# Atrey Desai

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## Research Interests

I am an undergraduate student in computer science and linguistics at the University of Maryland, College Park, advised by Professor Rachel Rudinger. My research interests center around developing **novel evaluation methods** that probe deeper linguistic understanding, leveraging insights from theoretical linguistics (especially semantics and pragmatics) to design more **robust** and **trustworthy** models, and enhancing the **explainability** of LLMs in reasoning tasks. I am grateful to be supported by the UMD Presidential and NMSC Merit scholarships.

## Education

**University of Maryland, College Park** — College Park, Maryland
*B.S. in Computer Science, Honors Program* — *Exp. Graduation: May 2027*

- **Selected Coursework**: Data Structures, Algorithms*, Computer Systems, Data Science*, Natural Language Processing*, Machine Learning*, Discrete Math, Linear Algebra

**University of Maryland, College Park** — College Park, Maryland
*B.A. in Linguistics, Minor in Korean Studies* — *Exp. Graduation: May 2026*

- **Selected Coursework**: Syntax, Phonetics, Psycholinguistics*

## Publications

Chace Hayhurst, Hyojae Park, **Atrey Desai**, ..., and Michael Littman (2022). *Reinforcement Learning As End-User Trigger-Action Programming.* Interactive Machine Learning Workshop at AAAI, Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM).

**Atrey Desai**, et al. (In progress). *A Comprehensive Survey on Computational Animal Language Processing.*

## Research Experience

**University of Maryland, College Park** — May 2024 — Present
*Undergraduate Researcher | CLIP Lab (advised by Prof. Rachel Rudinger)* — *College Park, MD*

- Working on improving LLM reasoning consistency in MCQA processes, focusing on analyzing partial input success and exploring various conditional generation strategies to enhance model reliability for complex language tasks.

**The University of Texas at Arlington** — Feb. 2024 — Present
*Visiting Researcher | ACL2 Lab & National Science Foundation (advised by Prof. Kenny Zhou)* — *Arlington, TX*

- Developed AniVoice-cat, a dataset of 26,000+ annotated cat vocalizations from 250+ hours of video, identifying 57 unique cat phones and expanding resources for lexical semantics and AI research in animal behavior.
- Improved vocalization transcription accuracy to 96% by implementing PANNs and HuBERT models, achieving 65% precision in cat vocalization detection and 93.89% top-5 accuracy in action recognition.

**University of Maryland, College Park** — Dec. 2023 — Aug. 2024
*Researcher | FIRE Sustainability Analytics Lab (Advised by Prof. Thanicha Ruangmas)* — *College Park, MD*

- Streamlined environmental impact assessment of U.S. emissions regulations by developing a Python-based data processing pipeline, enabling more efficient policy analysis.
- Drafted framework to inform evidence-based policymaking on climate restoration strategies.

**Brown University** — Dec. 2020 — June 2023
*Researcher | Reinforcement Learning at Brown Group (advised by Prof. Michael Littman)* — *Providence, RI*

- Created new applications of reinforcement learning to 2D non-sequential tasks, simulating real-world scenarios.
- Presented research findings at AAAI-22 IMLW and RLDM-22, demonstrating how human-readable interfaces enable fine-grained control during inference and improving AI-human interaction in robotics.

## Personal Projects

- **Yelp-Help**: Developed an NLP-based classifier achieving 98.7% accuracy in vectorizing Yelp reviews, enabling precise emotional response analysis and improving customer insight extraction.
- **Archimal**: Created a high-speed CNN model achieving 95% accuracy in animal image classification, streamlining content organization and retrieval for zoological databases.
- **Trek**: Conducted statistical analysis using web crawlers and public APIs, revealing a significant positive age-performance correlation in British first-division soccer, providing actionable insights for player recruitment.

## Selected Honors and Grants

**Omicron Delta Kappa Top 10 Freshman** 2024
**CMSC & ARHU Dean's List** Fall 2023, Spring 2024
**UMD President's Scholar** (Top 1%) 2023—2027
**NMSC National Merit Scholarship** 2023—2027
**Catherine Yang Scholarship** 2023
**FIRST Robotics World Championship** (Top 30) 2023

## Students Mentored

**Tanya Grover**, (B.S. UMD), 2024—Present
**Nakshatra Hiray**, (B.S. UMD), 2024—Present
**Savya Miriyala**, (B.S. UMD), 2024—Present
**Jessica Ononye**, (B.S. UMD), 2024—Present

## Professional Service

**Computer Science Ambassador (Department)** 2024—Present
*Hosted official department guests, met with prospective applicants, and planned community outreach events*

**NSF REU Internal Seminar Panelist** Nov. 2024
*Organized by UMD Office of Undergraduate Research; presented findings from UT ACL2 Lab and promoted creating and attending NSF-funded opportunities to 160+ students and professors*

**Technica Hackathon** Oct. 2024
*Volunteer and mentor; world's largest hackathon for underrepresented genders in tech*

**FIRE Student Leadership Council** 2024—Present
*Councilmember; Represented 200+ peers, ran events & workshops, and work on program reforms*

**CMNS Recruitment Ambassador (College)** 2024—Present
*Ambassador for computer science; presented in admissions open houses and organized student meetings*

**MSET Robotics & Programming Workshops** 2020—2022
*Organizer, curriculum designer, and volunteer; ran numerous events teaching robotics, computer modeling, and programming languages to young girls and underprivileged youth*

## Additional Information

**Clubs**: Stylus Literary Magazine (Associate Editor), Technica Hackathon, Photography Club, Linguistics Club
**Languages**: Python, Java, R, MATLAB, JavaScript, HTML/CSS
**Packages**: PyTorch, NLTK, pandas, tidyverse, NumPy, Matplotlib
**Developer Tools**: Git, Docker, GCP, Google Vertex AI, VS Code, Eclipse
**Natural Languages**: English (native), Gujarati (native), Spanish (intermediate), Korean (beginner)