The University of Tokyo, School of Engineering
Small group seminar
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Guillaume Lopez
Department of Mechanical Engineering

Understanding Heart and Body Status from a Smartphone

– Introduction on how to collect, display, measure, and communicate sensor signal –

Smartphone Sensor Web application programming tutorial

1 Create an application reading , processing, and communicating sensor data

1.1 Reading from Accelerometer/Compass

i. Packages for sensor data access

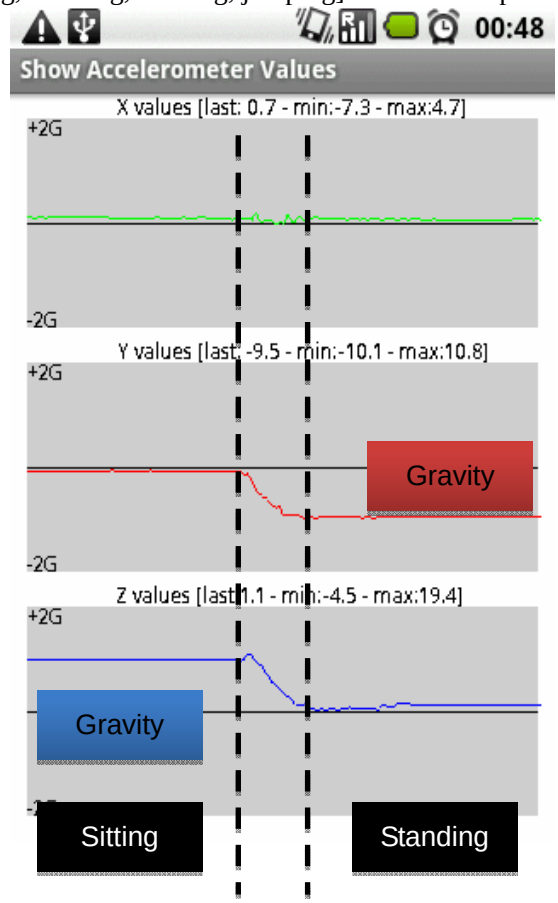
```
importandroid.hardware.Sensor;
importandroid.hardware.SensorEvent;
importandroid.hardware.SensorEventListener;
importandroid.hardware.SensorManager;
```

ii. Packages for graphics

```
importandroid.graphics.Canvas;
importandroid.graphics.Rect;
importandroid.graphics.Paint;
importandroid.graphics.Color;
```

1.2 Reading from Accelerometer

i. 3 values [x, y, z]
ii. Earth gravity component on 1 axe (±10 m/s^2)
iii. Signal examples: [sitting, standing, walking, jumping] when device placed in jeans pocket



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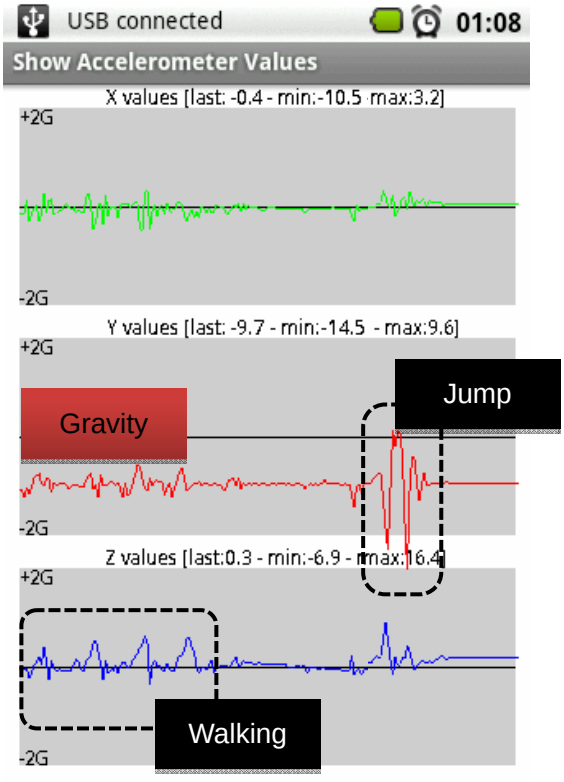

1.3 Reading from Compass data

i. 3 values [azimuth, pitch, roll]
   - Azimuth, angle between the magnetic north direction and the Y axis around the Z axis (0 to 359). 0=North, 90=East, 180=South, 270=West
   - Pitch, rotation around X axis (-180 to 180) with positive values when the Z axis moves toward the Y axis.
   - Roll, rotation around Y axis (-90 to 90), with positive values when the X axis moves away from the Z axis.

ii. Angle transformation:
```
angle=Math.toDegrees(Math.atan2((double)compassOut[0][1], (double)compassOut [0][0]));
```

2 Create a Sensor Web application: sharing information issued from processed sensor data

2.1 Using Accelerometer.

i. “Jumping now”
ii. “Seating now”
iii. “Standing now”
iv. …

2.2 Using Compass

i. “Looking toward North now”
ii. …