

Android Pedometer

Teaching Assistant

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1. The Tasks

(1) Acceleration sensor's application

Using the giving Android program, you could realize the functions listed below.

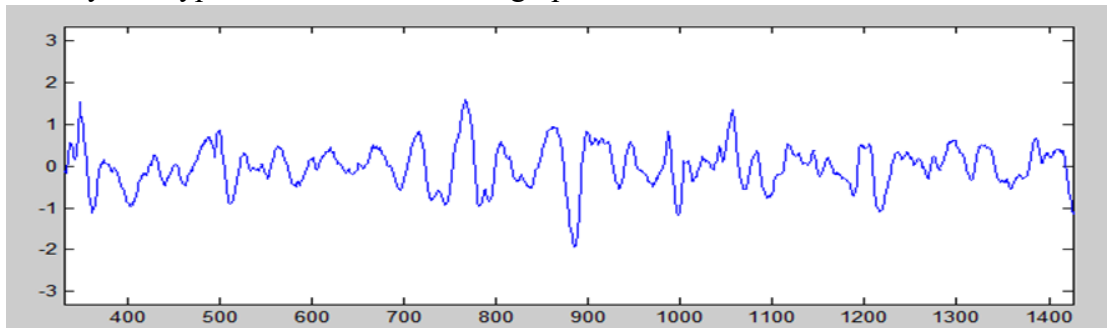
1st Use the acceleration sensor to measure the mobile's acceleration in the X, Y and Z axis directions and the scalar value of the total acceleration.

2nd Display the results on the screen.

3rd Record the results in the specified file.

(2) Step counting method

There are many mobile step-counting methods but the best method has not found yet. A typical acceleration scalar graph is showed below.



Self-designed methods are encouraged in this part and the display of the results on the screen in real time is required.

Hint

You can use the threshold filtering method. When the acceleration is higher or lower than the threshold, you may treat it as a step's beginning or ending. You will also need to consider the waveform burr and the acceleration of walking, which is not a simple single-peak waveform.

2. Questions

- Why we need low pass filtering when we measure the acceleration?
What are the differences made by the filtering? Make a contrast.
- Can we estimate the stride length using the acceleration oscillogram?

- c) What's the meaning of using `super.onPause`?

3. Bonus

Let us consider that scenario where a person rides a bike with his Android phone in his pocket. Could the data collected by the on-board sensors (e.g., accelerometer, gyroscope) of the person's Android phone tell us how good the condition of the road surface is (e.g., whether there exists potholes or bumps on the road surface)? If you could implement the system, collect the corresponding sensory data, and carry out necessary analysis on the collected data to distinguish different road surface conditions, we will offer you the bonus.