

# James Oswald

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## Research Interests

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**Artificial Intelligence** Automated Reasoning, Cognitive Architectures, Machine Intelligence Measures  
**Machine Learning** Generative Models, Reinforcement Learning  
**Logic** Modal Logics, Higher Order Logics

## Selected Skills

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**Programming Languages** Python, Typescript, Java, C++, C, Lean4  
**ML and NLP Platforms** Tensorflow, PyTorch, Hugging Face, IBM-genai  
**Relevant Libraries** Numpy, Matplotlib, scikit-learn  
**Devops** Git, Github, Python Packaging, NPM Packaging, Dependabot

## Education

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### Rensselaer Polytechnic Institute

Troy, NY

PHD IN COMPUTER SCIENCE (PURSUING)

Aug. 2021 - PRESENT

- Concentration in Artificial Intelligence
- Sub-concentrations 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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### Research Intern (SEP Student)

Washington, DC

UNITED STATES NAVAL RESEARCH LABORATORY

May. 2023 - Aug. 2023

- Working under Paul Bello in the Integrated Cognitive Systems Section at the Navy Center For Applied Research In Artificial Intelligence.

### International Business Machines (IBM)

Yorktown Heights, NY

RENSSELAER-IBM AIRC RESEARCH INTERN

May. 2023 - Aug. 2023

- Working under Kavitha Srinivas and the IBM AI Planning Research Group.
- Enabling **Large Language Models** to be used as **PDDL** planning domain generators using **Huggingface** and **Python**.
- Published results at flagship conferences: **ICAPS** (Main Track) and **AAAI** (Student Abstract Track).

## Rensselaer AI and Reasoning Laboratory

Troy, NY

### GRADUATE RESEARCH ASSISTANT

May - Sep. 2022, Jun. - Aug. 2024

- Funded by ONR Grant #N00014-22-1-2201 "Meta-Cognitively Perceptive Artificial Teammates"
- 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"
- 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
- Published results at flagship conference, **KDD**.

## Teaching Experience

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### RPI Graduate Teaching Assistant

Aug 2021 - Present

- Introduction to Logic Based AI (Fall 2024)
- Introduction to Formal Logic and AI (Spring 2024)
- Intermediate Formal Logic and AI (Fall 2023)
- Data Structures (Spring 2023)
- Computer Science I (Fall 2022)
- Data Structures (Spring 2022)
- Programming Languages (Fall 2021)

### SUNY Albany Capstone Project Sponsor

Fall 2022 - Present

I propose and manage capstone projects for the final course in the UAlbany undergraduate computer science curriculum (ICSI 499).

- A Cross-platform App for the Evaluation of Geospatial Reasoning Ability (Fall 2024)
- A Web Application for Modeling Peirce's Alpha Existential Graph System (Fall 2023)
- A 3D Virtual Reality Interface for Graphical Interactive Theorem Proving (Fall 2023)
- A Test Suite for the Evaluation of The NARS Cognitive Architecture on 3D Reasoning (Fall 2022)

### RPI Center for Open Source (RCOS) Project Sponsor

Fall 2024 - Present

I propose and manage RCOS projects for RPI undergraduate students.

- An Application Modeling Peirce's Gamma Existential Graph System (Fall 2024)

## Professional Service / Reviewing

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**PC Member** AGI (2023, 2024)

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

## Selected Publications

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### Key:

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

*Under review* - submitted but not yet accepted for publication.

### COMPETITIVELY REFEREED CONFERENCE AND WORKSHOP PAPERS

1. **James Oswald**, Thomas Ferguson, Selmer Bringsjord. "A Universal Intelligence Measure for Arithmetical Uncomputable Environments". Artificial General Intelligence (AGI), 2024.
2. **James Oswald**, Kavitha Srinivas, Harsha Kokel, Junkyu Lee, Michael Katz, Shirin Sohrabi. "Large Language Models as Planning Domain Generators". International Conference on Automated Planning and Scheduling (ICAPS), 2024.
3. **James Oswald**, Brandon Rozek. "Parallel Verification of Natural Deduction Proof Graphs". Logical Frameworks and Meta-Languages: Theory and Practice (LMFTP), 2023.
4. 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.
5. 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.
6. 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
7. **James Oswald**. "Market Prediction as a Task for AGI Agents", Artificial General Intelligence (AGI), 2022
8. 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. **James Oswald**, Brandon Rozek, Thomas M. Ferguson. "Modeling C0 Family Logics for Artificial Intelligence: Doxastic-Temporal Logics for Reasoning About Goals". Künstliche Intelligenz, 2024.
2. Selmer Bringsjord, Michael Giancola, NS Govindarajulu, **James Oswald**, John Slowik, Paul Bello, Micah Clark. "Argument-Based Inductive Logics, With Coverage of Compromised Perception". Frontiers in Artificial Intelligence, 2023.

### BOOK CHAPTERS

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

## Selected Awards

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### Springer Prize for Best Paper at AGI24

Aug 2024

For the paper: *A Universal Intelligence Measure for Arithmetical Uncomputable Environments*

### RPI Departmental Letter of Recognition from Boleslaw K. Szymanski

Jan 2023

For the project: *An Analysis of Motifs in Multilayer Brain Networks Across Sex and Age*

### SUNY Albany Presidential Award for Undergraduate Research

Jun. 2021

For the project: *Intelligent Nanomaterial Design using Variational Autoencoders*

### SUNY Albany Presidential Scholarship

Aug. 2018 - May. 2021

## Professional Memberships & Societies

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### Association for the Advancement of Artificial Intelligence (AAAI)

July. 2023 - Present

- Student Member (July. 2023 - Present)

### Association for Computing Machinery (ACM)

July. 2023 - Present

- Student Member (July. 2023 - Present)

### Artificial General Intelligence Society (AGI Society)

August. 2022 - Present

- Senior Member (Aug. 2022 - Present)

### Institute of Electrical and Electronics Engineers (IEEE)

Jan. 2019 - Present

- Graduate Student Member (Jan. 2022 - Present)
- Undergraduate Student Member (Jan. 2019 - Jan. 2022)

### IEEE Computer Society

Jan. 2022 - Present

- Graduate Student Member (Jan. 2022 - Present)

## 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)