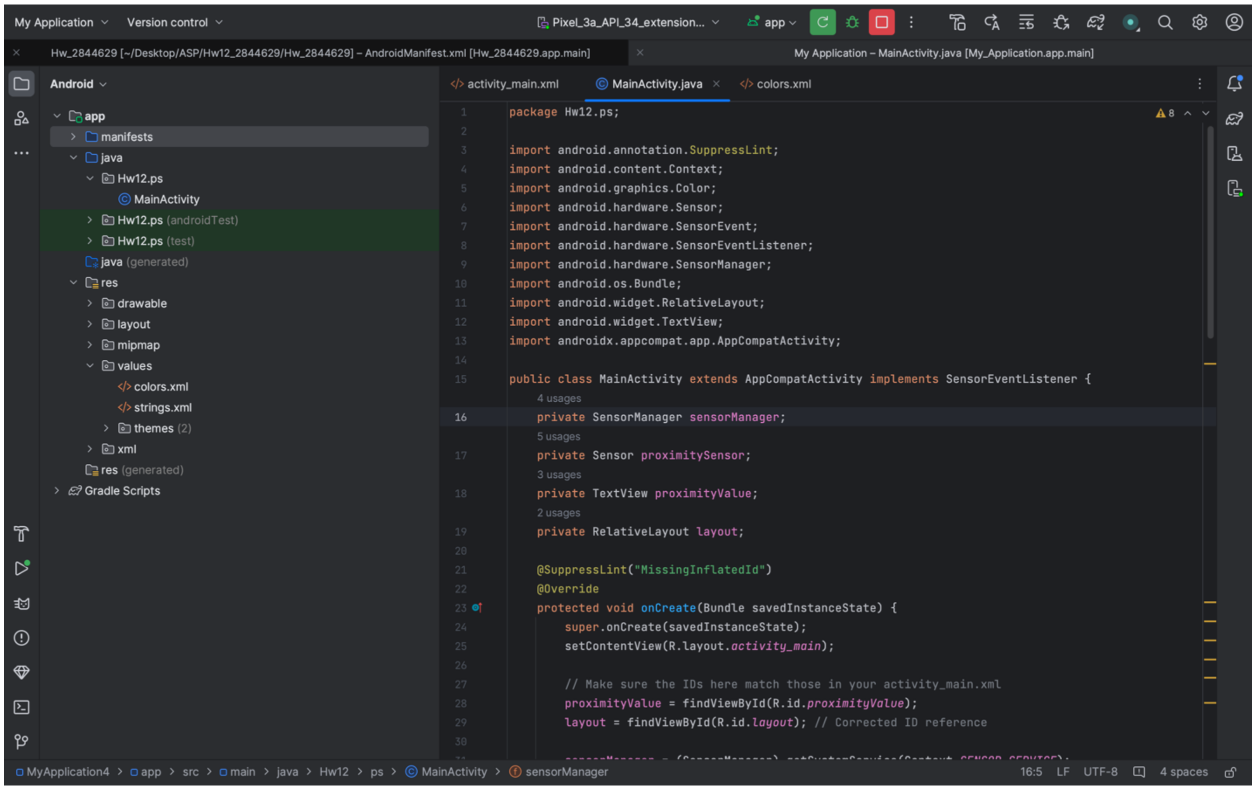
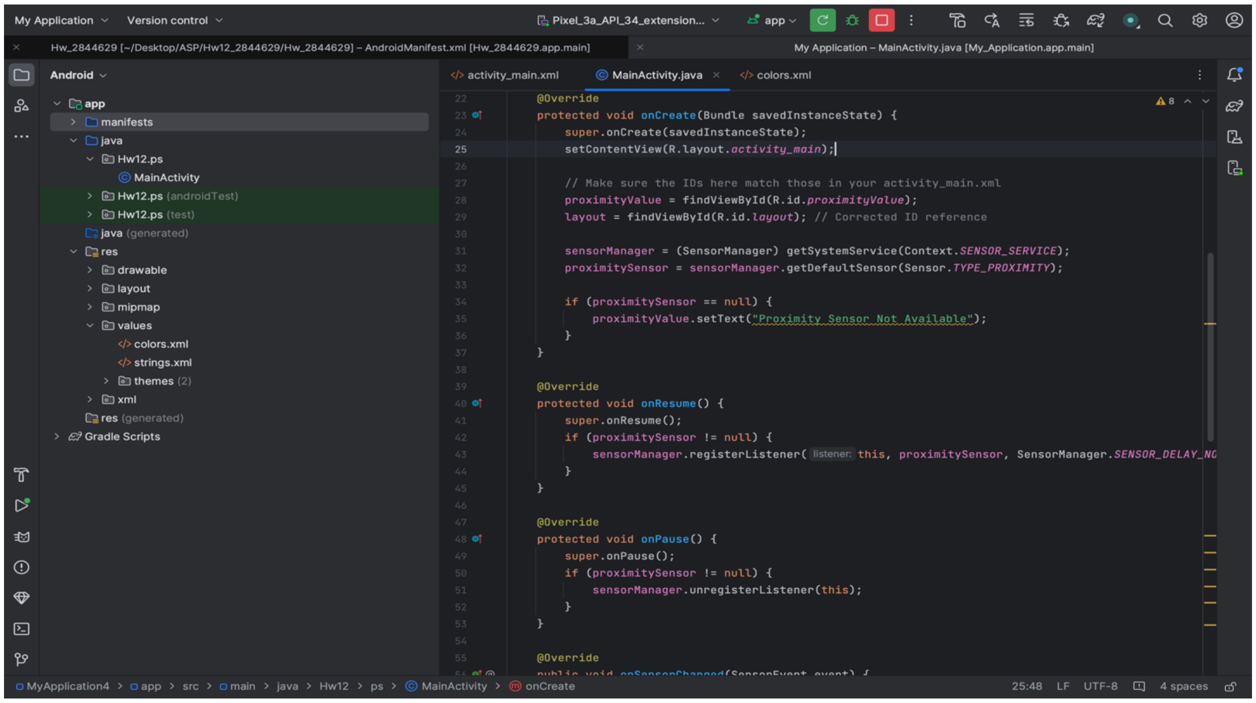
Modify the demo app for the proximity sensor such that you will see the spectrum of colors (at least 5) while the object is getting closer and closer to the phone. For example, if the max range is 1.0, when the distance from phone is 0.9, the background color is brown, when the distance from phone is 0.7, the background color changes to red, when the distance from phone is 0.5, the background color changes to pink, when the distance from phone is 0.3, the background color changes to yellow, and when the distance from phone is 0.1, the background color changes to blue. If the stance from phone is larger than the max range, the background color is set to green as before.

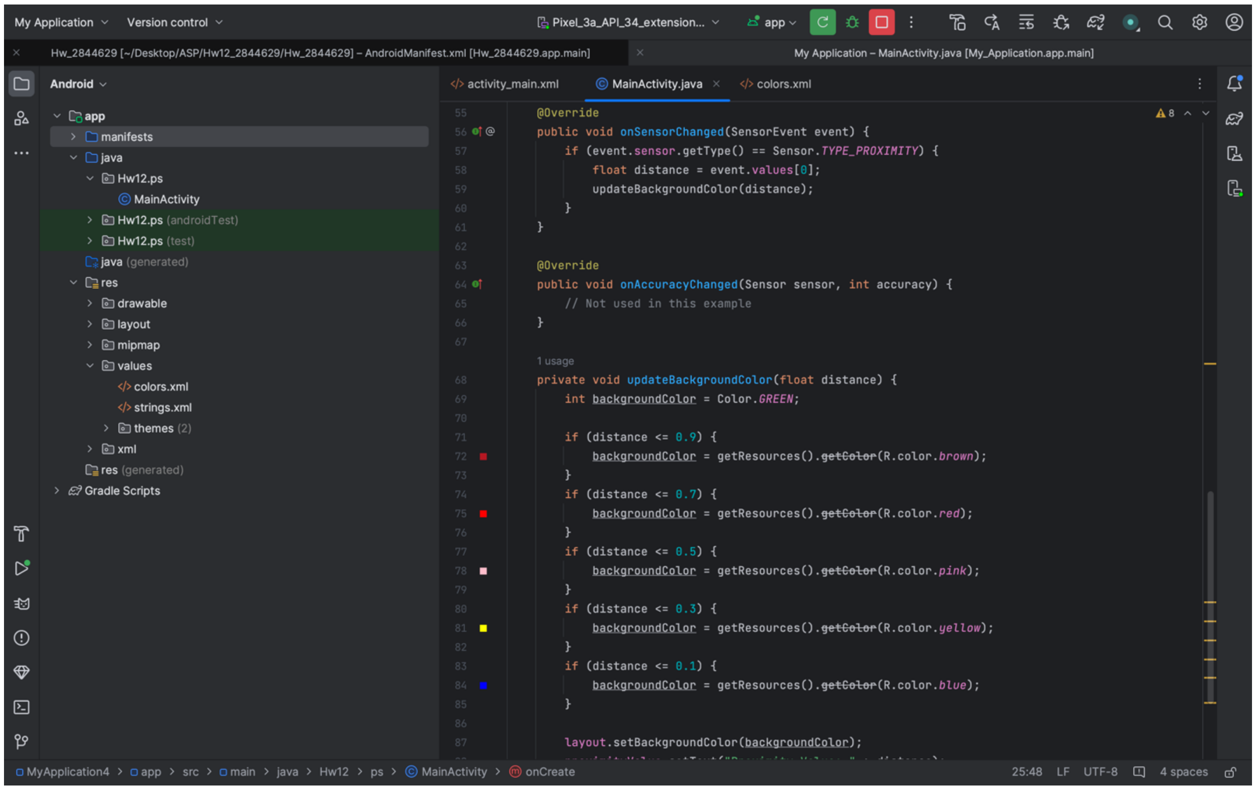
MainActivity.java : The 'MainActivity' class in this Android app interacts with the device's proximity sensor via the 'SensorManager'. It creates a 'TextView' and a 'RelativeLayout' to display sensor data and adjusts the backdrop color based on proximity sensor readings. To optimally manage system resources, the app registers itself as a listener to the proximity sensor in 'onResume' and unregisters itself in 'onPause'. The 'onSensorChanged' method alters the background color of the 'RelativeLayout' and the displayed text in 'proximityValue' based on the data from the proximity sensor, enabling a dynamic visual reaction to sensor changes.



```java
package Hw12.ps;

import android.annotation.SuppressLint;
import android.content.Context;
import android.graphics.Color;
import android.hardware.Sensor;
import android.hardware.SensorEvent;
import android.hardware.SensorEventListener;
import android.hardware.SensorManager;
import android.os.Bundle;
import android.widget.RelativeLayout;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity implements SensorEventListener {
    private SensorManager sensorManager;
    private Sensor proximitySensor;
    private TextView proximityValue;
    private RelativeLayout layout;

    @SuppressLint("MissingInflatedId")
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // Make sure the IDs here match those in your activity_main.xml
        proximityValue = findViewById(R.id.proximityValue);
        layout = findViewById(R.id.layout); // Corrected ID reference

```

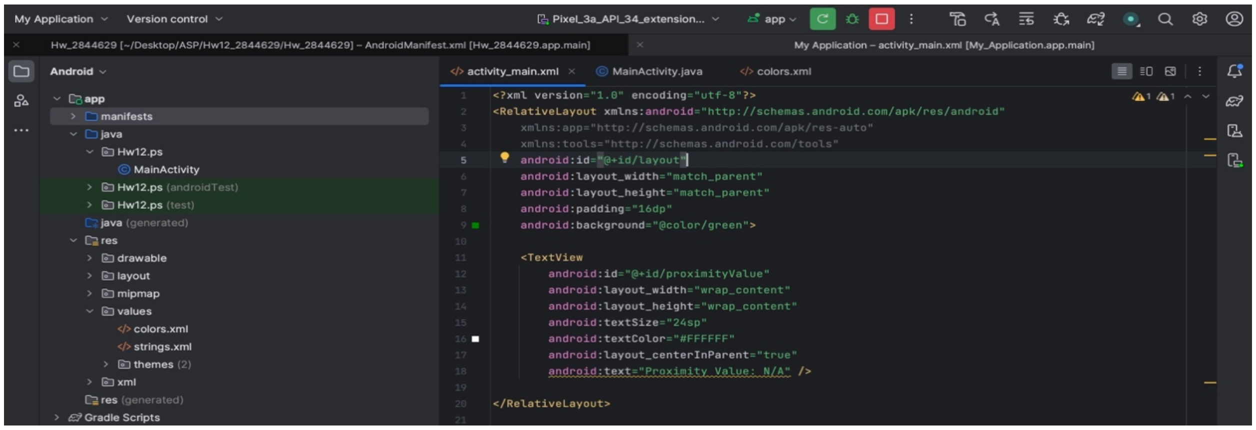


```java
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        // Make sure the IDs here match those in your activity_main.xml
        proximityValue = findViewById(R.id.proximityValue);
        layout = findViewById(R.id.layout); // Corrected ID reference

        sensorManager = (SensorManager) getSystemService(Context.SENSOR_SERVICE);
        proximitySensor = sensorManager.getDefaultSensor(Sensor.TYPE_PROXIMITY);

        if (proximitySensor == null) {
            proximityValue.setText("Proximity Sensor Not Available");
        }
    }

    @Override
    protected void onResume() {
        super.onResume();
        if (proximitySensor != null) {
            sensorManager.registerListener( listener: this, proximitySensor, SensorManager.SENSOR_DELAY_NO
        }
    }

    @Override
    protected void onPause() {
        super.onPause();
        if (proximitySensor != null) {
            sensorManager.unregisterListener(this);
        }
    }

    @Override
```



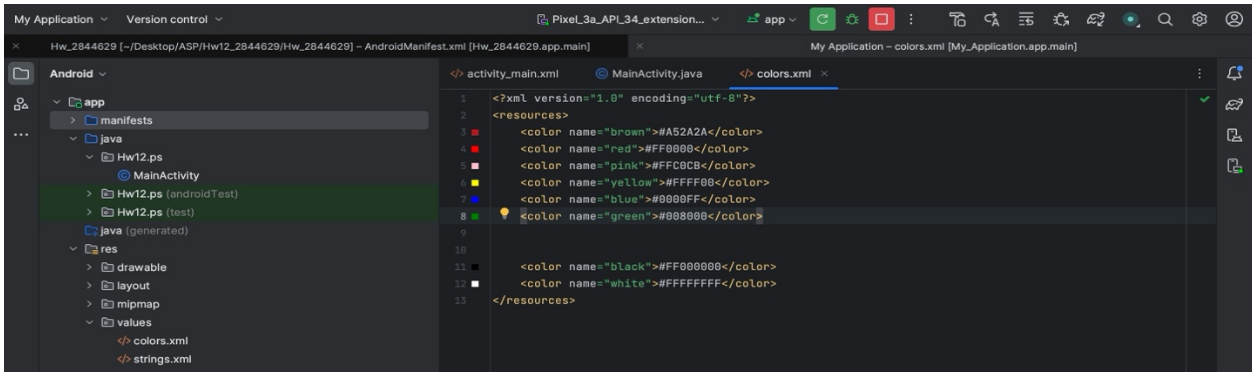
```java
    @Override
    public void onSensorChanged(SensorEvent event) {
        if (event.sensor.getType() == Sensor.TYPE_PROXIMITY) {
            float distance = event.values[0];
            updateBackgroundColor(distance);
        }
    }

    @Override
    public void onAccuracyChanged(Sensor sensor, int accuracy) {
        // Not used in this example
    }

    1 usage
    private void updateBackgroundColor(float distance) {
        int backgroundColor = Color.GREEN;

        if (distance <= 0.9) {
            backgroundColor = getResources().getColor(R.color.brown);
        }
        if (distance <= 0.7) {
            backgroundColor = getResources().getColor(R.color.red);
        }
        if (distance <= 0.5) {
            backgroundColor = getResources().getColor(R.color.pink);
        }
        if (distance <= 0.3) {
            backgroundColor = getResources().getColor(R.color.yellow);
        }
        if (distance <= 0.1) {
            backgroundColor = getResources().getColor(R.color.blue);
        }

        layout.setBackgroundColor(backgroundColor);
```

Activity_main.xml : This XML layout for an Android app defines a 'RelativeLayout' as the root container, with a green backdrop, 16dp padding, and a 'TextView' in the center. The 'TextView,' denoted by '@id/proximityValue,' displays the text "Proximity Value: N/A" in white with a font size of 24sp as a placeholder for showing proximity sensor readings.



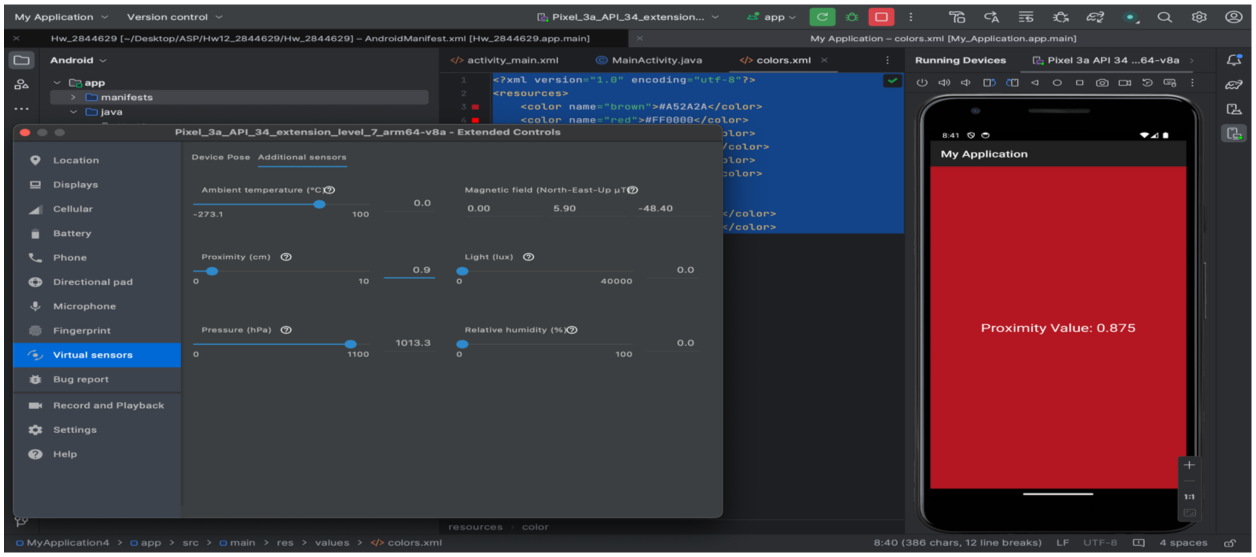
```xml
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/layout"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp"
    android:background="@color/green">

    <TextView
        android:id="@+id/proximityValue"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="24sp"
        android:textColor="#FFFFFF"
        android:layout_centerInParent="true"
        android:text="Proximity Value: N/A" />

</RelativeLayout>
```

Colors.xml : This XML file, commonly referred to as 'colors.xml,' defines specific color resources for an Android application. Each color is given a distinct name such as "brown," "red," "pink," and so on, as well as a corresponding hexadecimal color value, allowing for consistent and reusable color definitions throughout the app's layout and code.



```xml
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="brown">#A52A2A</color>
    <color name="red">#FF0000</color>
    <color name="pink">#FFC0CB</color>
    <color name="yellow">#FFFF00</color>
    <color name="blue">#0000FF</color>
    <color name="green">#008000</color>


    <color name="black">#FF000000</color>
    <color name="white">#FFFFFFFF</color>
</resources>
```

Below are the screenshots of the sensors showing different colors on different distances:



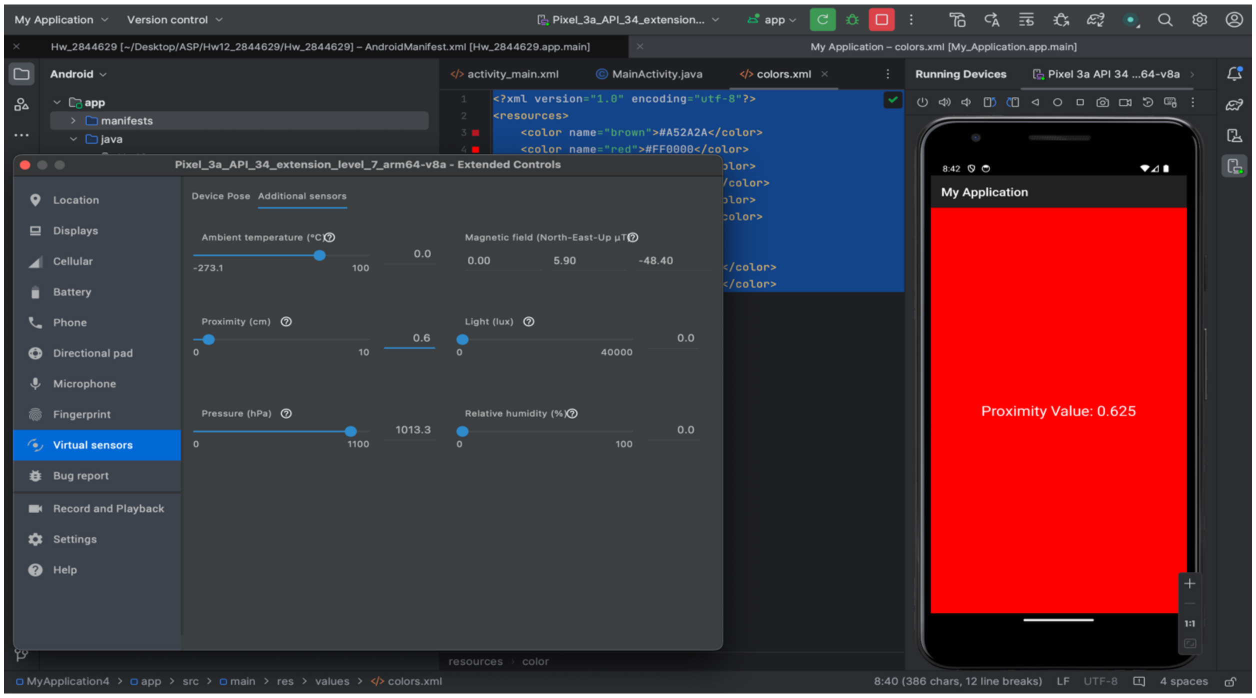
Pixel_3a_API_34_extension_level_7_arm64-v8a - Extended Controls

Ambient temperature (°C) 0.0
Magnetic field (North-East-Up µT) 0.00 5.90 -48.40
Proximity (cm) 0.9
Light (lux) 0.0
Pressure (hPa) 1013.3
Relative humidity (%) 0.0

My Application

Proximity Value: 0.875

At distance 0.9



```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="brown">#A52A2A</color>
    <color name="red">#FF0000</color>
```

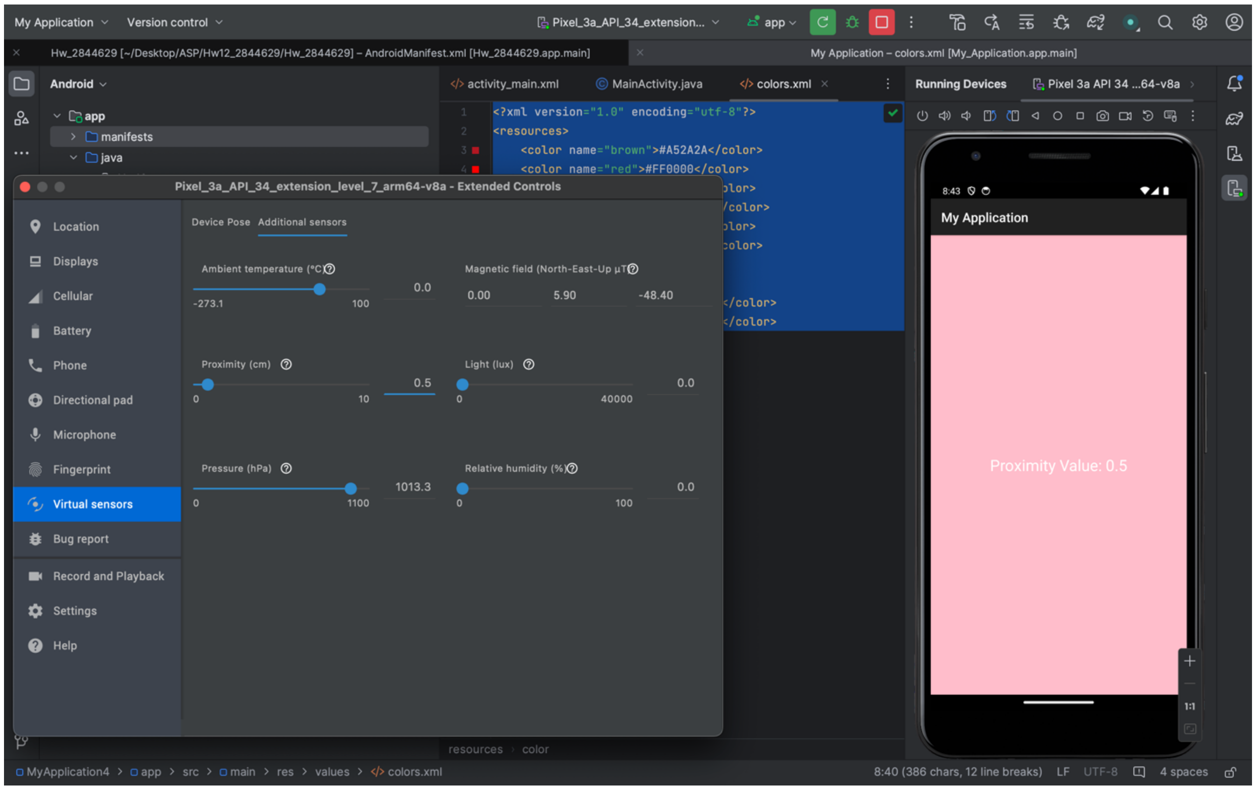
Pixel_3a_API_34_extension_level_7_arm64-v8a - Extended Controls

Virtual sensors – Additional sensors: Ambient temperature (°C) 0.0; Magnetic field (North-East-Up µT) 0.00 5.90 -48.40; Proximity (cm) 0.6; Light (lux) 0.0; Pressure (hPa) 1013.3; Relative humidity (%) 0.0

My Application

Proximity Value: 0.625

At value 0.6.



```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="brown">#A52A2A</color>
    <color name="red">#FF0000</color>
```

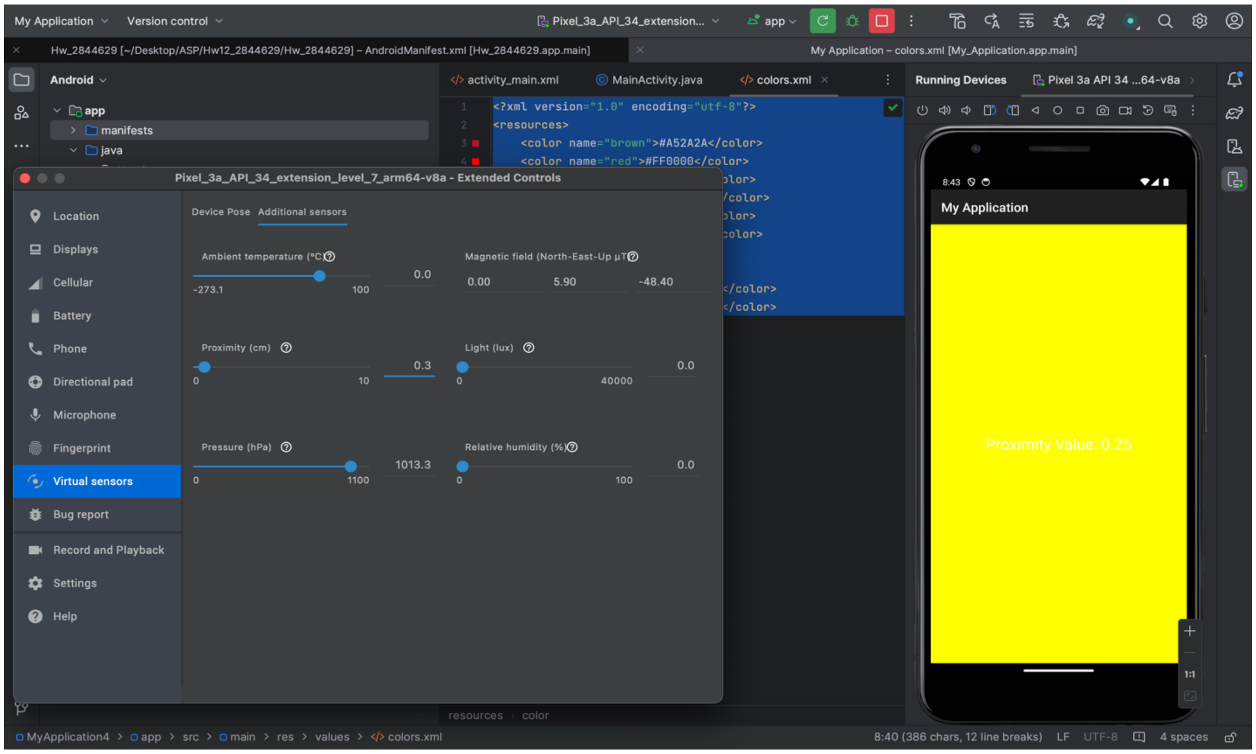
Pixel_3a_API_34_extension_level_7_arm64-v8a - Extended Controls

Virtual sensors – Additional sensors: Ambient temperature (°C) 0.0; Magnetic field (North-East-Up µT) 0.00 5.90 -48.40; Proximity (cm) 0.5; Light (lux) 0.0; Pressure (hPa) 1013.3; Relative humidity (%) 0.0

My Application

Proximity Value: 0.5

At value 0.5.



```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="brown">#A52A2A</color>
    <color name="red">#FF0000</color>
```

Pixel_3a_API_34_extension_level_7_arm64-v8a - Extended Controls

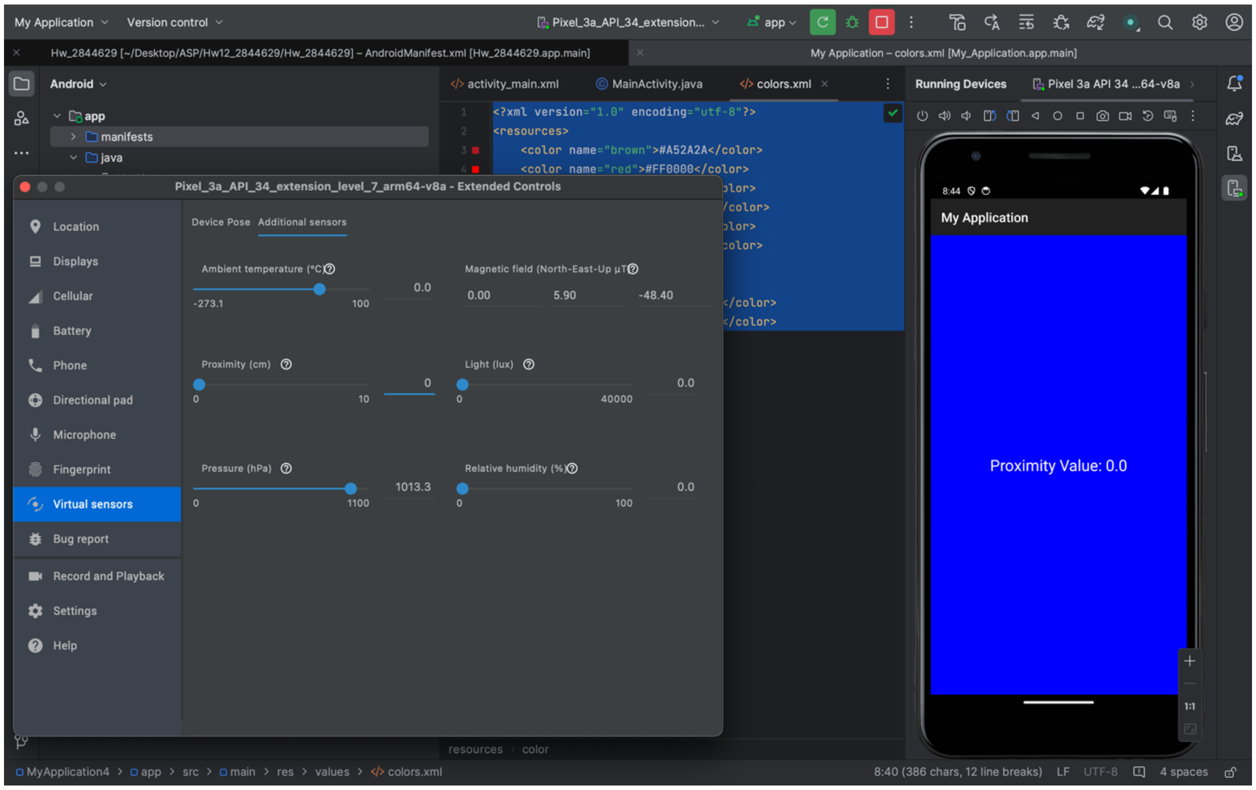
Virtual sensors — Additional sensors

Ambient temperature (°C): 0.0
Magnetic field (North-East-Up µT): 0.00 5.90 -48.40
Proximity (cm): 0.3
Light (lux): 0.0
Pressure (hPa): 1013.3
Relative humidity (%): 0.0

My Application

Proximity Value: 0.25

At value 0.3.



```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="brown">#A52A2A</color>
    <color name="red">#FF0000</color>
```

Pixel_3a_API_34_extension_level_7_arm64-v8a - Extended Controls

Virtual sensors — Additional sensors

Ambient temperature (°C): 0.0
Magnetic field (North-East-Up µT): 0.00 5.90 -48.40
Proximity (cm): 0
Light (lux): 0.0
Pressure (hPa): 1013.3
Relative humidity (%): 0.0

My Application

Proximity Value: 0.0