

# Siddharth Parekh

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## RESEARCH INTERESTS

- Multi-Agent Systems
- Optimization
- Game Theory
- NLP
- Deep Learning Theory

## EDUCATION

### Carnegie Mellon University

Pittsburgh, PA

B. Sc. in Computer Science, with SCS Concentration in Machine Learning

Expected: May 2025

Relevant Coursework: Machine Learning, Deep Learning, Natural Language Processing, Foundations of Learning, Game Theory and Their Connections, Convex Optimization, Probabilistic Graphical Models, Database Systems

Thesis: Exploring the application of Equilibrium Ranking (Jacob et al., 2024), a game-theoretic language model decoding technique, to multimodal tasks including Visual Question Answering.

- Investigating how this approach, which casts language model decoding as a regularized imperfect-information sequential signaling game (Consensus Game), can improve performance in complex, multi-input scenarios.
- Exploring how this technique can bridge gaps between generative and discriminative querying methods in language models, aiming to enhance the coherence and accuracy of visual question answering systems.

Advisor: Prof. Carolyn Rosé

## RESEARCH EXPERIENCE

### Language Technologies Institute – Document Understanding Group

Pittsburgh, PA

**Research Assistant** (with Prof. Carolyn Rosé and PhD candidate Armineh Nourbakhsh)

Jan 2024 - Present

- Developed a robust evaluation metric, SEDGE, for document visual question answering datasets like DocVQA, DUDE, InfographicVQA, MultiPage-DocVQA that focuses on multimodal grounding of answers in the source document.
- Contributed to a graph-based generative model for Form Processing, achieving performance comparable to state-of-the-art models (LayoutLMV3, GeoLayoutLM) in Key-Information and Relation Extraction with 30% fewer parameters.

### Language Technologies Institute

Pittsburgh, PA

**Summer Research Intern** (with Prof. Carolyn Rosé)

June 2023 – Aug 2023

- Led research on numeracy and multi-turn conversations in Large Language Models (LLMs) under Professor Carolyn Rose, focusing on financial document parsing and question answering tasks using datasets like FinQA, TAT-QA, and PACIFIC.
- Improved baseline models' accuracy by 3-5% through integration of code-generation LLMs (T5, CodeT5), enhancing their ability to process numerical data in complex financial contexts.

## ACADEMIC HONORS

- Dean's List with High Honors: Fall 2021, Fall 2022, Spring 2023

## TEACHING

### Teaching Assistant

11-411/611 Natural Language Processing (S23)

- Served as the sole undergraduate teaching assistant for CMU's premier NLP course led by Prof. David Mortensen and Prof. Lori Levin.
- Managed a diverse cohort of undergraduate and graduate students, providing instruction, resolving queries, and mentoring teams throughout a semester-long project focused on question answering and question generation.

## INDUSTRY

### MikoAI

Mumbai, India

### AI Intern - NLP

June 2022 – Aug 2022

Streamlined the multilingual personality module of the Miko robot, enhancing its language processing capabilities:

- Benchmarked Helsinki-NLP machine translation models and Google Cloud Translate API using cosine similarity of SIEBERT-generated sentence embeddings, optimizing cost-efficiency without compromising performance.
- Developed a classification system for multilingual question answering using feed-forward neural networks, achieving linear speedup over traditional vector search methods.

## EXTRACURRICULARS

### Tartan Student Fund

Pittsburgh, PA

### Associate Portfolio Manager

Aug 2022 – Dec 2023

Developed an automated system for providing analysts with updated news and statistics on equities to assist TSF, CMU's student managed long-equity investment fund with approximately \$100k in management, with weekly coverage of our holdings.

## PUBLICATIONS **Conference Papers**

1. Armineh Nourbakhsh, Zhao Jin, **Siddharth Parekh**, Sameena Shah, and Carolyn Rose. 2024. [AliGATr: Graph-based layout generation for form understanding](#). In *Findings of the Association for Computational Linguistics: EMNLP 2024*, pages 13309–13328, Miami, Florida, USA. Association for Computational Linguistics.

### Under Review

1. Armineh Nourbakhsh, **Siddharth Parekh**, Pranav Shetty, Zhao Jin, Sameena Shah, Carolyn Rose. 2024. Where is this coming from? Making groundedness count in the evaluation of Document VQA models. *Under Review*.