Arnav Patil

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Summary

Interested in computer hardware (**FPGAs and digital electronics/ASIC design**) and **artificial intelligence/machine learning**. Competent in **Python, C++, MATLAB, and Verilog**. Experience in designing digital hardware systems and ML cloud computing platforms. Interested in student research positions.

Education

University of Toronto Sept 2023 – Apr 2027

BASc. in Electrical and Computer Engineering *Toronto, ON*

- **CGPA: 3.53/4.00 with recognition on Dean's Honours List**
- **Double Minor in Artificial Intelligence and Engineering Business**
- **Extracurriculars:** IEEE University of Toronto, UofT Machine Intelligence Student Team, Engineering Society

Technical Skills

Languages & Tools: **C/C++**, **Verilog**, **Python** (NumPy & pandas), MATLAB, Git, LaTeX
Hardware Courses: **Digital Systems**, **Field-Programmable Gate Arrays**, Electronics, AC/DC Circuit Analysis
Software Courses: **Object-Oriented Programming**, Software Design, Computer Fundamentals

Experience

ML Compute Platform Developer Sept 2024 – Ongoing

University of Toronto Machine Intelligence Student Team *Toronto, ON*

- Developing a compute platform for UTMIST to optimize ML jobs using **GPU accelerated cloud computing**.
- Working with a team of compute and full-stack developers to **deploy the platform** and establish **monthly feature release cycles**.

Sustainability Director Apr 2024 – Ongoing

University of Toronto Engineering Society *Toronto, ON*

- **Oversaw 7+ projects** to achieve directorship goals, from launching a student body-wide **Sustainability Policy** to divesting design teams from fossil fuel sponsors, and reducing the Engineering Society's footprint.
- **Organized** a research team to conduct a study of the Engineering Society's and Faculty's historical and present carbon footprint and practices, and collecting student voices for sustainability in the curriculum.

Selected Projects

Blackjack Implementation on an FPGA Oct 2024 – Ongoing

- Developed a digital blackjack game using finite state machines **(FSMs)** on a DE1-SoC FPGA, handling **complex game states** such as dealing, betting, and scoring in real-time to **simulate card-counting experience**.
- Optimized FPGA resource utilization by efficiently **mapping game logic to FSMs** and employing use of **off-chip SRAM memory**, achieving smooth and responsive gameplay with **minimal latency**.
- Integrated PS/2 keyboard and VGA monitor as **input/output interfaces**, facilitating real-time user interactions and graphical display output. Designed an **intuitive and responsive interface** directly on the FPGA.

Deep Learning Framework with NumPy | Neural Network from Scratch May 2024 – Jun 2024

- Created a modular deep learning neural net framework from scratch using NumPy, and documented mathematical derivations of **forward pass**, **gradient descent**, and other relevant mathematical components.
- Solved the XOR using a network with two linear layers with **ReLU activation & MSE backprop** functions.

Personal Website | Personal Portfolio Website Jun 2024 – Ongoing

- Customized a Hugo theme to **create a static portfolio website**, showcasing coursework and achievements.
- Deployed the site on GitHub Pages using a **continuous development pipeline** integrated into the repository through **GitHub Actions**, which automatically rebuilds and redeploys the site after each push.
- Integrated **Google Analytics 4** into the site to track insights and analyze which course pages are most popular.