

BENJAMIN KANE

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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

Experience

University of Rochester

Rochester, NY

Graduate Research Assistant

June 2019 – Present

- **SOPHIE Conversational Agent:** created a multimodal dialogue system and virtual human capable of acting as a cancer patient in simulated patient-physician conversations, using a hybrid of symbolic and neural NLP/NLG techniques. Deployed in collaborative 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 situated conversational agent capable of collaboratively assisting a user in the construction of structures in a physical blocks world setting, and answering free-form questions about spatial relations between blocks. 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.
- **Belief, Desire, Intention, and Fine-Grained Inference:** investigated the lexical-semantic properties of English verbs that give rise to belief, desire, and intention inferences. Crowdsourced human annotations across a wide range of verbs and modeled inference patterns using mixed-effects natural language inference models created in PyTorch/Pyro.

Undergraduate Research Assistant

May 2017 – May 2019

- Assisted in developing the LISSA Virtual Human, a casual conversational agent intended for social skills coaching.
- Developed a dialogue turn-taking model using a mixture-of-experts classifier trained on prosodic and linguistic data.
- Annotated English corpus with semantic representations based on an episodic logical form; created Lisp algorithms to generate natural logic inferences from the resulting logical forms.

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.
- Presented work to ARL branch as well as panel of ARL researchers from multiple directorates.

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.

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]

Technical Skills

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

Web: Node.js, Heroku, PostgreSQL, HTML, CSS

Data Analysis: PyTorch, Pyro, Matplotlib, Jupyter, Numpy, Pandas, Scikit-learn

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