

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

Speculative Diffusion Decoding: Accelerating Language Generation through Diffusion

2025

Jacob K. Christopher, Brian R. Bartoldson, Tal Ben-Nun, Michael Cardei, Bhavya Kailkhura, and Ferdinando Fioretto

Accepted at NAACL 2025; [arXiv:2408.05636]

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

- Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models** **2025**
Jinhao Liang, **Jacob K. Christopher**, Sven Koenig, and Ferdinando Fioretto
The 6th International Workshop on Multi-Agent Path Finding (**Oral**); [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
ENLSP Workshop @ NeurIPS 2024 [paper]
- Constrained Synthesis with Projected Diffusion Models** **2024**
Jacob K. Christopher, Stephen Baek, and Ferdinando Fioretto
ML4Molecules Workshop @ ELLIS 2024; ML4PS Workshop @ NeurIPS 2024; [paper]
- Physics-Aware Diffusion Models for Micro-structure Material Design** **2024**
Jacob K. Christopher, Stephen Baek, and Ferdinando Fioretto
AI4Mat Workshop @ NeurIPS 2024 (**Spotlight**); [paper]

Preprints

- Training-Free Constrained Generation With Stable Diffusion Models** **2025**
Stefano Zampini*, **Jacob K. Christopher***, Luca Oneto, Tal Ben-Nun, Davide Anguita, and Ferdinando Fioretto
[arXiv:2502.05625]
- Simultaneous Multi-Robot Motion Planning with Projected Diffusion Models** **2025**
Jinhao Liang, **Jacob K. Christopher**, Sven Koenig, and Ferdinando Fioretto
[arXiv:2502.03607]
- 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

- **Oral @ The 6th International Workshop on Multi-Agent Path Finding (AAAI 2025)**
Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models
- **Oral @ AAAI-25 Bridge: AI+ORMS (AAAI 2025)**
Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models
- **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

Invited Talks

- **Invited Talk:** Speculative Diffusion Decoding
Machine Intelligence Neural Design (MIND) group at Apple
- **Invited Talk:** Physics-Aware Diffusion Models for Micro-structure Design
AI for Accelerated Material Design Workshop at NeurIPS 2024

Teaching

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

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.