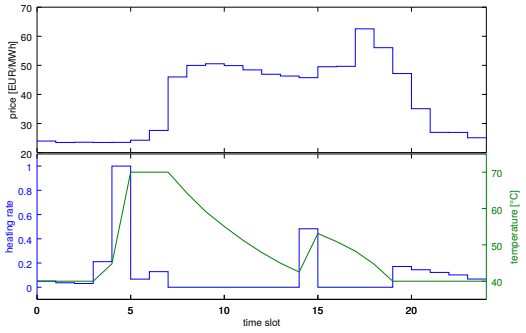
Project Work

« Performance of Cost-Optimization Methods on an 8-bit AVR Microcontroller »

Background

In electricity networks produced and consumed power is the same at any point in time. Therefore, traditionally, power plants are regulated to produce the amount of consumed power. But now, the increasing amounts of renewable energy from wind and solar, produced according to the weather not as needed, demands for new approaches. The approach demand response contributes to the issue by changing the consumption of devices in time. Suppliers encourage their customers to change their consumption by providing prices varying during the day. With day-ahead real-time-pricing, suppliers fix these prices once every day for the next day.

Smart devices may directly receive price information and autonomously optimize their energy consumption costs. In this work a domestic electric water heater is considered as smart device, which determines an optimal heating schedule considering the price, its thermal losses and the expected water demand of the consumer. To apply an up to date cost-optimal heating state requires recomputing the optimal consumption schedule. Thus execution time is an important factor.



Task Description

In this work the execution time of different optimization methods shall be measured using the hardware timer on an 8-bit AVR microcontroller. A linear programming solution as well as a developed constructive method shall be implemented on the microcontroller to compare their performance. Furthermore, the performance of the constructive method can be improved by using fixed-point instead of floating-point numbers.

Prerequisites

- Interest in embedded systems, smart grid and optimization techniques
- Software for Embedded Systems
- Advanced knowledge of C programming

Contact: Tobias Lübkert

tobias.luebkert@tu-harburg.de Phone: +49 40 / 428 78 – 3704 Room: E 4.075