Siddhant Chaurasia

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Education

Binghamton University, State University of New York May 2024
Master of Science in Electrical and Computer Engineering *CGPA: 3.90/4.00*

Manipal University Jaipur May 2022
Bachelor of Science in Electronics and Communications Engineering *CGPA: 7.29/10.00*

Relevant Coursework: Digital Signal Processing (with Lab), Computational Tools, Mathematical Methods in EE, Neural Network & Deep Learning, Data Structures and Algorithms Using C++, Embedded & Real-Time Operating Systems, Computer Organization & Architecture, Digital System Design & HDL (with FPGA Focus), Analog & Digital Communication

Technical Skills

Programming Languages: C, C++, Python, MATLAB, Bash Scripting, Verilog
Frameworks & Tools: FreeRTOS, Embedded Linux, GIT/GitHub, JIRA, MATLAB/Simulink, PyTorch, TensorFlow
Design & Development: DSP Algorithms, Embedded Systems, Hardware Interfaces
Engineering Tools & Instrumentation: Xilinx Vivado, Oscilloscopes, JTAG, Linux/UNIX Command Line, AutoCAD Electrical, Cadence
Proficiencies: Digital Signal Processing, Firmware Development, Software Integration, Real-Time Systems

Professional Experience

Research Assistant July 2024 - Present
Binghamton University | Python, Image Processing, Security Testing *Remote*

- Developed **Python**-based image byte manipulation techniques to bypass cryptographic checks in C2PA standards.
- Identified and analyzed a date-handling vulnerability, applying systematic testing to support ongoing exploitation efforts.

Machine Learning Intern May 2022 - Nov 2022
IOTA Informatics Pvt Ltd | Python, PyTorch, Neural Network *Bhopal, India*

- Built a convolutional neural network model using **PyTorch** for handwritten character recognition in medical notes.
- Increased recognition precision to 91% by applying **OCR-specific preprocessing techniques** and optimizing the model through cross-validation.

Project Trainee (Internship) Jan 2022 - May 2022
Indian Space Research Organization | Microwave Engineering, Ansys HFS *Ahmedabad, India*

- Modeled and simulated a **square coaxial 4-way power divider** for a 2 GHz phased array antenna using **Ansys HFSS**.
- Achieved equal signal split and precise quadrature phase differences across output ports, enabling efficient circular polarization for the antenna.

Projects

Generative Denoising for Medical Image Reconstruction | *Python, PyTorch, Diffusion Models, Image Processing*

- Developed and trained a conditional **score-based diffusion model** (VP-SDE with U-Net/Attention) in **PyTorch** to reconstruct clean medical CT patches from noisy inputs ($\sigma_n = 0.3$) using the OrganAMNIST dataset.
- Achieved a **+2.44 dB PSNR improvement** by utilizing a combined loss function (MSE + frequency-domain L1), effectively removing noise while preserving anatomical details in the reconstructed images.

Speech Recognition with Bidirectional LSTM | *Python, PyTorch, DSP, Audio Processing*

- Built a **bidirectional LSTM** model for speech recognition, processing audio spectrograms (n_fft=512, n_mels=128).
- Optimized with Adam (lr=1e-3), achieving 97.89% test accuracy; outperformed SGD through parameter sensitivity analysis.

Real-Time DSP for Noise Suppression | *C++, MATLAB, DSP, Embedded*

- Designed and implemented a noise suppression algorithm using **adaptive filtering (LMS)** on an **ESP32** microcontroller, reducing background noise in voice recordings by 8-10 dB.
- Validated performance through **MATLAB** simulations and real-time testing, demonstrating improved voice clarity.

FPGA-Based Matrix Multiplier for AI Acceleration | *Verilog, Vivado, Computer Architecture*

- Built and fine-tuned a **4x4 matrix multiplier** on a Basys 3 FPGA, achieving real-time performance through **UART-based I/O**.
- Reduced computation latency and optimized FPGA resource usage by pipelining the second-level loop of the matrix multiplication algorithm, successfully synthesizing and simulating the design in **Vivado**.

Licenses & Certifications

Embedded Systems Essentials with Arm: Getting Started (edX) Nov 2024
Skills: Embedded Systems, C++, Embedded C, ARM Cortex-M, Mbed

GitHub Foundations (GitHub) Feb 2025
Skills: GIT, Version Control