CMSC 628 – Introduction to Mobile Computing

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**Overview**

The app displays the device orientation angles (in degrees) and as colored spots along the four edges of the device screen. Below are the 3 angles w.r.t device orientation.

* Azimuth: Direction (north/south/east/west) to which the device is pointing to.
* Pitch: top-to-bottom tilt of the device
* Roll: left-to-right tilt of the device

As we tilt the device, the spots along the edges that are tilted up becomes darker.

**Build**

**Layout:** The app uses constraint layout with nested text views and image views. Image views has been used to add the spots around the edges of the screen.

**MainActivity:** Below are the methods which have been implemented.

* OnCreate(): This method retrieves specific sensors, the accelerometer and the magnetometer.
* OnStart() and OnStop(): These methods have been used to register and deregister the listeners for the accelerometer and magnetometer.
* OnSensorChanged(): This method notices the sensor event and stores the arrays of floating-point values w.r.t both accelerometer and magnetometer, representing points on the x-axis, y-axis, and z-axis of the device’s coordinate system.

Next, both the arrays were combined to get the orientation angles each time the device orientation changes.

* lowpass(): This method eliminates the noise.

**References:**

* <http://franciscoraulortega.com/pubs/Algo3DFusionsMems.pdf>
* <http://students.iitk.ac.in/roboclub/2017/12/21/Beginners-Guide-to-IMU.html>
* <https://arduino.stackexchange.com/questions/19359/compute-yaw-from-magnetometer-and-accelerometer>
* <https://stackoverflow.com/questions/14513597/cannot-convert-from-double-to-float>
* <https://stackoverflow.com/questions/38200791/rendering-problems-couldnt-resolve-resource-id-search-edit-frame>
* <https://math.stackexchange.com/questions/2466949/get-magnetic-field-values-from-euler-angle>
* <http://www.skylinesoft.com/SkylineGlobe/TerraExplorer/v6.5.0/APIReferenceGuide/Yaw_Pitch_and_Roll_Angles.htm>
* <https://mbientlab.com/community/discussion/2095/pitch-and-roll-values-inverted-for-euler-angles-in-metacloud>
* <https://arduino.stackexchange.com/questions/53478/what-is-corrrect-the-way-to-find-roll-pitch-yaw>
* <https://theccontinuum.com/2012/09/24/arduino-imu-pitch-roll-from-accelerometer/>