

# BENJAMIN KANE

✉ [bkane2@ur.rochester.edu](mailto:bkane2@ur.rochester.edu)  [linkedin.com/in/bkane2](https://www.linkedin.com/in/bkane2)  [github.com/bkane2](https://github.com/bkane2)  <https://cs.rochester.edu/u/bkane2/>

## Experience

---

### University of Rochester

Rochester, NY

Graduate Research Assistant

June 2019 – Present

- **Eta Dialogue Manager:** created a dialogue management architecture for development of conversational agents (Python). Utilized a hybrid of symbolic techniques (event schemas, logical forms, tree transduction) and neural techniques (fine-tuned transformer models, LLMs, RAG) for understanding, reasoning, planning, and generation. Resulted in first-author publications in venues such as EMNLP and IEEE Transactions on Affective Computing. Additionally deployed architecture to the web for crowdsourcing conversational data using Heroku, Node.js, and PostgreSQL.
- **SOPHIE Conversational Agent:** worked with interdisciplinary team to create a multimodal virtual human capable of acting as a cancer patient in simulated patient-physician conversations. Mentored undergraduate student in developing the dialogue flow and NLU pipeline. Deployed agent in pilot study with UR Medical Center (URMC) aimed at helping medical students practice end-of-life communication scenarios.
- **Blocks World QA/Tutoring Agent:** created a conversational agent capable of spatial/temporal QA and collaborative structure-building in a physically situated blocks world setting. Designed a semantic parser capable of processing user inputs into structured logical forms, as well as integration with a spatial reasoner, planner, and episodic memory.
- **MegaIntensionality Project:** developed and trained machine learning models to generate inferences pertaining to a speaker's belief, desire, and intention states given natural language sentences. Crowdsourced a lexicon-scale natural language inference (NLI) dataset and performed analysis using a mixed-effects neural NLI model (PyTorch) as well as a Bayesian mixed-effects mixture model (Pyro/Pytorch).

### Openstream.AI

Somerset, NJ (Remote)

Summer Research Intern

May 2022 – September 2022

- Developed an approach for automatically generating hierarchical planning models from a domain ontology (OWL) and business process model (BPMN) using graph decomposition algorithms, allowing domain experts to specify dialogue plans for task-oriented chatbots in a “low-code or no-code” environment.
- Conducted extensive literature review on hierarchical planning and Belief-Desire-Intention (BDI) dialogue systems, and proposed a method for enriching a BDI dialogue system with domain-specific hierarchical planning capabilities.

### Army Research Lab

Adelphi, MD (Remote)

Summer Research Intern

May 2021 – August 2021

- Enabled a situated robot to learn novel concepts in unexplored environments through interactive back-and-forth dialogue with a human operator, by extending DIARC cognitive robotic architecture with a decision network model for adaptive question generation.
- Created robot actions and natural language capabilities necessary to support robot learning in novel spacecraft domain.
- Worked with Unity3D to connect cognitive robotic architecture to PR2 robot situated in simulated spacecraft domain.
- Resulted in a publication and physical demonstration at SIGDIAL, as well as a presentation before a panel of ARL researchers from multiple directorates.

## Education

---

### University of Rochester

Rochester, NY

PhD Candidate in Computer Science (Artificial Intelligence), 4.00/4.00 GPA

June 2019 – Present

- **Advisor:** Lenhart Schubert
- **Co-Advisor:** Ehsan Hoque, Aaron Steven White
- **Relevant Coursework:** Deep Learning, Statistical Speech & Language Processing, Formal Semantics, Sampling Algorithms, Machine Vision, Lexical Semantics, Computational Neuroscience
- **Awards:** NSF GRFP Honorable Mention, Donald M. and Janet C. Barnard Fellowship

### University of Rochester

Rochester, NY

BSc (Highest Distinction) in Computer Science, BA (Distinction) in Economics, 3.92/4.00 GPA

Aug 2015 – May 2019

- **Relevant Coursework:** Knowledge Representation & Reasoning in AI, Natural Language Processing, Machine Learning, Data Mining, Web Technologies, Databases, Statistics, Linear Algebra.
- **Education Abroad:** University of Bristol

## Publications & Presentations

---

### Conference

- Kane B.; Schubert L. **We are what we repeatedly do: Inducing and deploying habitual schemas in persona-based responses.** *EMNLP*, December 6-10, 2023, Singapore.
- Haut K.; Wohn C.; Kane B.; Carroll T.; Guigno C.; Kumar V.; Epstein R.; Schubert L.; Hoque E. **Validating a virtual human and automated feedback system for training doctor-patient communication skills.** *Affective Computing and Intelligent Interaction (ACII)*, September 10-13, 2023, Boston, USA.
- Kane B.; Gervits F.; Scheutz M.; Marge M. **A System For Robot Concept Learning Through Situated Dialogue.** *SIGDIAL*, September 7-9, 2022, Edinburgh, UK.
- Platonov G.; Kane B.; Schubert L. K. **Generating Justifications in a Spatial Question-Answering Dialogue System for a Blocks World.** *Reasoning and Interaction (ReInAct 2021)*, October 4-6, 2021, Virtual.
- Kane B.\*; Gantt W.\*; White A. S. **Intensional Gaps: Relating veridicality, factivity, doxasticity, bouleticity, and negraising.** *Semantics and Linguistic Theory (SALT) 31*, May 7-9, 2021, Virtual.
- Gantt W.\*; Kane B.\*; White A. S. **Natural Language Inference with Mixed Effects.** *The 9th Joint Conference on Lexical and Computational Semantics (\*SEM 2020)*, December 12-13, 2020, Virtual.
- Kane B.; Platonov G.; Schubert L. K. **Registering Historical Context for Question Answering in a Blocks World Dialogue System.** *Text, Speech, and Dialogue*, September 8-11, 2020, Virtual.
- Platonov G.; Kane B.; Gindi A.; Schubert L. K. **A Spoken Dialogue System for Spatial Question Answering in a Physical Blocks World.** *SIGDIAL*, July 1-3, 2020, Virtual.
- Razavi S. Z.; Kane B.; Schubert L. K. **Investigating Linguistic and Semantic Features for Turn-Taking Prediction in Open-Domain Human-Computer Conversation.** *Interspeech*, September 15-19, 2019, Graz, Austria.

\* equal contribution

### Journal

- Kane B.; Giugno C.; Schubert L.; Haut K.; Wohn C.; Hoque E. **Managing Emotional Dialogue for a Virtual Cancer Patient: A Schema-Guided Approach** *IEEE Transactions on Affective Computing*, January 2023.
- Rafayet Ali M.; Sen T.; Kane B.; Bose S.; Carroll T. M.; Epstein R.; Schubert L.; Hoque E. **Novel Computational Linguistic Measures, Dialogue System, and the Development of SOPHIE: Standardized Online Patient for Healthcare Interaction Education.** *IEEE Transactions on Affective Computing*, January 2021.

### Workshop

- Kane B. **Schema-Guided Dialogue Management for Virtual Conversational Agents.** *Young Researchers' Roundtable on Spoken Dialog Systems (YRRSDS)*, at the Special Interest Group on Discourse and Dialogue (SIGDIAL), September 5-6, 2022, Edinburgh, UK.
- Kim G. L.; Kane B.; Duong V.; Mendiratta M.; McGuire G.; Sackstein S.; Platonov G.; Schubert L. K. **Generating Discourse Inferences from Unscoped Episodic Logical Formulas.** *1st Int. Workshop on Designing Meaning Representations (DMR)*, at the 57th Annual Meeting of the Association for Computational Linguistics (ACL 2019), Aug 1, 2019, Florence, Italy.
- Razavi S. Z.; Schubert L. K.; Kane B.; Rafayet Ali M.; Van Orden K. A.; Ma T. **Dialogue Design and Management for Multi-Session Casual Conversation with Older Adults.** *Workshop on User-Aware Conversational Agents (User2Agent)*, at the 24th Int. Conf. on Intelligent User Interfaces (ACM IUI 2019), March 17-20, 2019, Los Angeles, USA.

### Other

- Presentation at the Second Workshop on Processing and Evaluating Event Representations (PEER2023). March 31, 2023, Rochester, USA. [Slides]
- Hosted workshop on Probabilistic Programming with Pyro for ROC HCI group. June 29, 2023, Rochester, USA. [Slides] [Code]

## Skills and Technologies

---

**Languages:** Python, Common Lisp, Java, JavaScript, C#, Haskell

**ML/Data Analysis:** PyTorch, Pyro, Jupyter, Numpy, Pandas, Scikit-learn, transformers, Matplotlib, ggplot2

**NLP:** Conversational Agents/Dialogue Architectures, Semantic Parsing, Natural Language Inference (NLI), LLMs (fine-tuning, prompting, RAG, etc.), Ontologies

**Web/Deployment:** Docker, Heroku, Node.js, PostgreSQL, HTML, CSS

**Other:** Git, Amazon Mechanical Turk, LaTeX, Protégé, Unity, Photoshop/Illustrator