

Vishwas Mruthyunjaya

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Professional Profile

Experienced researcher specialising in conversational AI and social robotics with a background in computational linguistics, spoken dialogue systems, and human-robot interaction (HRI). With over seven years of experience, I create cutting-edge, intelligent systems for conversational AI platforms and physical robots. I engage in policy and service activities to increase equity, access, and participation of underrepresented groups in AI and Robotics. My expertise lies in utilising dynamic predictive models, language models, and deep learning models with real-life data. I am passionate about the development of ethically responsible intelligent systems that prioritise human-centric AI, incorporating cognitive factors.

Research Interests: Human-Robot Interaction (HRI) | Conversational AI | Language Modelling | Graph Representation Learning | Semantic Understanding

Education

Master's of Science in Robotics Technology (Dual Master's Program)

Carnegie Mellon University

Pittsburgh, PA, US 2014-2016

University of Plymouth

Plymouth, UK 2014-2015

Advisers: [Prof. Emeritus Mel Siegel](#) and [Dr. Guido Bugmann](#)

Areas of Study: Human-Robot Interaction, Machine Learning, Natural Language Processing

Thesis: Facial Expressions Interpretation for Human-Robot Interaction

Selected Projects

- Created search and rescue prototypes with an Intuitive Ground Station for UMV Tele-Control in AR.
- Developed a spoken dialogue word game using speech recognition and NLP.

Bachelor of Engineering in Information Science and Engineering

N.M.A.M. Institute of Technology (Affiliated to VTU)

Nitte, Karnataka, India 2007-2011

Adviser: [Devidas Bhat](#)

Areas of Study: Computer Science, Information Theory, Fundamentals of AI

Thesis: Designed and implemented a biometric ATM system featuring multi-lingual speech support to assist rural communities in India.

Skills

Programming Languages: Python (*primary*), Perl/Bash, C++
Python Data Science Libraries: Keras, TensorFlow, PyTorch, NumPy, Pandas, Sklearn
Natural Language Processing: Statistical, Sequential, and Transformer-based Language Models; NLTK; SpaCy; Rasa; Flair
Development and Deployment: AWS, Docker, Linux, Elasticsearch, Git, Jenkins, VSCode, Kubernetes, MySQL, MongoDB, DBeaver

Research and Industry Experience

Senior Data Scientist-NLP at Megagon Labs, US

Sep 2022 - Present

Research: Conduct NLP research for job applications and postings, implementing innovative techniques, collaborating across teams, and providing actionable insights for process optimisation.

Topics: Language Models, Knowledge Graphs, Graph Representation Learning, Relation Extraction

Language Models as Symbolic Knowledge Graphs:

- Explored language models as knowledge graphs, assessing their capacity to capture and encode semantic entity relationships through experimental research.
- This research aimed to enhance advanced reasoning and bolster information retrieval capabilities in NLP applications.

Skills Extraction from Resumes (POC):

- Developed relation extraction techniques and custom entity libraries.

- Collaborated with cross-functional teams to develop NLP solutions and provided actionable insights for optimising job application processes.

Senior Applied Scientist-Conversational AI at Aisera, US

Apr 2019 - Sep 2022

Research: Designed, researched, and developed software for large-scale natural language processing and conversational AI applications using machine learning and deep learning algorithms.

Topics: Named Entity Recognition, Relation Extraction, Document Clustering, Text Summarisation, Language Models.

Implementations:

- Created NLP pipelines with various models for conversational AI, such as sentiment analysis, intent classification, and question-answering systems.
- Designed custom utterance and dialogue generators for natural language generation.
- Managed the implementation and maintenance of a regression test suite for NLP models.
- Led weekly reading groups to discuss current research papers.

A.I. Engineer at CloudMinds Technology, US

Sep 2016 - Apr 2019

Research: Conversational capabilities on a social robot by conducting NLP research and developing domain-specific ASR models using machine and deep learning techniques.

Topics: Social Robotics, Human-Robot Interaction, Language Models, Automatic Speech Recognition (ASR), Intent Classification, Slot-filling

Implementations:

- Led NLP pipeline development for intent classification, slot-filling, domain classification, question-answering, and dialogue management.
- Designed English ASR models with the Kaldi toolkit and a language model using Reddit data.
- Researched and developed an interaction design framework and spoken dialogue systems for HRI.
- Contributed to four papers at Cloudminds—two at peer-reviewed conferences and two on arXiv.

Research Mentor at Carnegie Mellon University, US

Jun 2016 - Sep 2016

- Mentored summer scholar students in robotics research through the Robotics Institute Summer Scholars (RISS) Program.
- Authored logistics for the RISS journal to streamline the publication process.
- Advised undergraduates in language-centred human-robot interaction and supported them with journal write-up strategies.
- Held weekly office hours to offer additional support and answer questions.

Systems Software Engineer at Infosys, India

Sep 2011 - Jul 2014

Responsibilities: Developed web applications and services within an MVC 3.0 architecture to enhance application performance and generate bug reports.

Award: Received a 'Spot Award' for being the best performer in the peer group.

Publications

In Review

- [1] **Mruthyunjaya, V.**, Pezeshkpour, P., Hruschka, E., and Bhutani, N. "Rethinking Language Models as Symbolic Knowledge Graphs." [arXiv:2308.13676](https://arxiv.org/abs/2308.13676) (submitted)

Peer Reviewed Conference Papers

- [1] **Mruthyunjaya, V.**, Burcin, R., Evans, C., and Dolan, J., "Mind the Gap: Enhancing AI and STEM Accessibility in Rural Pennsylvania." The IAFOR Conference on Education. (Anticipated March 2024)
- [2] Burcin R., **Mruthyunjaya, V.**, and Dolan J. (2023) "Transforming Undergraduate Research Experiences With Experiential Learning." ISSN:2435-1202 - The IAFOR Conference on Educational Research & Innovation: 2023 Official Conference Proceedings <https://doi.org/10.22492/issn.2435-1202.2023.11>
- [3] **Mruthyunjaya, V.** and Jankowski, C., 2019, October. "Human-Augmented Robotic Intelligence (HARI) for Human-Robot Interaction." In Proceedings of the Future Technologies Conference (pp. 204-223). Springer, Cham. https://doi.org/10.1007/978-3-030-32523-7_14
- [4] Lin, R., Costello, C., Jankowski, C. and **Mruthyunjaya, V.**, 2019, "Optimizing Voice Activity Detection for Noisy Conditions." Proc. Interspeech 2019, pp.2030-2034. <https://doi.org/10.21437/Interspeech.2019-1776>

- [5] Fosch-Villaronga, E. and **Kalipalya-Mruthyunjaya, V.** 2016, "Robot Enhancement of Cognitive and Ethical Capabilities of Humans." in J Seibt, M Norskov and SS Andersen (eds), What Social Robots Can and Should Do. Frontiers in Artificial Intelligence and Applications, vol. 290, IOS Press, pp. 223-233, International Research Conference Robophilosophy 2016 / TRANSOR 2016, Aarhus, Denmark, 17/10/16. <https://doi.org/10.3233/978-1-61499-708-5-223>

Preprints

- [1] Jankowski, C., **Mruthyunjaya, V.** and Lin, R., 2020. "Improved Robust ASR for Social Robots in Public Spaces." arXiv preprint [arXiv:2001.04619](https://arxiv.org/abs/2001.04619).
- [2] Costello, C., Lin, R., **Mruthyunjaya, V.**, Bolla, B. and Jankowski, C., 2018. "Multi-Layer Ensembling Techniques for Multilingual Intent Classification." arXiv preprint [arXiv:1806.07914](https://arxiv.org/abs/1806.07914).

Poster Presentations

April 7, 2016, Vishwas Mruthyunjaya, "Facial Expressions Interpretation for Human-Robot Interaction", Innovation with Impact: Cross-Disciplinary Exhibition of Graduate Student Work, Pittsburgh, PA

AI & Robotics for Social Impact

Invited Presentations

November 4, 2023, Burcin, R., **Mruthyunjaya, V.**, and Evans, C., "Learning to Imagine Together: Engaging Undergraduate Researchers in Equity-Centered Rural Tech Initiatives", [Transforming STEM Higher Education Conference](#), AAC&U, Arlington, VA, US

October 13, 2023, Burcin, R., **Mruthyunjaya, V.**, and Abramovic, C., "Promoting Equity and Student Participation in Robotics Graduate Programs: Policy Recommendations", [Smart Safety Connect Seminar Series](#) at Heinz College, Pittsburgh, PA, US

June 14, 2023, **Mruthyunjaya, V.**, "Language Models as Knowledge Graphs", Seminar Series: Robotics Institute Summer Scholars Program, CMU, Pittsburgh, PA, US

June 12, 2023, Burcin, R., Evans, C., and **Mruthyunjaya, V.**, "Leveraging AI Tools for Learning: ChatGPT in the K-12 Classroom", [PA Rural STEM Innovation Summit](#), I4T, Franklin, PA, US

July 11, 2020, **Mruthyunjaya, V.**, "NLP for Conversational AI & Human-Robot Interaction", Faculty Development Programme: Natural Language Processing and Related Technologies, Nitte, India

Volunteer Researcher at Carnegie Mellon University

Jul 2022 - Present

- Collaborative analysis with [Rachel Burcin](#) on data from the Robotics Institute Summer Scholars Program.
- Improving the summer research experience for undergraduate students while assessing its impact on graduate and doctoral program participation.

R&D Infrastructure Design at [Kubuntu Focus](#)

Nov 2019 - Present

- Set up environments to run multiple deep learning frameworks such as PyTorch, MxNet, TensorFlow, and Theano with GPU enabled.
- Automated test suite to confirm the working of the deep learning frameworks to use GPU.
- Used open-source algorithms to run on the machines to benchmark the competitive comparison standings of the system performance.

RoboTutor at [Carnegie Mellon University](#)

Nov 2016 - Feb 2016

- Global XPRIZE's one of five \$1M Finalists
- Multi-disciplinary project that empowered children in Africa to drive their learning.
- Designed user interface, face recognition, and lip-motion tracking.

Services

2024	Reviewer	National Conference on Undergraduate Research
2023	Reviewer	Association for Computational Linguistics
2016	Reviewer	International Multi-Conference on Complexity, Informatics and Cybernetics