Programming with Android: System Services

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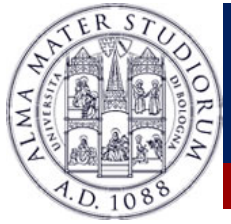
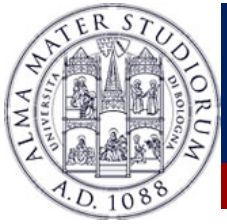


System Services

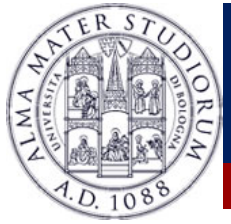
- There is a wide list of services available
  - Power Service
  - KeyGuard Service
  - Vibrator Service
  - Alarm Service
  - Sensor Service
  - Audio Service
  - Telephony Service
  - Connectivity Service
  - Wi-Fi Service



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);
```

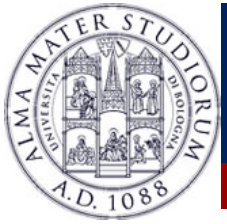


Vibrator Service

- 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

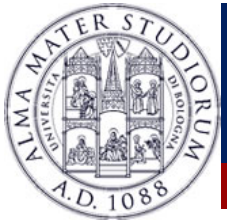
- Fires an Intent in the future
- Get it with

```
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

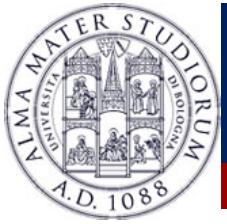
SystemClock.elapsedRealTime()

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);

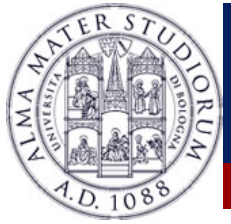


Sensor Service

- Interaction with sensors
- Get it with

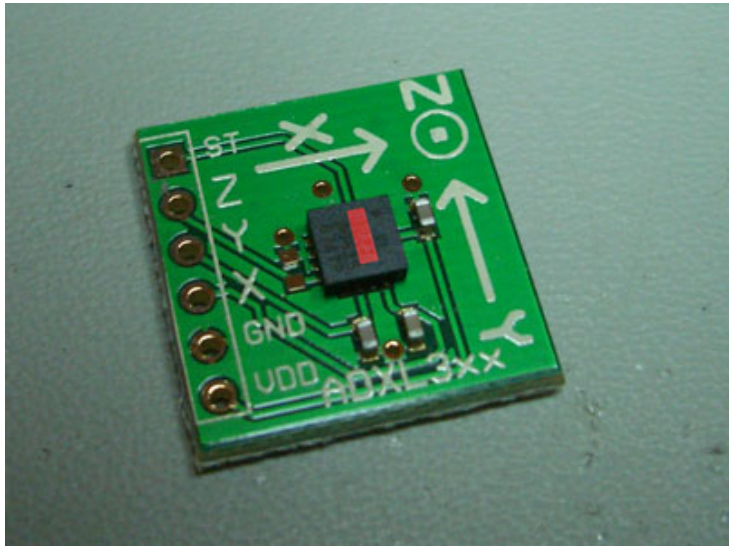
```
SensorManager sm = (SensorManager) getSystemService(Context.SENSOR_SERVICE);
```

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



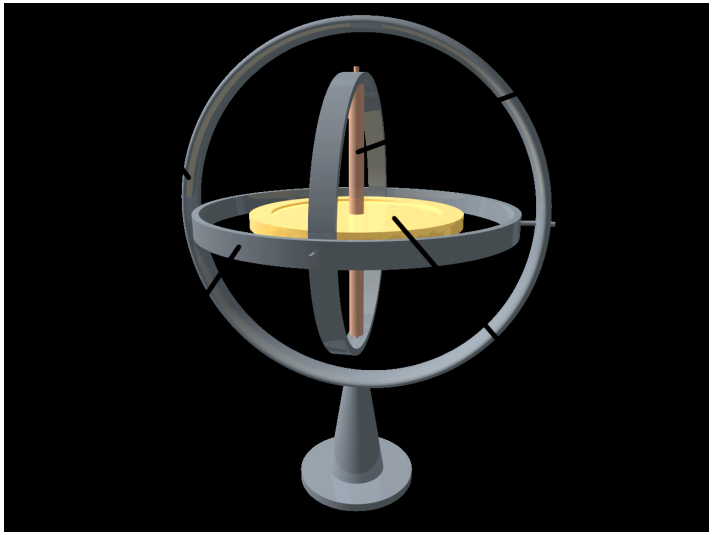
Accelerometer

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



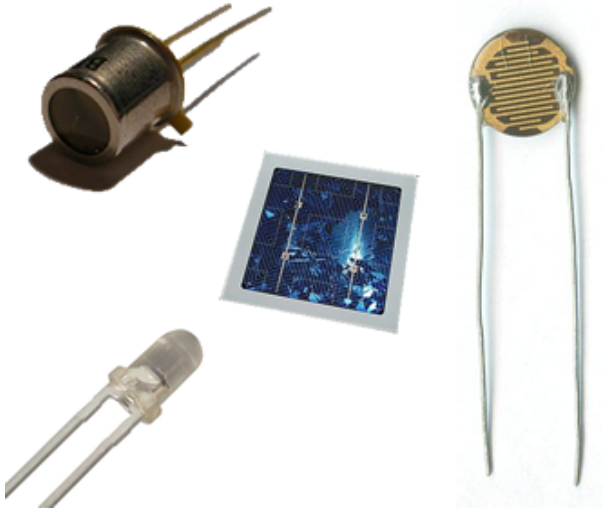
Gyroscope

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



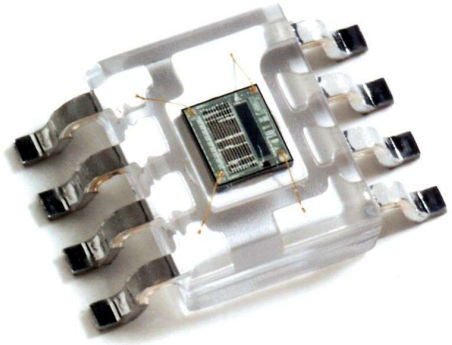
Light sensor

- Usually a photodiode



- When exposed to light, they create a current

- More current, more light

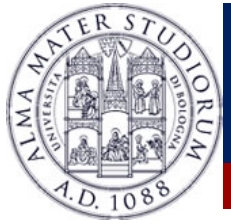


Proximity sensor

- To measure distance from objects

- Useful to understand when the smartphone is in, for instance, a pocket

- Used to switch off screen during calls

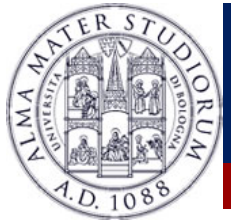


Sensors

- 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?

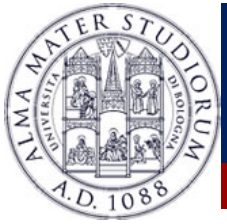
Sensors List

- 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



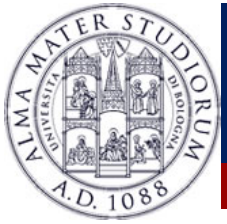
How to "use" a Sensor

- 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

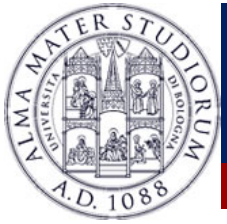


Telephony Service

- Interacts with calls
- Get it with

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

- Ask the device about call information
  - getCallState()
  - getDataState()
  - getDataActivity()
  - getNetworkType()
  - isNetworkRoaming()

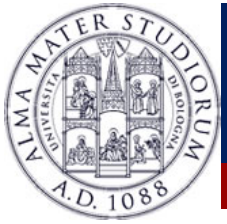


SMS Service

- 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

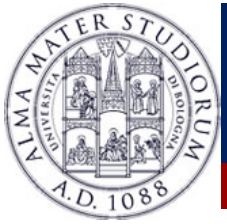


Connectivity Service

- Check device network state
- Get it with

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

- Check WI-FI, GPRS
- Notify connection changes
- Needs
  - android.permission.ACCESS_NETWORK_STATE
  - android.permission.CHANGE_NETWORK_STATE

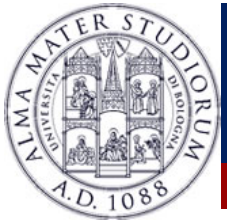


Wi-Fi Service

- 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()