9 REFERENCES

9.1 RELEVANT PUBLISHED PAPERS


Title: Anomaly Detection Using Power Signature of Consumer Electrical Devices

Author(s): Cernazanu-Glavan, C; Marcu, M

Source: ADVANCES IN ELECTRICAL AND COMPUTER ENGINEERING Volume: 15 Issue: 1 Pages: 89-94 DOI: 10.4316/AECE.2015.01013 Published: 2015

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Abstract: The use of the smart grid for developing intelligent applications is a current trend of great importance. One advantage lies in the possibility of direct monitoring of all devices connected to the electrical network in order to prevent possible malfunctions. Therefore, this paper proposes a method for automatic detection of the malfunctioning of low-intelligence consumer electrical devices. Malfunctioning means any deviation of a household device from its normal operating schedule. The method is based on a comparison technique, consisting in the correlation between the current power signature of a device and an ideal signature (the standard signature provided by the manufacturer). The first step of this method is to achieve a simplified form of power signature which keeps all the original features. Further, the signal is segmented based on the data provided by an event detection algorithm (values of the first derivatives) and each resulting component is approximated using a regression function. The final step consists of an analysis based on the correlation between the computed regression coefficients and the coefficients of the standard signal. Following this analysis all the differences are classified as a malfunctioning of the analyzed device.

Accession Number: WOS:000352158600013

Language: English

Document Type: Article

Author Keywords: Feature extraction; Pattern matching; Signal analysis; Signal processing

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Direct FPGA-based power profiling for a RISC processor

This paper investigates the possibility of creating an energy profile of a RISC processor instruction set in the prototyping phase, using FPGA implementation and physical measurements. In order to determine the power consumption at instruction-level, several programs have been developed and run on the processor implementation on FPGA. The experiments have focused at the following groups of instructions: arithmetic and logic (ALU) instructions, memory access instructions, control instructions, compare and move instructions. The main goal of our work is the investigation of the correlation between dynamic power consumption of a RISC processor design implemented in different technologies (FPGA vs. ASIC) and manufacturing processes, called power technology gap. The achieved correlation coefficient between the FPGA 45nm physical power measurements and ASIC 45nm power estimation is 86.38%.

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1578 - 1583

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15281265

Conference Location :
Pisa

DOI:
10.1109/I2MTC.2015.7151514

Publisher:
IEEE
Title: Energy Profiling of FPGA Designs
Author(s): Cernazanu-Glavan, C; Fedea, S; Amariciu-Boncalo, A; Marcu, M
Book Group Author(s): IEEE
Source: 2014 IEEE INTERNATIONAL SYMPOSIUM ON ROBOTIC AND SENSORS ENVIRONMENTS (ROSE 2014)
Published: 2014

Abstract: This paper investigates the possibility of energy profiling for FPGA based designs by means of direct board based measurement. We aim to determine how different design parameters and FPGA components usage affect the overall power and energy consumption of the device. The power and energy measurements have been performed on a Digilent Arty board with Xilinx Spartan-6 device. We have varied the following parameters: the usage of slice-based resources, the usage of DSP block, the usage of BRAM memory modules and the clock frequency. Our goal is represented by the development of an accurate energy profiling methodology which will enable to estimate the power consumption of FPGA designs.

Conference Title: 12th IEEE International Symposium on Robotic and Sensors Environments (ROSE)
Conference Date: OCT 16-18, 2014
Conference Location: Politehnica Univ Timisoara, Timisoara, ROMANIA
Conference Host: Politehnica Univ Timisoara
Conference Keywords: energy profiling; FPGA design; embedded systems; power consumption
Address: Cernazanu-Clavan, Cosmin; Fedea, Stefan; Amariciu-Boncalo, Alexander; Marcu, Marius; Politehnica Univ Timisoara, Comp & Software Engr, Timisoara, Romania.
Reprint Address: Cernazanu-Clarkean, C (reprint author), Politehnica Univ Timisoara, Comp & Software Engr, Timisoara, Romania.
Publisher: IEEE
Publisher Address: 345 E 47TH ST, NEW YORK, NY 10017 USA
Web of Science Categories: Computer Science; Artificial Intelligence; Engineering; Electrical & Electronic; Robotics
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Power-thermal profiling of software applications

Author(s): Marcu, M

Source: MICROELECTRONICS JOURNAL Volume: 42 Issue: 4 Special Issue: SI Pages: 601-608 DOI: 10.1016/j.mejo.2010.09.012 Published: APR 2011

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Abstract: Power consumption and heat dissipation are becoming the major factors that limit the performance evolution of current state-of-the-art microprocessors. As they become key elements in the design of both high performance computers and battery powered devices, different power and thermal management strategies have been proposed and implemented during the last years in order to overcome this performance limitation. Considering that software applications have a large impact on power consumption and thermal map of the CPU cores, these design strategies tend to be addressed at higher levels even as they are usually implemented at lower levels of system abstraction. The work presented in this paper evaluates the relation between power consumption and thermal response of CPU cores when different software applications are executed. The goal of this study is to identify how software applications can be used in thermal management process and whether it is feasible to implement thermal-aware software applications. (C) 2010 Elsevier Ltd. All rights reserved.

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Author Keywords: Power profiles; Thermal profiles; Thermal management; Energy efficiency

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Marcu, Markus C-3914-2011
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29-char Source Abbrev.: MICROELECTRON J
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Energy Consumption Model for Mobile Wireless Communication

Title: Energy Consumption Model for Mobile Wireless Communication
Author(s): Marcus, M.; Tudor, D.
Book Group Author(s): ACM
Source: MOBIWAC 11: PROCEEDINGS OF THE NINTH ACM INTERNATIONAL SYMPOSIUM ON MOBILITY MANAGEMENT AND WIRELESS ACCESS
Pages: 191-194
Published: 2011

Abstract: Mobile wireless devices continue their fast seizure of our daily lives as they become smarter, powerful and faster. However, the new features built in these devices come with an increase of resources usage and energy consumption. Therefore, prolonging the battery lifetime of mobile devices was one of the main research topics in mobile computing for the last decade. The main goal of our work is to find specific models for application level estimation of energy consumption in order to build energy aware mobile applications. In this paper, we propose a general model based on decomposition of the whole system in hardware and software components that can be monitored and evaluated separately. Next we try to personalize this model for energy consumption of mobile wireless communication. The proposed model is based on monitoring components' measurable parameters and computing component specific efficiency metrics. Based on this model and the associated metrics we intend to propose and build a software framework for power-aware applications support.

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Language: English
Document Type: Proceedings Paper
Conference Title: 9th ACM International Symposium on Mobility Management and Wireless Access
Conference Date: OCT 31-NOV 04, 2011
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Author Keywords: Energy-efficiency; wireless communications; mobile applications; energy-aware
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Power consumption measurements of virtual machines

Marcu, M.; Comput. Dept., Politeh, Univ. of Timisoara, Timisoara, Romania; Tudor, D.

Abstract

The environment sustainability is one of the main directions of intervention for all developed countries. Solutions for alternative energies generation and energy reduction are already discussed. Furthermore, energy efficiency has become an important aspect in data centers and large server systems. Virtualization is one of the main research directions for both large scale data centers and servers. This paper explores how virtualization solutions influence the power consumption of physical systems they are implemented on and which is the most effective way to test and measure the energy efficiency of these solutions. In our tests we used two physical machines (one laptop and one desktop), both running Windows and Linux operating systems and we selected the VMWare virtualization solution.

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Publisher:
IEEE
Title: Energy characterization of mobile devices and applications using power-thermal benchmarks

Author(s): Marcu, M; Tudor, D; Moldovan, H; Fuicu, S; Popa, M

Source: MICROELECTRONICS JOURNAL Volume: 40 Issue: 7 Pages: 1141-1153 DOI: 10.1016/j.mejo.2008.05.001 Published: JUL 2009

Times Cited in Web of Science Core Collection: 1

Abstract: Power consumption and heat dissipation are the major factors that limit the performance and mobility of battery-powered devices. As they become key elements in the design of mobile devices and their applications, different power and thermal management strategies have been proposed and implemented during the previous years in order to overcome the mobility limitation due to the battery lifetime. A new energy management approach is to build energy-aware applications so that we have knowledge on the consumed energy while the device is running. In this paper we define two new types of benchmarks, called power and thermal benchmark, which are software applications intended for the run-time system level to provide power and thermal characterization. These benchmarks are an easy way for the applications to adapt their execution pattern, in order to finish their tasks both in time and in the battery lifetime. (C) 2008 Elsevier Ltd. All rights reserved.

Language: English

Document Type: Article

Author Keywords: Energy characterization; Power management; Thermal management; Power benchmark; Thermal benchmark

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Designing a power efficiency framework for battery powered systems

Full Text: PDF

Authors: Dacian Tudor Politechnica University of Timisoara, Timisoara, Romania
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Proceeding SYSTOR '09 Proceedings of SYSTOR 2009: The Israeli Experimental Systems Conference
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Abstract
The continuous expansion of modern battery powered devices with complex and resource hungry feature sets have shown that battery life time does not scale according to their evolution. The problem of supporting extended battery life time has been drawing a lot of attention in recent years, especially for mobile communication systems. Besides the advances in power efficiency for hardware components, another emerging dimension has been opened by energy-aware software components. In this paper we briefly survey some of the most recent directions in supporting power efficiency for battery powered devices. In order to promote power-aware application, we propose an open power efficiency framework which addresses some of the shortcomings of existing approaches towards power aware software. We describe both generic and specific concepts of the proposed framework together with a new evaluation dimension at both lower and higher layers. Last but not least, we define the architecture of the framework which we aim to realize and evaluate through several battery powered mobile systems.
Title: A View on Mobile Terminal Power Efficiency of Wireless Communication

Author(s): Marcus, M; Tudor, D; Fuicu, S; Moldovan, H; Groza, V

Source: 2008 IEEE INSTRUMENTATION AND MEASUREMENT TECHNOLOGY CONFERENCE, VOLS 1-5

Book Series: IEEE INSTRUMENTATION & MEASUREMENT TECHNOLOGY CONFERENCE PROCEEDINGS

Pages: 382-387 DOI: 10.1109/IMTC.2008.4547065 Published: 2008

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Abstract: The evolution of portable and mobile computation systems towards an increased feature set and increasing hardware and software requirements demand, together with the significant increase of market penetration in our modern society, is raising complex problems from a reasonable energy consumption level point of view under different usage scenarios. The multitude and complexity of components that implement a large spectrum of communication protocols on these devices requires closer evaluation and understanding in respect to power efficiency. As there is very little analysis on the relationship between wireless specific components and their power profile in the context of mobile wireless communication we investigate the landscape of wireless communication efficiency methods. Next we apply power efficiency metrics on different wireless systems and analyze the experimental data we obtained through a monitoring application. Evaluation scenarios start with different wireless communication systems (WLAN, Bluetooth GSM) and then analyze power consumption and efficiency in several scenarios on the WLAN communication system.

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Thermal Benchmark and Power Benchmark Software

I. Marcu, M. Vladutiu, H. Moldovan, M. Popa

Submitted on 12 Sep 2007

Power consumption and heat dissipation become key elements in the field of high-end integrated circuits, especially the transistor count and clock frequencies. Dynamic thermal management strategies have been proposed and implemented that can be used to evaluate DTM strategies and thermal response of real life systems. Therefore, in this paper we introduce benchmark software as a software application for run-time system level thermal and power characterization.

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