

# Preetam Chhimpa

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## Education

### Indian Institute of Technology Roorkee

M.Tech in Data Science (CGPA: 9.29)

Roorkee, India

2024 – Present (Expected Graduation: 06/26)

### Indian Institute of Technology Gandhinagar

B.Tech in Civil Engineering Minor: Computer Science & Engineering (CGPA: 8.10)

Gandhinagar, India

2020 – 2024

## Experience

### SafeTrip Lab, IIT Roorkee

Student Researcher (Efficient Multimodal Fusion)

Roorkee, India

Jun. 2025 – Present

- Built a compute-efficient multimodal fusion pipeline to map **multi-view camera images** to a **T5-aligned** scene embedding.
- Focused on reducing compute and memory overhead to support **edge devices** in autonomous vehicles.
- Reduced parameters by **52%** using **anchor-token pruning**, **Perceiver cross-attention**, and **gated view pooling**.
- Achieved **EM 51%, F1 70%, BLEU-4 47.1, ROUGE-L 69.1, CIDEr 2.99** on multi-view VQA, outperforming baselines.
- Training: token-level cross-entropy, AdamW (**1e-4**), NVIDIA A6000; dataset: **nuScenes** (autonomous driving).

### Mercor

Remote

Scientific Computing Contractor

Jul. 2025 – Nov. 2025

- Built terminal-based scientific benchmarks to evaluate **AI agents** across mathe, **GenAI** workflows, and structured data tasks.
- Designed auto-graded tasks with reference solvers, I/O contracts, and deterministic scoring for reproducible evaluation.
- Implemented simulation-based benchmarks with parameter sweeps, seeded runs, and failure handling in **Linux** environments.

### IntentSignal Systems, LLC

Remote

Software Engineer Intern

May. 2024 – Sep. 2024

- Built a scalable data-as-a-service platform using **Next.js**, exposing **15M+** B2B business records to enterprise clients.
- Implemented secure **JWT**-based authentication, faceted search, pagination, and **CSV export**; deployed via CI/CD on **AWS Amplify**.
- Optimized data fetching with lazy loading and caching strategies, **halving API calls** and reducing page load time by **40%**.

### Patible AI

Remote

Cloud Operations Intern

May. 2023 – Aug. 2023

- Developed scalable scraping pipelines using Python, **Scrapy**, and **Selenium** to collect large-scale business-intelligence data.
- Ingested, cleaned, and validated **2.6M+** records on **AWS EC2/S3** using Pandas and AWS CLI for downstream analytics.
- Optimized PostgreSQL schema design and ingestion queries via **psycopg2**, eliminating database bottlenecks and improving throughput.

### Water and Climate Lab, IIT Gandhinagar

Gandhinagar, India

Student Researcher (Flood Forecasting System) Guide: Prof. Vimal Mishra [Dashboard Link](#)

Aug. 2023 – Nov. 2023

- Developed a supervised thresholding-based flood forecasting pipeline for pixel-level inundation mapping in the **Narmada basin**, inspired by Google's operational flood forecasting framework ([Katiyar et al., 2021](#)).
- Curated gauge and inundation datasets using empirical insights from prior work and Google Earth Engine imagery, achieving **F1 = 0.86** on historical data spanning **2001–2012**.
- Deployed a real-time flood-warning dashboard for local authorities using **React** and a **Flask**-based backend, with **Cloudinary** for efficient storage and serving of generated flood maps.

## Projects

### Adversarial Evaluation of Vision-Language Models | Robustness

Prof. Indrajit Ghosh

IIT ROORKEE | ROORKEE, INDIA

Aug. 2025 – Nov. 2025

- Designed inference-time adversarial attacks to induce systematic counting and attribute reasoning failures in vision-language models.
- Developed training-free evaluation pipelines to compare clean vs. attacked VQA outputs on **IMP-v1-3B** and **Qwen2.5-VL-7B**.
- Achieved answer flip rates of **75.1%** on IMP-v1-3B and **38.4%** on Qwen2.5-VL-7B under adversarial perturbations.
- Induced large counting deviations with mean absolute shifts of **6.74** and **1.24** respectively, revealing brittle visual aggregation behavior.

## DiffGraph+ | Heterogeneous Graph Diffusion

IIT ROORKEE | ROORKEE, INDIA

Prof. Gaurav Kumar Nayak

Feb. 2025 – Apr. 2025

- Extended the open-source **DiffGraph (WSDM'25)** PyTorch implementation for heterogeneous graph representation learning across multiple semantic views.
- Replaced hand-crafted meta-paths with a **Graph Transformer**-based automatic discovery mechanism, making diffusion task-agnostic across downstream objectives.
- Generalized cross-view denoising diffusion to heterogeneous graphs without manual schema engineering or dataset-specific tuning.
- Achieved **78%** Micro-F1, **77%** Macro-F1, and **93%** AUC on the DBLP author classification benchmark.

## Cminusminus | Programming Language and Compiler

IIT GANDHINAGAR | GANDHINAGAR, INDIA

Prof. Abhishek Bichhawat

Jan. 2024 – Apr. 2024

- Designed Cminusminus, a **dynamically-typed**, C/C++ inspired programming language with a full compiler toolchain.
- Built the compiler in **Lark**, implementing lexical analysis, parsing, AST construction, and semantic validation.
- Developed a **WebAssembly (WASM)** backend to generate portable executable binaries for browser and native execution.
- Authored comprehensive unit and integration tests to validate language semantics and compiler correctness.

## Population Density Estimation Using Satellite Imagery

MACHINE INTELLIGENCE AND RESILIENCE (MIR) LAB, IIT GANDHINAGAR | PROF. UDIT BHATIA

Prof. Udit Bhatia

Sep. 2023 – Nov. 2023

- Developed a **ViT** model for population density estimation, achieving **70%** accuracy and outperforming CNN baselines.
- Generated gridded population-density labels for **Washington DC** and **Baltimore** using **US Census** datasets.
- Curated paired satellite imagery and grid-level labels from open-source APIs for training and evaluation.

## Waste Segregation System | ResNet-50 (OpenCV + Arduino)

IIT GANDHINAGAR | GANDHINAGAR, INDIA [Prototype Link](#)

Prof. Vimal Mishra

Feb. 2022 – May. 2022

- Led a team of **3** to design and build an end-to-end deep learning system for automated waste classification and sorting.
- Fine-tuned **ResNet-50** on **2,500** labeled images across **six** waste categories, curated from web sources and on-campus image collection using custom camera setups.
- Achieved **94%** validation accuracy through data augmentation and systematic hyperparameter tuning.
- Integrated **OpenCV**, **Arduino**, and servo motors to enable real-time waste detection and automated mechanical segregation.

## Skills

**Programming** Python, C++, C, SQL

**ML/DL** PyTorch, TensorFlow, Hugging Face Transformers & Diffusers, Scikit-Learn, NumPy, Pandas, Matplotlib

**Tools** Git/GitHub, Docker, AWS, PostgreSQL, REST APIs

## Extracurricular Activity

### Teaching Assistant | DAC-505: Advanced Data Structures & Algorithms

IIT Roorkee

Roorkee, India

july, 2025 – Present

- Lead weekly labs and office hours, design & grade C++ assignments, and mentor students on algorithm-problem-solving.

### Open-Source Contributor

Byte Latent Transformer (BLT) | **Hugging Face Transformers (GitHub Stars: 154000)**

2025

- Fixed **BLT** training CI failures by resolving **KV-cache-induced generation mismatches** and training overfit behavior.
- Implemented BLT-specific **weight initialization** and integrated BLT into shared training tests by removing custom skips and **stabilizing gradient-norm** reduction.
- Resolved cross-model CI regressions via model-specific cache handling while maintaining public API consistency.

### Dean's List & Academic Excellence Award

IIT Gandhinagar

Gandhinagar, India

2022 – 2023

- Awarded Dean's List & Academic Excellence Award (Semester V).

### Research Poster Competition

IIT Gandhinagar

Gandhinagar, India

2023

- Placed **3rd** (out of **18** teams) in the institute-level Research Poster Competition.

## References

### Prof. Indrajit Ghosh | IIT Roorkee

Professor, Dept. of Civil Engineering & Joint Faculty, Mehta Family School of Data Science & AI

Roorkee, India

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