

# Zachary Stoebner

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## Overview

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I am working on provably efficient, scalable, and robust algorithms for large-scale inverse problems. Broadly, I'm interested in **machine learning, signal processing, optimization, and probability.**

## Education

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### University of Texas at Austin

PhD in Electrical & Computer Engineering (advised by Prof. Jon Tamir)

Austin, TX  
August 2022 - Present

- Coursework: Convex Optimization, Probability & Stochastic Processes, Computational MRI, Real Analysis, Advanced Computer Vision, Fourier Optics, Digital Signal Processing, Large-Scale Optimization, Advanced Probability, Tensor Methods

### Vanderbilt University

BS in Computer Science & Neuroscience, Minor in Applied Mathematics

Nashville, TN  
May 2021

MS in Computer Science (advised by Prof. Ipek Oguz)

August 2022

- Thesis: A deep learning-enabled automatic segmentation system for surgical endoscopy
- Coursework: Statistical ML, Systems Theory, Computational Game Theory, Intelligent Systems & Robotics

## Work

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### Adobe

AI/ML Research Intern (Advisors: Abhishek Tandon, Sid Iyer, Oliver Brdiczka)

Bay Area, CA  
May 2025 - Sep 2025

- Developed state-space models for sequence compression in long-form text-to-image/video generation.
- Won the Firefly intern research showcase.

## Research

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### IN PROGRESS

"Quasi-Newton monotone operator learning for large-scale inverse problems", **Zachary A. Stoebner**, Tao Hong, Jonathan I. Tamir. (2025-Present)

- Designed a quasi-Newton version of MOL via variable-metric forward-backward splitting with provable contraction and robustness.
- Developed matrix-free methods for high-dimensional, non-uniform operators using Chebyshev polynomials and randomized linear algebra.

### CONFERENCE

"INFusion: diffusion regularized implicit neural representations for 2D and 3D accelerated MRI reconstruction", Yamin Arefeen, Brett Levac, **Zachary A. Stoebner**, Jonathan I Tamir. *IEEE-Asilomar* (2024).

[DOI][pdf]

- Contributed a [library] for generally defining implicit neural representations for inverse problems using PyTorch and Lightning.

"Segmentation of kidney stones in endoscopic video feeds", **Zachary A. Stoebner**, Daiwei Lu, Seok Hee Hong, Nicholas L. Kavoussi, and Ipek Oguz. *SPIE Medical Imaging: Image Processing* (2022).

[DOI][arXiv]

- Optimized a high-performing (>0.9 Dice, 0.8 Kappa) residual U-Net with PyTorch and Comet for video segmentation and deployed it in live surgeries with OpenCV in Python.
- Built and annotated a novel dataset of endoscopic nephrolithotomy videos using OpenCV in C++.

### JOURNAL

"Reducing malware analysis overhead with coverings", Michael Sandborn, **Zachary A. Stoebner**, Westley Weimer, Stephanie Forrest, Ryan Dougherty, Jules White, Kevin Leach. *IEEE-TDSC* (2023).

[DOI][GitHub]

- Developed a high-performing (>90% hit rate) deep multilabel CNN classifier using PyTorch and Comet that predicted which sandboxes will run a stealthy malware sample using its binary image.
- Implemented scheduling algorithms in Python to simulate the analysis framework's scalability given the classifier's predictions and evaluated the algorithms' performance in simulation using NumPy.

"Comprehensive shape analysis of the cortex in Huntington's disease", **Zachary A. Stoebner**, Kilian Hett, Ilwoo Lyu, Hans Johnson, Jane S. Paulsen, Jeffrey Long, Ipek Oguz. *Human Brain Mapping* (2023).

[DOI][GitHub]

- Formulated a linear-mixed model with lme4 in R to describe the cortex from the longitudinal PREDICT-HD dataset, using a novel index for gyrification, sulcal depth, and cortical thickness.
- Investigated novel areas of change associated with Huntington's disease and corroborated the degree of change reported in known areas using SufStat in MATLAB.

## POSTER

"Jointly solving for system identification and signal reconstruction with implicit neural representations", **Zachary A. Stoebner**, Jonathan I. Tamir. {6G@UT, Oden SciML Workshop} (2024)

## PATENTS

"Systems and Methods for Navigation and Identification during Endoscopic Surgery", Nicholas L. Kavoussi, Ipek Oguz, Jie Ying Wu, **Zachary A. Stoebner**, Daiwei Lu, Ayberk Acar.  
U.S. Patent Application No. 18/622,134.

## Accolades

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- 2026-2027 **Tolbert Endowed Fellowship**, University of Texas at Austin
- 2022-2026 **Cockrell Engineering Doctoral Fellowship**, University of Texas at Austin
- 2021 **Research Honors in Computer Science**, Vanderbilt University
- 2017-2021 **Dean's List**, Vanderbilt University

## Teaching

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### ASSISTANT *\*held weekly office hours and graded homework*

Spring 2022	<b>Projects in ML</b> , CS 3892	<i>Vanderbilt</i>
Fall 2021	<b>Artificial Intelligence</b> , CS 4260	<i>Vanderbilt</i>
Spring 2021	<b>Deep Learning</b> , CS 3891	<i>Vanderbilt</i>
Fall 2020	<b>Operating Systems</b> , CS 3281	<i>Vanderbilt</i>
Spring 2020	<b>Discrete Math</b> , CS 2212	<i>Vanderbilt</i>
Fall 2019	<b>Discrete Math</b> , CS 2212	<i>Vanderbilt</i>

## Skills

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**Theory:** Optimization, Approximation, Estimation, Tensors, Operators, Randomization

**Practice:** Python (PyTorch, OpenCV), C++ (OpenCV, LLVM, ITK, VTK), C, Git, Linux

**Verbal:** English (native), Portuguese (fluent), Spanish (advanced), French (basic)