MANAS GANDHI

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EDUCATION

University of Illinois at Urbana-Champaign – Grainger College of Engineering *Expected Graduation: May 2025*
Bachelor of Science in Computer Engineering *GPA: 3.74*

- *Security Clearance Level:* Q (Top Secret)

SKILLS & COURSEWORK

Relevant Coursework: Computer Systems Engineering, Digital Systems Laboratory, Parallel Programming, Artificial Intelligence, Algorithms and Models of Computation, Data Structures and Algorithms, Intro to Robotics, Digital Signal Processing
Programming Languages: C, C++, Python, Cuda, SystemVerilog, x86, Scala, React Native, JavaScript, Solidity, Java, HTML, CSS
Tools & Technologies: Nvidia RSI, GDB, Vivado, QuestaSim, PyTorch, Ghidra, Django, React.js, Qiskit, Git, Pandas, Android Studio

EXPERIENCE

Sandia National Laboratories | *Embedded Systems Research and Development Intern* *May 2024 – Present*

- Adapted single core model of **radiation hardened** chips to a **dual core** system using **Verilog** and **C** using **i2c** for two-way communication, as well as **software tests** to ensure the dual core is functioning properly; used for radiation heavy **weapons**
- Transmitted data **bidirectionally** between chips using i2c peripheral registers and **AXI bus line**, accounting for **handshaking** between master and slave chip using interrupts, as well as debugging components using **questasim**

Sandia National Laboratories | *Embedded Systems Research and Development Intern* *May 2023 – April 2024*

- Developed firmware for quantum resistant **root of trust** on an **FPGA** board with a RISCCV compiler, using **C** to implement various crypto algorithms including **AES**, SPHINCS+, and KMAC, as well as designing a **lifecycle manager** in **Verilog**
- Benchmarked algorithms, ported on an FPGA board, through **BearSSL** and **C**, editing CMake files and designing **benchmarking algorithms** to determine what runs the fastest with and without **hardware acceleration**

Target | *Software Engineer* *June 2023 – Aug 2023*

- Engineered a **filtering system** to filter incomplete data out of a pipeline before ingestion using **Apache Spark**, **Scala**, and **Kafka**, savings of **3 petabytes** and **$500K** for Target over three years
- Upgraded existing data processing pipeline to **Apache Spark3**, elevating **processing speed** and significantly **reducing latency**

Xclusive Sports Management | *Software Engineer* *May 2022 – Aug 2022*

- Analyzed databases with 10000+ entries using **pandas** and designed AI model using **H20 GBM** to predict results of **MLB recruits**
- Built a python-based **web scraping** model using **beautiful soup** and **pandas** to scrape multiple sites for MLB pitcher data

PROJECTS

Custom Linux-based Operating System | *Computer Systems, x86, C*

- Created a **Linux-based operating system** from scratch with functionalities including an interrupt descriptor table, global descriptor table, system calls, **video-mapping**, EXT2 filesystem, and **virtualization/paging** support for user and kernel-specific tasks.
- Scripted **hardware drivers** for the Programmable Interval Timer, Real-Time Clock, Intel 8259 Programmable Interrupt Controller, Ps/2 Keyboard, and mouse to interface with the operating system
- Implemented Round-Robin **scheduling**, running 3 independent terminals with **6 processes** running concurrently between terminals
- Developed **system calls** for executing and halting processes, along with **assembly linkage** for system calls and interrupts

FPGA-based 16-bit Microprocessor | *Embedded Systems, FPGA, SystemVerilog*

- Engineered custom microprocessor with **CPU**, **SRAM memory**, and **I/O interfaces**, capable of running algorithms like bubble-sort
- Conceived **instruction set** with LDR, STR, JMP, and bitwise operations with **opcode management** via **decoding** and **FSM** logic
- Devised **memory management** system using FPGA's **2700Kb on-chip memory** for data storage and device memory I/O functions

Reinforcement Learning with Policy Gradient Methods | *Artificial Intelligence, PyTorch, PPO*

- Developed reinforcement learning algorithms through **policy gradient methods** such as **Proximal Policy Optimization**, future returns, and advantage estimation using **PyTorch** and Python to test on OpenAI gymnasium environments
- Created **value network** to estimate state value functions and **reduce variance** of policy gradient estimates, enhancing **efficiency**

INVOLVEMENT

Disruption Lab | *Quantum Computing Engineer*

- Researched implementation of **quantum gates**, **Fourier transformations**, and other quantum computing concepts to create a research paper to help the client better understand quantum computing applications to classical options pricing models
- Leveraged **Qiskit** and **qBraid** to implement a quantum based Monte Carlo options pricing model, accurate to **3 decimal points**