

Rahul PRAJAPAT

Software Engineer II | Uber

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🐙 burixzura

RESEARCH INTERESTS

⚙ Mechanism Design ⚙ Complexity Science ⚙ Game theory ⚙ Social Networks ⚙ Machine Learning

EDUCATION

Indian Institute of Technology Bombay

Bachelor of Technology, Computer Science and Engineering.

2019-2023

GPA = 8.87/10.0

RESEARCH EXPERIENCE

University of Sydney Australia	SKewed MERKLE TREES 2022 <i>Prof. Willy Zwaenepoel, Dr. Baptiste Lepers</i> <ul style="list-style-type: none">➤ Analyzed 21 papers on frequency-aware skewed Merkle trees, identifying 30% performance gains through 1/x access pattern exploitation➤ Discovered fundamental limitations (state reversibility, order independence violations) preventing blockchain deployment➤ Evaluated alternative structures : Sparse Merkle trees, Verkle trees, and dynamic integrity trees <div>BlockchainDistributed SystemsCryptographyData Structures</div>
University of Neuchâtel Switzerland	PERSISTENT KEY-VALUE STORE 2021 <i>Prof. Willy Zwaenepoel, Dr. Baptiste Lepers</i> <ul style="list-style-type: none">➤ Designed MassTree-PMEM with hierarchical two-tier locking enabling lock-free reads and concurrent writes➤ Resolved RECIPE framework atomicity issues via version-based coordination, achieving 3.159M ops/sec in PMEM➤ Developed PMEM-native optimizations : cache-line aware layouts, selective persistence, atomic pointer updates <div>Persistent MemoryConcurrencyB-treesCrash Consistency</div>
IIT Bombay India	FILE SYSTEM METADATA SNAPSHOTS 2020 <i>Prof. Rushikesh K Joshi</i> <ul style="list-style-type: none">➤ Built cross-platform data recovery for EXT4 and VFAT/FAT32 using direct block device access➤ Developed lightweight metadata-only snapshots (176 bytes/file) preserving directory hierarchy without file content➤ Implemented extent tree processing, Unicode LFN support, and shell interface with advanced filtering <div>File SystemsData RecoveryC ProgrammingSystems Programming</div>

WORK EXPERIENCE

Uber Systems Bangalore

CONFIG AUTOMATION, Earners

JAN 2025 - PRESENT

- Partnering with **Uber AI** to design a **multi-agent** web orchestration layer that coordinates existing Uber agents to automate operations.
- Designed a **Config Knowledge Graph** in **Neo4j** to support complex market validations and configuration impact analysis.
- Enabled the **Knowledge Graph as a secondary config store** via Kafka-based ingestion and domain-wise segregation.
- Prototyped an **AI assistant** using **LangGraph** and explainability APIs to automate root-cause analysis of access issues.

Multi Agent Distributed Systems Cadence Event Ingestion

CONFIG MANAGEMENT AND RELIABILITY, Earners

JUNE 2023 - PRESENT

- **Led adoption of workflow-driven config management**, bringing code-like rigor to market-facing configuration changes.
- **Designed a unified validation and testing platform**, enabling safe and reliable rollouts via pre-deployment gates.
- **Collaborated with ops teams and managed incidents**, reducing investigation time and improving system reliability.

React Go SQL

PLACES CREATION, Uber Maps

MAY-JULY 2022

- Automated freshness status detection for business places using trip data and internal metadata.
- **Built ML prototypes and recommended production pipelines** using engineered features and model scoring heuristics.

Presto Pandas Machine Learning Noise Reduction

KEY PROJECTS

RED PLAG

AUTUMN 2020

Prof. Amitabh Sanyal | Course Project : Software Systems Lab

IIT Bombay

- Developed a comprehensive plagiarism detector via representing source files as **fingerprints**, by using **Winnowing** strategy, and calculated intersection of sets to establish pairwise co-variance measures.
- Applied **Running Karp Rabin Greedy String Tiling** to remove stub code from the source files.
- Created a web frontend which incorporates user **authentication** and **surface plots** for visualization.
- Used **Django REST** for managing files and integrating logic, while **ExpressJS** for authentication.

ROBUST VIDEO DENOISING

SPRING 2021

Prof. Ajit Rajwade | Course Project : Advanced Image Processing

IIT Bombay

- Modelled denoising as a **Matrix Completion Problem** by marking off-threshold pixels as absent.
- Employed **Adaptive Median Filter** for detecting and marking impulse noise in the first phase.
- Used **Three-Step-Cross Search Algorithm** for grouping temporally and spatially similar patches.
- Utilized **Fixed Point Iterative Algorithm** to minimize the **Nuclear Norm** of the Patch Matrix.

16 BIT MULTICYCLE PROCESSOR

SPRING 2021

Prof. Virendra Singh | Course Project : Digital Logic Design

IIT Bombay

- Designed and simulated a 16-bit Multicycle Processor based on the **IIT-B RISC** Instruction Set.
- Applied behavioral VHDL principles to implement RAM, ALU, Register File, and, Test Bench units.

COMPUTER ARCHITECTURE

AUTUMN 2022

Prof. Biswa Panda | Course Project : Computer Architecture

IIT Bombay

- Analyzed the instructions per cycle as a performance metric for different SPEC-2017 CPU traces using Champsim.
- Compared the performance of different cache replacement policies like LRU, SHiP++ and Hawkeye combine with PACMan and Instruction Pointer Classifier-based Hardware Prefetcher(IPCP) at L1 and L2 Cache

COMPILER FOR C-LIKE LANGUAGE

SPRING 2022

Prof. Uday Khedkar | Course Project : Implementation of Programming Languages

IIT Bombay

- Developed a **compiler** and **evaluator** for subset of C supporting functions, scope levels and control sequences.
- Implemented a parser driven frontend using Lex & Yacc for generating **TAC**, **RTL** and Assembly code.

OTHER PROJECTS

MASTERMIND

Prof. Ashutosh K. Gupta | Course Assignment : Logic for CS

- Encoded moves of Mastermind game into a SAT problem with the help of the **z3py** library in Python.
- Implemented a solver based on **Conflict Driven Clause Learning** which is robust to an unreliable player.

SPRING 2021
IIT Bombay

OPTIMIZED PERMUTATION

Prof. Ajit Diwan | Course Assignment : DSA

- Implemented an abstract data type called permutation via an encapsulated class with efficient functionality and operations using a cyclic representation of permutations and **modulo space** properties.
- Employed **Extended Euclidean Algorithms** in conjunction with the **Extended Chinese Remainder Theorem** to implement logarithms, and find square roots for permutations in linear time.

AUTUMN 2020
IIT Bombay

QUAD TREE

Prof. Ajit Diwan | Course Assignment : DSA

- Designed a **hierarchical spatial data structure** for representing binary image to optimize on space.
- Associated efficient image manipulation and refinement methods using binary operations recursively.

AUTUMN 2020
IIT Bombay

BASH AND FEATURES OF xv6

Prof. Mythili Vutukuru | Course Assignment : Operating Systems

- Built a **shell** capable of serial, parallel & background execution of simple Linux commands and signal handling.
- Examined **xv6** source code and implemented process scheduling algorithms like round robin & priority based.
- Implemented **memory management** techniques like lazy page allocation, copy on write and applications of pthreads.

AUTUMN 2022
IIT Bombay

SOCKET PROGRAMMING

Prof. Vinay Ribeiro | Course Assignment : Computer Networks

- Used Socket Programming libraries in C++ to study different TCP variants in terms of throughput, using server and client systems.
- Used Wireshark to capture packets on the loopback interface and study TCP window variations w.r.t. time.
- Modelled and Simulated The Hidden Terminal Problem using ns3 library in c++, to study the relation between Throughput and offered load.

SPRING 2021
IIT Bombay

ACADEMIC ACHIEVEMENTS

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| ➤ Achieved All India Rank 302 in JEE Advanced amongst 245,000 eligible candidates. | 2019 |
| ➤ Secured All India Rank 360 in JEE Main out of a total of 1.2 million candidates. | 2019 |
| ➤ Achieved International Rank 5 in National Science Olympiad (NSO) conducted by SOF. | 2019 |
| ➤ Secured All India Rank 50 in JEE Main 2 (B Arch.) amongst 145,000 candidates. | 2019 |
| ➤ Ranked amongst National Top 1% in National Standard Exam in Chemistry (NSEC). | 2019 |
| ➤ Recipient of the prestigious Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship. | 2019 |

TEACHING ASSISTANT

Computer Programming and Utilization (CS101)

Course Instructors : Prof. Kameswari Chebrolu, Prof. Bhaskaran Raman

AUTUMN 2020
IIT Bombay

Operating Systems Lab (CS347)

Course Instructors : Prof. Purushottam Kulkarni, Prof. Umesh Bellur

AUTUMN 2022
IIT Bombay

TECHNICAL SKILLS

Languages	Go, TypeScript, C/C++, Python, SQL, Bash, MATLAB, Java, VHDL
Frameworks / Tools	React, GraphQL, Protobuf, gRPC, Cadence, Docker, Git, LangChain, LangGraph, Jupyter, GDB, Sed, Awk, Make, Lex, Yacc, NS-3, ChampSim, \LaTeX
Infra / Datastores	Neo4j, Postgres, Redis, MySQL, Kafka

RELEVANT COURSEWORK

Game Theory and Mechanism Design	Advanced Image Processing	AI and Machine Learning
Database and Info. Systems	Logic for Computer Science	Automata Theory
Operating Systems	Data Structures and Algorithms	Computer Architecture
Implementation of Prog. Languages	Computer Networks	Digital Logic Design

EXTRACURRICULAR

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|---|---------|
| ➤ Stood runner up in the AI hackathon at Uber. | 2025 |
| ➤ Associated with National Service Scheme (NSS) , IIT Bombay, to promote sustainability. | 2019-20 |
| ➤ Worked under Sustainable Social Dev. (NSS) to ideate a Rainwater Harvesting model . | 2019-20 |
| ➤ Designed a basic RC plane for a competition held by Aeromodelling Club, IIT Bombay. | 2019 |
| ➤ Participated in box cricket at Fun2shh organised by hostel 2, IIT Bombay. | 2020 |
| ➤ Participated in a 10 Km cyclothon organized virtually by L&T Cyling Group. | 2021 |

HOBBIES

 Reading		 Anime		 Cooking		 Diary Writing		 Drawing		 Pool
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