

Frank Hodges

PhD Student — Drug Discovery and Biomedical Knowledge Graphs

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Education

- 2024–Present **Ph.D. in Artificial Intelligence**, Oregon State University, Corvallis, OR, 3.79
- Advisor: Dr. Stephen Ramsey — Expected Fall 2028
 - Concurrent M.S. in Computer Science — Expected Fall 2026
- 2023–2024 **B.S. in Computer Science**, Oregon State University, Corvallis, OR, 3.81
- 2017–2020 **B.A. in Biology**, The Ohio State University, Columbus, OH, 3.12

Relevant Experience

- 2024–Present **Graduate Research Assistant — Ramsey Lab**, Oregon State University, Corvallis, OR
- Conduct research in biomedical AI focused on drug repurposing for rare diseases using large-scale biomedical knowledge graphs and machine learning.
 - Develop **Deep RareTarget**, a Gated Relational Graph Neural Network (G-RGNN) framework identifying molecular mediators across **38M edges and 6M nodes** for drug repurposing.
 - Work within the NIH NCATS **Translator ecosystem**, integrating biomedical knowledge graphs derived from RTX-KG2 to model complex biological representation learning across multi-omic data scales.
 - Design scalable pipelines for ingestion, processing, and representation learning over biomedical literature and structured databases.
 - Design **multimodal** retrieval and reasoning components linking structural KG embeddings with unstructured clinical literature (RAG) to identify candidate therapeutics.
- 2025–Present **Technical Advisor**, Latent Knowledge, Melbourne, VIC (Remote)
- Provide strategic guidance on the development and scaling of proprietary biomedical knowledge graphs for citation exploration.
 - Consult on graph-based machine learning architectures and multi-modal data integration strategies.
- 2023–2024 **Project Assistant — Ramsey Lab**, Oregon State University, Corvallis, OR
- Engineered large-scale document processing pipelines to ingest and normalize data from over **250,000 biomedical papers** for AI-driven hypothesis generation.
 - Contributed to the development of benchmarking protocols for graph retrieval systems, optimizing performance for large-scale KG reasoning.
 - Collaborated with graduate researchers to benchmark models, identify workflow bottlenecks, and improve experimental reproducibility.

Research Projects

- Deep RareTarget Graph-based machine learning framework for rare disease drug repurposing that identifies intermediate molecular mediators linking genes, pathways, phenotypes, and therapeutics within large biomedical knowledge graphs.
- RTX-KG2 / PloverDB Development and maintenance of RTX-KG2 within the NIH NCATS Translator ecosystem, including knowledge ingestion pipelines, graph services, and reasoning infrastructure enabling large-scale biomedical queries.
- Translator Ecosystem Infrastructure and tooling for automated reasoning across federated biomedical knowledge graphs enabling discovery of gene–disease–drug relationships for translational medicine.

Radiant AI clinical decision support prototype for rare diseases using retrieval-augmented generation over biomedical literature and knowledge graphs with scalable ingestion and retrieval pipelines.

Query Graph Extraction Natural language-to-query-graph translation system converting biomedical questions into structured graph queries using SciSpacy and ontology alignment across MeSH and UMLS.

Technical Skills

Programming Python (Expert), C++, Bash/Zsh, LaTeX

Machine Learning PyTorch, Scikit-learn, GNNs (RGCN, GAT), RAG, Representation Learning

Knowledge Graphs In-memory Graph Databases, Link Prediction, Node Embeddings, Cypher

Informatics Systems Biomedical NLP, Ontology Alignment (UMLS, MeSH, Mondo, HP), Drug Repurposing
Linux (Advanced), HPC Workflows, Slurm, Docker, Git, CI/CD (GitHub Actions)

Other Experience

2014–2020 **Ohio Army National Guard — Health Care Specialist / Combat Medic**

2020–2021 **Cleveland Clinic — Medical Assistant**

2021–2023 **FEMA — Contract EMT**

Leadership, Service, and Teaching

2025–Present **President — AI Graduate Student Association (AIGSA)**

- Organize technical workshops, speaker events, and initiatives supporting graduate research in artificial intelligence.

2025–Present **Graduate Council Member — Faculty Senate**

- Review graduate program proposals and contribute to university-level academic policy decisions.

2024–2025 **Union Steward — Coalition of Graduate Employees (CGE)**

- Represent graduate employees in workplace matters and facilitate communication between union leadership and department members.

2023–2024 **Teaching Assistant — Data Structures & Computer Architecture / Assembly Language**

- Supported instruction through office hours, discussion sessions, and grading for courses covering algorithms, memory systems, and low-level programming.

Publications & Presentations

F.M. Hodges, et al., "Using AI to Improve Diagnosis and Treatment of Rare Diseases: A Chat Agent for Equitable and Accessible Healthcare," *Artificial Intelligence in Medicine (AIME)*, LNCS vol. 15735, Springer, 2025. doi:10.1007/978-3-031-95841-0_35

F.M. Hodges, et al., White Paper on Radiant, Oregon State University, 2025. radiant.rtx.ai/whitepaper

Presentation *Radiant: An Agentic RAG System for Rare Diseases*. Artificial Intelligence in Medicine Conference (AIME), Pavia, Italy, 2025.

Demo *Radiant*. Stanford Med & Research to the People Rare Disease Hackathon, San Francisco, California, 2024.