

Android Things开发板使用经验



王玉成 IoT GDE

wfing123@gmail.com



概要

- 硬件介绍
- 以图像识别应用为例：
 - 搭建软硬件开发环境
 - 开发中碰到的问题及解决办法

王玉成1

王玉成2

王玉成3

Imx7d硬件介绍



幻灯片 3

王玉成1 王玉成, 2018/1/7

王玉成2 王玉成, 2018/1/7

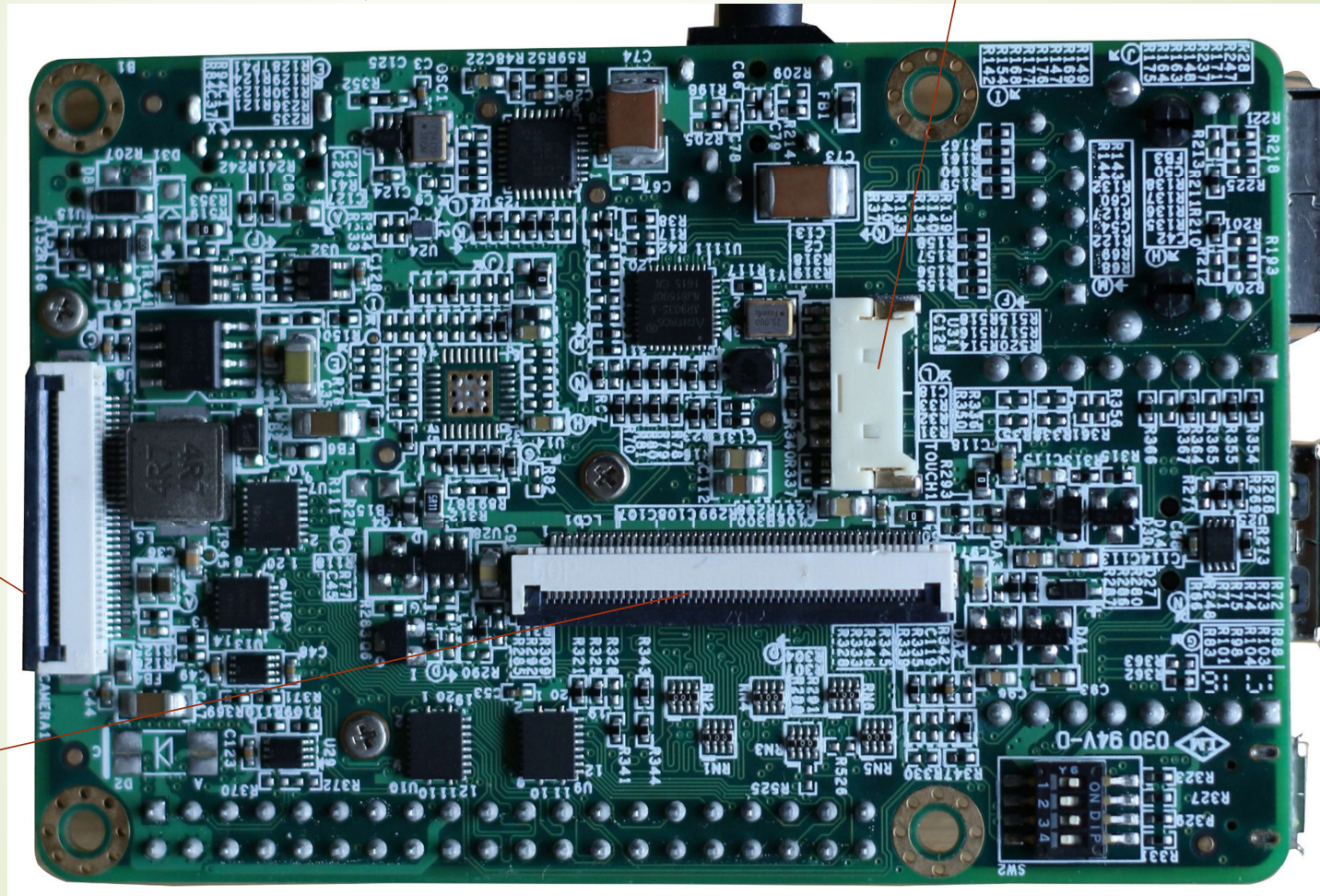
王玉成3 王玉成, 2018/1/7

Imx7d硬件介绍

I2C Touch

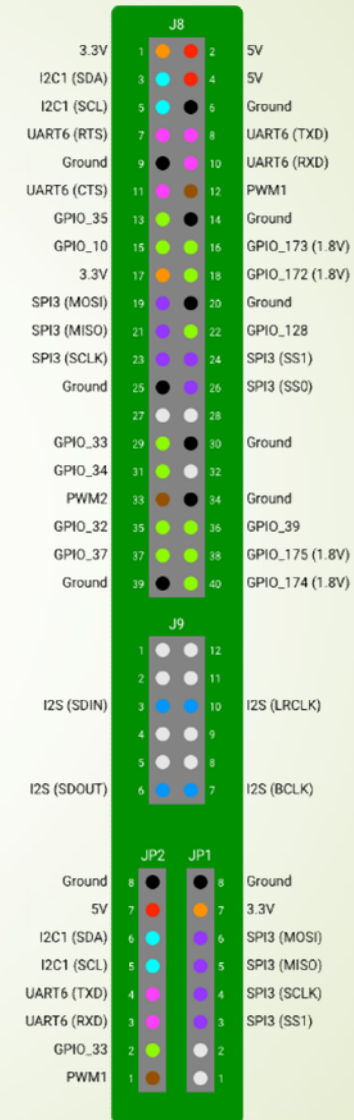
Camera
Interface

RGB TTL
Display

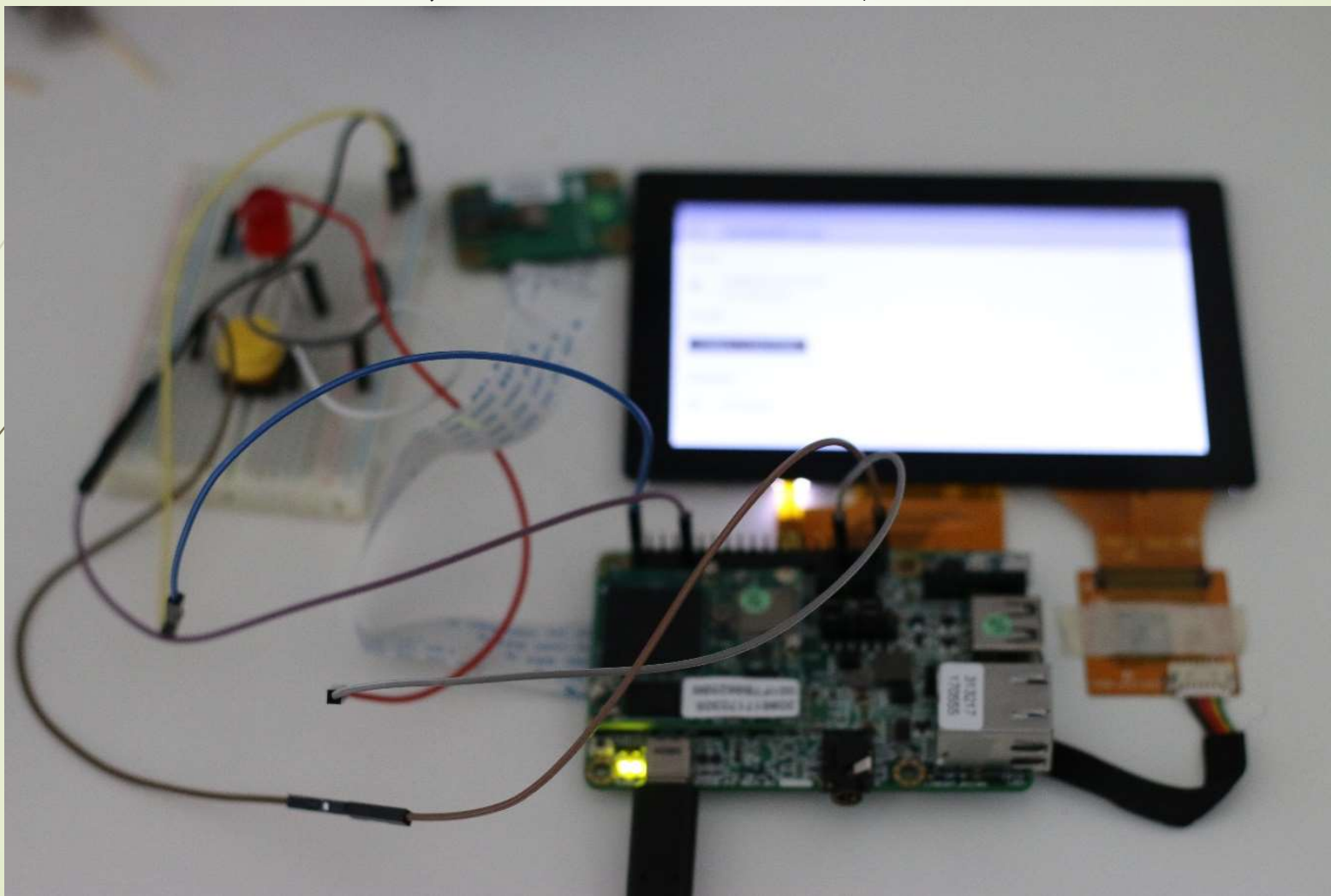


Imx7d针脚介绍

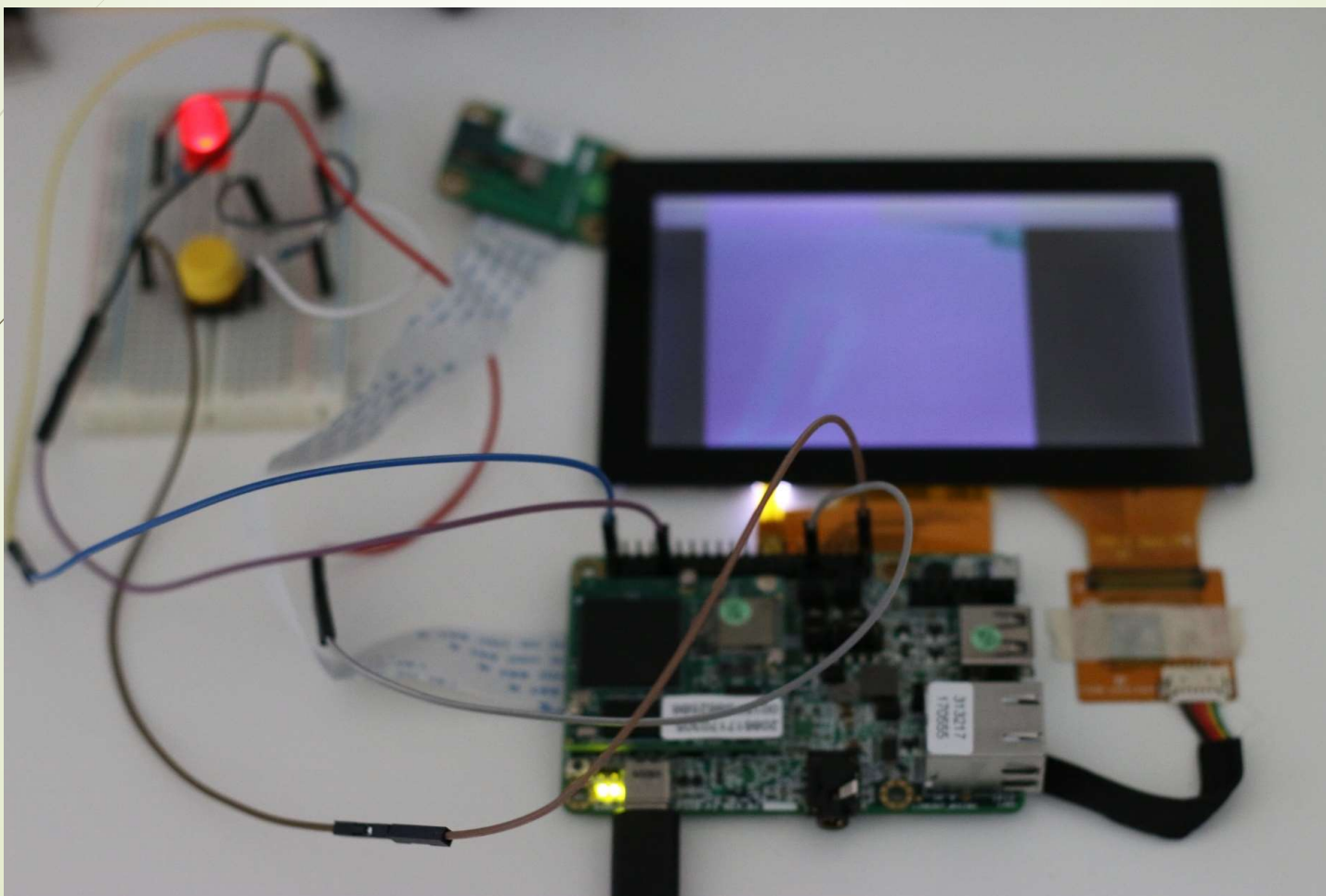
● = 5V ● = 1.8V ● = GPIO ● = I2C ● = SPI
● = 3.3V ● = Ground ● = PWM ● = I2S ● = UART



TensorFlow 图像识别示例



运行示意图

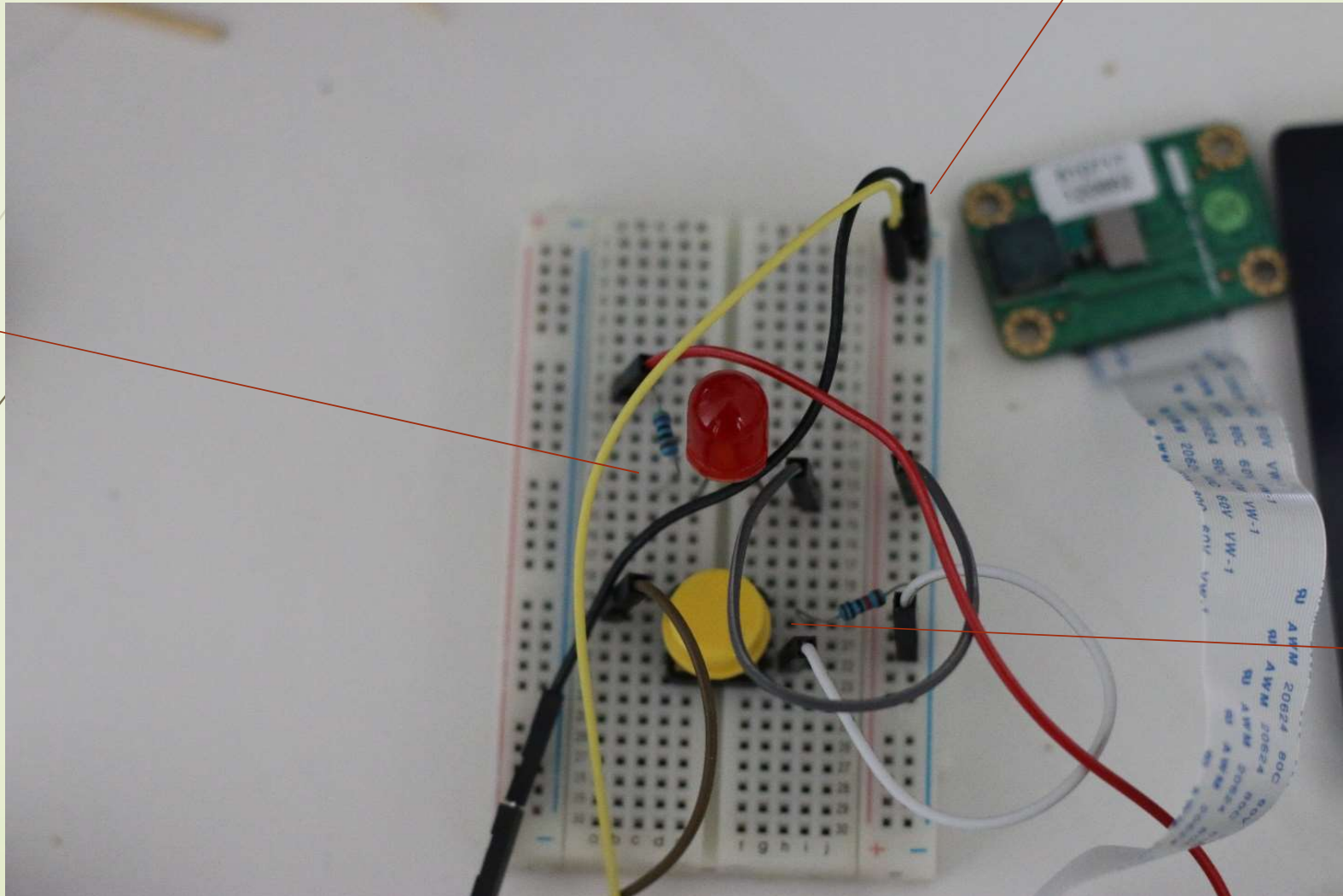


面包板连接

LED

VCC GND

BUTTON

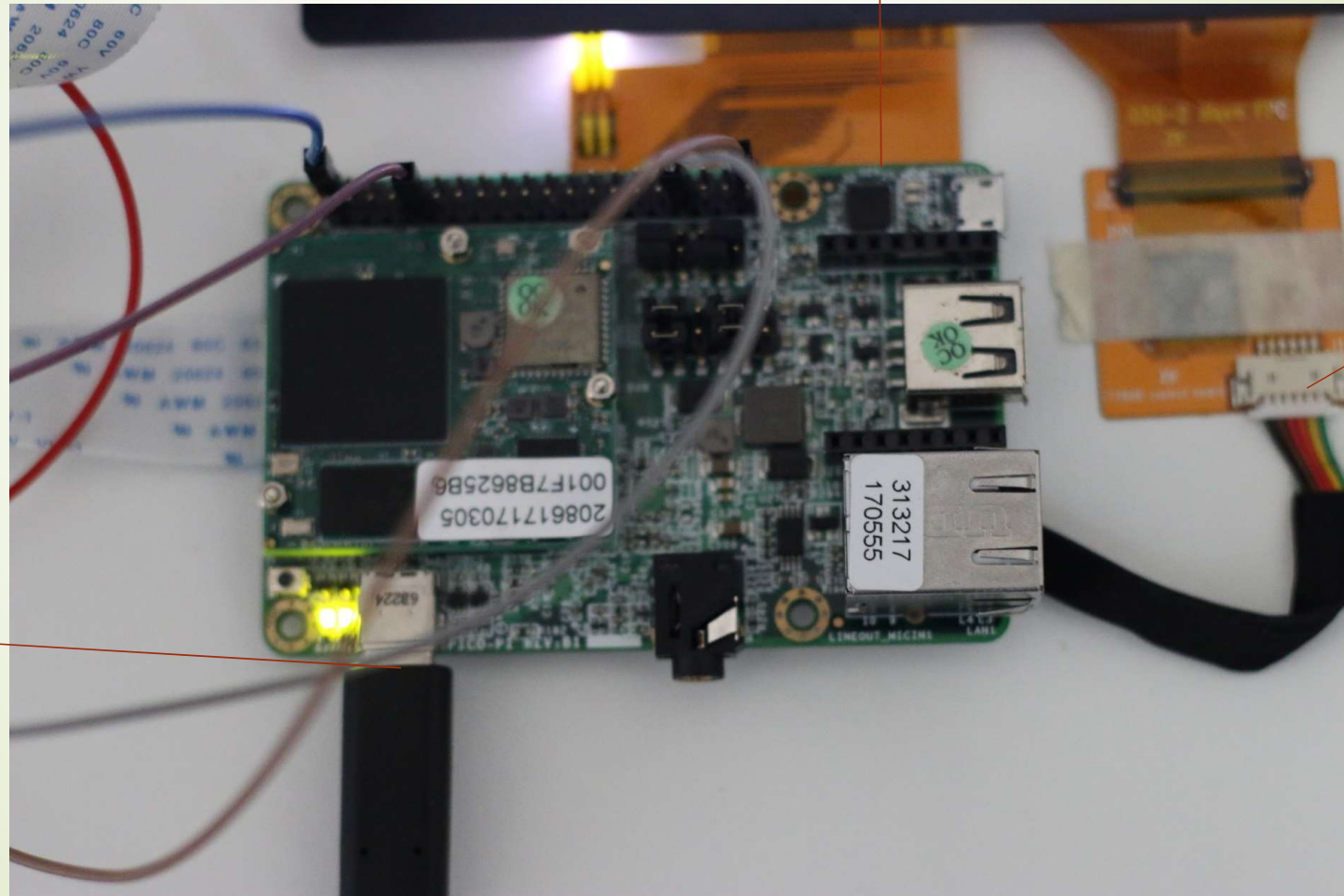


开发板连接

DISPLAY

I2C
Touch

USB TYPE-C



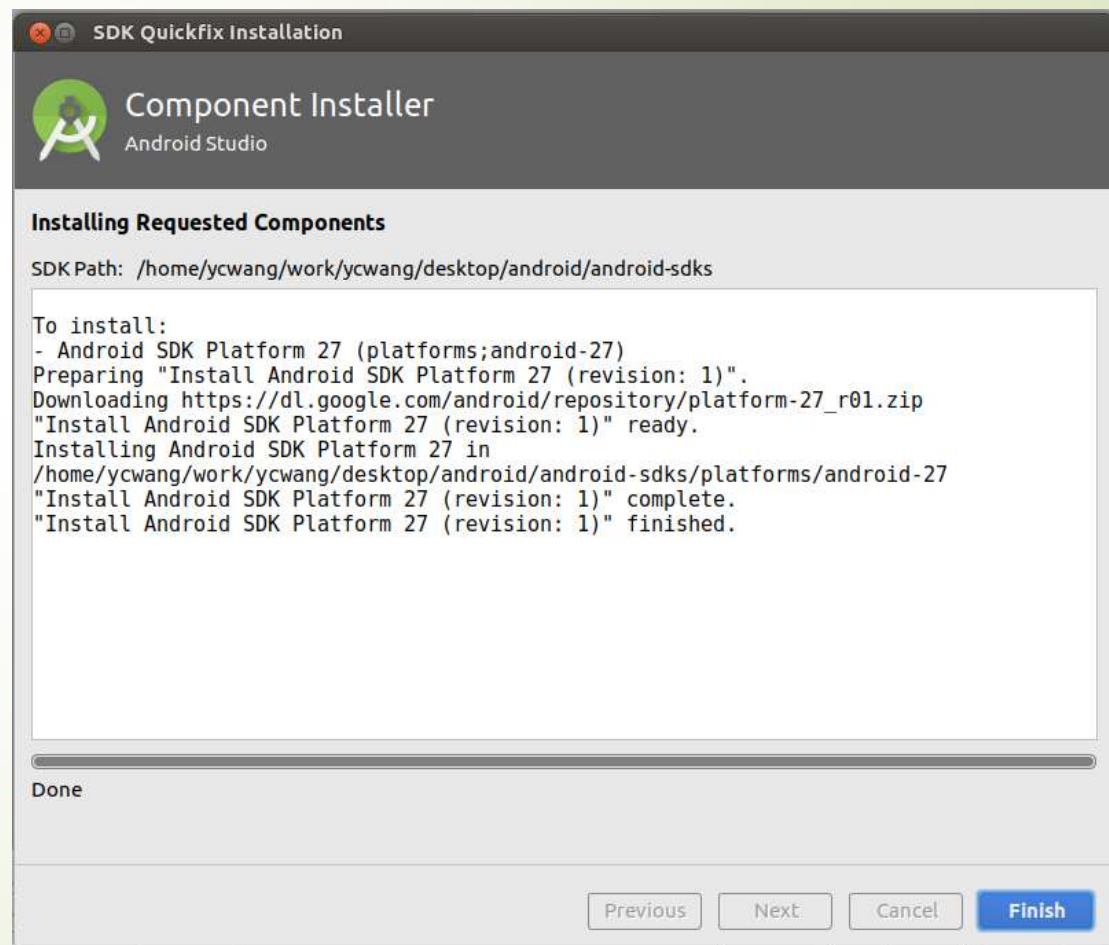


软件运行环境

- Android Studio最新版
- 下载代码
- 自动配置相应的sdk版本， gradle版本， 编译

运行中待解决的问题

Android SDK升级到 AP 27版本，跟 Android 8.1对应，也跟Android Things的6.1版对应

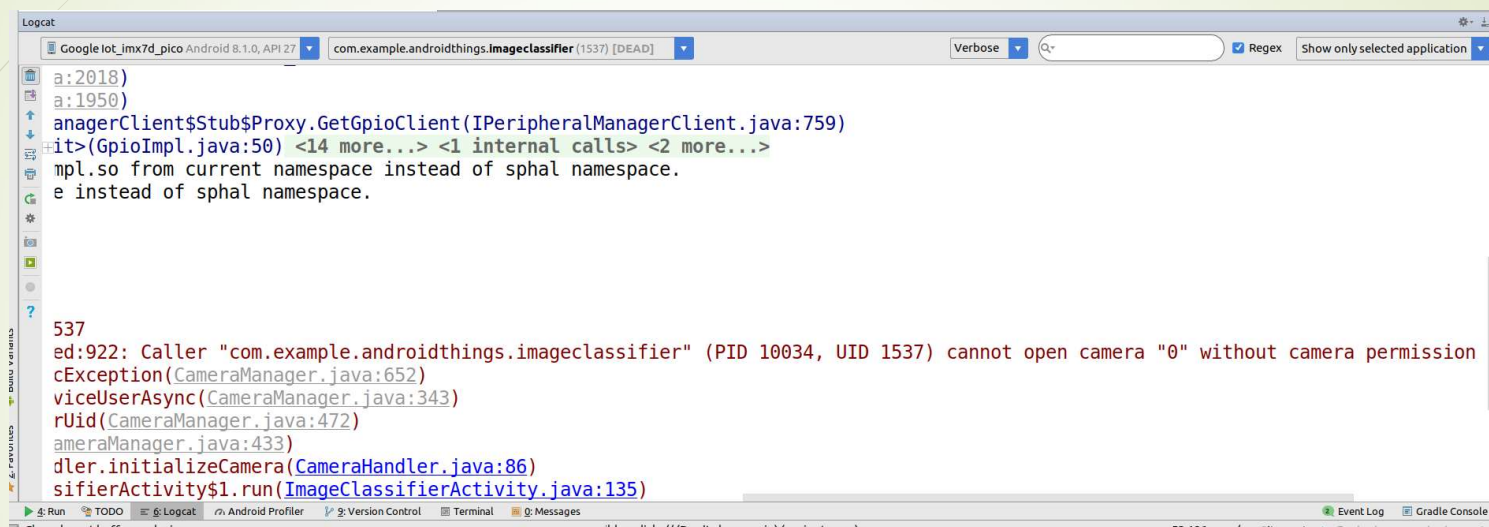


匹配版本

The screenshot shows the Android Studio interface for a project named 'sample-tensorflow-imageclassifier'. The left sidebar displays the project structure, including folders for 'manifests', 'java', 'assets', and 'res'. The main editor shows the 'build.gradle' file for the 'app' module. The code defines the Android configuration, including 'compileSdkVersion 27', 'buildToolsVersion '26.0.2'', 'minSdkVersion 26', and 'targetSdkVersion 27'. A red circle highlights the 'targetSdkVersion 27' line, indicating a version mismatch or warning.

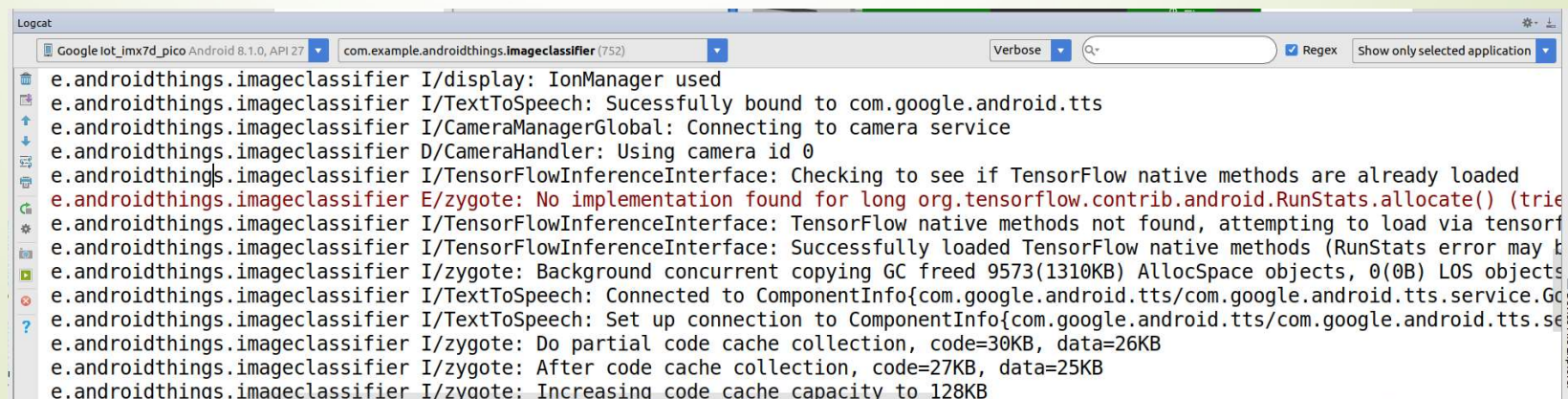
```
1 // This file provides basic support for building the TensorFlow demo
2 // in Android Studio with Gradle.
3
4 apply plugin: 'com.android.application'
5 apply plugin: 'de.undercouch.download'
6
7 android {
8     compileSdkVersion 27
9     buildToolsVersion '26.0.2'
10
11     lintOptions {
12         abortOnError false
13     }
14
15     defaultConfig {
16         applicationId = 'com.example.androidthings.imageclassifier'
17         minSdkVersion 26
18         targetSdkVersion 27
19     }
20
21     buildTypes {
22         release {
23             minifyEnabled = false
24             proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
25         }
26     }
27
28     sourceSets {
29         main {
30             assets.srcDirs = ['../assets']
31         }
32     }
33
34     // Download model zip file into ../assets directory
35     // unzip it to demo project's own ../assets directory
36     import de.undercouch.gradle.tasks.download.Download
37     task downloadFile(type: Download) {
```


不允许动态权限引发的问题



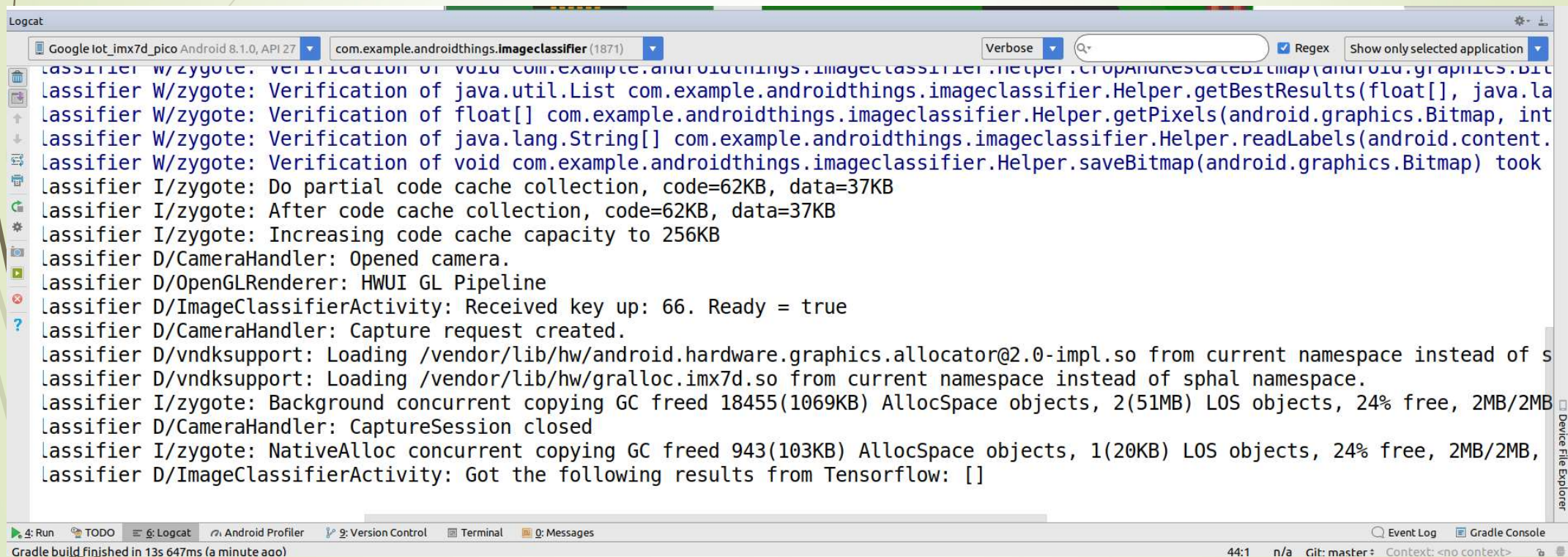
```
Logcat
Google IoT IMX7D_PICO Android 8.1.0, API 27 | com.example.androidthings.imageclassifier (1537) [DEAD] | Verbose | Q* | Regex | Show only selected application
a:2018)
a:1950)
anagerClient$Stub$Proxy.GetGpioClient(IPeripheralManagerClient.java:759)
it>(GpioImpl.java:50) <14 more...> <1 internal calls> <2 more...>
mpl.so from current namespace instead of sphal namespace.
e instead of sphal namespace.

537
ed:922: Caller "com.example.androidthings.imageclassifier" (PID 10034, UID 1537) cannot open camera "0" without camera permission
cException(CameraManager.java:652)
viceUserAsync(CameraManager.java:343)
rUid(CameraManager.java:472)
ameraManager.java:433)
dler.initializeCamera(CameraHandler.java:86)
sifierActivity$1.run(ImageClassifierActivity.java:135)
```



```
Logcat
Google IoT IMX7D_PICO Android 8.1.0, API 27 | com.example.androidthings.imageclassifier (752) | Verbose | Q* | Regex | Show only selected application
e.androidthings.imageclassifier I/display: IonManager used
e.androidthings.imageclassifier I/TextToSpeech: Successfully bound to com.google.android.tts
e.androidthings.imageclassifier I/CameraManagerGlobal: Connecting to camera service
e.androidthings.imageclassifier D/CameraHandler: Using camera id 0
e.androidthings.imageclassifier I/TensorFlowInferenceInterface: Checking to see if TensorFlow native methods are already loaded
e.androidthings.imageclassifier E/zygote: No implementation found for long org.tensorflow.contrib.android.RunStats.allocate() (tried
e.androidthings.imageclassifier I/TensorFlowInferenceInterface: TensorFlow native methods not found, attempting to load via tensorf
e.androidthings.imageclassifier I/TensorFlowInferenceInterface: Successfully loaded TensorFlow native methods (RunStats error may b
e.androidthings.imageclassifier I/zygote: Background concurrent copying GC freed 9573(1310KB) AllocSpace objects, 0(0B) LOS objects
e.androidthings.imageclassifier I/TextToSpeech: Connected to ComponentInfo{com.google.android.tts/com.google.android.tts.service.G
e.androidthings.imageclassifier I/TextToSpeech: Set up connection to ComponentInfo{com.google.android.tts/com.google.android.tts.se
e.androidthings.imageclassifier I/zygote: Do partial code cache collection, code=30KB, data=26KB
e.androidthings.imageclassifier I/zygote: After code cache collection, code=27KB, data=25KB
e.androidthings.imageclassifier I/zygote: Increasing code cache capacity to 128KB
```

运行状态



The screenshot shows the Logcat window in Android Studio, displaying the runtime logs of an application named 'com.example.androidthings.imageclassifier'. The logs show the application's initialization, including the loading of native libraries and the execution of the image classification process. The logs are filtered by the application package name and set to 'Verbose' level. The logs show the application's progress from the initial setup to the final results of the image classification.

```
Logcat
Google IoT_imx7d_pico Android 8.1.0, API 27 com.example.androidthings.imageclassifier (1871) Verbose
lassifier W/zygote: Verification of void com.example.androidthings.imageclassifier.Helper.cropAndRescaleBitmap(android.graphics.Bitmap, int, int, int, int) took
lassifier W/zygote: Verification of java.util.List com.example.androidthings.imageclassifier.Helper.getBestResults(float[], java.lang.String[]) took
lassifier W/zygote: Verification of float[] com.example.androidthings.imageclassifier.Helper.getPixels(android.graphics.Bitmap, int, int, int) took
lassifier W/zygote: Verification of java.lang.String[] com.example.androidthings.imageclassifier.Helper.readLabels(android.content.Context) took
lassifier W/zygote: Verification of void com.example.androidthings.imageclassifier.Helper.saveBitmap(android.graphics.Bitmap) took
lassifier I/zygote: Do partial code cache collection, code=62KB, data=37KB
lassifier I/zygote: After code cache collection, code=62KB, data=37KB
lassifier I/zygote: Increasing code cache capacity to 256KB
lassifier D/CameraHandler: Opened camera.
lassifier D/OpenGLRenderer: HWUI GL Pipeline
lassifier D/ImageClassifierActivity: Received key up: 66. Ready = true
lassifier D/CameraHandler: Capture request created.
lassifier D/vndksupport: Loading /vendor/lib/hw/android.hardware.graphics.allocator@2.0-impl.so from current namespace instead of sphal namespace.
lassifier D/vndksupport: Loading /vendor/lib/hw/gralloc.imx7d.so from current namespace instead of sphal namespace.
lassifier I/zygote: Background concurrent copying GC freed 18455(1069KB) AllocSpace objects, 2(51MB) LOS objects, 24% free, 2MB/2MB
lassifier D/CameraHandler: CaptureSession closed
lassifier I/zygote: NativeAlloc concurrent copying GC freed 943(103KB) AllocSpace objects, 1(20KB) LOS objects, 24% free, 2MB/2MB
lassifier D/ImageClassifierActivity: Got the following results from Tensorflow: []
```

4: Run TODO 6: Logcat Android Profiler 9: Version Control Terminal 0: Messages Event Log Gradle Console
Gradle build finished in 13s 647ms (a minute ago) 44:1 n/a Git: master Context: <no context>

其它问题-代理

```
String ipAddr = "192.168.1.3";  
String ipPort = "8123";  
try  
{  
    System.setProperty("http.proxyHost", ipAddr);  
    System.setProperty("http.proxyPort", ipPort);  
    System.setProperty("https.proxyHost", ipAddr);  
    System.setProperty("https.proxyPort", ipPort);  
}  
catch (Exception e)  
{  
    Log.d(TAG, "wifiProxy" + e.toString());  
}
```

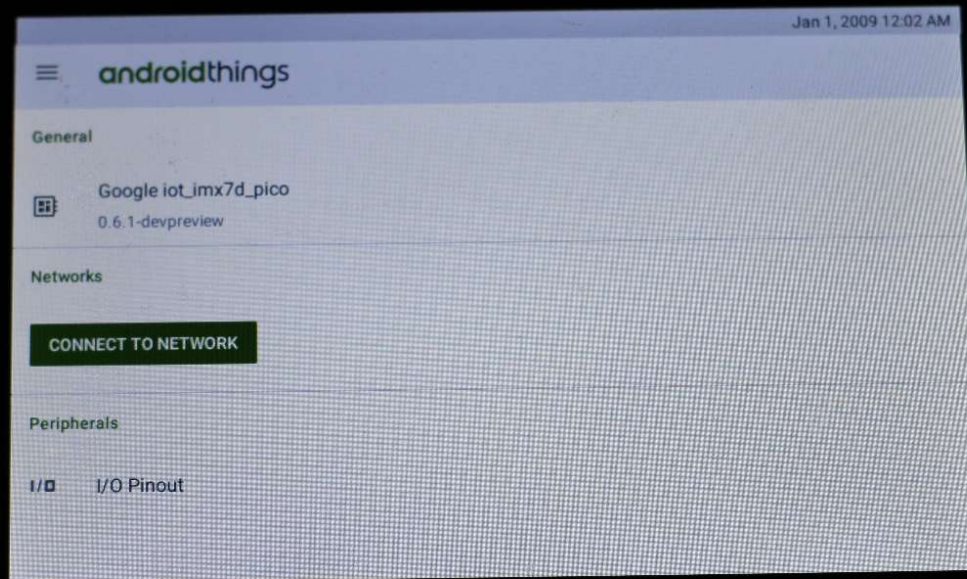
其它问题-电压

- 树莓派3有专用的USB-OTG供电接口:5V-3A
- NXP IMX7D 用USB TYPE-C接口做为供电及数据接口: 5V-500mA~900mA

其它问题-IO引脚

- IO引脚接，接VCC供电时要小心5V和3.3V的引脚，不要接错。
- 尽量不要用一个VCC引脚带动多个外设
- 引脚之前不要短接

其它问题-系统正常启动



其它问题-华山论剑

	Android Things	传统嵌入式Linux
系统	Google测试的稳定系统	OEM厂商系统，或者自己搭建的系统
开发环境	Android Studio	GCC交叉编译，有时候还需要自己做编译器
开发语言	JAVA/Kotlin/C/C++	基本用C/C++
文档支持	Android Things SDK	基本碰到问题，在网上查问题
海外市场	SoM已做FCC等认证	自己去申请认证，费时费力
驱动编写	Library支持，而且支持的驱动一直在增加	如果内核是没有集成，一般自己写驱动
云	方便的与Cloud IoT Core连接	自己搭建私有云，或者是用其它厂商的云



相关网站

- ➡ <https://github.com/androidthings>
- ➡ <https://www.hackster.io/google/products/android-things>
- ➡ <https://developer.android.google.cn/things/index.html>



Q&A 谢谢大家!