ARJUN YADAPADITHAYA

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PROFESSIONAL EXPERIENCE

Research Engineer

Illinois Institute of Technology, Chicago, IL — January 2024 - Present

- Designed custom PCBs in KiCAD and assembled a low-cost steam trap monitoring system, integrating multiple thermocouples, piezoelectric accelerometers, and an ARM Cortex-M0 based microcontroller for precision diagnostics.
- Optimized system firmware for seamless hardware integration, set up test points, and used oscilloscopes and logic analyzers for testing and debugging SPI and I2C communication.
- Automated data collection and logging with InfluxDB and dashboard powered by Grafana for real-time monitoring of system nodes and gateways leveraging sub-Ghz technology, ensuring efficiency and scalability.

Senior Software Engineer

Capgemini, Bengaluru, India — August 2021 - August 2023

- Streamlined backend with efficient data structures to improve speed and reduce memory usage, addressed 2 PRs daily, worked with cross-functional teams and introduced features to enhance functionality and user experience.
- Transitioned deployment processes from Jenkins to Rancher for efficient container management, supporting virtualization and enabling scalability across multiple systems in a hybrid environment.
- Scripted backend processes to parse complex XML files and convert to Excel sheets, decreasing manual operation time by 25% and improving workflow efficiency in server and network system evaluations.

PROJECTS

Architectural Exploration of Dynamic Branch Predictors — January 2025 – April 2025

- Designed and coded three correlated dynamic branch predictor microarchitectures (gpredict, gselect, gshare) within strict hardware constraints (4-bit GHR, 16-entry BHT) to optimize instruction-level parallelism.
- Conducted architectural trade-off analysis between aliasing and history depth; demonstrated how "gselect" indexing reduced collision mispredictions by segregating inner/outer loop branches in distinct BHT banks.
- Developed a universal Verilog testbench and a custom Python script to generate a 6,000-line nested-loop trace, verifying correct counter saturation and prediction timing via ModelSim waveform analysis.

Smart Energy Meter — March 2024 – Present

- Engineered a data-sniffing system by interfacing with op-amp LM2902 of a Kill-A-Watt device, converting raw analog signals into current, voltage, and power values leveraging linear regression to achieve accurate real-time calculations of energy usage.
- Implemented an ESP32-based solution to log data via Wi-Fi, transferring energy consumption data to a database for continuous monitoring, analysis, troubleshooting and insights on Grafana.

Battery Operated Radiator Control — October 2023 - Present

- Architected C++ firmware for a retrofit IoT controller, implementing robust error handling and packet recovery protocols for the RFM69HCW transceiver to ensure reliable sub-GHz communication.
- Utilized Watchdog Timer (WDT) interrupts to manage deep-sleep cycles, significantly reducing active duty cycle and extending battery life while maintaining periodic telemetry uploads to InfluxDB.
- Achieved 74% cost savings in energy consumption by systematizing temperature control and reducing electricity usage.

EDUCATION

Illinois Institute of Technology, Chicago, IL — May 2025

Ms, Electrical and Computer Engineering, GPA: 3.9 / 4.0

- Courses: Digital Signal Processing, OOPS and ML with C++/Python, Hardware Software Co-design, Computer Vision & Image Processing, Hardware Security and Advanced Computer Architectures, Cloud Computing & Native Systems, Elements of Smart Grid.

Nmam Institute of Technology, Karnataka, India — June 2021

Be, Electronics and Communication Engineering, GPA: 3.7 / 4.0

- Courses: VLSI Circuits, FPGA Design, PIC & ARM MCU, Embedded Systems, Data Structures and Algorithms using C++, AEC, DEC.

SKILLS

- **Languages:** C, C++, Python, SQL, MATLAB, Verilog.
- **Technologies & Tools:** Linux, FreeRTOS, LTSpice, Docker, PCBA, Sigma Studio, CCS, Git, PyTorch, TortoiseSVN, Grafana, Flask, MongoDB, Jenkins, Rancher, Angular, Raspberry Pi, Wi-Fi, Bluetooth, SPI, UART, I2C.

ACHIEVEMENTS

- Winner of Kaplan Pitch Tank 2024; secured $30,000 in funding for BORC, a smart radiator attachment automatically adjusts temperature based on user preferences. Recognized for innovation, technical feasibility, and market potential.
- Completed Linux Device Driver Programming certification from CoreEL Technologies in Apr 2025.