Balaji Venkatesh

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Skills

Software: C, C++ Java, Python, Assembly, Node.js, Scripting, Web Development, AI/ML
Digital Hardware: Verilog, HLS, AMD/Intel/AWS FPGA
Electronics: Microcontrollers, PCB design, Prototyping
Professional: Research, Collaboration, Management, Problem-solving

Research Assistantship

Belief Propagation Accelerator, supervised by Professor Mark Jeffrey
University of Toronto, Canada, Sep 2023 - Apr 2024
• Built a hardware accelerator for the residual belief propagation algorithm on AWS FPGA
• Researched task-based speculative parallelism
• Implemented hardware designs with HLS and Verilog and programmed with C for RISC-V
C, HLS, Verilog, AWS FPGA, Scripting

Multi-FPGA Matrix Multiplier, supervised by Professor Paul Chow
University of Toronto, Canada, May 2023 - Aug 2023
• Conceptualized hardware accelerator for very large matrix processing over networked FPGAs
• Designed accelerator cores in Verilog/HLS, and then programmed application software in C
• Tested easyDMA direct memory interface using AXI streams
C, HLS, Verilog, AMD FPGA

Doppler Radar Simulator Improvements, supervised by Professor Ravi Adve
University of Toronto, Canada, May 2021 - Sep 2021
• Improved a simulator for training a doppler radar neural network in MATLAB
• Collaborated with an international research team based in Canada and the UK
• Wrote image processing scripts in Python
MATLAB, Python, AI/ML

Internship

Altium Education Platform Developer
Altium Limited, USA/Remote, Mar 2021 - Mar 2023
• Developed web platforms and curriculum for PCB design courses
• Integrated services together with open-source libraries
• Worked with an international team of developers, designers, and teachers
• Presented to over 200 students and industry leaders at the IPC APEX Expo (Jan 2022, 2023)
Node.js, Web Development

Education

Bachelor of Applied Science in Engineering Science with Honours
Major in Electrical & Computer Engineering
University of Toronto, Canada, Sep 2020 - Apr 2024
• Computer Architecture, Computer Systems Programming (*C, C++*)
• Digital and Computer Systems, Computer Organization (*Intel FPGA, Assembly*)
• Internetworking, Computer Networks I & II
• Cumulative GPA of 3.54/4, 4th-year GPA of 3.9/4
• Dean's Honour List: 2020F, 2021W, 2021F, 2022W, 2023F, 2024W
• Undergraduate Summer Research Program Dean's Pivot Fellowship Award (Sep 2021)

Implementing and Administering Cisco Solutions
Cisco U, Remote, Nov 2024 - Feb 2025
• Install, operate, configure, and verify basic IPv4 and IPv6 networks
• Configure network components, such as switches, routers, and wireless LAN controllers
• Manage network devices and identify basic security threats
• Describe and define network programmability, automation, and software-defined networking

Volunteer Experience

Computer Systems Administrator / Webmaster
University of Toronto Engineering Society, Canada, May 2022 - May 2024
• Administrated cloud storage, emails, and websites for over 50 UofT Engineering Society design teams, clubs, and associated organizations
• Modernised legacy computing equipment and migrated to cloud services
• Managed an office network
Node.js, Scripting, Web Development

Electrical Team Member
University of Toronto Robotics for Space Exploration, Canada, May 2022 - Aug 2022
• Conceptualized a circuit board for space rover peripheral power control
• Implemented the neopixel protocol to control LEDs
• Designed PCB using Altium Designer
PCB Design, Prototyping, Microcontrollers

Head Mentor and Director
Markham Community FIRST Robotics Club, Canada, Jun 2017 - Jun 2024
• Managed finances for a not-for-profit corporation
• Mentored youth in business strategy, mechanical design, software programming
• Fostered team leadership
• Planned outreach events and proposing sponsorships to local businesses
Java, Python, Prototyping

Publications

Accelerating Belief Propagation with Task-Based Hardware Parallelism
Balaji Venkatesh, Leo Han, and Mark Jeffrey
IEEE Canadian Conference on ECE, Vancouver, Canada, May 2025
• Created belief propagation accelerator on AWS F1 FPGAs
• Under review
C, HLS, Verilog, AWS FPGA, Scripting

Automation of Thermal Energy Storage for Homes using Artificial Neural Networks
Balaji Venkatesh
IEEE Canadian Conference on ECE, London, Canada, Sep 2020
• Developed AI controller for a thermal energy storage system
• DOI: 10.1109/CCECE47787.2020.9255680
MATLAB, AI/ML

Thermal Energy Storage for Homes (TESH)
Balaji Venkatesh
IEEE International Conference on Smart Energy Grid Engineering, Oshawa, Canada, Aug 2018
• Theorised a system to storage solar energy in thermal mass of homes
• DOI: 10.1109/SEGE.2018.8499511
MATLAB, Prototyping, Microcontrollers