


# 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

<i>Ph.D. in Electrical and Computer Engineering</i> , Advisor: Chen Liu	2020 - Expected May 2025
<i>M.Sc. in Electrical and Computer Engineering</i>	2018 - 2020
<i>B.Sc. in Computer Engineering, with Great Distinction</i>	2015 - 2018

## Research & Industry Experience

### Clarkson University

2018 - Present

*Graduate Research Assistant*

*Potsdam, NY*

- Published 13 papers, 7 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 **Diffusion Morphs (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

*Undergraduate 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: *arXiv preprint arXiv:2502.08834* (Feb. 2025). URL: <https://arxiv.org/abs/2502.08834>.
- [2] **Zander W. Blasingame** and Chen Liu. "Greed is Good: Guided Generation from a Greedy Perspective". In: *arXiv preprint arXiv:2502.08006* (Feb. 2025). URL: <https://arxiv.org/abs/2502.08006>.

## Peer-reviewed Conference & Journal Publications

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- [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](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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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 Farkas, 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](https://doi.org/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](https://doi.org/10.1145/3203422.3203433)  URL: <https://doi.org/10.1145/3203422.3203433>.



## Workshop Presentations & Posters

- [1] **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.
- [2] **Zander W. Blasingame** and Chen Liu. “Leveraging Diffusion Models for Stronger Face Morphing Attacks”. In: *European Association for Biometrics (EAB) and the Center for Identification Technology Research (CITeR) Biometrics Workshop*. Martigny, Switzerland, Apr. 2023.
- [3] 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.
- [4] 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

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

## Projects

<b>Efficient Gradients for Diffusion Models - AdjointDEIS</b>	<a href="#">AdjointDEIS </a>
<ul style="list-style-type: none"> <li>Efficient algorithms for backpropagation in diffusion models for guided generation and related tasks</li> <li>Tools Used: Python, PyTorch</li> </ul>	
<b>Diffusion Morphs (DiM)</b>	<a href="#">Greedy-DiM </a>
<ul style="list-style-type: none"> <li>Developed a family of SOTA face morphing algorithms using diffusion models</li> <li>Tools Used: Python, PyTorch</li> </ul>	

## Research Funding

<b>Explainable Image Quality with Transformer-based Models</b>	2023 - 2024
Funding from the Center for Identification Technology Research a NSF-IUCRC Role: Helped draft grant proposal, primary student investigator PIs: Chen Liu	
<b>Towards the Creation of a Large Dataset of High-Quality Face Morphs</b>	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, Sébastien Marcel	

<b>Comparative Detection of Facial Image Manipulation Techniques</b>	2020 - 2022
Funding from the Center for Identification Technology Research a NSF-IUCRC	
Role: Helped draft grant proposal, primary student investigator	
PIs: Chen Liu	
<b>Adversarial Learning Based Approach Against Face Morphing Attacks</b>	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

<b>IJCB Doctoral Consortium</b>	2024
<b>Clarkson Presidential Scholar</b>	2015 - 2018
<b>Best Oral Presentation for Software Engineering - Clarkson RAPS</b>	2017

## Teaching

<b>Griffiss Institute</b>	2020 - 2024
<i>Instructor</i>	<i>Rome, NY</i>
<ul style="list-style-type: none"> <li>Taught and co-designed the introduction to CyberSecurity Summer Camp for advanced high school students</li> </ul>	
<b>Clarkson University</b>	2018 - 2021
<i>Graduate Teaching Assistant</i>	<i>Potsdam, NY</i>
<ul style="list-style-type: none"> <li>Electrical Science (ES 250)</li> <li>Introduction to Digital Design (EE 264)</li> <li>Electrical and Computer Engineering Sophomore Lab (EE 211)</li> </ul>	
<b>Clarkson University</b>	2016 - 2018
<i>Undergraduate Teaching Assistant</i>	<i>Potsdam, NY</i>
<ul style="list-style-type: none"> <li>Software System Architecture (EE 462)</li> <li>Differential Equations (MA 232)</li> </ul>	

## Professional Services

### Reviewer

<b>ICML</b>	2025
<b>ICLR Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy</b> <a href="#">↗</a>	2025
<b>AISTATS</b>	2025
<b>NeurIPS</b>	2024
<b>IJCB Workshop on Face Morphing Attack and Detection Techniques</b> <a href="#">↗</a>	2024
<b>IEEE ICPR</b>	2024
<b>IEEE MOST</b>	2023,2024
<b>PMAM</b>	2022,2023
<b>ICANN</b>	2021
<b>IEEE BTAS</b>	2019

### Organizer

<b>IJCB Workshop on Face Morphing Attack and Detection Techniques</b> <a href="#">↗</a> (Student Organizer)	2024
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## Skills

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

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

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

**Tools:** Vim, Git, Linux, Docker, LaTeX

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