EVALUATION OF LOW-POWER STRATEGIES FOR WEARABLE DEVICES

Promotor(s)

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Context

Wearable devices are power-constrained embedded devices. Such a power limitation becomes critical when considering front ends composed of arrays of sensors. The additional computational power demand quickly drains the battery level if an efficient power management is not considered. Nowadays microcontrollers offer different low-power modes, which can be exploited towards power efficiency and longer battery life [1].

Research activities and goals

The objective of this master thesis is to evaluate the available low-power modes of microcontrollers to be exploited towards power efficient biomedical wearable devices [2]. Several realistic applications in the biomedical domain will be used for this evaluation. The ultimate goal is to propose general guidelines to exploit power modes for biomedical devices.

Kind of Work:

- Literature study of existing solutions and their limitations.
- Evaluation of the most interesting power saving techniques exploiting existing hardware for a realistic use case.
- Implementation of the most promising techniques on embedded device(s) for a realistic use case.

Expected student profile:

- Interested in embedded systems and wearables.
- Experience with Python/Matlab or C/C++.

References and further reading

[1] Lu, Y. H., Benini, L., & De Micheli, G. (2000, May). Low-power task scheduling for multiple devices. In *Proceedings of the Eighth International Workshop on Hardware/Software Codesign. CODES 2000 (IEEE Cat. No. 00TH8518)* (pp. 39-43). IEEE.

[2] Dieffenderfer, J., Goodell, H., Mills, S., McKnight, M., Yao, S., Lin, F., ... & Bozkurt, A. (2016). Low-power wearable systems for continuous monitoring of environment and health for chronic respiratory disease. *IEEE journal of biomedical and health informatics*, *20*(5), 1251-1264.