# Workout Watch

Ilmo Euro, 24.4.2016, for FutureHack
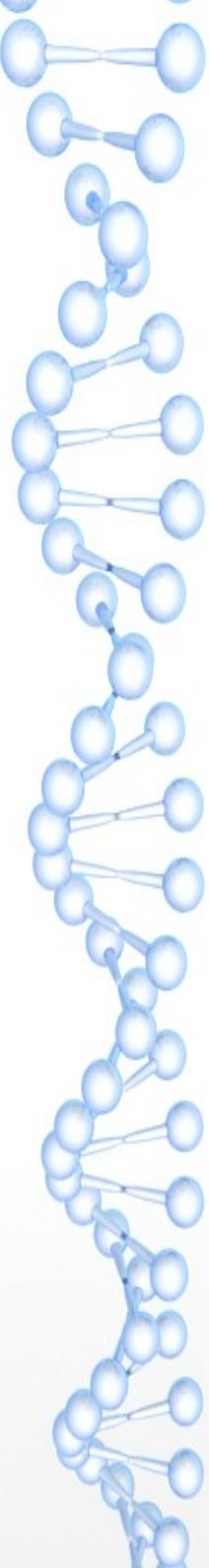
Workout Watch

- A system for monitoring and improving exercise technique

- Works with different kinds of exercise equipment – dumbbells, kettlebells, weight machines…

- Consists of low-cost accelerometer stickers and a program installed on a PC or tablet computer.
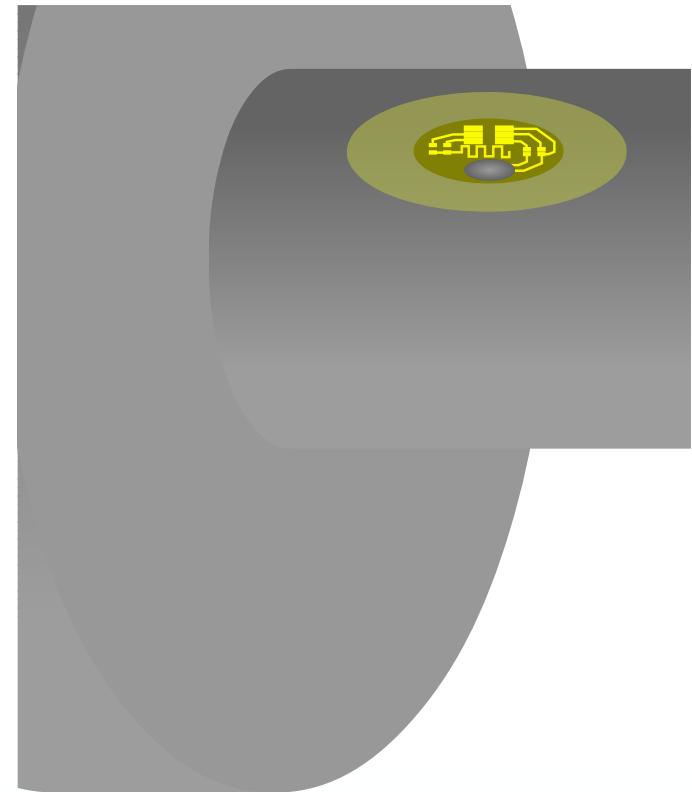
Example applications
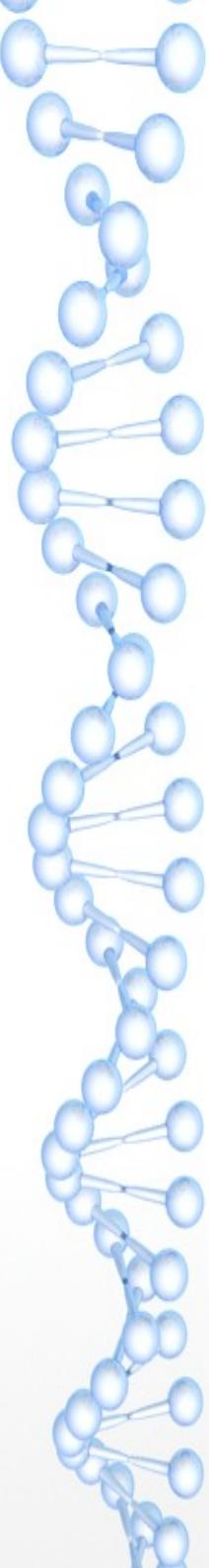
- Low-cost, non-intrusive "personal trainer"

- A way for patients to share their exercise data with their physicians, physiotherapists and trainers

- A basis for personalized gym experience with per-client tracking and personal exercise programs

Accelerometer stickers
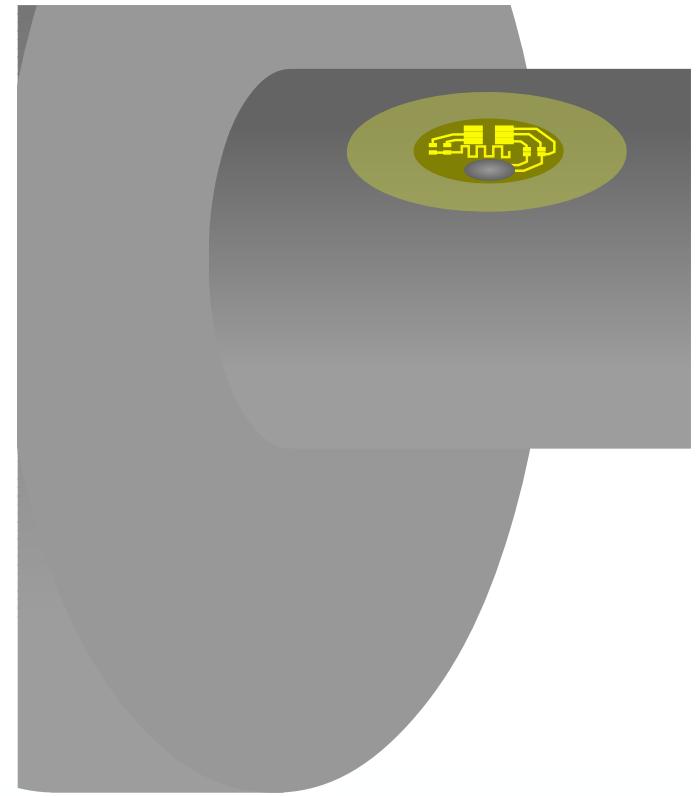
- A flexible sticker attached to exercise equipment

- Consists of an accelerometer and a transmitter

- Around 2 cm in diameter
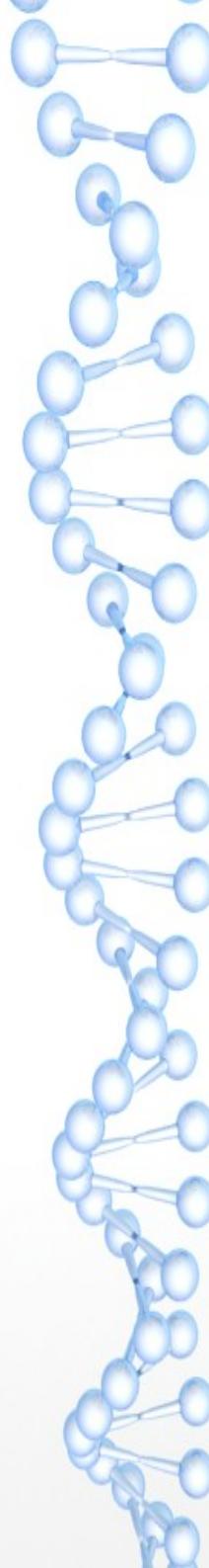
Accelerometer stickers

- Powers on when equipment is picked up

- Powered with a button battery cell

- Long battery life

- Connects to PC/tablet using Bluetooth/BLE

Monitoring software

- A cross-platform desktop application
- Can connect to any number of accelerometer stickers
- Has both long-term and real-time monitoring
- Can provide analysis and tips for technique enhancement

Monitoring software
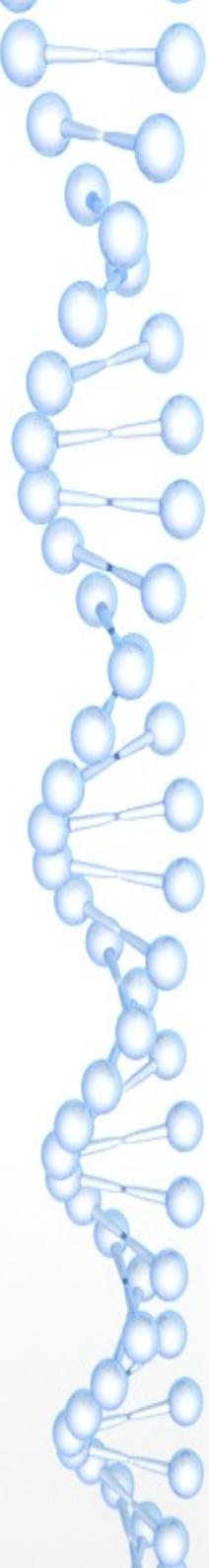
The top bar is only for development version

Monitoring software
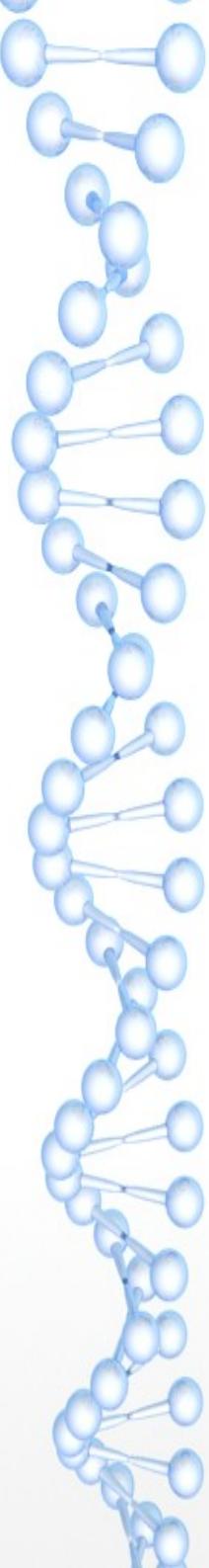
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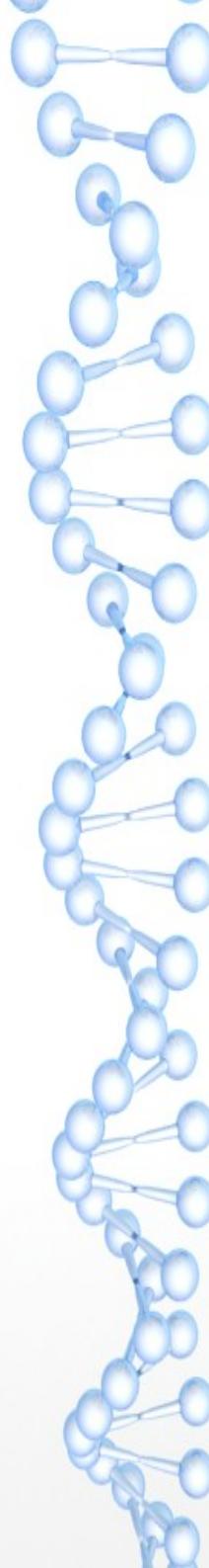
Real-time monitoring

- Displays information about your current exercise

- Information includes:

  - Number of repeats

  - Repeat speed

  - Possible jolts in movement

- Can give hints on improving your technique

- Both visual and voice interface
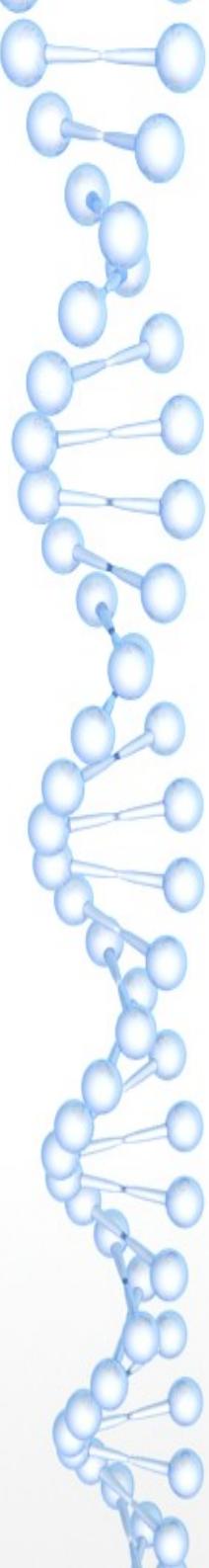
Long-term monitoring

- Displays your exercise history
- Information includes
  - Number of repeats with various equipment
  - Average speed of repeats each day
  - Number of possible technique errors each day
- Show information in graph form
- Also collects and stores raw sensor data for future processing
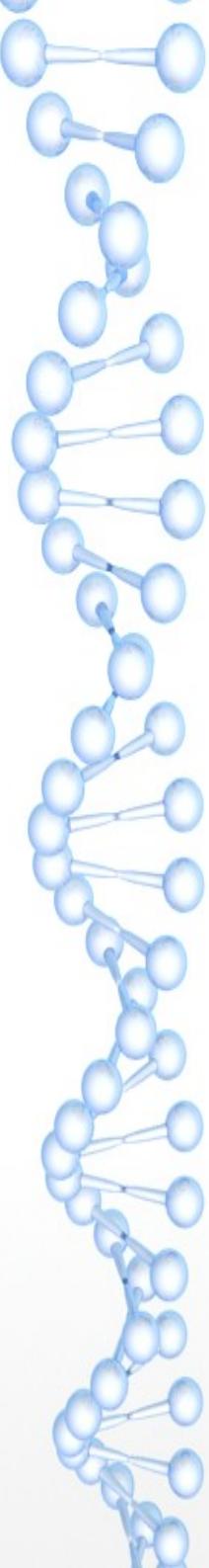
Analysis

- Plot trends and predict future development

- Determine the best and worst days and times of day for exercise

- Assess the problems in exercise technique
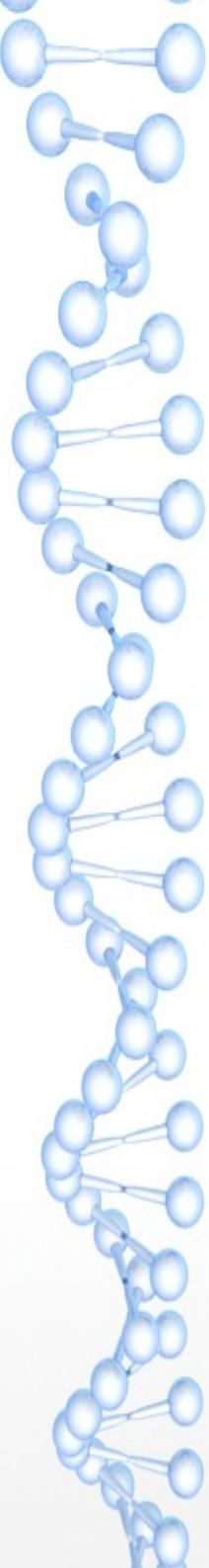
Current status

- Software is functional, but calculates only a few values

- Two-day timespan is too short for long-term monitoring and analysis

- Accelerometer is attached using wires for rapid prototyping, no sticker form factor yet
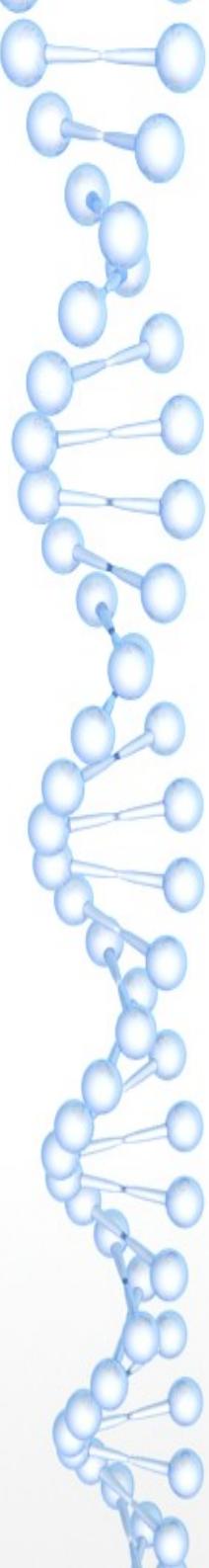
Future development options

- More measuring and analysis options developed in co-operation with sports professionals

- Mobile measurement software for all tablets and most smartphones

- Voice input

- Options for attaching stickers to exercise bikes, or sewing them to clothing for measuring pushups.
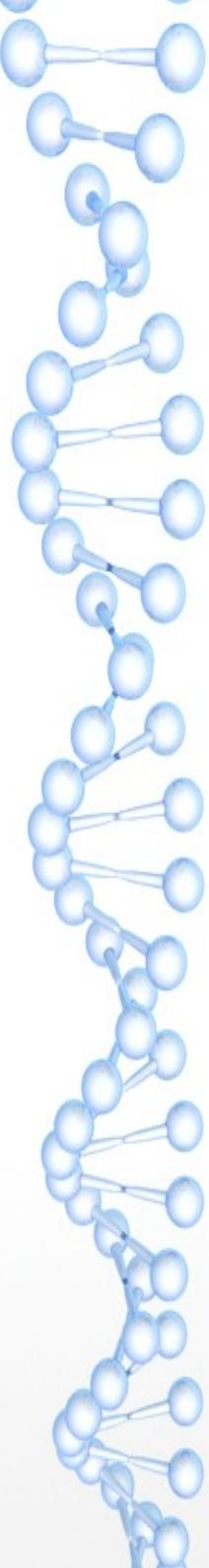
Technobabble, software

- JavaFX-based monitoring software

- Connects to accelerometer using serial interface

- Text-to-speech is powered by Watson

- Calculate numbers using statistical and signal processing methods

- C++-based sticker firmware

Technobabble, hardware

- Components:
  - 3-axis accelerometer
    - In this prototyping stage, only one axis is used
  - Microcontroller
  - Bluetooth/BLE transmitter
    - Another alternative is using a custom radio transmitter/receiver pair
  - Shake switch for power on
    - You could have a functional unit even without an accelerometer!
  - Button cell battery
- Flex-PCB enclosed in a sticker

Live Demo

- Thanks to Atte Pitkänen for the accelerometer used in prototyping