Modeling and simulation of Power Consumption on Heterogenous CPU Cores under varying workloads and operating conditions

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***Abstract*—This document serves as phase-1 report for E0-240 - Modeling and Simulation course project delivery. The main objective of this project is to apply concepts learned in E0-240 course in to Modeling and simulation of a real-world system, which in this case is Multi-core, Heterogenous CPU. This project, will focus on developing a Power Consumption Model for simulated Full-System [1] under varying workloads. This model will be developed taking in consideration various operating conditions of the CPU such as Dynamic Frequency Scaling, Heterogenous Cores [2]**

***Index Terms*—Modeling, simulation, heterogenous CPU cores, power consumption**

I. Background

II. Data Gathering

test

III. Phase-2 Observations and Results

test

IV. Discussion on Phase-2 outcomes

V. Next Step

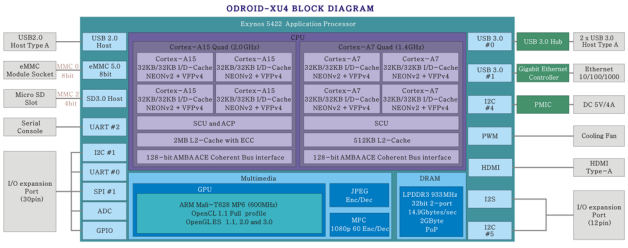

Fig. 1. ODroid XU4 board overview

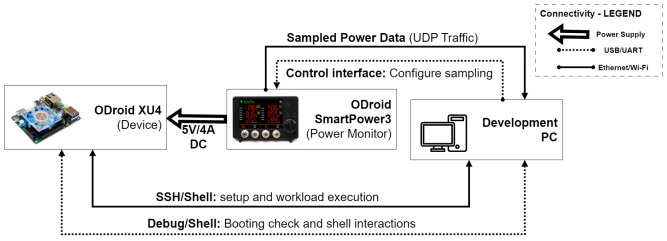

Fig. 2. Experiment setup for power data gathering from actual hardware

TABLE I
List of workloads being used for data gathering and validation

Workload Type	Workload Details	
	***W*orkloads**	***Status***
Stress Test	stress command [3]	✓
Video Encoding	ffmpeg encode [x]	✓
File Compression	gzip, bzip2, xz compression on datasets [x]	✓
Benchmark Suite	SPEC2017 [x]	Planned

References

[1] A. Akram and L. Sawalha, "A survey of computer architecture simulation techniques and tools," *IEEE Access*, vol. 7, pp. 78 120–78 145, 2019.

[2] A. Inc., ""big. little technology: The future of mobile", white paper," ONLINE, 2013. [Online]. Available: https://www.arm.com/

[3] A. L. Wiki, "Stress testing," ONLINE, Aug 2023. [Online]. Available: https://wiki.archlinux.org/title/Stress_testing