

# James Oswald

✉ oswalj@rpi.edu | 🏠 <https://jamesoswald.dev> | 📄 James-Oswald | 🎓 Google Scholar

## Research Interests

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**Artificial Intelligence** Logic-Based AI, Automated Reasoning, Cognitive Architectures  
**Machine Learning** Generative Models, Reinforcement Learning  
**Logic** Many-Dimensional Modal Logics, Description Logics, Fuzzy Logics

## Selected Skills

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**Programming Languages** C++, Python, Java, C, Javascript, Lean  
**ML Technologies** Tensorflow, PyTorch, scikit-learn, Huggingface  
**Proof Assistants and Provers** Coq, Lean3, Lean4, Isabelle  
**Other** Numpy, Matplotlib, Github, MPI, OpenMP, CUDA, OpenGL

## Education

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### Rensselaer Polytechnic Institute

Troy, NY

PHD IN COMPUTER SCIENCE (PURSUING)

Aug. 2021 - PRESENT

- Concentration in Artificial Intelligence
- Subconcentrations in in Theory of Computation and Systems/Software
- Advised by Prof. Selmer Bringsjord
- Graduate Researcher in the Rensselaer Artificial Intelligence and Reasoning (RAIR) Lab
- 4.0 GPA

### The State University of New York at Albany (SUNY Albany)

Albany, NY

B.S. IN COMPUTER SCIENCE AND MATHEMATICS

Aug. 2018 - May. 2021

- Double Major in Computer Science and Mathematics
- Undergraduate Researcher in the Data Mining and Management (DMM) Lab
- Graduated *summa cum laude* (3.89 GPA)

## Research Employment

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### International Business Machines (IBM)

Yorktown Heights, NY

RENSSELAER-IBM AIRC RESEARCH INTERN

May. 2023 - August. 2023

- Working under Kavitha Srinivas and the IBM AI Planning Group.
- Enabling **Large Language Models** to be used as **PDDL** planning domain generators using **Huggingface** and **Python**.

### Rensselaer AI and Reasoning Laboratory

Troy, NY

GRADUATE RESEARCH ASSISTANT

May. 2022 - September. 2022

- Funded by ONR Grant #N00014-22-1-2201 "Meta-Cognitively Perceptive Artificial Teammates" with Advisor/PI: Selmer Bringsjord (RPI).
- Integration of **automated reasoners** with the ARCADIA Cognitive Architecture
- Development of reasoning demos with robots and **Minigrid OpenAI Gym environment**

## The Research Foundation for SUNY

Albany, NY

### RESEARCH AIDE

Jan. 2021 - Aug.2021, Jan. 2022

- Funded By NSF Grant #2025793: "Generative Machine Learning for Nanomaterial Design" with advisors/PIs: Petko Bogdanov (SUNY Albany), Stacy Copp (UC Irvine)
- Developed novel attribute-regularized variational autoencoder (ARVAE) models for intelligent design of Ag-DNA nanoparticles
- Implemented **generative AI** models in **Tensorflow** and **Pytorch** using custom LSTMs
- Designed robust visualization tools using **WebGL** and **Matplot** Lib

## Teaching Experience

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### RPI Graduate Teaching Assistant

Aug 2021 - Present

- Data Structures (Spring 2023)
- Computer Science I (Fall 2022)
- Data Structures (Spring 2022)
- Programming Languages (Fall 2021)
- Intermediate Formal Logic and AI (Fall 2023)

### RPI Guest Lecturer

Aug 2023 - Present

- Intermediate Formal Logic and AI (Fall 2023)

## Professional Service / Reviewing

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**PC Member** AGI (2023)

**Subreviewer** IJCAI (2021), DSAA (2021)

## Publications

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### Key:

*Forthcoming* - accepted for publication but not published yet.

textitUnder review - submitted but not yet accepted for publication.

### CONFERENCE PAPERS

1. **James Oswald**, Kavitha Srinivas, Harsha Kokel, Junkyu Lee, Michael Katz, Shirin Sohrabi. "Large Language Models as Planning Domain Generators (Student Abstract)", Proceedings of the AAAI Conference on Artificial Intelligence, 2024. (Forthcoming)
2. Michael Giancola, **James Oswald**. "Non-Profit-Driven Development Paths for Equitable AI/AGI", International Conference Series on Robot Ethics and Standards (ICRES), 2023. (Forthcoming)
3. Selmer Bringsjord, John Slowik, NS Govindarajulu, Michael Giancola, **James Oswald**, Rikhiya Ghosh, "Affect-based Planning for a Meta-Cognitive Robot Sculptor: First Steps", Affective Computing and Intelligent Interaction Conference (ACII), 2023.
4. Selmer Bringsjord, **James Oswald**, Michael Giancola, Brandon Rozek, NS Govindarajulu. "The M Cognitive Meta-Architecture as Touchstone for Standard Modeling of AGI-Level Minds", Artificial General Intelligence (AGI), 2023.
5. Selmer Bringsjord, NS Govindarajulu, John Slowik, **James Oswald**, Michael Giancola, John Angel, Shreya Banerjee, Aiden Flaherty. "PERI.2 Goes to PreSchool and Beyond, in Search of AGI", Artificial General Intelligence (AGI), 2022

6. **James Oswald**. "Market Prediction as a Task for AGI Agents", Artificial General Intelligence (AGI), 2022
7. Fariha Moomtaheen, Matthew Killeen, **James Oswald**, Anna González-Rosell, Peter Mastracco, Alexander Gorovits, Stacy M Copp, Petko Bogdanov. "DNA-Stabilized Silver Nanocluster Design via Regularized Variational Autoencoders", ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2022

## JOURNAL ARTICLES

1. Selmer Bringsjord, Michael Giancola, NS Govindarajulu, **James Oswald**, John Slowik, Paul Bello, Micah Clark. "Argument-Based Inductive Logics, With Coverage of Compromised Perception" (Forthcoming)

## BOOK CHAPTERS

1. Selmer Bringsjord, NS Govindarajulu, **James Oswald**. "Universal Cognitive Intelligence, from Cognitive Consciousness, and Lambda". Computational Approaches to Conscious Artificial Intelligence, 2023.

## WORKSHOPS<sup>1</sup>

1. **James Oswald**, Brandon Rozek. "Parallel Verification of Natural Deduction Proof Graphs" Logical Frameworks and Meta-Languages: Theory and Practice (LMFTP). 2023 (Forthcoming)

## Awards

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<b>RPI Departmental Letter of Recognition from Boleslaw K. Szymanski</b>	Jan 2023
For the project <i>An Analysis of Motifs in Multilayer Brain Networks Across Sex and Age</i>	
<b>SUNY Albany Presidential Award for Undergraduate Research</b>	Jun. 2021
<b>SUNY Albany Dean's List</b>	Spring. 2019 - Spring. 2021
<b>SUNY Albany Presidential Scholarship</b>	Aug. 2018 - May. 2021

## Professional Memberships & Societies

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<b>Association for the Advancement of Artificial Intelligence (AAAI)</b>	July. 2023 - Present
• Student Member (July. 2023 - Present)	
<b>Association for Computing Machinery (ACM)</b>	July. 2023 - Present
• Student Member (July. 2023 - Present)	
<b>Institute of Electrical and Electronics Engineers (IEEE)</b>	Jan. 2019 - Present
• Graduate Student Member (Jan. 2022 - Present)	
• Undergraduate Student Member (Jan. 2019 - Jan. 2022)	
<b>IEEE Computer Society</b>	Jan. 2019 - Present
• Graduate Student Member (Jan. 2022 - Present)	

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<sup>1</sup>This only includes workshops with published proceedings

## University Involvement & Honor Societies

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### **RPI Computer Science Honors Society - Upsilon Pi Epsilon**

Nov. 2022 - Present

- Full Member (Nov. 2022 - Present)
- Website Committee Member (Oct. 2023 - Present)
- Programming Competition Committee Member (Oct. 2023 - Present)

### **NY Capital Region Logic Reading Group**

May 2022 - Present

- Co-Founder and Organizer

### **SUNY Albany IEEE Student Chapter**

Oct. 2018 - Present

- Secretary of the Board of Trustees (May. 2023 - Present)
- Alumni Advisor (Jun. 2021 - May. 2023)
- Chair (May. 2020 - Jun. 2021)
- Junior Chair (Feb. 2020 - May. 2020)
- Member (Oct.2018 - Feb. 2020)

### **SUNY Albany KDD Cup (Machine Learning Competition) Team**

May 2021

- Team Captain (Apr. May 2021)

### **SUNY Albany Presidential Honors Society**

Jan 2019 - May 2021

- Full Member (Jan 2019 - May 2021)