TETRACOM: Technology Transfer in Computing Systems

FP7 Coordination and Support Action to fund 50 technology transfer projects (TTP) in computing systems.
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 609491.

GDO-NGS²: Gesture Detection On-Loading for Next Generation Sensor Subsystems

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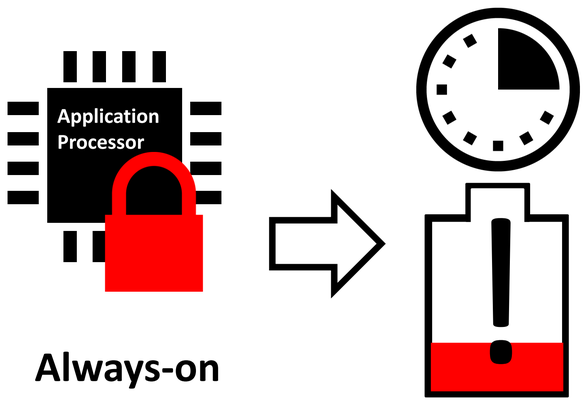
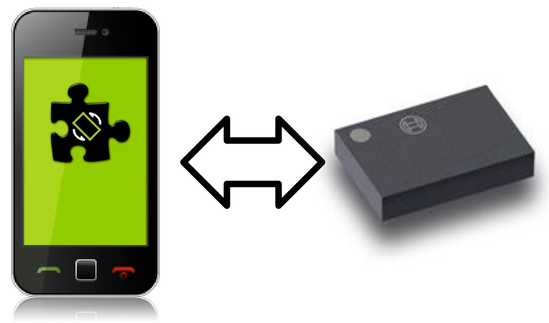
TTP Problem



Always-on gesture detection

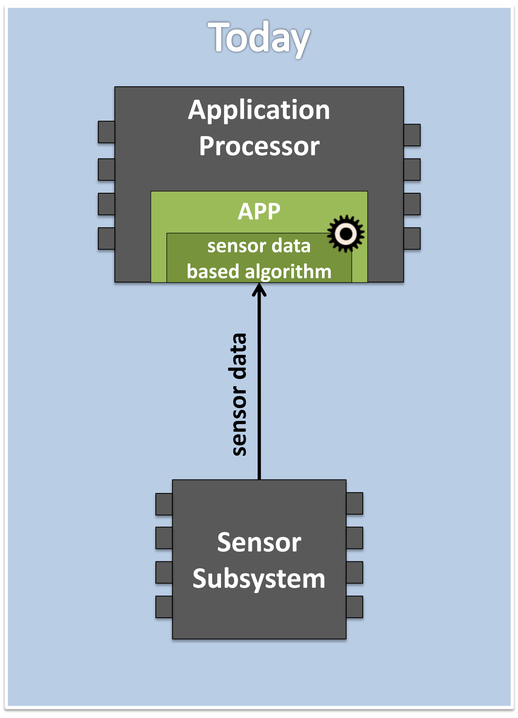
Energy consumption critical

- Human-Computer-interactions are steadily growing in number and diversity, **especially in a mobile context**
- State-of-the-art gesture detection on smartphones is done with inertial MEMS sensors detecting basic activity and triggering an analysis on the application processor in order recognizing higher-level gestures
- Most smartphone activity does not relate to any gesture
- **The main disadvantage of today's smartphone gesture detection is the overall energy consumption caused by the activation of the application processor (APU)**



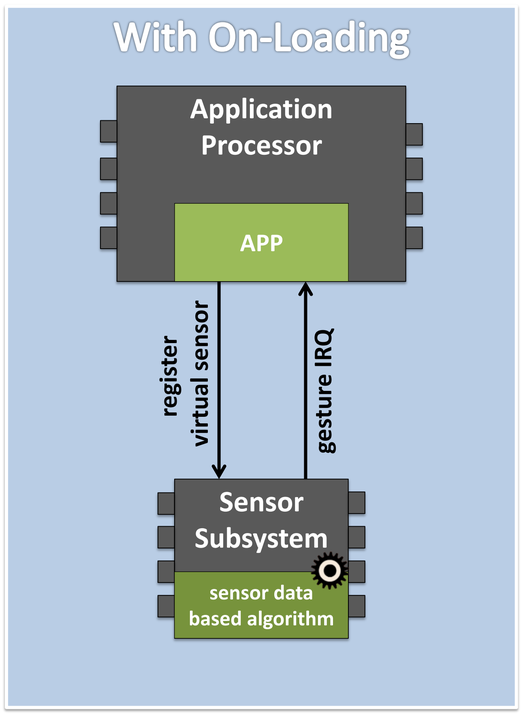
High level design flow vs. Low level implementation

TTP Solution



Gesture Detection On-Loading

- Android 5 now specifies a new interface for glance, wake-up, and pick-up gestures, which can be detected, e.g., using inertial MEMS sensors
- Extension of microcontroller-based sensor subsystems (sensor hubs) by gesture detection algorithms
  → **On-loading of detection algorithms onto sensor hubs**
- Application processor is only interrupted when a registered gesture is detected.
- Energy saving by lowering computation overhead of the application processor and allowing the **application processor** for spending more time in **deep-sleep power modes**



TTP Impact

Experiment

- **Lego Robot**
- **Nexus 5**
- **Direct Power Measurement**

First Experiment:

Compare real energy consumption of smartphone running gesture detection:

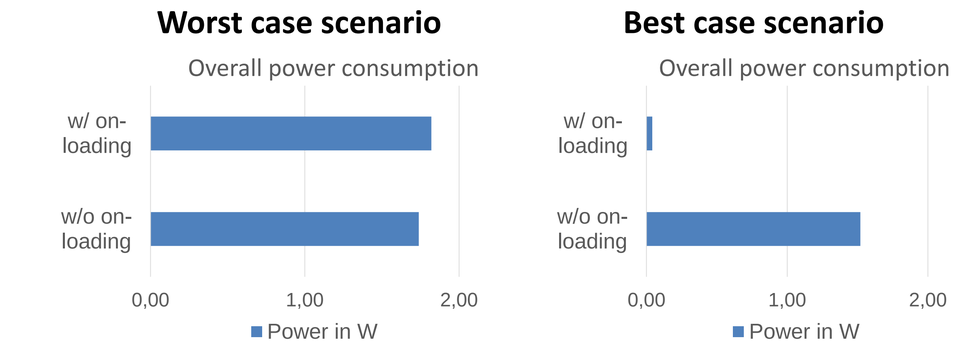
- w/o on-loading (traditional on APU)
- w/ on-loading (our approach)

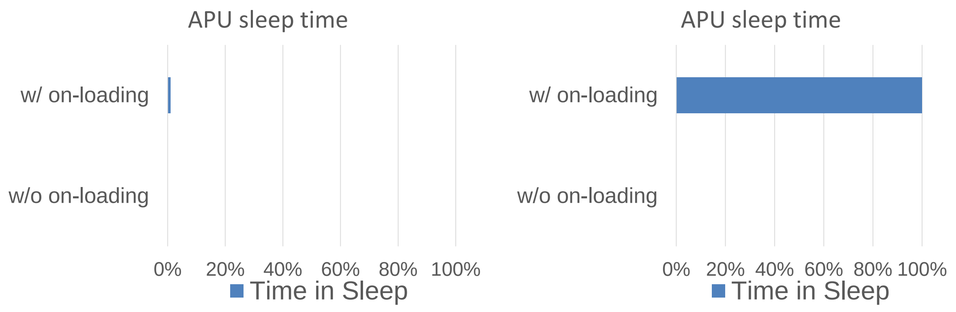
Best case scenario:

- No performed gestures at all
- APU in low power mode as much as possible

Worst case scenario:

- Regularly performed gestures
- APU sleeps only for split seconds





TTP Facts

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Gesture recognition on APU

Gesture recognition on sensor hub

TTP Facts

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