

# Shubhashis Roy Dipta

No visa sponsorship required; Green Card holder.



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## EDUCATION

**Ph.D. in Computer Science**, UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

May 2023 – May 2027 (Expected)

Specialization: **Decomposition-based Multimodal Reasoning, Tool-Calling LLM, Math Reasoning**

- Phi Kappa Phi Award – **Top 10% of STEM**. GPA 4.00/4.00 – **Top 1% of class**.

## EXPERIENCE

**Applied Research Scientist Intern**, AMAZON

June 2025 – Aug 2025

Tech Stack: Tool-calling LLM, Agentic LLM, PyTorch, Multi-Stage SFT, PPO, GRPO, RL, Weight & Biases

- **Injecting Tool-use Knowledge**: Developed multi-stage continual training pipeline to inject tool-use policies, outperforming  $\tau$ -Bench baselines by **20 points** without in-context policies while decreasing the **context length by 40%**.
- **GRPO RL**: Introduced a novel **PolicyRecall** reward with Jaccard score and hallucination penalty for precise policy adherence in LLMs.
- **Tau-Override**: Developed a synthetic test benchmark,  $\tau$ -Override, to evaluate the ability of LLMs to override already learned rules.

**Machine Learning Research Intern**, SCALE.AI

June 2024 – Aug 2024

Tech Stack: PyTorch, DeepSpeed, Hugging Face, Kubernetes, Dagster, RLHF, SQL, Weight & Biases

- **RLHF text2sql**: Used Online KTO (a novel method) and data augmentation to improve BIRD benchmark accuracy by **8 points** over the same size SFT model (featured in [Scale.AI Blog](#)).
- **Auto Eval**: Implemented AutoCOT and Self-Critique to improve the current Auto Eval system by 6 points (**F1 score: 83 → 89**).
- **Many-Shot text2sql**: Implemented Many-Shot *text2sql* system, improving the total accuracy by **8%** and per use case accuracy by **12%**.

**Machine Learning Engineer**, BACKPACKBANG.COM

Oct 2018 – Mar 2019

Tech Stack: PyTorch, Keras, Hugging Face, Large Language Model, NLTK, Python, MySQL, Elasticsearch, AWS EC2, Node.js, React

- **Boosted the sales by approximately 23%** by improving existing product recommendation system using *Product2Vec* embedding.
- **Reduced server cost by approximately 10%** by implementing an AWS Lambda-based ML pipeline for online learning.

**Founder & Chief Technology Officer**, UNISHOPR.COM

Jan 2019 – Jan 2021

- Led a cross-functional team of 10, achieving **1,000+** active e-commerce users and **\$100,000+/month** in orders.

## PUBLICATIONS (FIRST AUTHORED)

For a comprehensive list, visit my [Google Scholar](#) Profile

1. "GANITLLM: Difficulty-Aware Bengali Mathematical Reasoning through Curriculum-GRPO", under review at AAAI 2026
2. "Advancing Reference-free Evaluation of Video Captions with Factual Analysis", under review at WACV 2026 ([arXiv](#))
3. "Q2E: Query-to-Event Decomposition for Zero-Shot Multilingual Text-to-Video Retrieval", under review at AACL 2025 ([arXiv](#))
4. "If We May De-Presuppose: Robustly Verifying Claims through Presupposition-Free Question Decomposition", 14th Joint Conference on Lexical and Computational Semantics, EMNLP (2025)
5. "Semantically-informed Hierarchical Event Modeling", 12th Joint Conference on Lexical and Computational Semantics, ACL (2023)
6. "HU at SemEval-2024 Task 8A: Can Contrastive Learning Learn Embeddings to Detect Machine-Generated Text?", Proceedings of the 17th International Workshop on Semantic Evaluation, (SemEval-2024), NAACL (2024)
7. "UMBCLU at SemEval-2024 Task 1A and 1C: Semantic Textual Relatedness with and without machine translation", Proceedings of the 17th International Workshop on Semantic Evaluation (SemEval-2024), NAACL (2024)

## COLLABORATIONS

1. "Learning How to Use Tools, Not Just When: Pattern-Aware Tool-Integrated Reasoning", MathAI @NeurIPS 2025; under review at EACL 2025 ([arXiv](#))
2. "FedMentor: Domain-Aware Differential Privacy for Heterogeneous Federated LLMs in Mental Health", GenAI4Health @NeurIPS 2025; under review at EACL 2025 ([arXiv](#))
3. "BanglaLlama: LLaMA for Bangla Language", under review at BLP@AACL 2025 ([arXiv](#))
4. "BanglaTalk: Towards Real-Time Speech Assistance for Bengali Regional Dialects", under review at BLP@AACL 2025 ([arXiv](#))
5. "Read Between the Lines: A Benchmark for Uncovering Political Bias in Bangla News Articles", under review at BLP@AACL 2025 ([arXiv](#))

## RELEVANT PROJECTS

For a comprehensive list, visit my [Portfolio](#)

**Bird Chirping Identification** [↗](#)

Tech Stack: PyTorch, Keras, TensorFlow, Python, Matplotlib, Seaborn, EfficientNet

- Secured **Bronze Medal** in Kaggle (**Top 6%**) by using EfficientNet on the spectrogram with a weighted ensemble of framed timespan.

**Amazon [Crawler] [Search Engine]**

Tech Stack: Elasticsearch, Node.js, Express.js, Python, Multithreading, GCP

- Designed a distributed data pipeline using GCE to extract and index over **10M products**, enhancing resource-efficient data retrieval.

## ACHIEVEMENTS

- **Reviewer**: Reviewed 32+ papers in top ML conferences (NeurIPS, CVPR, ACL, NAACL, CoNLL) & Bioinformatics journals.
- **Mentoring**: Mentored Multiple undergraduate and graduate students and published 5+ papers.
- **Competitions**: 2 International Robotics Competitions (URC, USA; ERC, Poland), 2 ACM-ICPC, 25+ National Programming Competitions.