Locy: Energy-efficient sensing with Android smartphones.

Martin Kukla (Supervisor: Dr Tristan Henderson)

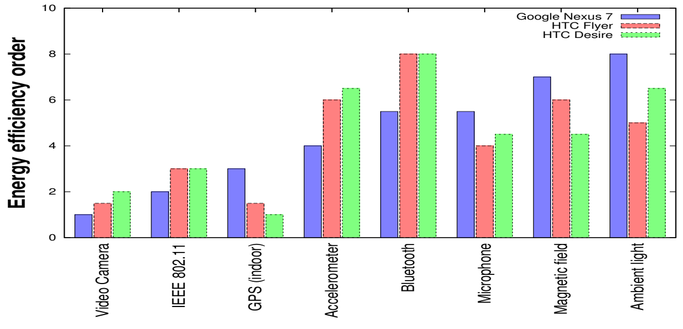
Introduction

- Phone sensing may be utilized by mobile applications to provide **advanced services** such as navigation systems.

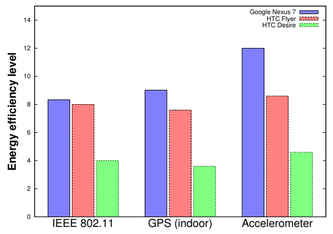
- **Phone sensing** fetches raw sensor data (e.g. from an accelerometer) and tries to extract high-level information from it (e.g. a user is walking).
- Phone sensing has **high energy demands**, which is crucially important to mobile phone users.
- To solve the problem:
  - investigate three different devices.
  - establish the energy efficiency of their sensors.
  - leverage results for energy-efficient sensing.
  - build **Locy**, an energy efficient sensing library.
  - evaluate its energy efficiency in real-life scenarios.

Solution

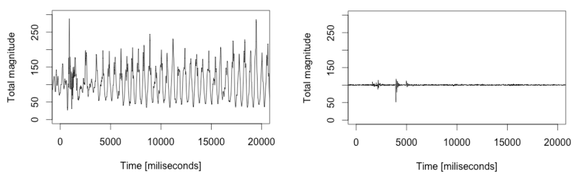
- Energy efficiency of sensors are **different among the three devices**.



However, **accelerometer is always more energy-efficient** than the standard localization sensors.



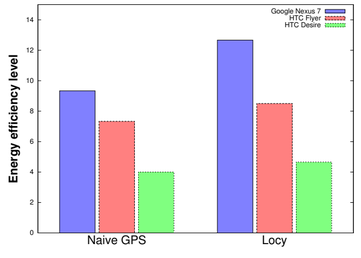
- **Locy** leverages an efficient **accelerometer**:
  - if a user is not moving, it **switches off GPS**.
  - **movement detection** based on ”peaks” (steps):



  - Locy uses **duty-cycling sampling** (sleeping periods interleaves sampling), whose ratio (sampling over sleeping period) is **adaptive according to current battery life**.

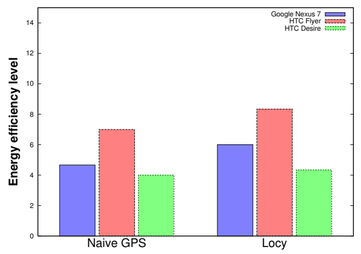
Evaluation

- **scenario one**:



While a user is staying in one place, Locy is more energy-efficient than the naive GPS localization.

- **scenario two**:



While a user is half of the time moving and the rest of the time he is staying in one place, Locy is more energy-efficient than the naive GPS localization.

Conclusions

Locy is more energy-efficient than the standard Android implementation.