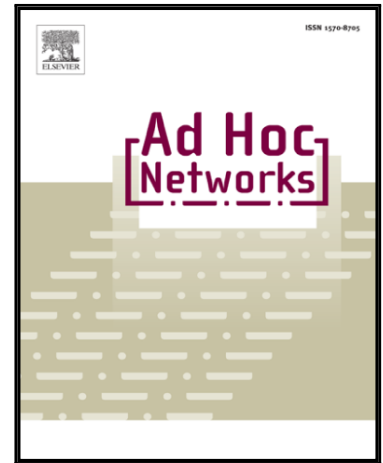


Accepted Manuscript

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PII: S1570-8705(18)30557-2
DOI: <https://doi.org/10.1016/j.adhoc.2018.08.004>
Reference: ADHOC 1734



To appear in: *Ad Hoc Networks*

Received date: 8 March 2018
Revised date: 12 July 2018
Accepted date: 6 August 2018

Please cite this article as: Jose-Miguel Horcas, Mónica Pinto, Lidia Fuentes, Context-Aware Energy-Efficient Applications for Cyber-Physical Systems, *Ad Hoc Networks* (2018), doi: <https://doi.org/10.1016/j.adhoc.2018.08.004>

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Context-Aware Energy-Efficient Applications for Cyber-Physical Systems

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Abstract

Software systems have a strong impact on the energy consumption of the hardware they use. This is especially important for cyber-physical systems where power consumption strongly influences the battery life. For this reason, software developers should be more aware of the energy consumed by their systems. Moreover, software systems should be developed to adapt their behavior to minimize the energy consumed during their execution. This can be done by monitoring the usage context of the system and having runtime support to react to those changes that impact the energy footprint negatively. Although both the hardware and the software parts of cyber-physical systems can be adapted to reduce its energy consumption, this paper focuses on software adaptation. Concretely, the paper illustrates how to address the problem of developing context-aware energy-efficient applications using a Green Eco-Assistant that makes use of advanced software engineering methods, such as Dynamic Software Product Lines and Separation of Concerns. The main steps of our approach are illustrated by applying them to a cyber-physical system case study.

Keywords: Energy efficient cyber-physical systems, software sustainability, self-adaptive greenability, Dynamic Software Product Lines

1. Introduction

The percentage of global emissions attributable to Information Systems is expected to further increase in the coming years, due to the proliferation of Internet-connected devices omnipresent in our daily lives [1]. Software never consumes energy in itself, rather its design, implementation and usage

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