Scholastic Achievements

- Ranked in the **top 1%** out of **1.2M+** candidates in the **JEE Main** exam demonstrating strong problem-solving skills *(2023)*
- Secured a **98.4 percentile** in **JEE Advanced** exam, taken by **180,000+ top-ranking students** across India *(2023)*

Professional experience

Embedded Systems Intern | Nirixense Technologies | Guide: Prof. Siddharth Tallur *(Jun'25 – Nov'25)*

- Engineered a **custom self-healing LoRa mesh protocol** on **STM32WL** enabling autonomous multi-hop communication
- Designed a **layered protocol stack** with hop-by-hop reliability and retries, achieving **90%+ packet delivery**
- Implemented **dynamic network adaptation** for fast node integration and automatic single points of failure recovery
- Extended **Beyond-Line-of-Sight (BLOS)** communication by using mesh with **loop prevention** to overcome obstacles

Key Projects

Q-learning based RL ASIC Design| Guide: Prof.Laxmeesha Somappa |Course Project *(Sept'25 – Dec'25)*

- Implemented a **pipelined Q-learning agent** (64×4 state-action space) in **Verilog** using sequential logic, with a hardware-optimized Q-update datapath (FSM, state storage, fixed-point) achieving one update per clock cycle
- Executed the complete **ASIC design flow**—RTL, synthesis, and place-and-route—using **Cadence Innovus**
- Designed **transistor-level layouts** for X1/X2 inverter, NOR gate, and DFF using **Magic VLSI** with **Sky130A PDK**

AI-Assisted Wi-Fi RRM+ | Inter-IIT Tech Meet 14.0 | Arista Networks *(Oct'25 – Dec'25)*

- Built an **NS-3 simulation platform** for enterprise Wi-Fi networks to optimize overall **throughput** and **retry rate**
- Architected a **Multi-Timescale Control Loop** with a sub-second **Fast Loop** for interference and radar avoidance
- Integrated **Bayesian Optimization** with **NS-3** to tune Tx Power, Channel Width, and OBSS-PD for better QoE
- Achieved **31.5% improvement** in mean edge-client throughput and **1364% bottleneck elimination**
- Developed a **Graph Attention Network (GAT)** surrogate achieving **92%** R^2 **accuracy**, reducing inference time by **1000**×

Frequency Analysis of Nonlinear Circuit | Guide: Prof. Shalabh Gupta | Course Project *(April'25)*

- Generated dual-tone signals on an **ESP32** using **DAC** to drive a nonlinear circuit and observe intermodulation tones
- Used an **8051 microcontroller** for synchronized, precise sampling of circuit output to enable accurate frequency analysis
- Leveraged **ADC**, **SPI**, hardware timers, and interrupts to ensure accurate timing and efficient data capture
- Implemented error-handling strategies due to phase miss alignment to maintain accuracy in amplitude estimation

Combinatorial and Sequential Circuits | Guide: Prof. Saurabh Lodha | Course Project *(Jun'24-Dec'24)*

- Designed digital circuits in **VHDL** using **Quartus**, including ALU, **BCD adder**, and **sequence detector**
- Built a Mealy Finite State Machine **FSM** for word detection in binary strings, tested using **Scan Chain** on **Xen10 board**
- Implemented a **Fibonacci sequence generator** and validated through simulation and FPGA testing

Hardware Hacking | Electronics and Robotics Club *(Mar'25)*

- Studied **timing-based side-channel vulnerabilities** by analyzing instruction-level delays in cryptographic operations
- Performed **Simple Power Analysis (SPA)** on **RSA** to extract secret keys through visual inspection of power traces
- Used **ChipWhisperer Nano** to analyze power traces on an **STM32-based target** for side-channel vulnerability

IITB-CPU V1.5 | Electronics and Robotics Club *(Jun'25-July'25)*

- Designed a **16-bit** reduced instruction set CPU as a **Finite State Machine** model having 23 states using **Verilog**
- Developed **combinational logic** to execute 15 instructions including arithmetic, control flow, and memory R/W
- Created **Hardware Flowcharts** to achieve **minimal number of states** in the processor, enhancing efficiency

Mobile Crop Manipulator Co-Bot | Eyantra *(Aug'25 - Dec'25)*

- Integrated **mobile manipulation**, coordinating a differential-drive base with a **6-DOF arm** for autonomous pick-and-place tasks
- Designed **low-latency geometric algorithms** for LiDAR-based shape detection, avoiding compute-heavy ML pipelines
- Implemented real-time **TF2-based spatial transformations** to map 2D vision outputs into precise 3D actuation frames
- Built a **deterministic navigation and control architecture** using custom state machines without reliance on Nav2

Other Projects

Autonomous SLAM Bot | Electronics and Robotics Club *(April'25 - Present)*

- Simulated an **Autonomous Robot** in a custom Gazebo world using Robot Operating System (ROS2) and **SLAM Toolbox**
- Configured **AMCL** and the **Navigation2** stack for real-time localization, goal-based path planning, and obstacle avoidance
- Interface a **Raspberry Pi 5** with **ESP32** via **UART** to transmit ROS2 commands to stepper motors for precise control

8051 Microcontroller Interfacing | Guide: Prof. Sachin B Patkar | Course Project *(Jan'25–Apr'25)*

- Configured **timers**, **interrupts**, and **SPI/UART** to interface peripherals like ADC, UART, LCDs, and sensors
- Developed **RSA encryption** and decryption from scratch using **8051 Assembly** and memory-mapped registers
- Wrote custom routines for **prime check**, **totient computation**, and **modular exponentiation** on hardware

Analog Computer | Guide: Prof. Anil Gopalan Kottantharayil | Course Project *(Jun'25-Dec'25)*

- Built an **analog computer** to solve second-order differential equations using op-amp summing and dual integrator blocks
- Implemented **Howland current-source** integrators for improved stability, accuracy, and initial condition control
- Developed **Butterworth** and **Chebyshev filters** using **Sallen-Key topology** for noise reduction in circuit
- Characterized **MOSFETs**, and designed **common-source amplifiers** and **current mirrors** for analog processing

ESP32 based AI chatbot | Electronics and Robotics Club *(Jan'25)*

- Built a real-time AI chatbot on **ESP32** using **Gemini API** for response generation and **text-to-speech (TTS)**
- Used a dual-ESP32 setup with **UART** communication to separate **speech-to-text (STT)** and AI+TTS tasks
- Optimized memory and compute by managing **PSRAM** and streaming TTS audio to fit within ESP32 limits

Drone Assembly and Calibration | Guide: Prof. Joseph John| Course Project *(Jan'24-April'24)*

- Designed a quadcopter frame using **CAD** modeling, and implemented **PID control** on **Arduino Nano** for stable flight
- Integrated a **gyroscope** and tuned control loops for smooth, responsive maneuvering and real-time user input handling
- Enabled remote control via a Wifi-module **ESP8266** and mobile joystick interface for user interaction

Positions of Responsibility

Institute Electronics & Robotics Secretary | Institute technical Council *(Mar'25 - Present)*

- Leading a **13-member team** organising 20+ events, hackathons & discussions for a community of **8000+ enthusiasts**
- Organizing **XLR8'25**, the largest tech event for 900+ first-years and guiding bot-building with **Rpi Pico** and gesture control
- Optimized the tenure timeline and a budget of INR **0.8 million**+ to ensure effective outreach and successful events
- Boosted club engagement through social media and hands-on workshops on **Docker**, **IoT**, and a month-long **ROS2** series

Operations Coordinator | Inter-IIT Tech Meet 13.0 *(Sep'24 - Jan'25)*

- Organized a 3-month technical event as part of a **50-member team**, attracting **2000+** attendees and **15+ MNCs**
- Led execution of industry problem statements from **ISRO** and **Rigbetel Labs** with cross-team coordination
- Managed **logistics** and **hospitality** by coordinating with 50+ student representatives for smooth on-ground operations

Technical Skills

Programming	C++, Python, VHDL, Verilog, Embedded C, Assembly, HTML, Docker, LaTeX
Libraries	NumPy, Pandas, Matplotlib, Scikit-learn
Software / Tools	Arduino IDE, Keil, KiCAD, Jupyter, Quartus, Fusion 360, MATLAB, ROS2, Anaconda, Gazebo

Courses Undertaken

Electrical	Digital Systems, Power Engineering, Microprocessors, Signal Processing, Analog Circuits, Control Systems, Communication systems, Electromagnetic Waves
Mathematics	Calculus, Differential Equations, Linear Algebra, Probability and Random Processes
Labs	Digital Circuits Lab, Power Engineering Lab, Chemistry Lab, Physics Lab, Makerspace Lab, Analog Lab, Microprocessor Lab, Control Systems Lab, Communication Lab, VLSI Design LAB*
Others	Quantum Physics and Applications, Classical Physics, Computer Programming and Utilization, Economics, Introduction to Entrepreneurship, Sociology

**To be completed by May'26*

Extra Curricular Activities

- Mentored a **4-member team** for the national competition *Innovation Story*, guiding them to **3rd place in India** by addressing a real-world challenge through a solution pitch and working prototype *(2024)*
- Mentoring **three 4-member teams** for the institute's technical summer projects in Mechatronics, focusing on **autonomous warehouse** systems, **healthcare robots**, and **multi-terrain vehicles** *(2025)*
- Volunteered with NGO **GnaanU** (*Smile Foundation*) to conduct a hands-on **STEM workshop** on making a mobile controlled 4 wheeler bot for school children, promoting curiosity and technical awareness *(2025)*
- Represented My School at the district level in the prestigious *INSPIRE MANAK* National Competition; presented an **energy-saving innovation** and was recognized for **creativity and problem-solving** *(2019)*
- Successfully completed rigorous training of one year of **Hockey** under the **NSO** programme *(2023-2024)*
- Part of E-Cell's digital outreach and helped organize **E-Summit 2024**, boosting national visibility for **India's largest student-run startup body** *(2024)*