Anikesh Parashar

github.com/an1k3sh linkedin.com/in/an1k3sh a_parashar@cs.iitr.ac.in anikeshparashar@gmail.com

Education

Indian Institute of Technology Roorkee, India Nov 2021 - July 2025
Bachelor of Technology in Computer Science and Engineering *Current CGPA: 9.34/10.0*

Experience

Research Fellow | *Microsoft Research, Bangalore, India* Nov 2025 - Present
- Contributing to the PROSE team on program synthesis and ML-driven code generation
- Working on improved natural-language-to-code translation for Excel Copilot, focusing on integrating formal reasoning signals with LLM outputs

Software Engineer | *Enphase Energy, Bangalore, India* July 2025 - Nov 2025
- Working with Cloud R&D team managing backend architecture for IoT devices
- Worked with Ruby on Rails and Java to help transition internal services toward a more scalable backend architecture

Summer Research Intern | *INSAIT, Sofia, Bulgaria* July 2024 - October 2024
- Worked on techniques for Uncomputation of temporary values in Quantum Programs
- Analyzed limitations of existing techniques for uncomputation in current Quantum Compilers and worked on improvements

Project Intern | *Enphase Energy, Bangalore, India* May 2024 - July 2024
- Led an applied cybersecurity project to understand SIEM tools and propose ML-based solutions
- Trained and evaluated models for rare-event detection, achieving an F1 score of 94% on internal datasets

Teaching Assistant | *Indian Institute of Technology Roorkee, India* July 2023 - Dec 2023
- TA for the freshman-year Programming course; assisted with labs, debugging sessions, and assignment design
- Helped develop practice material and guided students through foundational programming concepts

Research Intern | *SPARK, Indian Institute of Technology Roorkee, India* May 2023 - July 2023
- Worked on quantum circuit compilation with a focus on enforcing nearest-neighbour constraints for realistic hardware architectures
- Surveyed existing approaches and contributed to implementing optimized layouts that reduce swap overhead

Projects

LLVM Contributor (libc, SelectionDAG, Backend Tests) | *C++, LLVM* Dec 2025 - Jan 2026
- Contributed to LLVM, with 4+ merged PRs across libc math and backend test infrastructure
- Refactored libc math functions (`sinhf16`, `sinhf`, `logf`) to header-only implementations
- Improved backend test coverage for SystemZ and SelectionDAG-based optimizations
- Proposed optimization in SelectionDAG (`SimplifyDemandedBits`) for sign-bit analysis across multiple targets

Z3 Based SMT Generator for LLVM IR Programs | *Python* Feb 2025 - Present
- Designed and implemented a tool to translate LLVM IR programs into SMT formulas using the Z3 theorem prover
- Enabled reasoning and verification over IR code, supporting analysis of control flow and arithmetic constraints
- Integrated with LLVM's pass infrastructure for automated SMT formula extraction from intermediate representation

Mitigating Adverse Effects of Concept Unlearning in Diffusion Models | *Python* Jan 2025 - Apr 2025
- Researched and implemented methods to erase undesirable concepts from text-to-image diffusion models while preserving generation quality of remaining concepts
- Proposed and developed two novel preservation-enhancing techniques, improving upon state-of-the-art adversarial concept preservation methods

Knowledge Graph-Augmented Long Context QA System | *Python, Neo4j, LangChain* Apr 2025
- Built a retrieval-augmented QA pipeline combining multi-query vector search with knowledge-graph traversal and targeted summarization for long-context reasoning
- Evaluated on the QuALITY benchmark, improving accuracy from 31.87% (zero-shot) to 50.15% through a graph-enhanced retrieval component

FPGA-Based Pseudorandom Number Generator | *Verilog, Xilinx Vivado* Apr 2025
- Designed a parameterizable LFSR-based PRNG with configurable feedback polynomials and seed patterns
- Completed synthesis, pin-mapping, and deployment on the Xilinx ZC702 platform using Vivado

Undefined Behavior Sanitizers for C/C++ | *C++, LLVM* Dec 2024 - Jan 2025

- Researched and analyzed undefined behavior in C++ to identify gaps in existing sanitizer coverage
- Designed and implemented custom sanitizers in LLVM to detect pointer misuse and other common undefined behaviors not caught by existing tooling

Single View 3D Semantic Completion for Indoor Scenes | *Python* Oct 2024 - Nov 2024

- Implemented a 3D semantic scene completion pipeline using single view images for indoor scene reconstruction
- Achieved IoU of 45.99% and classwise mean IoU of 30.65%, improving over state of the art accuracy by over 5% and 6% respectively

GAN-Based Data Generators for Differential Privacy | *Python* Feb 2024 - March 2024

- Reproduced and analyzed the "Pricing GAN-based Data Generators under Rényi Differential Privacy." framework
- Evaluated privacy–utility tradeoffs across varying noise levels during training and measured their impact on downstream performance

Finetuning Large Language Models for Code Summarization | *Python* March 2024 - April 2024

- Built an LLM-based code summarization tool with an interactive chat interface for exploring model behaviors
- Finetuned Llama-2-7B and Mistral-7B models using QLoRA on a Python code summarization corpus, improving summary fidelity on unseen snippets

LLVM IR Code Generator | *C++, LLVM* Feb 2024 - March 2024

- Built an intermediate code generator using LLVM for a small instruction set, including parsing, AST construction, and IR emission
- Added error-reporting support to detect invalid syntax and semantic issues during compilation

Early Detection of Earthquake Magnitude using Seismograph Data | *Python* Feb 2024 - March 2024

- Implemented LSTM-based models to predict earthquake magnitude from the first 2–4.5 seconds of seismic data
- Compared multiple time-window inputs and analyzed performance trends across short-horizon forecasting setups

Revlib Benchmark Parser | *Python Qiskit, QASM* May 2023

- Developed a parser to convert Revlib quantum circuit benchmarks into executable Qiskit and QASM codes
- Enabled automated handling of common quantum gate formats for downstream compilation experiments

Design and Implementation of an assembler for the SIC/XE machine | *C++* March 2023 - April 2023

- Implemented a two-pass SIC/XE assembler with support for instruction parsing and symbol resolution
- Simulated functioning of core memory data structures used to store and process information

Asteroid Diameter Prediction | *Python* Aug 2022 - Oct 2022

- Explored NASA JPL asteroid data and trained baseline ML and ANN models to predict asteroid diameter
- Performed dataset cleaning, feature analysis, and achieved 97% prediction accuracy

Solution of Boolean SAT Problem using Grover's Algorithm | *Python, Qiskit* May 2022 - June 2022

- Developed an algorithm to solve a Boolean Satisfiability Problem using quantum computers
- Used Qiskit library for simulating quantum behaviour

Design and Simulation of 5-stage pipelined processor and cache simulator | *Verilog* July 2022 - Sept 2022

- Designed a basic 5-stage pipelined processor with hazard handling and simple branch-resolution logic
- Implemented a cache-coherence and memory-access simulator to study protocol behavior

Achievements

JEE Advanced Examination	All India Rank 402	2021
JEE Mains Examination	All India Rank 181	2021
KVPY	All India Rank 24	2020
ISIAT	All India Rank 5	2021
Techshila Hackathon	3rd Position	2024

Technical Skills

Programming Languages: C, C++, Python, Verilog, SystemVerilog, MATLAB, Haskell, Assembly, LaTeX
Frameworks: Arduino IDE, Qiskit, Scikit, Numpy, Pandas, MySQL, LLVM, Xilinx Vivado, Neo4j, LangChain

Positions of Responsibility

Quantum Computing Group, IITR | *Core Member* Mar 2023 - May 2025

Helped conduct workshops and research paper discussions related to Machine Learning and Quantum Computing. As a core member, I assisted in organizing a Quantum Computing hackathon in my university.

Academic Reinforcement Program, IITR | *Undergraduate Teaching Assistant* Dec 2022 - Feb 2023

Provided support and guidance to students in their academic journey. Assisted with course materials, conducted study sessions, and offered individualized help.

Qiskit Fall Fest, QCG-IITR x IBM | *Volunteer* Oct 2023 - Nov 2023

Helped organize the Qiskit Fall Fest, sponsored by IBM, at IIT Roorkee. Organized multiple lectures and contests during the Fest.