Paper-Reading-Group

POET: A Portable Approach to Minimizing Energy Under Soft Real-Time Constraints

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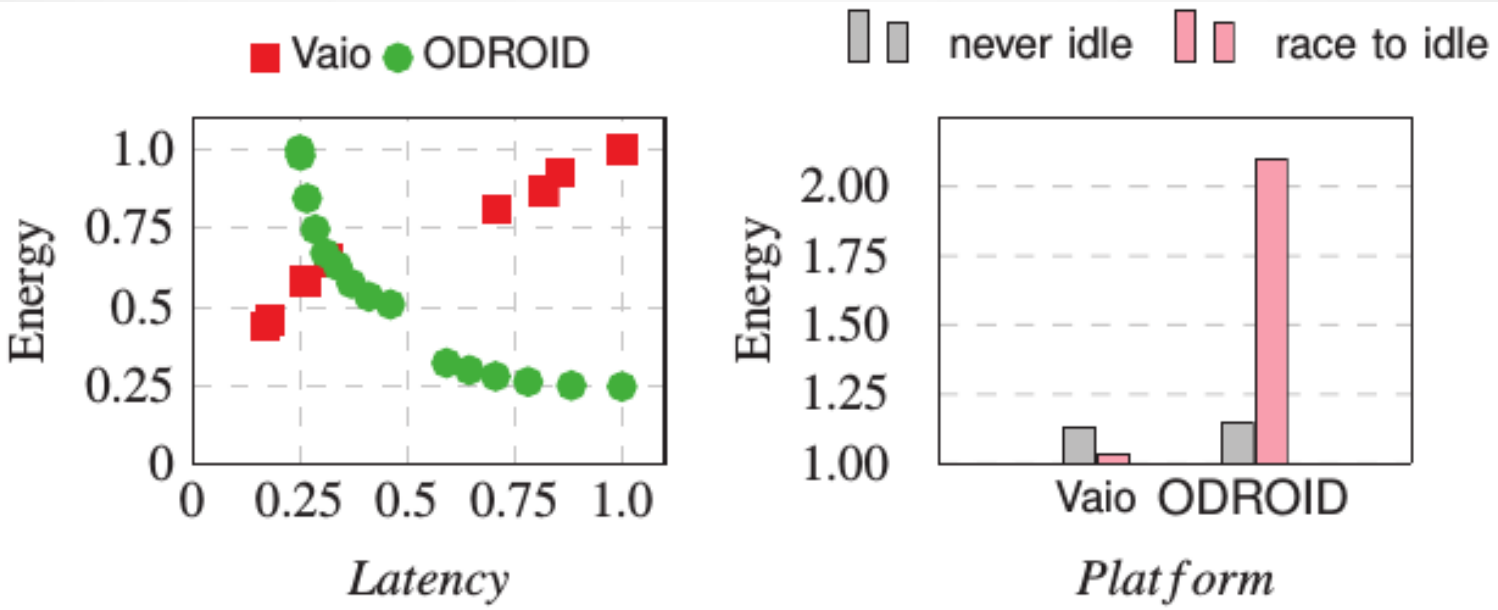
Goals

- Library & Runtime to
  - easily extend applications not designed for energy or latency awareness
  - provide predictable latency guarantees
  - reduce energy consumption compared to simple DVFS schemes
  - provide adaptable system tuning for applications with distinctive phases

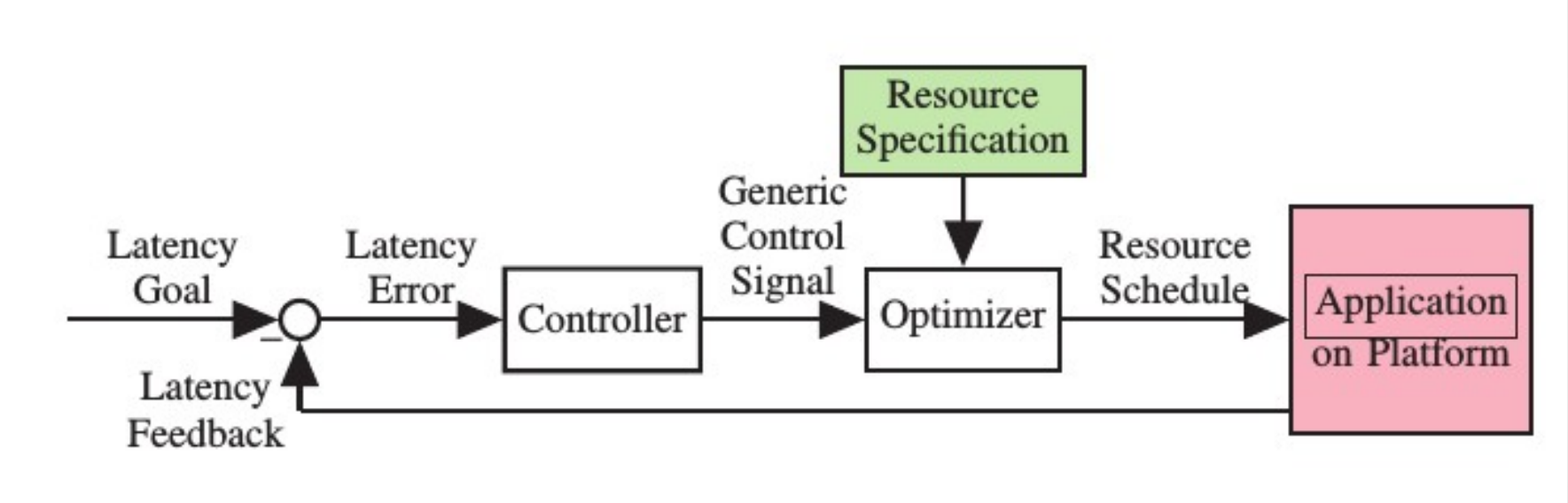
Motivation



(a) Energy/Latency Tradeoffs (b) Energy Consumption

Fig. 1: Energy/latency tradeoffs.

POET Basics


Resource Specification
Generic Control Signal
Latency Goal
Latency Error
Controller
Optimizer
Resource Schedule
Application on Platform
Latency Feedback

Key Mechanics

- Speedup based system configurations (“system agnostic”)

#id	speedup	powerup
0	1	1
1	1.20	1.09
2	1.40	1.16
3	1.60	1.30
4	2.12	1.35
5	2.53	1.50
6	2.88	1.64
7	3.18	1.69

#id	frequency	cores
0	250000	0
1	300000	0
2	350000	0
3	400000	0
4	250000	1
5	300000	1
6	350000	1
7	250000	2

Fig. 3: Example of POET system-agnostic (left) and system-specific (right) configuration files.

- Find speedup required to meet latency goal

Evaluation

TABLE II: System configurations.

	Resource	Settings	Max Speedup
Vaio	cores	2	1.81
	core speeds	11	2.72
	hyperthreads	2	1.10
ODROID	big cores	4	6.10
	big core speeds	9	1.97
	LITTLE cores	4	3.94
	LITTLE core speeds	8	2.40

TABLE III: System power characteristics.

System	Idle Power	Min Power	Max Power
Vaio	2.50 W	3.04 W	8.05 W
ODROID	0.12 W	0.17 W	8.14 W

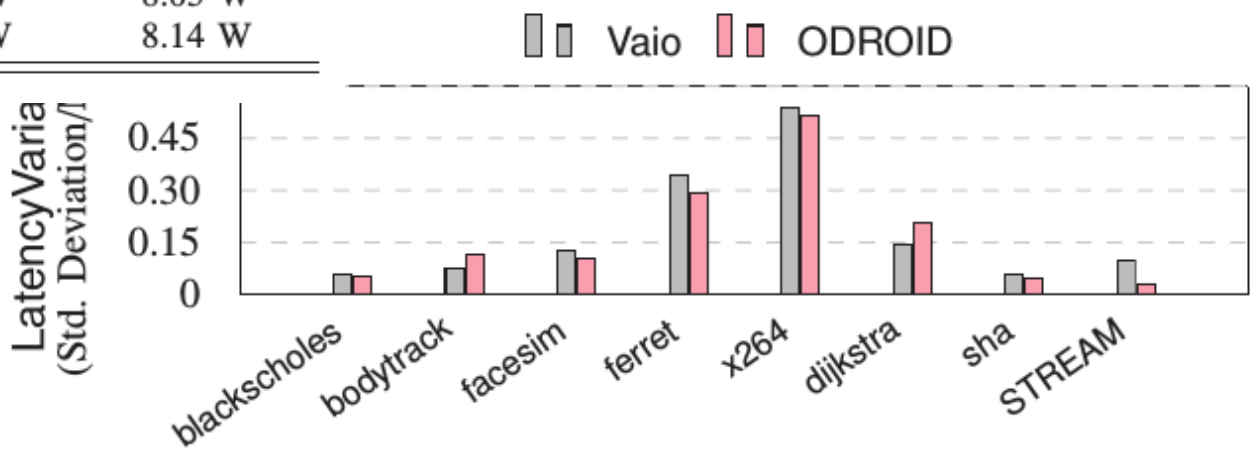
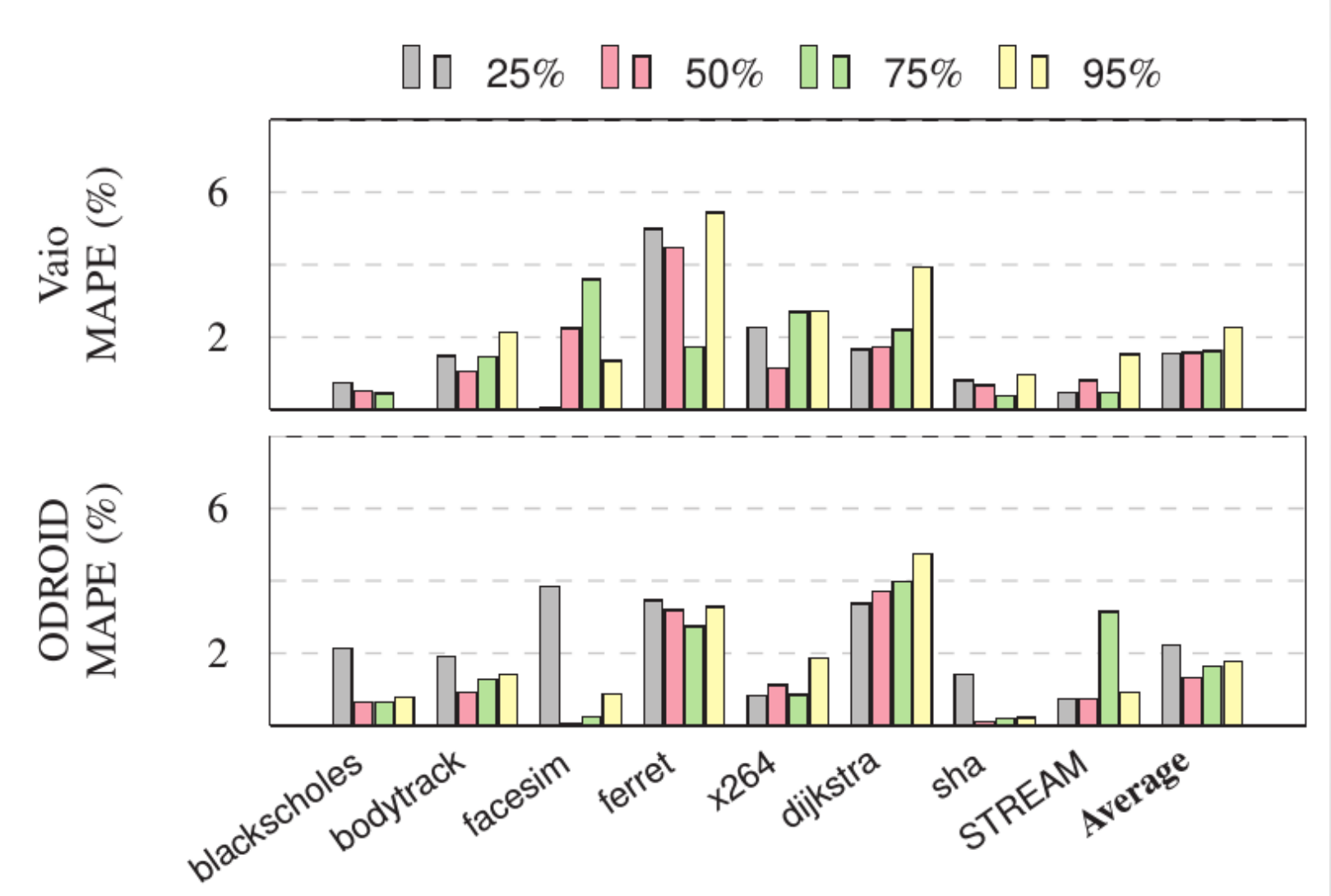
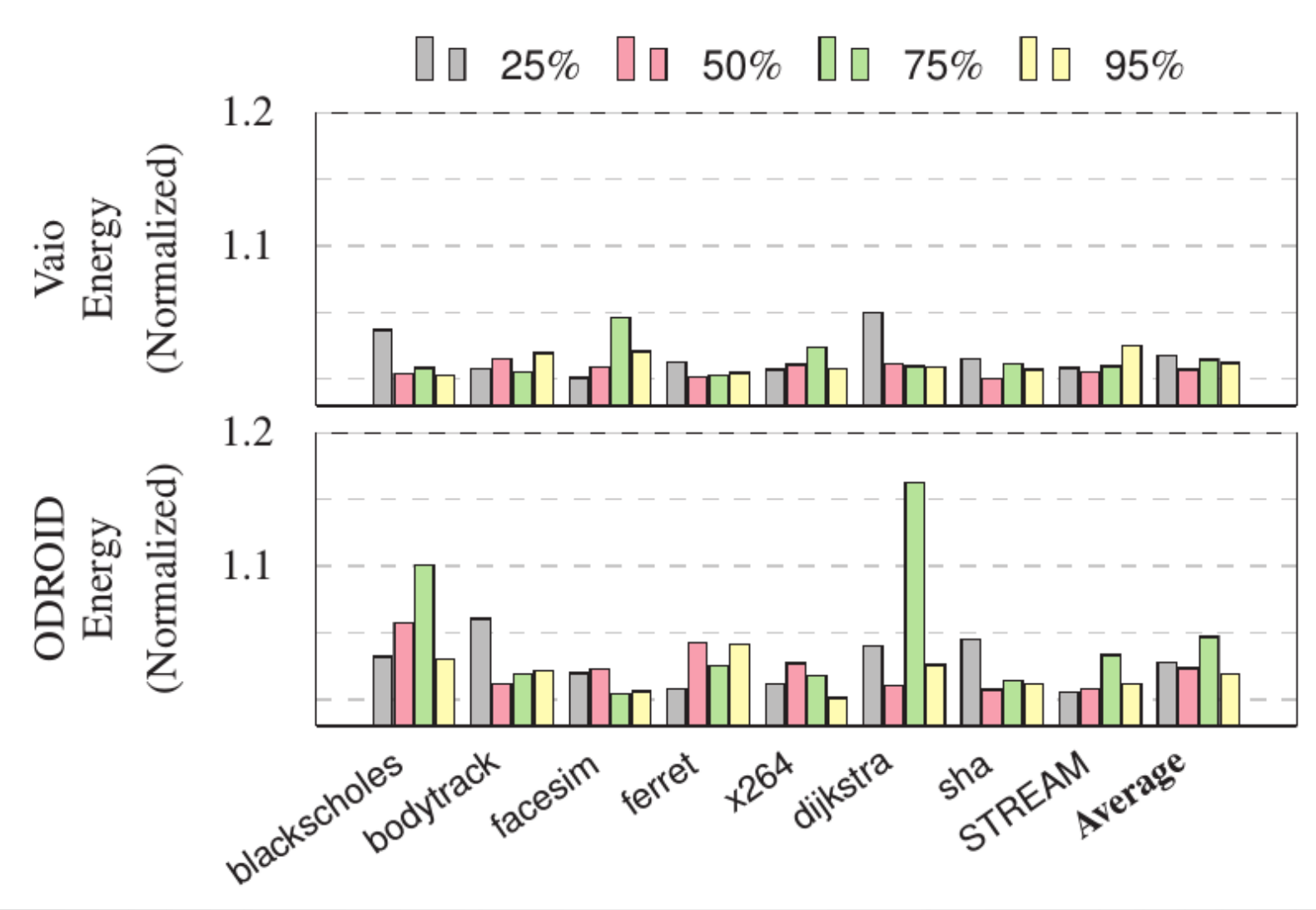


Fig. 4: Application Latency Variability.

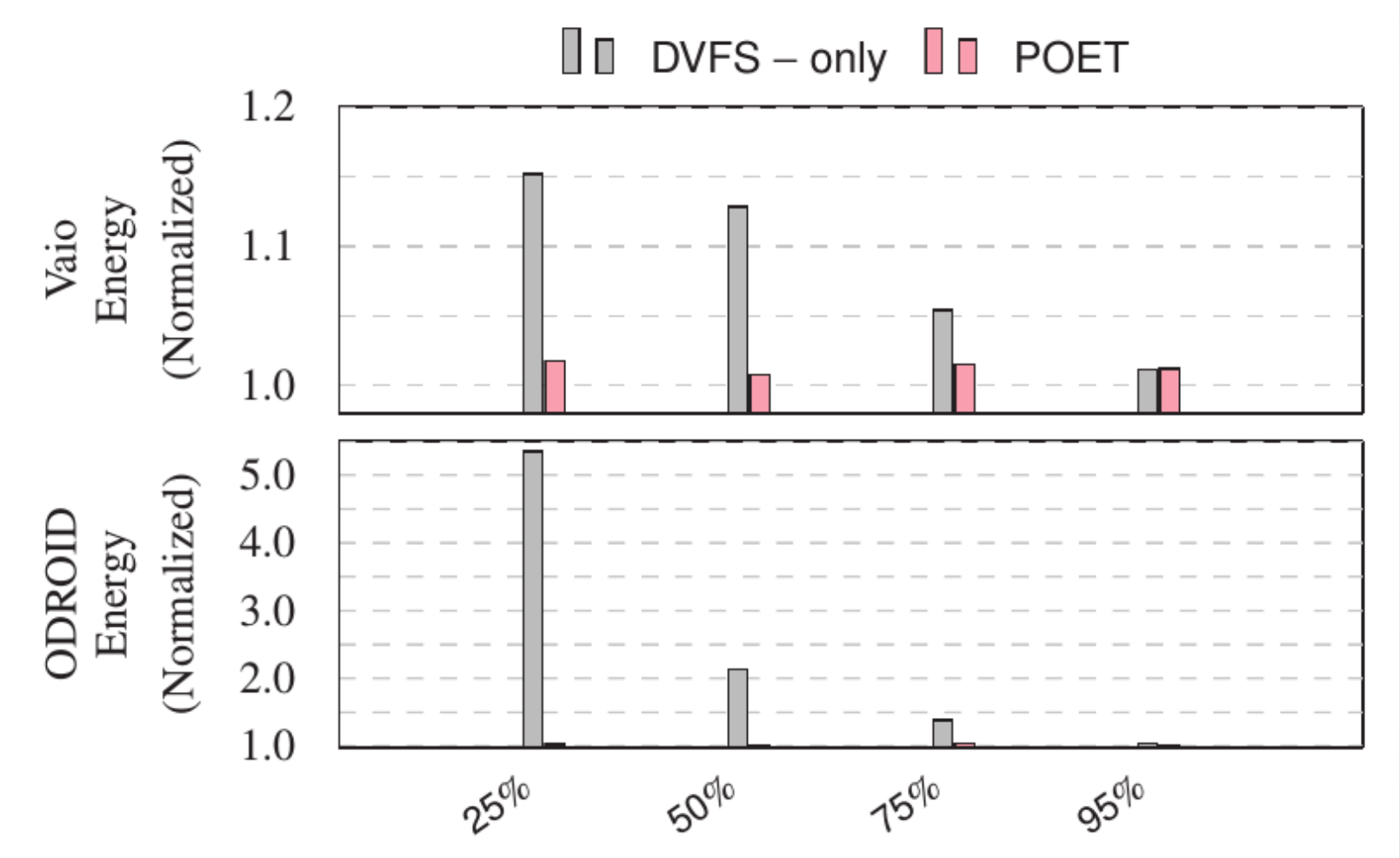
Evaluation – Latency Error



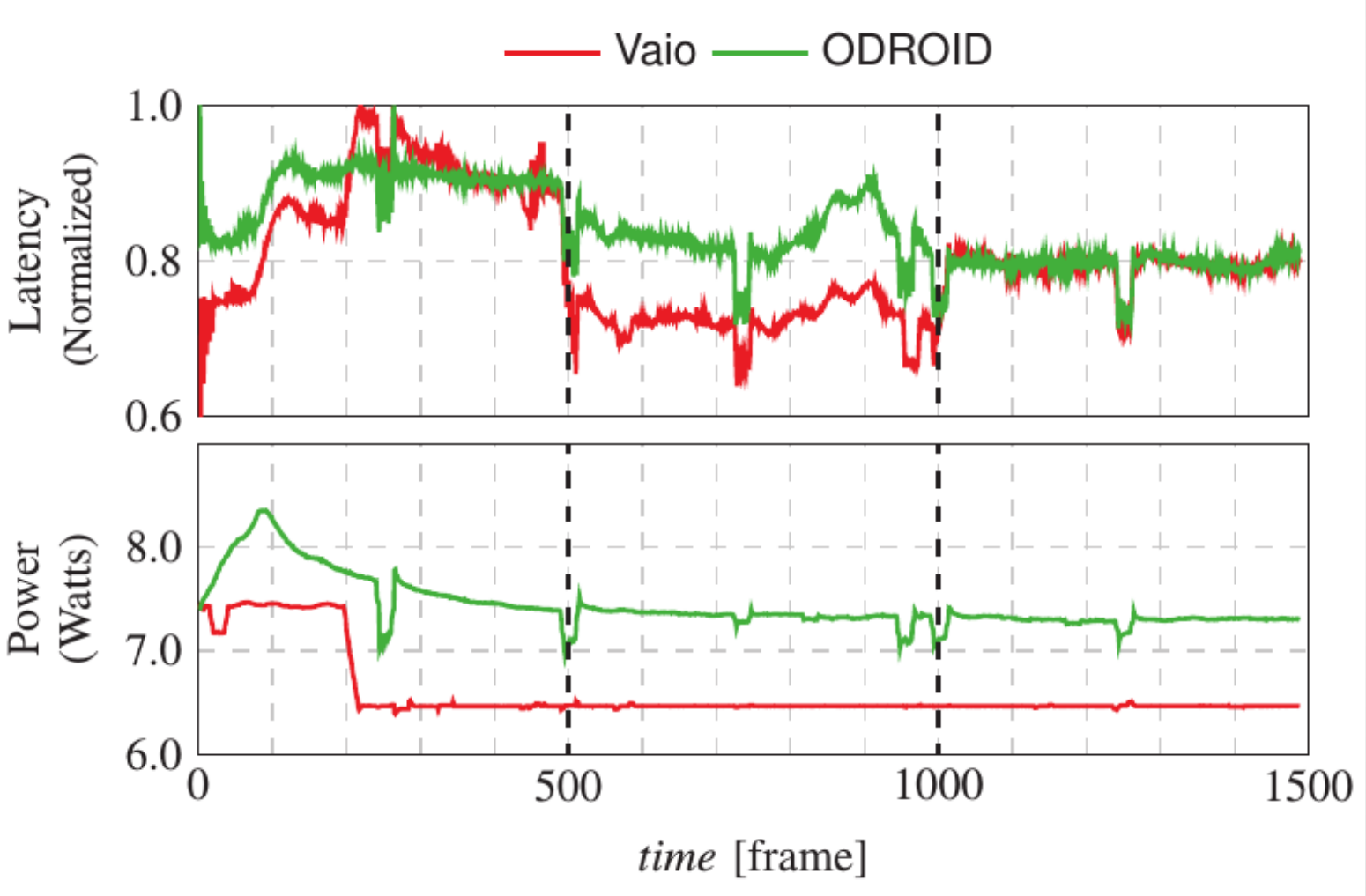
Evaluation - Energy



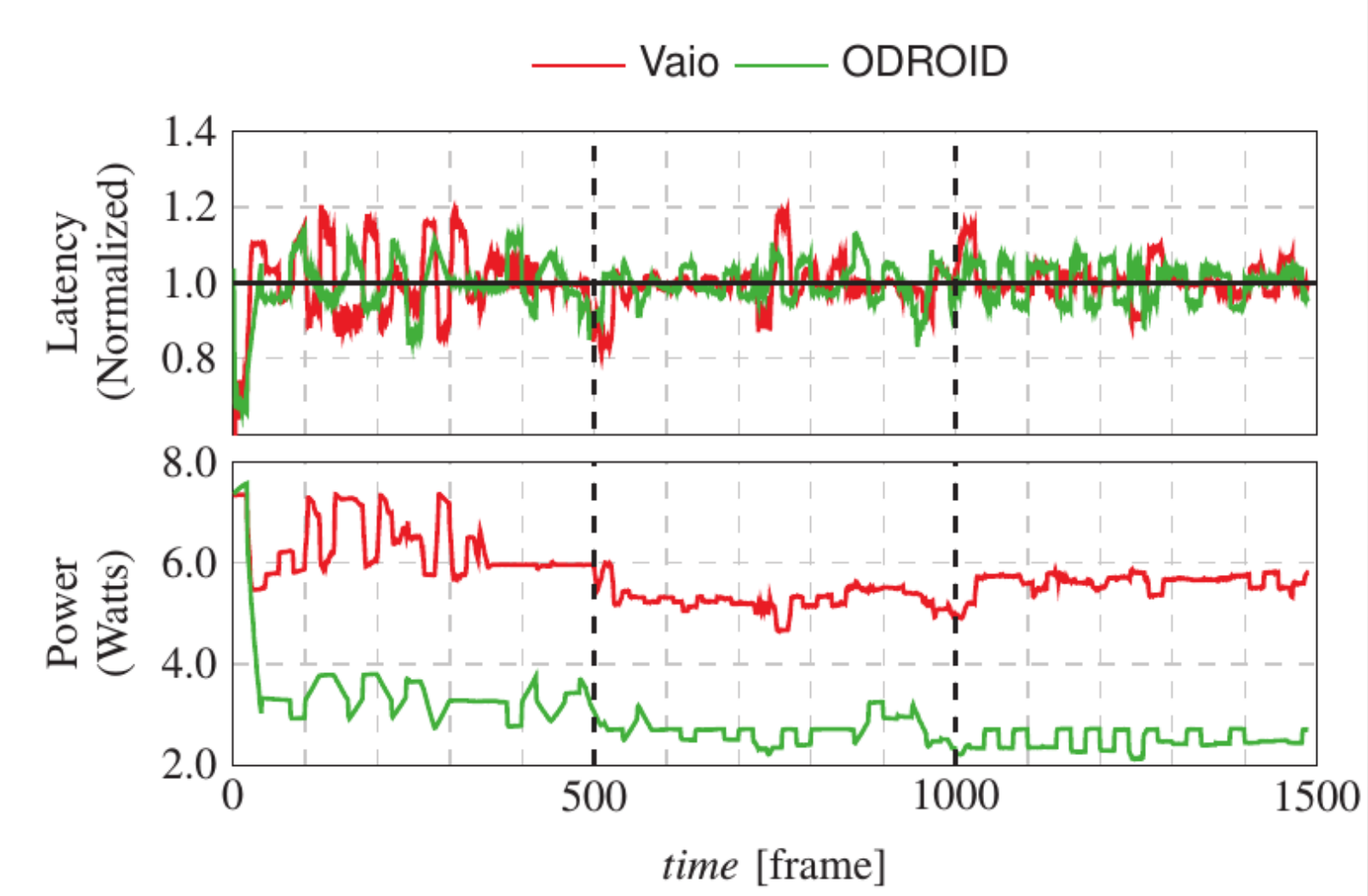
Evaluation – vs. DVFS



Evaluation – Phase Behavior



Evaluation – Phase Behavior (2)



Discussion

- Cool :) It seems to work
- “A Sony Vaio tablet” is not a hardware description
- Is this really application independent? Speedup?
- What does “system-agnostic” mean? Surely not that it is valid across different systems