Locy: Energy-efficient sensing with Android smartphones.

Martin Kukla (Supervisor: Dr Tristan Henderson)

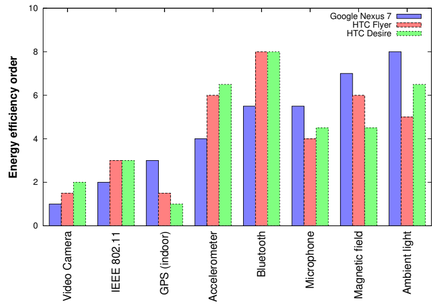
Introduction

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

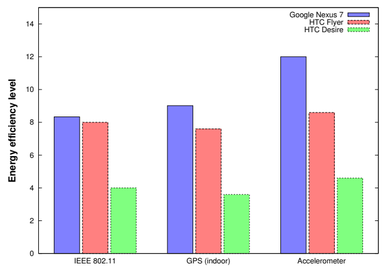
- **Phone sensing** fetches raw sensor data (e.g. from an accelerometer) and tries to extract high-level information from it (e.g. a user is walking).
- Phone sensing has **high energy demands**, which is crucially important to mobile phone users.
- To solve the problem:
  - investigate many devices.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

Solution

- Energy efficiency of sensors is **different among the devices**.



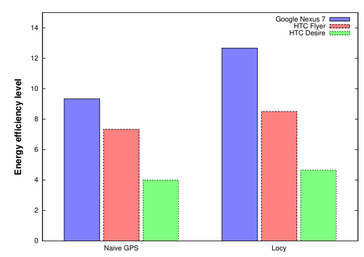
- **Accelerometer is always more energy-efficient** than the standard localization sensors.



- Locy is an energy-efficient sensing library:
  - if a user is not moving, it switches off high-power GPS.
  - movement detection is based on energy-efficient accelerometer (the standard deviation of the total magnitude over accelerometer data). [GRAPH]
  - the library uses duty-cycling sampling (sleeping period interleaves sampling).
  - duty-cycling ratio (sampling over sleeping period) is adaptive to battery life.

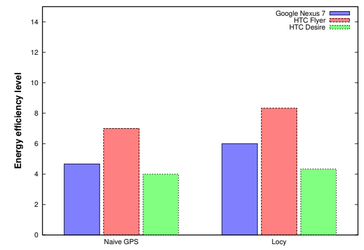
Evaluation

- the **first scenario**:



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

- the **second scenario**:



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.