Design and Development of Applications for Mobile Devices

Sensors

Semester 1, 2020

Mobile going forward

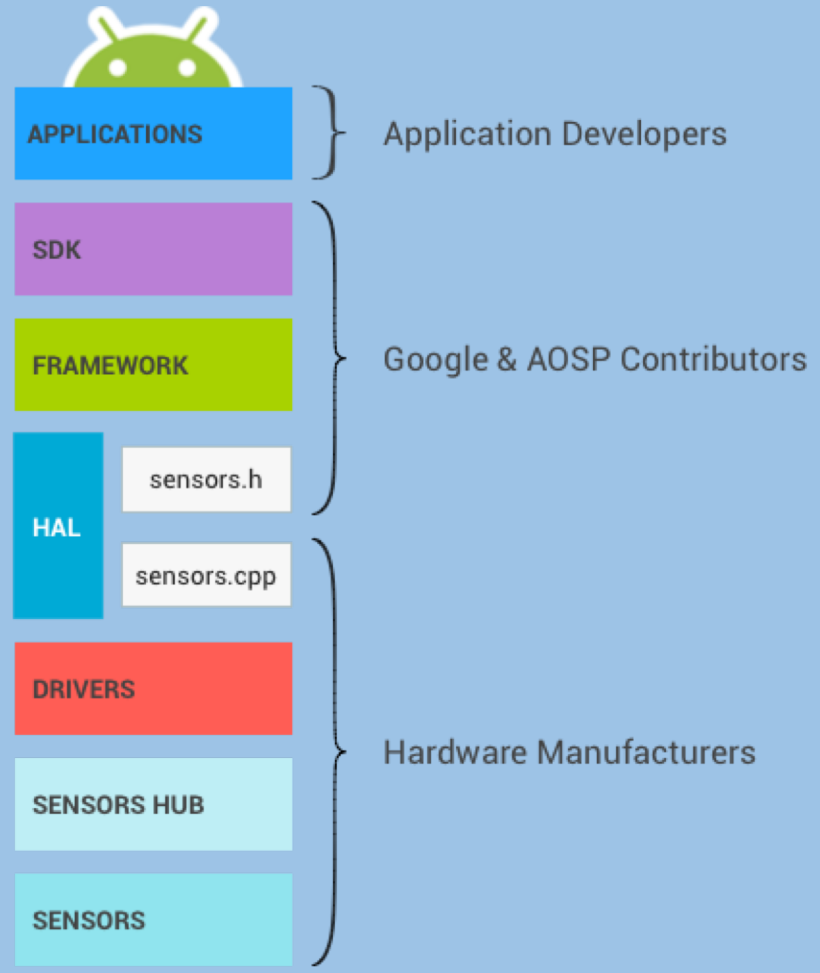
- This week will discussing sensors and camera
- Next week is the last week of content for the paper
- Lab work and marks
- Assignments

What are Android sensors?

- Measures motion, orientation, etc
- Provide high accuracy and precision
- Practical example would be calculating moisture in a room

Sensor stack

What are the components???

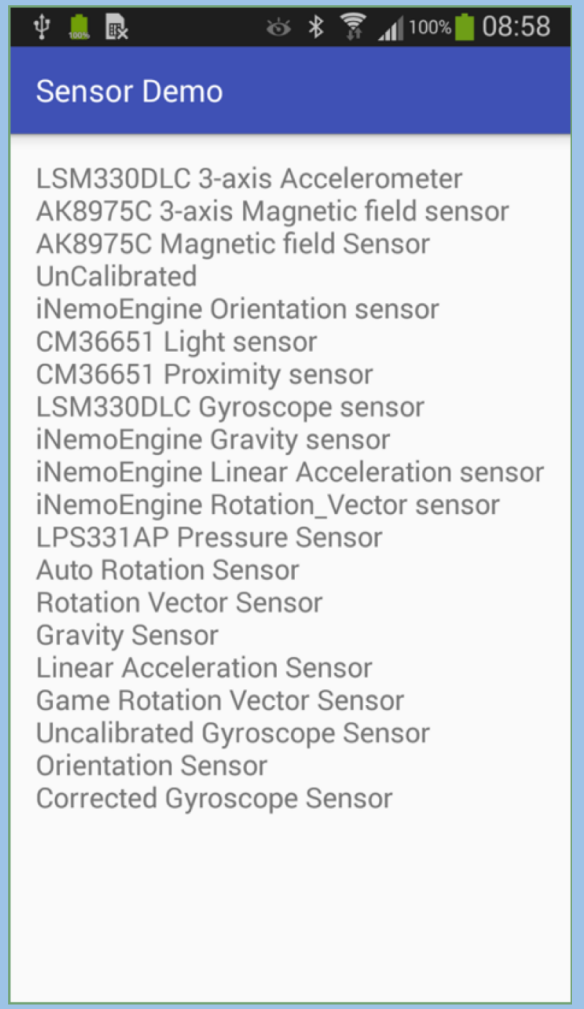


Sensor types

- Motion sensors
- Environmental sensors
- Position sensors
- Raw sensors vs Composite sensors

List of sensors

Sensor	Type	Description	Common Uses
TYPE_ACCELEROMETER	Hardware	Measures the acceleration force in m/s^2 that is applied to a device on all three physical axes (x, y, and z), including the force of gravity.	Motion detection (shake, tilt, etc.).
TYPE_AMBIENT_TEMPERATURE	Hardware	Measures the ambient room temperature in degrees Celsius (°C). See note below.	Monitoring air temperatures.
TYPE_GRAVITY	Software or Hardware	Measures the force of gravity in m/s^2 that is applied to a device on all three physical axes (x, y, z).	Motion detection (shake, tilt, etc.).
TYPE_GYROSCOPE	Hardware	Measures a device's rate of rotation in rad/s around each of the three physical axes (x, y, and z).	Rotation detection (spin, turn, etc.).
TYPE_LIGHT	Hardware	Measures the ambient light level (illumination) in lx.	Controlling screen brightness.
TYPE_LINEAR_ACCELERATION	Software or Hardware	Measures the acceleration force in m/s^2 that is applied to a device on all three physical axes (x, y, and z), excluding the force of gravity.	Monitoring acceleration along a single axis.
TYPE_MAGNETIC_FIELD	Hardware	Measures the ambient geomagnetic field for all three physical axes (x, y, z) in μT.	Creating a compass.
TYPE_ORIENTATION	Software	Measures degrees of rotation that a device makes around all three physical axes (x, y, z). As of API level 3 you can obtain the inclination matrix and rotation matrix for a device by using the gravity sensor and the geomagnetic field sensor in conjunction with the getRotationMatrix() method.	Determining device position.
TYPE_PRESSURE	Hardware	Measures the ambient air pressure in hPa or mbar.	Monitoring air pressure changes.
TYPE_PROXIMITY	Hardware	Measures the proximity of an object in cm relative to the view screen of a device. This sensor is typically used to determine whether a handset is being held up to a person's ear.	Phone position during a call.
TYPE_RELATIVE_HUMIDITY	Hardware	Measures the relative ambient humidity in percent (%).	Monitoring dewpoint, absolute, and relative humidity.
TYPE_ROTATION_VECTOR	Software or Hardware	Measures the orientation of a device by providing the three elements of the device's rotation vector.	Motion detection and rotation detection.
TYPE_TEMPERATURE	Hardware	Measures the temperature of the device in degrees Celsius (°C). This sensor implementation varies across devices and this sensor was replaced with the TYPE_AMBIENT_TEMPERATURE sensor in API Level 14	Monitoring temperatures.



Best practices for accessing and using sensors

There are five best practices that you should consider:

- Unregister sensor listeners
- Do not block the onSensorChanged() method
- Avoid using deprecated methods or sensor types
- Verify sensors before you use them
- Choose sensor delays carefully

Lab 1: Sensor Exploration – Optional (no marks)

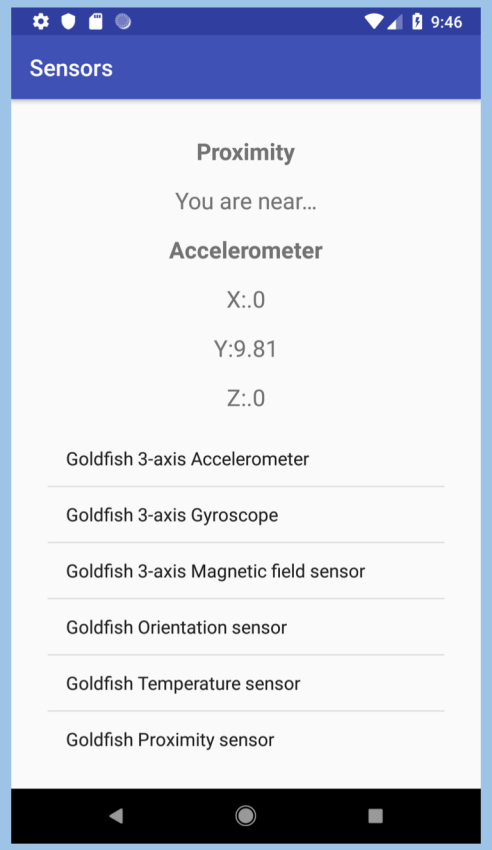
In lab 1, you will be explore the accelerometer, light and proximity sensors. Open up Android Studio and create a new application.

Lab 1: Sensor Exploration Continue

Implement the following functionality:

- List all the sensors on your phone
- Display the X, Y and Z tilt values using the accelerometer sensor
- If you have a light sensor, display the illumination level and values as you move your phone from light to dark
- If you have a proximity sensor, display **“Near”** when the phone is < 5cm from a surface (e.g. your hand) and **“Far”** when the phone is > 5cm from surface

Lab 1: Sensor Exploration Example



Lab 2: Sensor Animation – Optional (no marks)

Implement the following functionality:

- Create an animation that responds to tilting on the X and Y axis

Link to sensors overview

http://developer.android.com/guide/topics/sensors/sensors_overview.html

Please take note

There are examples online where the sensor event handlers are written as part of the activity. **Please do not do this**. Instead, implement your event handler as inner classes.

Provide correct handlers for the onPause() and onResume() methods. If you are unsure, refer to the code snippet on slide eight.