Energy-efficient sensing with Android smartphones

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Abstract

A previous SH project implemented an energy-efficient sensing system for Symbian smartphones [1]. In short this system exploits the different energy characteristics of the different sensors available on a smartphone to save energy by using cheaper sensors where possible (e.g., preferring an accelerometer to an 802.11 radio).

This project will reimplement this system on more modern Android smartphones. Since the design of the system is already known, a new project should extend the system in one or more ways, e.g.,

- online energy measurement to determine the exact energy consumption of sensors in the current context (we used static measurements in the original implementation)
- switching off expensive location sensors through prediction of location/activity by exploiting periodicity of behaviour (e.g., you go to work at 9am every day and this could be determined in an initial training period)
- sensing application requirements (i.e., treating the OS or task manager as a "sensor") and aggregating sensor requests to reduce load
- online feedback to improve the quality of inferences
- adjusting L2/L3 parameters to save energy accordingly (this was difficult to do in our original Symbian implementation but might be easier in Android)
- or other ideas as might arise in the early project planning phase

Artifact component

Software implementation and evaluation.

Type of project

ACS; NDS; MSci; SH

Hardware needs

One or more Android smartphones or tablets (to be provided).

Specific skills required

Experience with Android programming would be very useful. At the very least, experience with Java and the initiative to gain some Android programming experience prior to beginning the project would be expected.

References

[1] F. Ben Abdesslem, A. Phillips, and T. Henderson. Less is more: energy-efficient mobile sensing with SenseLess. In *MobiHeld '09: Proceedings of the 1st ACM workshop on Networking, systems, and applications for mobile handhelds*, pages 61–62, Barcelona, Spain, Aug. 2009. doi:10.1145/1592606.1592621.