

# Nicholas Bampton

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## EDUCATION

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**University of Illinois at Urbana Champaign**  
Doctorate in Electrical Engineering, GPA 3.93

Urbana IL, May 2027

**Virginia Polytechnic Institute and State University**  
Bachelors Degree in Electrical Engineering, GPA 3.75  
Bachelors Degree in Mathematics, GPA 3.75

Blacksburg VA, May 2022

## RESEARCH EXPERIENCE

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### Research Assistantship

January 2025 - Present

University of Illinois, Urbana IL

- Modeled camera motion using the Fourier transform for background reconstruction in small target detection. Specifically modeled the data as a blind demixing problem where images are convolved with a motion tensor and analyzed the region of convergence for the space of initializations.

### Research Assistantship

September 2023 - January 2025

University of Illinois, Urbana IL

- Derived convergence results for dynamic programming algorithms in small target detection. Specifically unified dynamic programming algorithms from a graph theory perspective and derived the inverse relationship between location uncertainty and existence uncertainty.

### Summer Intern

May 2023 - September 2023

Sandia National Laboratory, Albuquerque NM

- Modeled video backgrounds using topological properties for small infrared target detection. Specifically used the persistent homology of a surface, computed using the contour tree, to construct a background model and spatially filter out foreground elements. Mathematically demonstrated the class of domain operations for which the persistent homology is invariant.

### Summer Intern

May 2019 - September 2021

Naval Surface Warfare Center Dahlgren Division, Dahlgren VA

- Applied spectral graph theory techniques for low angle radar clutter comparisons. Reduced the dimensionality of video data through graph encoding and compared using graph metrics, primarily the Wasserstein metric and various spectral methods from the Eigendecomposition of the graph laplacian.

## PUBLICATIONS

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### In Review

N. Bampton, T. J. Ma, M. N. Do, "A Unified Theory of Dynamic Programming Algorithms in Small Target Detection," in IEEE Transactions on Signal Processing, vol. 74.

N. Bampton, T. J. Ma, M. N. Do, "A Graph-Based Framework for Detecting Small Noisy Targets: Theory and Analysis," in ICASSP 2026-2026 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).

### Published

A. Chakraborty, D. Herrera, P. Fallen, D. Hall, N. Bampton, T. Olivero, M. Orlowski, "Conductive organic electrodes for flexible electronic devices," Scientific reports, 13(1), 4125.

## TEACHING EXPERIENCE

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<b>Teaching Assistantship</b> University of Illinois, Urbana IL <ul style="list-style-type: none"><li>• ECE513 - Vector Space Signal Processing</li><li>• Created course content, graded assessments</li></ul>	January 2025 - May 2025
<b>Teaching Assistantship</b> University of Illinois, Urbana IL <ul style="list-style-type: none"><li>• ECE374 - Introduction to Algorithms and Models of Computation</li><li>• Conducted recitation sections, created course content, graded assessments</li></ul>	September 2022 - May 2023

## HONORS & AWARDS

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<b>Mavis Fellowship</b> <ul style="list-style-type: none"><li>• Engineering faculty development fellowship</li></ul>	September 2025 - May 2026
<b>Warfield Memorial Scholarship</b> <ul style="list-style-type: none"><li>• Electrical engineering academic merit scholarship</li></ul>	September 2020 - May 2021