://doi.org/10.1145/3337167.3337168.

[13] Chen Liu, Zhiliu Yang, **Zander Blasingame**, Gildo Torres, and James Bruska. "Detecting Data Exploits Using Low-Level Hardware Information: A Short Time Series Approach". In: *Proceedings of the First Workshop on Radical and Experiential Security*. RESEC '18. Incheon, Republic of Korea: Association for Computing Machinery, 2018, pp. 41–47. ISBN: 9781450357579. DOI: 10.1145/3203422.3203433 ☑. URL: https://doi.org/10.1145/3203422.3203433.

Workshop Presentations & Posters

[1] **Zander W. Blasingame** and Chen Liu. "A Reversible Solver for Diffusion SDEs". In: *ICLR 2025 Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy*. 2025. URL: https://openreview.net/forum?id=0gEFLVUL6n.

[2] **Zander W. Blasingame** and Chen Liu. "Greed is Good: Guided Generation from a Greedy Perspective". In: *ICLR 2025 Workshop on Frontiers in Probabilistic Inference: Learning meets Sampling*. 2025. URL: https://openreview.net/forum?id=o4yQzZ5qCW.

[3] Richard E. Neddo, Sean Willis, **Zander W. Blasingame**, and Chen Liu. "Adapting Pretrained Vision Transformers with LoRA Against Attack Vectors". In: *IEEE International Conference on Mobility: Operations, Services, and Technologies*. 2025.

[4] **Zander W. Blasingame** and Chen Liu. "AdjointDEIS: Efficient Gradients for Diffusion Models". In: *The 3rd New Frontiers in Adversarial Machine Learning Workshop (AdvML @ NeurIPS)*. Vancouver, Canada, Dec. 2024.

[5] **Zander W. Blasingame** and Chen Liu. "Leveraging Diffusion Models for Stronger Face Morphing Attacks". In: *European Association for Biometrics (EAB) and the Center for Identitification Technology Research (CITeR) Biometrics Workshop*. Martigny, Swizterland, Apr. 2023.

[6] Nasser Nasrabadi, Chen Liu, David Doermann, and **Zander W. Blasingame**. "Face Morph Generation and Attack Detection". In: *International Face Performance Conference*. [**Oral**]. Online, Nov. 2022.

[7] Chen Liu, **Zander W. Blasingame**, Jeremy Dawson, and Jacob Dameron. "Morph attack detection and mitigation projects". In: *International Face Performance Conference*. [**Oral**]. Online, Oct. 2020.

Invited Talks

Mila - Quebec Artificial Intelligence Institute	Jan 2025
AdjointDEIS: Efficient Gradients for Diffusion Models	*Montréal, Canada*
Transatlantic Dialogue on Presentation Attack Detection	Nov 2024
Diffusion Morphs (DiM): Diffusion is all you need for highly effective face morphs	*Washington, D.C.*
Journal Presentation - IEEE IJCB	Sep 2024
Diffusion Morphs (DiM): Leveraging Diffusion for Strong and High-Quality Face Morphing Attacks	*Buffalo, NY*
Idiap Research Institute	Jul 2024
Diffusion Morphs (DiM): The Power of Iterative Generative Models for Attacking FR Systems	*Martigny, Switzerland*
CITeR and DSA Webinar	Feb 2024
Diffusion for the Generation of Face Morphs	*Online*

Projects

Efficient Gradients for Diffusion Models - AdjointDEIS

AdjointDEIS ↗

- Efficient algorithms for backpropagation in diffusion models for guided generation and related tasks
- Tools Used: Python, PyTorch

Diffusion Morphs (DiM)

Greedy-DiM ↗

- Developed a family of SOTA face morphing algorithms using diffusion models
- Tools Used: Python, PyTorch

Research Funding

Explainable Image Quality with Transformer-based Models
2023 - 2024

Funding from the Center for Identification Technology Research a NSF-IUCRC
Role: Helped draft grant proposal, primary student investigator
PIs: Chen Liu

Towards the Creation of a Large Dataset of High-Quality Face Morphs
2021 - 2024

Funding from the Center for Identification Technology Research a NSF-IUCRC
Role: Helped draft Clarkson's portion of grant proposal, primary student investigator at Clarkson University
PIs: Chen Liu, Stephanie Schuckers, Xin Li, Jeremy Dawson, Nasser Nasrabadi, David Doermann, Srirangaraj Setlur, Siwei Lyu, Xiaoming Liu, Sébastian Marcel

Comparative Detection of Facial Image Manipulation Techniques
2020 - 2022

Funding from the Center for Identification Technology Research a NSF-IUCRC
Role: Helped draft grant proposal, primary student investigator
PIs: Chen Liu

Adversarial Learning Based Approach Against Face Morphing Attacks
2019 - 2021

Funding from the Center for Identification Technology Research a NSF-IUCRC
Role: Helped draft grant proposal, primary student investigator
PIs: Chen Liu

Awards and Honors

AISTATS Best Reviewer Award	2025
IJCB Doctoral Consortium	2024
Clarkson Presidential Scholar	2015 - 2018
Best Oral Presentation for Software Engineering - Clarkson RAPS	2017

Teaching

Griffiss Institute
2020 - 2024
Instructor — *Rome, NY*

- Taught and co-designed the introduction to CyberSecurity Summer Camp for advanced high school students

Clarkson University
2018 - 2021
Graduate Teaching Assistant — *Potsdam, NY*

- Electrical Science (ES 250)
- Introduction to Digital Design (EE 264)
- Electrical and Computer Engineering Sophomore Lab (EE 211)

Clarkson University
2016 - 2018
Undergraduate Teaching Assistant — *Potsdam, NY*

- Software System Architecture (EE 462)
- Differential Equations (MA 232)

Professional Services

Reviewer

NeurIPS	2024-2025
ICML	2025
ICLR Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy ↗	2025
ICLR Workshop on Frontiers in Probabilistic Inference ↗	2025
AISTATS	2025
IJCB Workshop on Face Morphing Attack and Detection Techniques ↗	2024
IEEE ICPR	2024
IEEE MOST	2023-2024
PMAM	2022-2023
ICANN	2021
IEEE BTAS	2019

Organizer

IJCB Workshop on Face Morphing Attack and Detection Techniques ↗ (Student Organizer)	2024

Skills

ML Architectures: Diffusion Models, Flow Matching, Neural Differential Equations, GANs, VAEs

Distributed Computing: Slurm, CUDA, ROCm, Linux

Languages: Python, C/C++, Java, Javascript, Bash, MATLAB, VHDL

Frameworks: TensorFlow, Pytorch, Numpy, Scipy, Matplotlib, Plotly, Pandas, Jax

Tools: Vim, Git, Docker, LaTeX

Audio: Over a decade of exeperience as a FOH engineer including theater productions and worship services