Vaishnavi Kulkarni

vaishnavik002@gmail.com
Project Portfolio Linkedin

Profile Summary

Final-year B.Tech student in Electrical and Electronics Engineering at MIT Manipal with a strong foundation in control systems, VLSI design, and AI applications. Experienced in FPGA-based system design, real-time control, and data acquisition systems, with hands-on expertise in tools such as MATLAB, Siemens MAGNET, Xilinx Vivado, and LabVIEW. Proven track record in interdisciplinary research and competition-winning projects spanning automation, embedded systems, and reinforcement learning. Adept at bridging hardware-software integration, with a keen interest in applying advanced computational and electronic design skills to large-scale scientific research environments.

Education

Bombay Scottish School, Mahim, Mumbai **2008 – 2020**
High School , 98.5%

PACE Junior Science College, Dadar, Mumbai **2020 – 2022**
Intermediate / +2, 83.5%

Manipal Institute of Technology, Manipal **2022 – 2026**
BTech. Electrical and Electronics Engineering, 8.85 CGPA (as of 7th semester)

Achievements

- Intelligent Ground Vehicle Competition (IGVC) 2024 : 1st place Design Challenge, 4th Overall - Project MANAS [2024]
- Student Unmanned Aerial Systems (SUAS) 2024 :Placed 4th Mission Demonstration - Project MANAS [2024]
- IET Student Prize [2024]
- Rank 1 in Branch (as of 7th semester)

Skills

- **PCB Design & Hardware Development**: KiCad
- **Motor & Electromagnetic Simulation**: Siemens MAGNET, ANSYS
- **Control Systems & Embedded Development**: NI LabVIEW, Xilinx Vivado, Vitis HLS, Code Composer Studio, Keil micro-Vision, MATLAB/Simulink
- **FPGA & Digital System Design**: Verilog, VHDL, Partial Reconfiguration (Artix-7, Zynq-7000)
- **AI & Machine Learning for Automation**: TensorFlow, PyTorch, Gymnasium, ROS
- **Quantum Computing**: Qiskit
- **Programming Languages**: Java, Python, C, C++, FORTRAN, Assembly, Verilog, VBS, LaTeX
- **3D Modeling & Fabrication**: Fusion 360, Custom 3D Printing

Internships

Bhabha Atomic Research Centre (BARC) **May 2025– July 2025**
Research Intern - Controls and Instrumentation Division *Mumbai*

- Worked on Vibration Monitoring and Analysis System (VMAS).
- Developed a fully automated LabVIEW system for VMAS: signal generator control, Ethernet-based configuration, waveform display, and signal processing (RMS, DC, SNR) along with multi-iteration curve fitting and regression for ADC calibration.
- Explored FPGA partial reconfiguration on Zynq-7000 to enable dynamic sampling rate adjustment.

Indian Institute of Technology, Bombay **Dec 2024– Jan 2025**
Research Intern - Electrical and Electronics Department *Mumbai*

- Implemented control of a SPIM using TI F28379D and SEMIKRON inverter stack.
- Enabled real-time parameter tuning via Code Composer Studio.
- Conducted FEA simulations in Siemens MAGNET and ANSYS to analyze electromagnetic, thermal, and mechanical performance and optimized motor parameters to improve efficiency and torque output.

Experience

Project MANAS — AI and Robotics Student Project **2023– 2025**
AI Member *Manipal Institute of Technology*

- Engineered a drop point detector from drone-captured images boosting YOLO accuracy from 76% to 94%.
- Developed a person detection and identification system with Siamese networks for face recognition using dashcam footage.
- Implemented and evaluated goal generation and real-time path planning algorithms for an autonomous ground vehicle, optimizing navigation efficiency and obstacle avoidance.

Projects

Honors in FPGA based digital system design **2025– Present**
FPGA based inference of AI models *Manipal Institute of Technology*

- Designed and implemented a simulated, user-configurable cache architecture on an Artix-7 FPGA, supporting both direct-mapped and set-associative modes.
- Currently investigating partial reconfiguration and reconfigurable cache architectures for accelerating image processing workloads on FPGA platforms.

Minor Specialization in Control Systems **2025– Present**
Reinforcement Learning based Non-Linear Model Predictive Control *Manipal Institute of Technology*

- Implementing a hybrid control system for a batch reactor, combining Model Predictive Control with Reinforcement Learning to enhance process efficiency and control performance.
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- Mauris ut leo.

Quadruped Robot Development (Ongoing) **June 2025– Present**
Personal Project

- Designing and building a quadruped robotic platform primarily using a Raspberry Pi 4B and custom 3D-printed components.
- Developed the base mechanical structure and integrating an AI-based navigation system for autonomous operation.
- Currently designing a custom PCB for centralized power distribution and signal routing to optimize system reliability and wiring efficiency.

Extracurriculars

- **Project MANAS** - Senior AI Member [2023-2025]
- **IECSE** - Working Committee Member [2022-23]
- **Research Society Manipal** - Working Committee Member (Mathematics and Physics Division) [2024-present]

Relevant Courses

Signal Processing | Digital System Design | Control Theory | Electromagnetic Field Theory | Advanced Computer Architectures | Analog System Design | Microcontrollers | Measurement and Instrumentation | Cryogenic Electronics for quantum computing | Research Methodology