Vishal Goyal

+91-6284367613 | vishalgoyal452003@gmail.com | linkedin | GitHub | Bathinda

Summary

Computer Engineering student with a strong foundation in computer architecture, data structures, and algorithms. Experienced in real-time graphics, system-level programming, and low-level design through academic projects and research. Interested in applying technical expertise to innovative software and research-driven projects.

Academic Research

Capstone Research Project: Tuning Magnetic Properties of Double Perovskites Jan 2025 – Present
via Monte Carlo Simulations *Patiala, Punjab, India*

- Investigating how the atomic structure of double perovskites affects their magnetic properties.
- Exploring how these magnetic and thermodynamic properties can be tuned to achieve desired characteristics, such as tailored Curie temperatures.
- Developed a framework to study magnetic properties of over 1000 compounds using Ising Model.
- Optimized simulation parameters using a Bayesian optimization approach, reducing manual trial-and-error.

Projects

Real-time Ray Tracer | *C++, CUDA, Dear ImGUI* Source

- Implemented a real-time ray tracing engine capable of rendering spheres, planes, triangles, and polygon meshes with high visual fidelity.
- Integrated CPU and GPU execution paths, achieving significant performance improvements through parallel computation.
- Applied the Cook–Torrance BRDF model to simulate realistic material properties including reflection, refraction, and surface roughness.
- Designed an interactive user interface using Dear ImGUI for real-time scene configuration and visualization.

LC3-Box | *Rust* Source

- Developed a virtual machine that simulates the LC-3 architecture, capable of executing any assembled LC-3 program.
- Implemented all LC-3 trap routines, including GETC, IN, OUT, etc, handling keyboard input in raw mode.
- Wrote comprehensive unit tests for individual operations to ensure correctness of instruction execution.
- Handled system signals and input buffering to allow clean termination and terminal state restoration.

Online-Chess | *MERN, Socket.io* Source

- Built a real-time multiplayer chess platform adhering to international rules, with support for multiple time-based formats.
- Deployed on a Raspberry Pi, enabling seamless gameplay with sub-100ms latency for multiple concurrent users.

Education

Thapar Institute of Engineering and Technology Patiala, Punjab, India
Bachelor of Engineering (B.E.) *2022 – 2026*

Technical Skills

Programming Languages: C/C++, Rust, Python, JavaScript, Go
Web Technologies: HTML, CSS, React, Tailwind, Node.js, Express
Tools: Git, Linux, GDB
AI/ML: NumPy, Pandas
Core Courses: Computer Architecture, Operating Systems, Data Structures and Algorithms, Software Design
Mathematics Courses: Mathematical Modeling, Linear Algebra, Matrix Computations, Probability and Statistics, Financial Mathematics