Swarup Majumder

US Citizen | 217-607-3792 | swarupm2@illinois.edu | linkedin.com/in/swarup1 | swarupm3.github.io

Education

University of Illinois at Urbana-Champaign GPA: 3.72/4.00

Bachelors of Science in Computer Engineering *Graduation: May 2027*

Relevant Coursework: Data Structures and Algorithms (**C++**), Operating Systems (**C, RISC-V, UART**), FPGA Lab (**SystemVerilog, AXI, SPI**), GPU Parallel Programming (**CUDA**), Digital Signal Processing, Analog Signal Processing, Advanced Probability

Experience

Systems Programming Course Staff Aug 2025 – Present

University of Illinois at Urbana-Champaign *Champaign, IL*

- Mentored 30+ students weekly, providing technical feedback for **C**, **C++** and **Assembly** projects

Undergraduate Research Assistant May 2025 – Present

Parasol Lab, University of Illinois at Urbana-Champaign *Champaign, IL*

- Benchmarked **C++** STAPL and STL algorithm runtimes across 64 samples (99% Confidence Interval)
- Enabled multi-GPU STAPL execution using **C++** and **CUDA**, achieving 100x speedup over CPU base
- Streamlined compilation, linking and execution for 25+ **MPI** configurations via **Bash** and **Linux** tools
- Automated data visualization using **Python** to graph runtime metrics, accelerating algorithm analysis

Robotics Software Mentor/Lead Dec 2022 – Aug 2024

FIRST Robotics Competition Team 4096 *Champaign, IL*

- Used **CAN** bus to control 30+ motors across 8 subsystems, enabling reliable low-latency communication
- Deployed computer vision **AI** object detection to provide operator feedback, reducing cycle times by 30%
- Managed **Git** workflows to ensure effective parallel development among 7 software team members

Projects

Camera Vision Pipeline on FPGA | *SystemVerilog, RTL Design, I2C, Vivado* Nov 2025 – Dec 2025

- Designed real-time camera video streaming pipeline in pure **RTL**, achieving sub-microsecond latency
- Initialized 40 camera registers via **I2C** with a custom **SystemVerilog** controller for stable color output
- Implemented filters and UV thresholding in **SystemVerilog** with line buffers for seamless edge detection
- Integrated **Vivado** XADC IP-based brightness dial with 128 discrete levels for precise luminance scaling

Interactive Thermometer | *Oscilloscope, Multimeter, Circuit Design* Feb 2025 – May 2025

- Built a temperature measurement circuit with op-amps and comparators, supporting a range of 0–99 C
- Designed an analog-to-digital stage to drive 7-segment displays showing temperature and user thresholds
- Verified signal integrity, temperature, and threshold accuracy using an **Oscilloscope** and **Multimeter**

24-Hour Clock | *Arduino IDE, C++, Circuit Design* Feb 2025

- Built an Arduino-based 24-hour clock using **C++** to display time with precise minute-level accuracy
- Implemented multiplexed control for 4x7-segment displays, reducing I/O to 11 pins with 4 ms cycles
- Integrated a potentiometer interface converting analog input to time values for real-time calibration

Skills

Programming: C, C++, SystemVerilog, Verilog, Python, CUDA, Bash, Java
Protocols/Interfaces: I2C, UART, SPI, CAN, AXI-4 Lite
Tools: Git, Linux, GDB, Vivado, MPI, NVIDIA NSight, Docker
Hardware: Oscilloscope, Logic Analyzer, Function Generator, Multimeter, Soldering