

Ishan Upadhyay

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Education

Indian Institute of Technology Bombay

2021 – 2025

Bachelor of Technology in Aerospace Engineering

CPI: 8.08/10

Selected coursework: Machine Learning, Deep Learning, NLP, Computer Vision, Data Structures & Algorithms, Databases, Probability & Statistics, Linear Algebra, Optimization Theory.

Research focus: Human–AI collaboration, multimodal evaluation, reliable AI agents.

Publications & Submitted Manuscripts

1. **Submitted to NAACL.** *Asking About Occluded Content Marks Adversarial Multimodal Questions.*
2. Y. Y. Sung, E. Fleisig, Y. Hou, **I. Upadhyay**, and J. Boyd-Graber. *GRACE: A Granular Benchmark for Evaluating Model Calibration against Human Calibration.* **ACL 2025.**
3. S. V. Shenoy, D. Biswas, A. Zalevsky, A. Kishishita, A. Verma, **I. Upadhyay**, et al. *AlphaCross-XL: A Seamless Tool for Automated and Proteome-Scale Mapping of Cross-Linked Peptides Onto 3D Protein Structures.* **Molecular & Cellular Proteomics, 2025.**

Patent: Filing in Progress

Named inventor, Adobe Inc.

Browser-to-desktop communication patent application; filing in progress.

Research Experience

Multimodal Quizbowl: NAACL Submission

2025 – Present

Research collaboration with Prof. Jordan Boyd-Graber, University of Maryland

- The project studies what makes multimodal quizbowl questions harder for vision–language models than skilled humans, combining question-level evaluation with authoring histories.
- Owned the **authoring platform and review pipelines**, designing workflows for iterative text-and-image drafting, in-place image editing, live model feedback, and question refinement.
- Shaped the study’s collection methodology through **data-quality guardrails**, including text-only tests that assessed whether visual evidence was needed and guided author revision and review.
- Logged clue revisions, image edits, model responses, and submissions across **27 authors** and **240 competition questions**, enabling analysis of **442 probe–edit–probe pairs**.

GRACE: Human–Model Calibration

May – Jul 2024

Research collaboration with Prof. Jordan Boyd-Graber, University of Maryland

- Coauthored **GRACE (ACL 2025)**, a text-based quizbowl benchmark comparing human and model calibration as clues unfold, using answer timing, accuracy, and confidence.
- Developed and deployed the ReactJS question-authoring platform with AI feedback, Google OAuth, and Google Docs integration, enabling **100+ writers** to contribute benchmark questions.

Professional Experience

Adobe Inc.: Member of Technical Staff

May 2025 – Present

Creative Cloud Desktop

- Resolved **100+ production issues** at a **60–70% end-to-end resolution rate** by developing **Patrol**, a supervisor-led parallel-agent system that inspects evidence and source code, synthesizes evidence-cited root-cause analyses, and drafts pull requests for review.

Adobe Inc.: Member of Technical Staff (continued)

- Built a **human-in-the-loop workflow**: engineers approve proposed changes, and new debugging lessons are validated before entering memory for reuse in future investigations.
- Restored Windows/macOS browser-to-desktop communication under modern browser security restrictions; named inventor on the related Adobe patent application.
- Saved **approximately \$200,000 in service costs** through incremental client-side feature-flag caching, reducing redundant requests and preserving a header-based fallback for safe rollback.
- Delivered a working **Adobe Express Photos** prototype for Windows and macOS in **under five weeks**, using AI-assisted development to integrate the application into Creative Cloud Desktop.
- Received Adobe's company-wide **Special Contribution Award** for Patrol, AI Pod integration, and patent work; Patrol's debugging agent was also selected for the India Tech Summit.

Additional Research & Applied Machine Learning

AlphaCross-XL: Computational Proteomics

May – Jul 2024

Prof. Sanjeeva Srivastava, IIT Bombay; collaboration with UCSF

- Enabled GUI-based protein cross-linking analysis through a ReactJS/NodeJS interface integrating ProDy, PyMOL, and pyfastx with parallelized processing; coauthored the *Molecular & Cellular Proteomics* paper and received an **INR 2,20,000 research grant** from IIT Bombay.

Mars Rover Team: Junior Software Engineer

Aug 2022 – Jul 2023

Image Processing Subsystem, IIT Bombay; 40+ member student rover team

- Increased rover-image resolution by **4x** through a cascaded super-resolution network, developing the image-enhancement component for the team's visual-perception subsystem.
- Built a **ResNet-50** rock classifier covering **seven classes** with **over 70% accuracy**; investigated image-processing approaches for Mars polar ice-cap conditions as part of the subsystem's research.
- **Team recognition**: Best Navigation Award, European Rover Challenge; Best Autonomous Award, International Rover Challenge. Contributed within the image-processing subsystem.

Tune.ai: Machine Learning Engineering Intern

Jun – Jul 2023

LLMOps and generative AI platforms

- Added vector-database integrations to **ChainFury**, an open-source prompt-chain framework, enabling the LLMOps platform to connect prompt workflows with vector storage and retrieval.
- Reimplemented GAN-inversion-based image blending and integrated the model with **TorchServe**, improving inference efficiency and supporting deployment of the image-generation workflow.

Adobe Inc.: Product Engineering Intern

May – Jul 2024

Machine learning for Creative Cloud application discovery

- Built LSTM, collaborative-filtering, and T5 recommenders for cross-app discovery, achieving **80% top-5 accuracy** with T5; deployed via FastAPI and Streamlit for evaluation.

Indoor Navigation: Extended Kalman Filtering

May – Jul 2023

Industrial project with Mapit.ai

- Improved predicted-position accuracy by **14.2%** through an Extended Kalman Filter-based model, applying statistical filtering to sensor data for indoor navigation using Bluetooth beacons.

Teaching & Leadership

- **CS101 Teaching Assistant, IIT Bombay** (Mar – Jul 2023): Mentored **24 first-year students** in programming and graded labs and mid-semester and end-semester exams.
- **Institute Manager, Web and Coding Club** (Apr 2023 – May 2024): Coordinated **70+ projects** with **200+ mentors**; ran three technical courses with **3,000+ enrollments**.

Technical Skills

Languages: Python, C++, C, JavaScript/TypeScript.

ML & robotics: PyTorch, TensorFlow, NumPy, pandas, ROS, Gazebo.

Systems & tools: ReactJS, NodeJS, FastAPI, TorchServe, CEF, Docker, Git, L^AT_EX.