CS-360-H7351 Mobile Architect & Programming

6-3 SensorManager

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In the world of mobile applications the SensorManager plays an important role. Sensors allow a device to interact with the environment and SensorManager provides a way for users to interact with sensors. Most devices nowadays have at least one sensor on them, there are sensors for keeping track of page orientation, speed of the device, the location of the device, temperature around the device and many more..

There are three main categories of sensors:

* Motion sensors – These sensors are all about moving, whether a device is moving in one

of the four-cardinal direction, flipping, moving vertically, or rotating. The sensors that make all of this happen include accelerometers, gravity sensors, gyroscopes, and rotational vector sensors.

* Position Sensors – The detect and measure device position. The sensors involved with

position are magnetometers and orientation sensors

* Environmental Sensors – Last but not least are the environment sensors, these sensors

interact with the environment. They get information such as barometric pressure, temperature, humidity, pressure illumination and ambient air temperature.

As you can see there are a wide variety of uses for sensors and the information they provide to uses is very important. Our lives would be exponentially more difficult without sensors on our mobile devices. We would get lost, be late for appointments, wear the wrong clothes, and get stuck in traffic. While there are three major categories of sensors, there are also two different types of sensors, there are hardware and software sensors.

* Hardware sensors – Are physical components that are built-in to a particular device.

They get information by using measuring the environment around them using the features made available to the sensor.

* Software sensors – They are not physical components, using software they imitate

hardware and are sometimes called virtual sensors. Software sensors get data by

utilizing one or more hardware sensors.

The uses for SensorManager are endless and the scenarios are vast. The three uses I want outline here are:

* Compass Application - I used SensorManager this week to develop a compass application that gives you a basic direction in which you are traveling. The sensors used are motion and position sensors.
  + Motion Sensors - TYPE\_ACCELEROMETER, TYPE\_ROTATION\_VECTOR, TYPE\_GRAVITY
  + Position Sensors - TYPE\_MAGNETIC\_FIELD, TYPE\_ORIENTATION

The context of this scenario is that you use the accelerometer to get device movement and the magnetometer to determine orientation in the world. Setting up sensor events allows the application to listen for those sensors to reports a change. In my case I used sensor events to rotate the compass need that represents the direction of travel.

* Step Counter – I thought about doing an application that was a step counter and then I wondered how I would test to see if it works. Creating a step counter application requires some user permissions to be enabled in the manifest file, as for the sensors used
  + Motion Sensors – TYPE\_STEP\_COUNTER

I was totally surprised to find that only one sensor is used to develop and application to count steps. I soon found out that just because it only uses one sensor does not mean it is simple. As with most sensors, an event listener is created and while active it will count steps. Other than that I don’t know too much more about the whole process other than using the onResume to register the event listeners and onPause to deregister it.

* Environment To Control Theme - I have seen this a couple times on my MAC but nothing on Windows and I don’t use my Android phone enough to find an application that can do this but overall I believe this is a cool feature. The theory behind that application is it uses the ambient temperature that is gathered from a service and the time of day to dynamically create the colors, the brightness of the screen and background on the desktop. To be honest since I have been using it on my MAC I can say it is a nice experience, so, from a SensorManager perspective. What sensors would be used, well, I was unable to find any examples out there for android so I’m going to wing it and use best guesses.
  + Environment Sensors – TYPE\_AMBIENT\_TEMPERATURE, TYPE\_TEMPERATURE

I’m not sure which one of the temperature sensors would be used. One of the reason why I wanted to use this scenario is because in my mind I would think event listeners would not have to be implemented which could save us some computing power. In thinking how an application like this would work I thought a background worker that executes functions on an interval. I imagine that when the sensor gets the temperature and the time from the device it would contact an API server passing the temperature and time which would result in the API server responding with the various colors, background and any other settings needed to change the theme on the device. In the context of SensorManager, I thought it would be cool to get the relative humidity and pressure to determine if it is storming or not but it is way much simpler to use an API to get the current temperature and then base a theme off the weather.

Sensors are very comple, initializing and setting them up can be frustrating so I learned the hard way lots of research needs to be done before delving into sensors. On my application this week I did not complete all the things I wanted to but I didn’t want my application to take too long.