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Andrew LeClair

Ontologist / AI Researcher

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I am a self-driven AI Researcher (Ph.D.) specializing in Knowledge Representation and Reasoning. My work focuses on building large-scale ontologies and knowledge graphs to create truthful, robust, and verifiable AI systems. My goal is to apply my deep expertise in formal knowledge structures to solve the critical challenges of accuracy and reliability in next-generation AI. My notable achievements are:

- Architected a predictive ontology system that drove multi-million Euro annual savings in a manufacturing environment.
- Served as lead inventor on two novel ontology-based systems, resulting in one internationally filed patent application and a second application currently in preparation.
- Led the full lifecycle of AI projects, from client discovery and requirements gathering to the deployment of machine learning models with over 85% F1 score in production.

Skills

Languages	Python, Java, SQL, SPARQL, R
Libraries & Frameworks	PyTorch, Scikit-learn, NumPy, Pandas, LangChain, LlamaIndex, Flask
Knowledge Representation	Ontology Engineering, Knowledge Graphs, OWL, RDF(S), SWRL, Semantic Search
Databases & Tools	Mongo DB, Apache Druid, Vector Databases (FAISS), Protégé, Git

Technical Experience

Ontologist & Knowledge Architect **OCT 2022 — Present**
GENAIZ *Montréal, Canada (Remote)*

- Served as lead inventor for the "System and Method for Ontology-based Generation of Semantically Validated Workflows," a novel technology for which a patent application is currently in preparation.
- Designed and standardized a scalable client-discovery framework to translate complex scientific needs into precise AI functional requirements; now used as the standard process to train other teams.
- Accelerated 6+ distinct clinical research pipelines (including OLink, MesoScale, and Flow Cytometry) by leading the development of a suite of AI tools to automate metadata conformity checking, computational analysis, and experiment review.
- Architected the core ontology for an in-house state-space search algorithm, enabling the automated discovery and generation of complex AI Workflows in a marketplace environment.
- Developed and deployed a machine learning model for title-detection of pharmaceutical and clinical documents, achieving over 85% F1 score in production.

Postdoctoral Researcher (Knowledge Representation and Reasoning) **SEPT 2021 — OCT 2022**
Robert Bosch Inc. *Sunnyvale, California (Remote)*

- Drove significant, multi-million Euro annual savings by developing a predictive tool that identified patterns between time-series anomalies and costly interruptions across multiple manufacturing lines.
- Developed the core ontology for the predictive tool, enabling it to reason about incoming data to predict the type and likelihood of a future production interruption.
- Improved performance of line workers by developing a domain-specific, ontology-based virtual assistant that could answer queries, generated from internal documents and enriched with external WikiData.
- Hired and mentored an intern over the summer to work on existing projects, leading to a co-authored submission for a top-rated AI conference.

Education

Doctor of Philosophy (Ph.D.) **FEB 2016 — AUG 2021**
McMaster University *Hamilton, Canada*

- Thesis: *A Formal Approach to Ontology Modularization and to the Assessment of its Related Knowledge Transformation*
- Formalized ontology modularization techniques with different algebras and theories (Boolean, lattice, set) to define what knowledge is lost due to the modularization process.
- Formalized different types of knowledge in an ontological system, and presented different use cases for modularizing based on the need for retaining specific knowledge or the coarsening/refining of specific knowledge.

Master of Applied Science (M. A. Sc.) **MAY 2014 — FEB 2016**
McMaster University *Hamilton, Canada*

- Thesis: *Conto: A Prototype Tool for the Generation and Utilization of a Configured Ontology*
- Developed a Java plugin that interfaced with Protégé, allowing for the incorporation of collections into the OWL structure, allowing for the extraction of previously indeterminable facts.

Bachelor of Engineering (B. Eng.) **SEPT 2010 — MAY 2014**
McMaster University *Hamilton, Canada*

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Patents & Publications

- **A. LeClair**, et al. "System and Techniques for Event Prediction from Observed Event Sequences." U.S. Patent Application No. US 20250068967 A1. Published August 25, 2023 (with corresponding international filings in Germany [DE] and China [CN]).
- **A. LeClair**, R. Khedri. "An Algebraic Approach to Ontology Modularization and Knowledge Refinement," in *Journal of Applied Non-Classical Logics*. Taylor and Francis, 2025. (Submitted)
- **A. LeClair**, J. Jaskolka, W. MacCaull, R. Khedri. "Architecture for Ontology-supported Multi-context Reasoning Systems," in *Data and Knowledge Engineering*. Elsevier, 2022.
- **A. LeClair**, A. Marinache, H. El Ghalayini, W. Maccaull and R. Khedri, "A Review on Ontology Modularization Techniques - A Multi-Dimensional Perspective" in *IEEE Transactions on Knowledge & Data Engineering*, 2022.
- **A. LeClair**, A. Marinache, R. Khedri, "Formalizing Graphical Modularization Approaches for Ontologies and the Knowledge Loss," in *Knowledge Discovery, Knowledge Engineering and Knowledge Management*, volume 1297 of *Communications in Computer and Information Science series*, pages 1-25. Springer, 2021. (Invited)
- **A. LeClair**, A. Marinache, R. Khedri, "Toward Measuring Knowledge Loss due to View Traversal," in *Proceedings of the 11th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management - Volume 2: KEOD*. INSTICC, SciTePress, 2019.
- **A. LeClair**, R. Khedri, "Conto: A protege plugin for configuring ontologies," in *The 7th International Conference on Ambient Systems, Networks and Technologies*. 2016.

Projects

AOMR Prototype
A prototype tool that demonstrates an implementation of the architecture outlined in the paper “An Architecture for Ontology-supported Multi-context Reasoning Systems". Written in Java and interfaces with local relational databases via SQL queries. An automated translation algorithm was developed that produces an OWL ontology that is submitted to OWL reasoners (e.g., Hermit). https://github.com/aLeClair/pac-prototype-paper

Conto
A Java plugin for Protégé. It utilizes the OWL representation and allows for relating one concept to another as a collection object (set, bag, or list). The relationship is utilized in a reasoning process to infer new facts about the domain.