James Oswald

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Research Interests

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

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

Education

Rensselaer Polytechnic Institute
Troy, NY

PHD IN COMPUTER SCIENCE (PURSUING)   *Aug. 2021 - PRESENT*

- Concentration in Artificial Intelligence
- Breadth 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

International Business Machines (IBM)
Yorktown Heights, NY

AIRC EXTERN   *May. 2023 - August. 2023*

- Working under Kavitha Sriniva 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

RPI Graduate Teaching Assistant
Aug 2021 - Present

- Data Structures (Spring 2023)
- Computer Science I (Fall 2022)
- Data Structures (Spring 2022)
- Programming Languages (Fall 2021)

Professional Service / Reviewing

PC Member   AGI (2023)
Subreviewer   IJCAI (2021), DSAA (2021)

Publications

Key:

Forthcoming - accepted for publication but not published yet.

Under review - submitted but not yet accepted for publication.

CONFERENCE PAPERS

1. 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. (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, **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.

4. 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

5. **James Oswald**. "Market Prediction as a Task for AGI Agents", Artificial General Intelligence (AGI), 2022

6. Fariha Moomtaheen, Matthew Killeen, **James Oswald**, Anna Gonzàlez-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" (Under Review)

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[1]

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

Awards

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
SUNY Albany Dean's List   Spring. 2019 - Spring. 2021
SUNY Albany Presidential Scholarship   Aug. 2018 - May. 2021

Professional Memberships & Societies

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)

Institute of Electrical and Electronics Engineers (IEEE)   Jan. 2019 - Present
- Graduate Student Member (Jan. 2022 - Present)
- Undergraduate Student Member (Jan. 2019 - Jan. 2022)

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[1]This only includes workshops with published proceedings

University Involvement & Honor Societies

RPI Computer Science Honors Society - Upsilon Pi Epsilon   Nov. 2022 - Present
- Full Member (Nov. 2022 - Present)

NY Capital Region Logic Reading Group   May 2022 - Present
- Co-Founder and Organizer

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)

SUNY Albany IEEE Student Chapter   Oct. 2018 - Present
- Secretary of the Board of Trustees (May. 2023 - Present)
- Trustee (May. 2023 - Present)
- Alumni Mentor (Jun. 2021 - May. 2023)
- Chair (May. 2020 - Jun. 2021)
- Junior Chair (Feb. 2020 - May. 2020)
- Member (Oct.2018 - Feb. 2020)