# Objective

In this tutorial, we will introduce some programming techniques in android studio, which includes the following:

1. Display of WebView on android studio;
2. PIPPY motion control by android pad;
3. Use of multi-interfaces to switch windows for advertisements;
4. Background music on start-up;
5. Rotating icons for decoration;

# Components

1. Window PC；
2. Pad；
3. USB Type-C Cable;
4. Smartphone (Personal Hotspot);
5. PIPPY;



# Basic Knowledge for the Experiment

Android Studio is the official integrated development environment (IDE) for Android application development. It is based on IntelliJ IDEA, a Java integrated development environment for software, and incorporates its code editing and developer tools.

To support application development within the Android operating system, Android Studio uses a Gradle-based build system, Android Emulator, code templates and GitHub integration. Every project in Android Studio has one or more modalities with source code and resource files. These modalities include Android app modules, Library modules and Google App Engine modules.

Android Studio uses an Apply Changes feature to push code and resource changes to a running application. A code editor assists the developer with writing code and offering code completion, refraction and analysis. Applications built in Android Studio are then compiled into the APK format for submission to the Google Play Store.

# Experimental Steps

## Camera video display

Notice:

* The followings are based on *5.3* of *Tutorial 1*, the URL of the PIPPY’s camera video should be found first.

1. Create a new android project, add the following codes in AndroidManifest.xml.

<uses-permission android:name="android.permission.ACCESS\_COARSE\_LOCATION" />  
<uses-permission android:name="android.permission.ACCESS\_FINE\_LOCATION" />  
<uses-permission android:name="android.permission.INTERNET"/>  
<uses-permission android:name="android.permission.CHANGE\_NETWORK\_STATE"></uses-permission>  
<uses-permission android:name="android.permission.CHANGE\_WIFI\_STATE"></uses-permission>  
<uses-permission android:name="android.permission.ACCESS\_NETWORK\_STATE"></uses-permission>  
<uses-permission android:name="android.permission.ACCESS\_WIFI\_STATE"></uses-permission>  
<uses-permission android:name="android.permission.CHANGE\_WIFI\_MULTICAST\_STATE" />

文本

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1. Open MainActivity.java file and add the following packages.

import android.webkit.WebViewClient;  
import android.webkit.WebView;  
import static android.view.Window.*FEATURE\_NO\_TITLE*;

1. Create a WebView widget in the layout xml file.

图形用户界面

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1. Write the following codes under the onCreate class.

requestWindowFeature(*FEATURE\_NO\_TITLE*);  
setContentView(R.layout.*activity\_main*);  
if (getSupportActionBar() != null){  
 getSupportActionBar().hide();}  
WebView webview = (WebView) findViewById(R.id.*web\_view*);  
webview.getSettings().setJavaScriptEnabled(true);  
webview.setWebViewClient(new WebViewClient()); //不調用系統瀏覽器  
webview.loadUrl("https://youtu.be/dQw4w9WgXcQ");

文本

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1. Build the project and verify its effectiveness.

图形用户界面, 应用程序, Teams

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Notice:

* You should first connect the Android Pad to the Internet.
* The URL in the code indicates the web that will appear. Replace it with the URL of the PIPPY’s monitor video, you can stream the camera video (See *5.3* in *Tutorial 1*).

## PIPPY Motion Control

In *Tutorial 1,* we have found the key words that can be used to send the instructions to the PIPPY. The followings will introduce how to use buttons to send those commands.

1. Open MainActivity.java file and add the following packages.

import android.os.Handler;  
import android.os.Message;  
import android.view.MotionEvent;  
import android.view.View;  
import android.widget.Button;  
import java.net.DatagramPacket;  
import java.net.DatagramSocket;  
import java.net.InetAddress;

电脑萤幕的截图

描述已自动生成

1. Create several buttons in the layout xml file, set their text to the appropriate commands to control the PIPPY.

图形用户界面, 应用程序

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1. Add the following declarations and the initializations.

public String temp;  
 public int bar\_num;  
 private Button button1;  
 private Button button2;  
 private Button button3;  
 private Button button4;  
 private StringBuilder builder;  
 public String trans;  
 @SuppressLint("HandlerLeak")  
 private Handler handler = new Handler() {  
 @Override  
 public void handleMessage(Message msg) {  
 switch ( msg.what) {  
 case 0x1001:  
 trans = builder.toString();  
// ms\_chatmsg.setText(builder.toString());  
 break;  
 }  
 }  
 };

电脑萤幕的截图

描述已自动生成

button1 = (Button) findViewById(R.id.*button1*);  
button2 = (Button) findViewById(R.id.*button2*);  
button3 = (Button) findViewById(R.id.*button3*);  
button4 = (Button) findViewById(R.id.*button4*);  
set\_touch(button1);  
set\_touch(button2);  
set\_touch(button3);  
set\_touch(button4);

电脑萤幕的截图

描述已自动生成

1. Write the following codes for chat function (Introduced in tutorials in *ECEN3024*):

private void chat(String str) {  
 new Thread(new Runnable() {  
 public void run() {  
 try {  
  
 InetAddress address = InetAddress.*getByName*("192.168.43.126"); // Raspberry pi  
 int port = 8003;  
 byte[] data\_se = str.getBytes();  
 handler.sendEmptyMessage(0x1001);  
 DatagramPacket packet = new DatagramPacket(data\_se, data\_se.length, address, port);  
 DatagramSocket socket = new DatagramSocket();  
 socket.send(packet);  
  
 byte[] data2 = new byte[1024];  
 DatagramPacket packet2 = new DatagramPacket(data2, data2.length);  
 socket.receive(packet2);  
 handler.sendEmptyMessage(0x1001);  
  
 socket.close();  
 } catch (Exception e )  
 {  
 e.printStackTrace();  
 }  
 }  
 }).start();  
}

1. Write the following codes for set\_touch function:

private void set\_touch(View v){  
 v.setOnTouchListener(new View.OnTouchListener() {  
 @Override  
 public boolean onTouch(View v, MotionEvent event) {  
 if (event.getAction() == MotionEvent.*ACTION\_DOWN* ) {  
 Button button = (Button) v;  
 temp = button.getText().toString();  
 chat(temp+' '+String.*valueOf*(bar\_num));  
 return true;  
 }else if (event.getAction() == MotionEvent.*ACTION\_UP*) {  
 chat("DS"+" 0");  
 chat("TS"+" 0");  
 }  
 return false;  
 }  
 });  
}

电脑萤幕的截图

描述已自动生成

Notice:

* set\_touch will send the text of the buttons in the form of string to the Raspi via chat function, if you want to send other short instructions, you only need to change the text of the button.
* set\_touch will continuously send the corresponding instructions when the button is being pressed. When released, it will immediately send the DS and TS to stop the PIPPY entirely.
* To verify this function, you should run the server on Raspi and monitor the corresponding port.

## Window switching

1. Create a new java file named MoreActivity.java, and this activity will serve as the start-up advertisement.

电脑萤幕的截图

描述已自动生成

1. Import the followings to MoreActivity.java. Also change the class MoreActivity into extends AppcompatActivity and add the onCreate function.

import android.content.Intent;  
import android.os.Bundle;  
import android.os.SystemClock;  
import android.view.View;  
import android.widget.Chronometer;  
import android.widget.TextView;  
import android.widget.Button;  
import androidx.appcompat.app.AppCompatActivity;

图形用户界面, 文本

描述已自动生成

1. Create a new layout xml file named activity\_more.xml.

图形用户界面

描述已自动生成

1. Create a button and write the following code for trans function and set it to be the onclick function of the button.

public void trans(View v){  
 Intent intent=new Intent(MoreActivity.this,MainActivity.class);  
 startActivity(intent);  
 finish();};

电脑萤幕的截图

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电脑萤幕画面

描述已自动生成

Notice:

* Intent switches from MoreActivity to MainActivity according to its argument sequence.

1. Add the description for MoreActivity in AndroidManifest.xml, change the start-up priority.

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1. Check the validity of the codes.

图形用户界面, 应用程序, Teams

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图形用户界面, 应用程序, 网站

描述已自动生成

1. To realize auto-switch, chronometer can be utilized as a timer. First, add the declaration of the widget in the xml file.

<Chronometer  
 android:id="@+id/chronometer"  
 android:layout\_width="100dp"  
 android:layout\_height="100dp"  
 android:layout\_marginStart="28dp"  
 android:layout\_marginTop="16dp"  
 android:visibility="visible"  
 app:layout\_constraintStart\_toStartOf="parent"  
 app:layout\_constraintTop\_toTopOf="parent" />

图形用户界面

描述已自动生成

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1. Add a textView1, write the following codes.

图形用户界面

描述已自动生成

Chronometer chronometer;  
private Button button11;  
private long time;  
private TextView textView1;  
@Override  
protected void onCreate(Bundle savedInstanceState){  
 super.onCreate(savedInstanceState);  
 requestWindowFeature(*FEATURE\_NO\_TITLE*);  
 setContentView(R.layout.*activity\_more*);  
 button11 = (Button) findViewById(R.id.*button*);  
 textView1 = (TextView)findViewById(R.id.*textView1*);  
 chronometer = findViewById(R.id.*chronometer*);  
 chronometer.setBase(SystemClock.*elapsedRealtime*());  
 chronometer.start();  
 chronometer.setOnChronometerTickListener(new Chronometer.OnChronometerTickListener() {  
 @Override  
 public void onChronometerTick(Chronometer chronometer) {  
 time = (SystemClock.*elapsedRealtime*()-chronometer.getBase())/1000;  
 if (time<5){  
 textView1.setText(String.*valueOf*(5-time));}  
 else{  
 textView1.setText("Skipping");  
 button11.callOnClick();}}});}

文本

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1. Followings are the overall effect of the codes.

图形用户界面, 应用程序, Teams

描述已自动生成

图形用户界面, 应用程序, Teams

描述已自动生成

图形用户界面, 网站

描述已自动生成

## Background Music

1. Download the music in mp3 format, create a directory in the project path named “raw” as follows.

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描述已自动生成

1. Write the following code for sound function.

protected void sound() {  
 MediaPlayer mediaPlayer = MediaPlayer.*create*(this, R.raw.*rotating*);  
 mediaPlayer.start();  
}

1. Place it under the onCreate function.

文本

描述已自动生成

## Rotating Icon

1. Download the icon in png format (other formats may applicable but not tested), place it under the “drawable” directory.

图形用户界面, 文本, 应用程序, 电子邮件

描述已自动生成

1. Write the following class.

public class MyYAnimation extends Animation {  
 int centerX, centerY;  
 Camera camera = new Camera();  
 @Override  
 public void initialize(int width, int height, int parentWidth, int parentHeight) {  
 super.initialize(width, height, parentWidth, parentHeight);  
 //获得中心点坐标  
 centerX = width / 2;  
 centerY = width / 2;  
 //动画执行时间 自行定义  
 setDuration(3 \* 1000);  
 setInterpolator(new DecelerateInterpolator());  
 }  
 @Override  
 protected void applyTransformation(float interpolatedTime, Transformation t) {  
 final Matrix matrix = t.getMatrix();  
 camera.save();  
 //中心是Y轴旋转，这里可以自行设置X轴 Y轴 Z轴  
 camera.rotateY(360 \* interpolatedTime);  
 //把我们的摄像头加在变换矩阵上  
 camera.getMatrix(matrix);  
 //设置翻转中心点  
 matrix.preTranslate(-centerX, -centerY);  
 matrix.postTranslate(centerX,centerY);  
 camera.restore();  
 }  
}

电脑萤幕的截图

描述已自动生成

1. Create an imageView widget.

图形用户界面

描述已自动生成

图形用户界面

描述已自动生成

文本

描述已自动生成

1. Place the below codes in onCreate .

MyYAnimation myYAnimation = new MyYAnimation();  
myYAnimation.setRepeatCount(Animation.*INFINITE*);  
ImageView.startAnimation(myYAnimation);

文本

描述已自动生成

1. Followings are the overall effect of the codes.

图形用户界面, 网站

描述已自动生成

图形用户界面, 网站

描述已自动生成

# Potential Direction

## Make the PIPPY generate different state’s notification.

While changing the modes of the PIPPY (e.g., PIPPY is doing motion changes or face detection), there is no display to tell the user what is PIPPY’s current state. It is recommended that a notification be given so that the user can better control the device.

To achieve this function, you can try to make the button change color when you press it or use TextView to make the pad show you PIPPY’s current state (e.g., QR detection or face tracking).

## Use rectangles to show the contour of face during face detection.

For face detection, the codes in the tutorials do not show the rectangle around the object (as shown in *Tutorial 3*), you can write codes to make the rectangles appear on the screen. The valid original codes are shown below from camera\_opencv.py, just follow its definition and try to add your own functions in it.

文本

描述已自动生成

# Reference

1. 安卓 socket 的基本使用, <https://blog.csdn.net/lfq88/article/details/118028400>
2. Android Studio中文社区, <http://forum.android-studio.org/forum.php>
3. Java 教程, <https://www.runoob.com/java/java-tutorial.html>

# End of Tutorial