Tanushree Banerjee

Curriculum Vitae

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Google Scholar

Education

08/25 – 05/30 **Doctor of Philosophy**, *University of Maryland*, College Park, MD
Department of Computer Science, Dean's Fellowship, advisor: Prof. Matthias Zwicker.

08/25 – 05/27 **Master of Science**, *University of Maryland*, College Park, MD
Department of Computer Science.

08/20 – 05/24 **Bachelor of Science in Engineering**, *Princeton University*, Princeton, NJ
Department of Computer Science, degree awarded with high honors (departmental GPA: 3.866).
Thesis: *Towards Inverse Neural Rendering for Explainable 3D Perception*, advisor: Prof. Felix Heide.

Research Experience

2025 – Now **Graduate Research Assistant**, *University of Maryland*, College Park, MD
Department of Computer Science, advisor: Prof. Matthias Zwicker.

2024 – 2025 **Pre-Doctoral Research Assistant**, *Princeton University*, Princeton, NJ
Princeton Computational Imaging Lab, Department of Computer Science, advisor: Prof. Felix Heide.
Developing explainable methods for 3D object detection via inverse generation.

2023 – 2024 **Undergraduate Research Assistant**, *Princeton University*, Princeton, NJ
Princeton Computational Imaging Lab, Department of Computer Science, advisor: Prof. Felix Heide.
Building a novel algorithm enabling 3D multi-object tracking via inverse rendering.

2022 – 2023 **Undergraduate Research Assistant**, *Princeton University*, Princeton, NJ
Princeton NLP Group, Department of Computer Science, advised by Prof. Karthik Narasimhan.
Exploring human and AI-in-the-loop systems and LLM self-refinement methods for improving the performance of LLMs on nuanced tasks such as lie detection.

Summer 2021 **Summer Research Assistant**, *Princeton Visual AI Lab*, Princeton, NJ
Advised by Prof. Olga Russakovsky. Investigated a novel application-focused human action recognition dataset from police body-worn camera videos.

Manuscripts and Pre-prints

Peer-reviewed Publications

[PR1] **Towards Generalizable and Interpretable Three-Dimensional Tracking with Inverse Neural Rendering**, *Nature Machine Intelligence, 2025.*
Julian Ost*, **Tanushree Banerjee***, Mario Bijelic, Felix Heide Project Page | Paper | Code | doi:10.1038
Extending our previous arXiv preprint [A2], which recasts 3D multi-object tracking from RGB cameras as an Inverse Rendering (IR) problem, to object classes other than vehicles and using several different generator models to showcase the generalization ability of our method.

arXiv Preprints

[A2] **Inverse Neural Rendering for Explainable Multi-Object Tracking**, *arXiv, 2025.*
Julian Ost*, **Tanushree Banerjee***, Mario Bijelic, Felix Heide Project Page | Paper | arXiv:2404.12359
We recast 3D multi-object tracking from RGB cameras as an inverse rendering problem. Our method is not just an alternate take on tracking; it enables examining generated objects and reasoning about failure cases.

[A1] **LLMs are Superior Feedback Providers: Bootstrapping Reasoning for Lie Detection with Self-Generated Feedback**, *arXiv, 2024.*
Tanushree Banerjee, Richard Zhu, Runzhe Yang, Karthik Narasimhan Paper | arXiv:2408.13915
We investigated a bootstrapping framework that leverages LLM-generated feedback to detect deception in diplomacy games. Our approach achieved a 39% improvement over the zero-shot baseline in lying F1 without any training.

Undergraduate Thesis

[T1] **Inverse Neural Rendering for Explainable 3D Perception**, *Princeton University.*
Advisor: Prof. Felix Heide Thesis Report | Abstract
This thesis explores unlocking explainable 3D perception via Inverse Neural Rendering. *Part I* proposes and evaluates a novel take on 3D multi-object tracking, while *Part II* proposes recasting 3D object detection as an inverse generation problem.

Honors and Awards

2025 **Dean's Fellowship at the University of Maryland**, *in recognition of outstanding academic achievement.*

2024 **Outstanding Computer Science Senior Thesis Prize at Princeton University**, *for the thesis titled "Inverse Neural Rendering for Explainable 3D Perception", awarded to one of only 6 students among 216 in the graduating class of the CS department.*

2024 **FitzRandolph Gate Award at Princeton University**, *for presenting my work on "Inverse Neural Rendering for Explainable 3D Tracking" at Princeton Research Day 2024.*

Teaching Experience

Spring 2024 **Undergraduate Course Assistant**, *Independent Work Seminar: AI for Engineering and Physics*, Princeton University

Summer 2022 **Research Instructor**, *Princeton AI4ALL*, Princeton University