



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

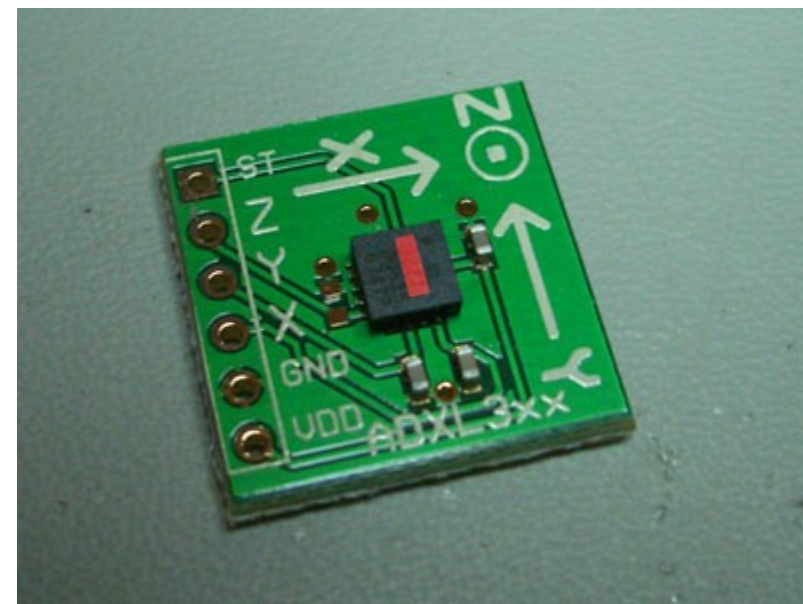
```
SensorManager sm = (SensorManager) getSystemService(Context.SENSOR_SERVICE);
```

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



Accelerometer

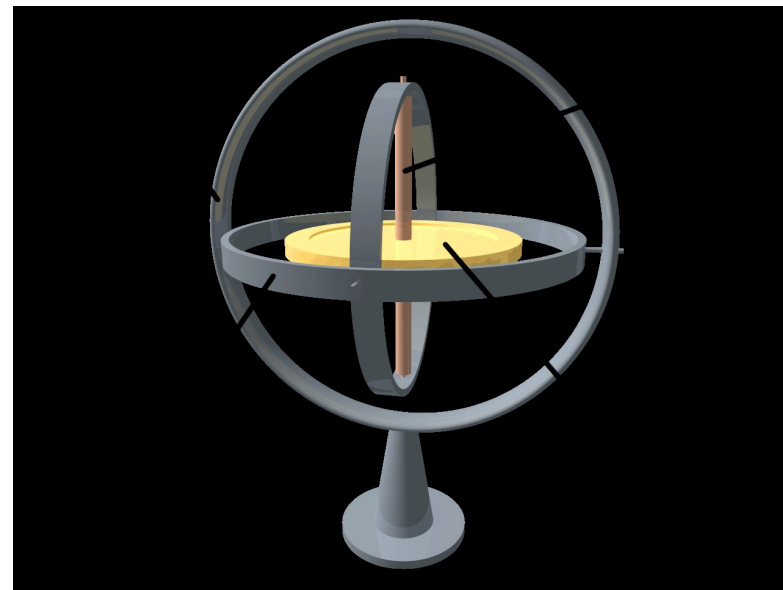
- ❖ To measure acceleration
- ❖ Given with 3-axes values
- ❖ Useful to inspect movements





Gyroscope

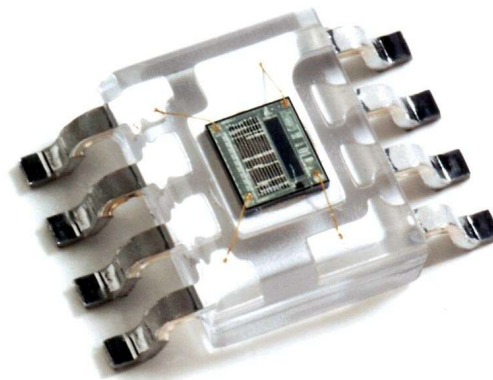
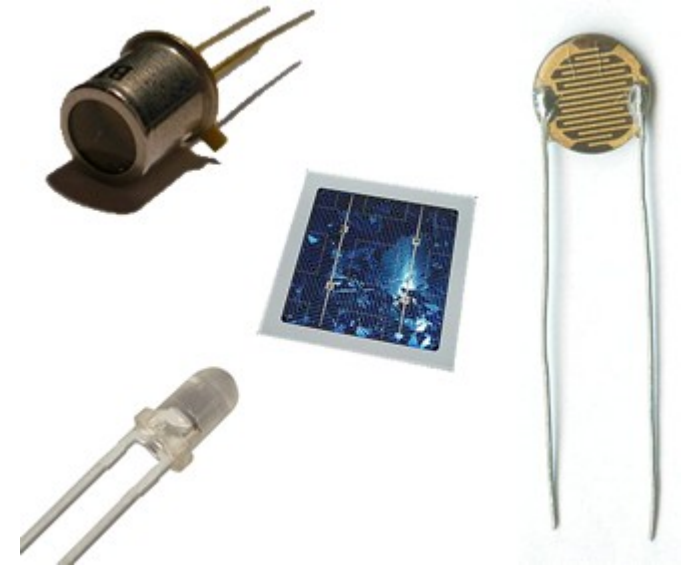
- ❖ To measure orientation
- ❖ Usually a spinning wheel or a spinning disk
- ❖ Gives angular speed
- ❖ Not so common in smartphones





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()`