

JACOB K. CHRISTOPHER

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Generative AI, Responsible AI, Differentiable Optimization

Education

University of Virginia

Ph.D. in Computer Science

Aug 2023 – Present

Charlottesville, Virginia

Syracuse University

Ph.D. Track Master of Science

Aug 2022 – July 2023

Syracuse, New York

Gordon College

Bachelor of Science in Computer Science

Aug 2019 – May 2022

Wenham, Massachusetts

Experience

Department of Computer Science, University of Virginia

Graduate Research Assistant

Aug 2023 – Present

Charlottesville, Virginia

- Mentor: Dr. Ferdinando Fioretto
- Focus Areas: Generative AI, Responsible AI, Differentiable Optimization

Lawrence Livermore National Laboratory

Data Science Institute

May 2024 – Aug 2024

Livermore, California

- Mentor: Dr. Bhavya Kailkhura, Dr. Brian R. Bartoldson
- Collaboration employing *discrete diffusion models* to enhance natural language generation. Focus on responsible generative AI.

Department of Computer Science, Syracuse University

Graduate Research Assistant

Jan 2023 – July 2023

Syracuse, New York

- Mentor: Dr. Ferdinando Fioretto
- Focus Areas: Generative AI, Responsible AI, Differentiable Optimization

Solü Technology Partners

Software Engineer Co-op

Aug 2021 – May 2022

Rochester, New York

- Working on a SCRUM Team to develop a web-based survey delivery application. Alongside another engineer, worked to research, design, and implement a comprehensive API test suite in Python for the survey delivery application. Created documentation on how to maintain, update, and utilize automated suite. Added frameworks to ensure all tests passed with each release to the dedicated AWS server. Tools used include Angular, HTML5, Kotlin, and MongoDB.

BorgWarner

Software Developer

Nov 2020 – Jan 2021

Rochester, New York

- Created a product tracking GUI for an automotive manufacturing plant to interface to their existing database. Needed to improve data access, real-time reporting, and empower users to manage their own processes. Tools used include ASP.NET Core and SQL Server with JavaScript support.

Publications

Conference Publications

Constrained Synthesis with Projected Diffusion Models

2024

Jacob K. Christopher, Stephen Baek, and Ferdinando Fioretto

Accepted at NeurIPS 2024; arXiv:2402.03559

Learning Joint Models of Prediction and Optimization

2024

James Kotary, Vincenzo Di Vito Francesco, Jacob K. Christopher, Pascal Van Hentenryck, and Ferdinando Fioretto

Accepted at ECAI 2024; arXiv:2409.04898

Workshop Publications

- Constrained Synthesis with Projected Diffusion Models** **2024**
Jacob K. Christopher, Stephen Baek, and Ferdinando Fioretto
ML4Molecules Workshop @ ELLIS 2024; ML4PS Workshop @ NeurIPS 2024; arXiv:2402.03559
- Physics-Aware Diffusion Models for Micro-structure Material Design** **2024**
Jacob K. Christopher, Stephen Baek, and Ferdinando Fioretto
Spotlight at AI4Mat Workshop @ NeurIPS 2024; Paper
- Speculative Diffusion Decoding for Accelerated Language Generation** **2024**
Jacob K. Christopher, Brian R. Bartoldson, Tal Ben-Nun, Michael Cardei, Bhavya Kailkhura, and Ferdinando Fioretto
Accepted at ENLSP Workshop @ NeurIPS 2024; Best Paper Award at UVA LLM Workshop; Paper

Preprints

- Speculative Diffusion Decoding: Accelerating Language Generation through Diffusion** **2024**
Jacob K. Christopher, Brian R. Bartoldson, Tal Ben-Nun, Michael Cardei, Bhavya Kailkhura, and Ferdinando Fioretto
arXiv:2408.05636
- Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models** **2024**
Jinhao Liang, **Jacob K. Christopher**, Sven Koenig, and Ferdinando Fioretto
arXiv:2412.17993
- Analyzing and Enhancing the Backward-Pass Convergence of Unrolled Optimization** **2023**
James Kotary, **Jacob K. Christopher**, My H. Dinh, and Ferdinando Fioretto
arXiv:2312.17394

Selected Honors/Achievements

- **Spotlight @ AI for Accelerated Material Design Workshop (NeurIPS 2024):** *Constrained Synthesis with Projected Diffusion Models*
- **Best Paper @ UVA LLM Workshop 2024:** *Speculative Diffusion Decoding: Accelerating Language Generation through Diffusion*
- Selected for the **Data Science Summer Institute** at Lawrence Livermore National Laboratory
- University of Virginia: *UVA Computer Science Scholar (2023-24)*
- Gordon College: *Magna Cum Laude, Global Honors Program*

Teaching

- Introduction to Discrete Math (Syracuse University: Fall 2022, Spring 2023)

Service/Reviewing

- **Reviewer - ICML 2024; ENLSP Workshop @ NeurIPS 2024**
- **Program Committee Member - AAAI 2024**

Volunteering/Organizing

Reading Group on Responsible Generative AI, University of Virginia **Oct 2023 - Present**
Co-Organizer *Charlottesville, Virginia*

- Organizing the reading group on responsible generative AI at the University of Virginia where members of various research groups that work on responsible AI/generative AI come together to discuss recent advancements and future directions of work.

Rafiki Foundation **May 2022 - July 2022**
Math and Computer Science Tutor *Mzuzu, Malawi*

- Led high school class for introductory computer programming. Tutored students in mathematics, physics, and other STEM disciplines.