



# Programming with Android: **System Services**

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# System Services

- There is a wide list of services available
  - Power Service
  - KeyGuard Service
  - Vibrator Service
  - Alarm Service
  - Sensor Service
  - Audio Service
  - Telephony Service
  - Connectivity Service
  - Wi-Fi Service



# Power Service

- ❖ Android runs on limited capabilities devices
- ❖ It is crucial to use the battery wisely
- ❖ The power service gives us informations about the power of the system
- ❖ Get it with:

```
PowerManager pm = (PowerManager) getSystemService(Context.POWER_SERVICE);
```



# Vibrator Service

- ❖ Manages the vibration service
- ❖ Get it with

```
Vibrator vibrator = (Vibrator) getSystemService(Context.VIBRATOR_SERVICE);
```

- ❖ Some methods:
  - `vibrate(long time);`
  - `cancel();`
  - `vibrate(long[] pattern, int repeat);`
- ❖ Needs `android.permission.VIBRATE`



# Alarm Service

- ❖ Fires an Intent in the future
- ❖ Get it with

```
AlarmManager as = (AlarmManager) getSystemService(Context.ALARM_SERVICE);  
// set(int type, long triggerAtTime, PendingIntent operation);
```

- ❖ type is one of:

- ELAPSED\_REALTIME
- ELAPSED\_REALTIME\_WAKEUP
- RTC
- RTC\_WAKEUP

SystemClock.elapsedRealTime()

System.currentTimeMillis()



# Alarm Service

## ❖ More methods

- `setRepeating(int type, long triggerAtTime, long interval, PendingIntent operation);`
  - Can use `INTERVAL_HOUR`, `INTERVAL_HALF_DAY`
- `cancel(PendingIntent operation);`
  - Match with `filterEquals(Intent anotherIntent);`

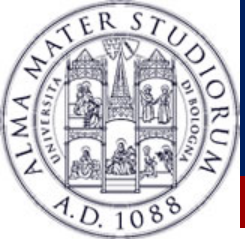


# Sensor Service

- ❖ Interaction with sensors
- ❖ Get it with

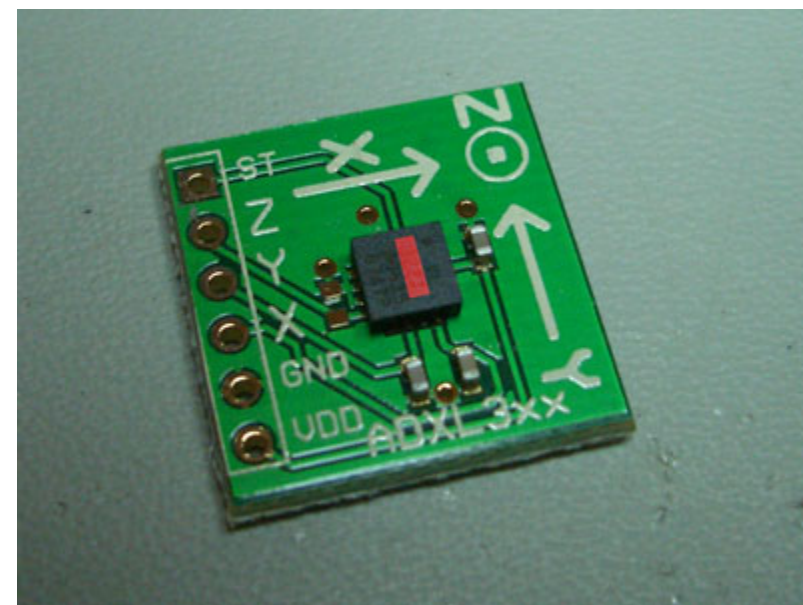
```
SensorManager sm = (SensorManager) getSystemService(Context.SENSOR_SERVICE);
```

- ❖ Various kind of sensors
  - Accelerometer
  - Gyroscope
  - Light
  - ....



# Accelerometer

- ❖ To measure acceleration
- ❖ Given with 3-axes values
- ❖ Useful to inspect movements

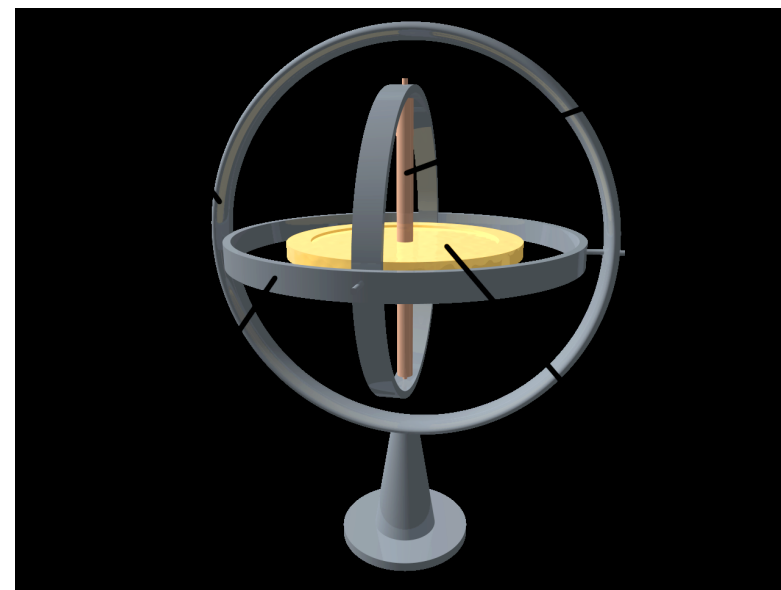






# Gyroscope

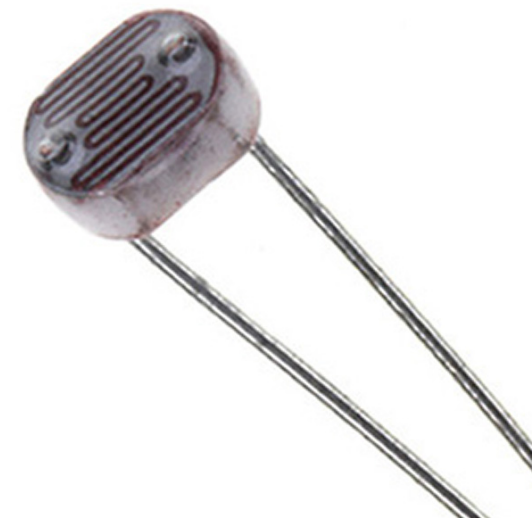
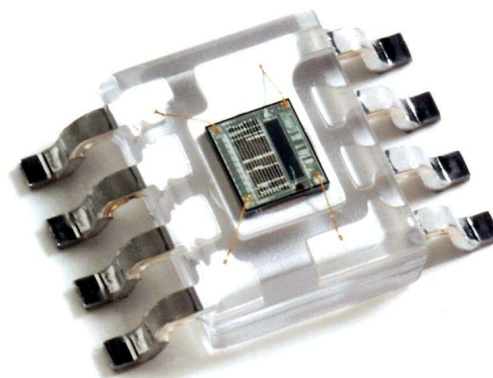
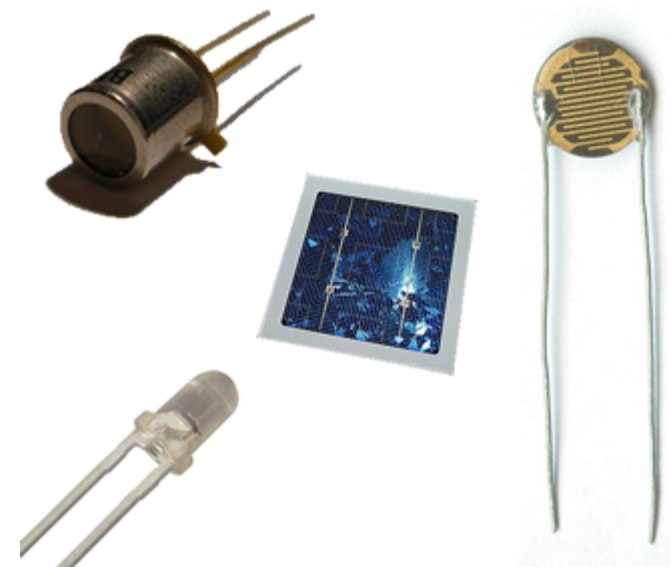
- ❖ To measure orientation
- ❖ Usually a spinning wheel or a spinning disk
- ❖ Gives angular speed
- ❖ Not so common in smartphones





# Light sensor

- ❖ Usually a photodiode
- ❖ When exposed to light, they create a current
- ❖ More current, more light





# Proximity sensor

- ❖ To measure distance from objects
- ❖ Useful to understand when the smartphone is in, for instance, a pocket
- ❖ Used to switch off screen during calls





# Sensors

- ❖ Not all smartphones are created equal
- ❖ Some carry a set of sensors some others don't
- ❖ How to know which sensors does your smartphone have?



# Sensors **List**

❖ `public List<Sensor> getSensorList(int type);`

❖ type is one of:

- `TYPE_ACCELEROMETER`
- `TYPE_GYROSCOPE`
- `TYPE_LIGHT`
- `TYPE_MAGNETIC_FIELD`
- `TYPE_ORIENTATION`
- `TYPE_PRESSURE`
- `TYPE_PROXIMITY`
- `TYPE_TEMPERATURE`
- `TYPE_ALL`



# How to "use" a Sensor

- ❖ Each Sensor contains information about the vendor, type and others
- ❖ Implement `SensorEventListener`
  - `onAccuracyChanged(Sensor sensor, int accuracy)`
  - `onSensorChanged(SensorEvent event)`
  - `registerListener(SensorEventListener listener, Sensor sensor, int rate)`
    - rate is one of
      - `SENSOR_DELAY_NORMAL`
      - `SENSOR_DELAY_FASTEST` (default)



# Audio Service

## ❖ Able to

- select a stream and control sound
- adjust the volume
- change ring type
- play effects



# Telephony Service

❖ Interacts with calls

❖ Get it with

```
TelephonyManager tm = (TelephonyManager) getSystemService(Context.TELEPHONY_SERVICE);
```

❖ Ask the device about call information

- `getCallState()`
- `getDataState()`
- `getDataActivity()`
- `getNetworkType()`
- `isNetworkRoaming()`





# SMS Service

❖ Send text messages

❖ Get it with

```
SmsManager sms = SmsManager.getDefault();
```

❖ To send a message call:

- `sendTextMessage(String dest, String sc, String text, PendingIntent sent, PendingIntent delivery);`
  - sent and delivery: two intents to be fired when the message is sent and/or delivered



# Connectivity Service

- ❖ Check device network state
- ❖ Get it with

```
String serId = Context.CONNECTIVITY_SERVICE;  
ConnectivityManager cm = (ConnectivityManager) Context.getSystemService(service);
```

- ❖ Check WI-FI, GPRS
- ❖ Notify connection changes
- ❖ Needs
  - android.permission.ACCESS\_NETWORK\_STATE
  - android.permission.CHANGE\_NETWORK\_STATE



# Wi-Fi Service

- ❖ Manages the Wi-Fi connection

- ❖ Get it with

```
WifiManager wfm = (WifiManager) getSystemService(Context.WIFI_SERVICE)
```

- ❖ Check Wi-Fi

- `getWifiState()`

- Returns `WIFI_STATE_DISABLED`, `WIFI_STATE_DISABLING`, `WIFI_STATE_ENABLED`, `WIFI_STATE_ENABLING`, `WIFI_STATE_UNKNOWN`

- `isWifiEnabled()` / `setWifiEnabled()`

- ❖ Lists all the configured wifi connections

- `getConfiguredNetworks()`



# Wi-Fi Service

- ❖ Check/edit wi-fi connection
  - `addNetwork(WifiConfiguration config)`
  - `updateNetwork(WifiConfiguration config)`
  - `removeNetwork(int netid)`
- ❖ Scan for wi-fi networks
  - `startScan()`
- ❖ Be notified about wi-fi changes
  - Broadcast Intent: `SCAN_RESULTS_AVAILABLE_ACTION`
    - Call `getScanResults()`