

Shivam Kundan, PhD

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EDUCATION


Southern Illinois University, Carbondale | Ph.D. May 2024

Electrical & Computer Engineering

Dissertation : Resource-Optimized Scheduling for Enhanced Power Efficiency and Throughput on Chip Multi-Processor Platforms.


Southern Illinois University, Carbondale | M.S. May 2019

Electrical & Computer Engineering





Thesis : Contention-Aware & Power-Constrained Scheduling for Chip Multicore Processors

EXPERIENCE


OpenGrowth Ventures | Technology Lead
September 2024 – Present | Hybrid (Illinois, USA)

- ◇ Developed an AI-native OS for edge/personal computing using Linux kernel and NVIDIA Jetson Orin AGX, including real-time multi-modal ambient intelligence through sensor integration based on my custom [Tricorder project](#) hardware ([startup website](#) )
- ◇ Designed FPGA-based Mathematical Processing Units (MPUs) for making our multimodal ambient intelligence operations more power efficient.

Southern Illinois University | PhD Research Assistant, Embedded Systems Lab
January 2018 – May 2024 | Carbondale, IL

- ◇ Developed a machine-learning approach for improving performance-per-Watt on Samsung Exynos 5422 Octa SoC with big. LITTLE ARM architecture ([paper](#)  [video](#) )
- ◇ (With Intel Corp.) Developed & published priority-aware scheduling strategies achieving performance within 0.2%–14% of hardware-assisted methods on x86 ([paper](#) ) and resource-pressure aware schedulers using Intel CMT improving performance by 16% to 40% vs. Linux baseline. ([paper](#) )

PROJECTS

Sun Tracking Astronomical Clock [video](#) 

See the exact positions of sun and earth for any given time of day and day of the year. Visualizes altitude, azimuth, distance, speed, and more. Accurate to the minute, without needing any external communication. RP2040 MCU on a Pi Pico board, C, custom-designed 2-layer PCB.

Ridiculously Advanced Tricorder [video1](#)  [video2](#) 

The most advanced *Tricorder* device from *Star Trek* yet implemented. If you ever ask yourself “*is the sky redder at sunset?*”, “*how clean is my air?*”, “*how bright is my TV?*”, “*how busy are the airwaves?*”, and seek the answer in real-time, beautifully visualized 18-bit color, then this is the device for you. ESP32 MCU & RaspberryPi 4, 15+ sensors, 4x custom PCBs, written in C & Python.

MIPS Pipelined CPU on AMD Artix-7 FPGA [code](#) 

32-bit, 5-pipeline-stage MIPS CPU implemented on an Artix-7 FPGA embedded on a Digilent Basys 3 development board. Verilog & Xilinx Vivado Design Suite.

X86 Profiling & Scheduler Development Tool [code](#)  [documentation](#) 

A runtime system that allows for rapid prototyping of resource-aware scheduling methodologies directly from user space on x86 processors. Handles memory management, signal handling, creation & termination of programs, and collection and analysis of experimental results. C with embedded assembly.

SKILLS

Languages

C • Python • Verilog • C++
MIPS & ARM Assembly • Bash • R

Tools & Software

Xilinx Vivado • Cadence Virtuoso • VCS
Git • CMake • GDB • MATLAB •
LaTeX

RESEARCH PROJECTS

Heterogeneity-Aware Scheduling on Asymmetric Chip Multicore Processors





Aug '20 – May '21

NSF I/UCRC CES, SIU

Partners: Intel Corporation

Explored/published workload migration strategies and energy-performance trade-offs on heterogeneous cores

SELECT PUBLICATIONS

- ◇ **IEEE ISCAS '20**
A Machine Learning Approach for Improving Power Efficiency on Clustered Multi-Processor System
[Paper](#)  [Video](#) 
- ◇ **Comp & Elec Eng. Vol 90 '21**
Online frequency-based performance and power estimation for clustered multi-processor systems 
- ◇ **IEEE ISCAS '21**
Priority-Aware Scheduling Under Shared-Resource Contention on Chip Multicore Processors 
- ◇ **ACM TACO '22**
A Pressure-Aware Policy for Contention Minimization on Multicore Systems 