

# PowerSaver - Activity-Based Implicit Energy Management

A. Ferscha, J. Erhart, P. Halbmayer,  
M. Matscheko, M. Wirthig  
Institute for Pervasive Computing  
Johannes Kepler University Linz  
Altenberger Straße 69, 4040 Linz, Austria  
office@pervasive.jku.at

S. Eisl, N. Hölzl, A. Abart, J. Kaltenleithner,  
H. Zeinhofer, W. Zandomeneghi  
Energie AG Vertrieb, Energie AG Data,  
Energie AG Oberösterreich  
Böhmerwaldstrasse 3, Postfach 298  
A-4021 Linz, Austria  
service@energieag.at

## Abstract

*A significant amount of electrical energy is wasted in modern digital equipment due to the everytime readiness without being effectively used generating high stand-by losses. In the project PowerSaver this issue was addressed to reduce unneeded electricity consumption by designing a system that unobtrusively cuts off stand-by consumption without reducing quality of life.*

## 1 Introduction

Although energy saving modes are supported in nowadays electronic appliances their functionality is seldomly realized due to tedious manual handling. Therefore a system was developed to achieve this task automatically by monitoring user behavior and accordingly control electricity consuming appliances by the application of a dedicated management software. Empirical evidence was elaborated in an extensive field study.

## 2 User Context and Activity

Environment and user activities are tracked by sensors integrated in the area or worn by the user. Raw sensor data is preprocessed and applied to activity recognition algorithms to provide the input for device management. Uniform access to heterogenous sensor configurations is supported by applying methods presented in [3].

## 3 Management Framework and Rule Engine

Incoming sensor activities (position, electricity consumption, accelerometer) are compared to the current system state and user defined rules that manage the control of

the end devices over an actuator control layer where similar methods have been approached in [1].

## 4 Actuators and Appliances

Energy consumers are the electrical power clients that are controlled by the PowerSaver framework. All electronic devices whose energy states can be altered in some way are connected over a custom adapter layer that is based the UPnP standard (cf. [2]).

## 5 Empirical Evaluation

User centered activity recognition for foot and wrist worn sensors in combination with a multi-person position tracking system, lead to a detailed data set that delivers the ground truth of the energy consumption and resulting gain calculations. A field study in 15 domestic households in a time period of 9 months has been executed, empirically underpinning the benefits of the PowerSaver technology.

## References

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