Venkatakrishnan Sutharsan

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Education

Texas A&M University Dec 2024
Master of Science in Computer Engineering — ***Current GPA 3.67/4.00*** *College Station, Texas*
- **Coursework:** Computer Architecture, Microprocessor System Design, Operating System, Quantum Logic Synthesis.

Anna University Apr 2020
Bachelors of Engineering in Electrical and Electronics Engineering — ***CGPA - 8.16/10.00*** *Chennai, India*

Experience

Indian Institute of Technology, Madras Jan 2021 – Dec 2022
Project Associate *- Mentored by: Prof. Kamakoti Veezhinathan - Director, IIT Madras* *Chennai, India*
- Engineered the first boot-up of the I-Class Processor (16-stage OOO Processor) in FPGA for the Shakti Ecosystem.
- Spearheaded a team on developing Secure Boot in hardware using Cryptographic accelerators in Shakti Processor.
- Collaborated on developing Secure Hypervisor (Sec-V) for Shakti Processor which is based on RISC-V Architecture.
- Developing device drivers specific to Shakti based SoC in bare-metal programming, boot-loaders and Linux Kernel.
- Addressed students and delegates from the Government of India with demo's and workshops on various features (including security) and working of Shakti Microprocessor.

Corporeal Health Solutions Ltd. Nov 2020 – Jan 2021
Backend Web Developer *- Mentored by: Mr. Hari Haran P - CEO, Corporeal Health Solutions Ltd.* *Chennai, India*
- Optimized and created an efficient backend for AI based Healthcare Product (CHOCO) using Flask (Python).
- Overhauled the data security infrastructure in the system including databases. Remodeled the Database System.

Council for Scientific and Industrial Research - CEERI May 2019 – Jun 2020
Intern & Graduation Project *- Mentored by: Dr. Madan Kumar Lakshmanan - Senior Scientist, CSIR* *Chennai, India*
- Modeled a Deep Learning pipeline for EEG processing that achieves **90%** accuracy in cognitive stress prediction.

Projects

Implementation of FIFO based cache replacement strategy in Champsim | *C++* — Mar 2024 - May 2024
- Designed a FIFO-based cache replacement strategy in Champsim simulator (inspired from S3FIFO algorithm) using the concept of quick demotion to increase efficiency.
- Benchmark evaluation yielded a maximum improvement of **29.2%**, with an overall average improvement of **2.6%**.

Custom ISA Design for Quantum Computers | *Python, pyQuil* — Mar 2024 - May 2024
- Conducted experimental study enhancing quantum computing with custom instructions, leveraging Quil language.
- Developed instructions similar to existing instructions and more quantum-specific instructions like ADD and QFT.

Hardware Fuzzing using Beagle Bone Black | *C, C++, Makefile, TI CCS, ARM Toolchain, JTAG DP* Nov 2023 - Present
- Developed fuzzing framework on Beagle Bone Black PLC for AM335X processor using OpenOCD and GDB.
- Designed Python script to dispatch operations to board and gather coverage, which can be used for bug detection.

Implementation of "B" Standard Extension from RISC-V| *BSV, Python, CoCoTB* — Aug 2022 - Dec 2022
- Implemented the RISC-V "B" extension for bit manipulation in Shakti Microprocessor using Bluspec System Verilog.
- The implemented design was also verified using CoCoTB framework in Python and was found to be **15%** more efficient to other implementations.

EEG Signal Processing using ICA to classify Cognitive Stress | *Python, sklearn, PyTorch* May 2019 - Jun 2020
- Orchestrated an EEG signal analysis strategy using Sklearn and PyTorch to enhance human brain predictability.
- Achieved an accuracy of **90%** in developing a algorithm to determining cognitive stress.

Publications

- Sutharsan, V., et al (2022), *Electroencephalogram Signal Processing with ICA and Cognitive Stress Classification Using CNN*, Proceedings of ICRTC, Lecture Notes in Networks and Systems, vol 341. Springer, Singapore.
- Swaminathan, Alagappan & Sutharsan, Venkatakrishnan & Tamilselvi, S.. (2021). *Wind Power Projection using Weather Forecasts by Novel Deep Neural Networks.*

Technical Skills

- **Languages**: C, C++, Python, Assembly, Verilog, Bluspec System Verilog (BSV), SQLite3, PostgreSQL, Makefile, Java.
- **Libraries**: CoCoTB, PyTorch, TensorFlow, Keras (v1.0), pyQuil, Flask, NumPy, SciPy, Pandas, Matplotlib, Scikit-learn.
- **Certifications**: CAD for VLSI, Advanced DSA, Computer System Design, DL Specialization, Mathematics for ML, ML with Python, Certificate Course in Management - Great Lakes, Certified Amateur Radio Operator - Govt. of India.