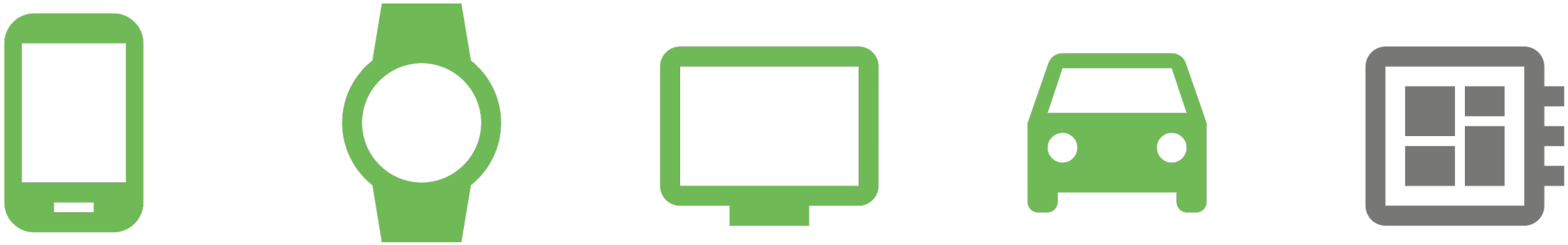
GDG DevFest 2017

android things

Tommy Lau
Lifelong Developer
@TommyLau

What is Android Things?

Android Things is an **extension** of the Android platform for **IoT** and **embedded** devices.



android things

Android Things is ideal for **powerful**, **intelligent** devices on the edge that need to be **secure**.

Point of Sale

Inventory Control

Interactive Ads

Vending Machines

Cameras

Gateways

HVAC Control

Smart Meters

Asset Tracking

Fleet Management

Driver Assist

Predictive Service

Security Systems

Smart Doorbells

Routers

Energy Monitors

Similarities

Android SDK

Android Studio

Kotlin

Firebase

Cloud Platform

Play Services

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Differences

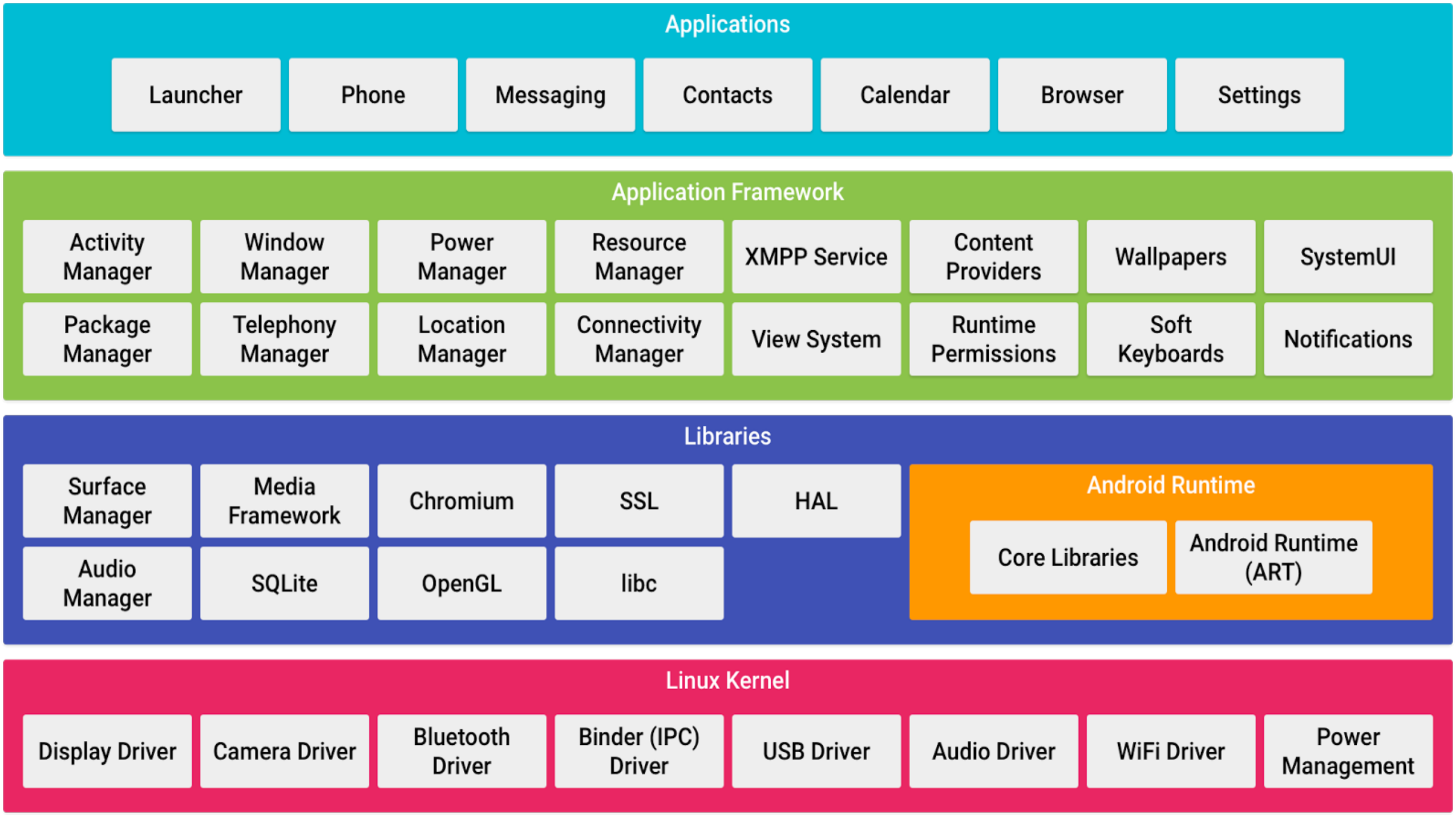
Without Play Store

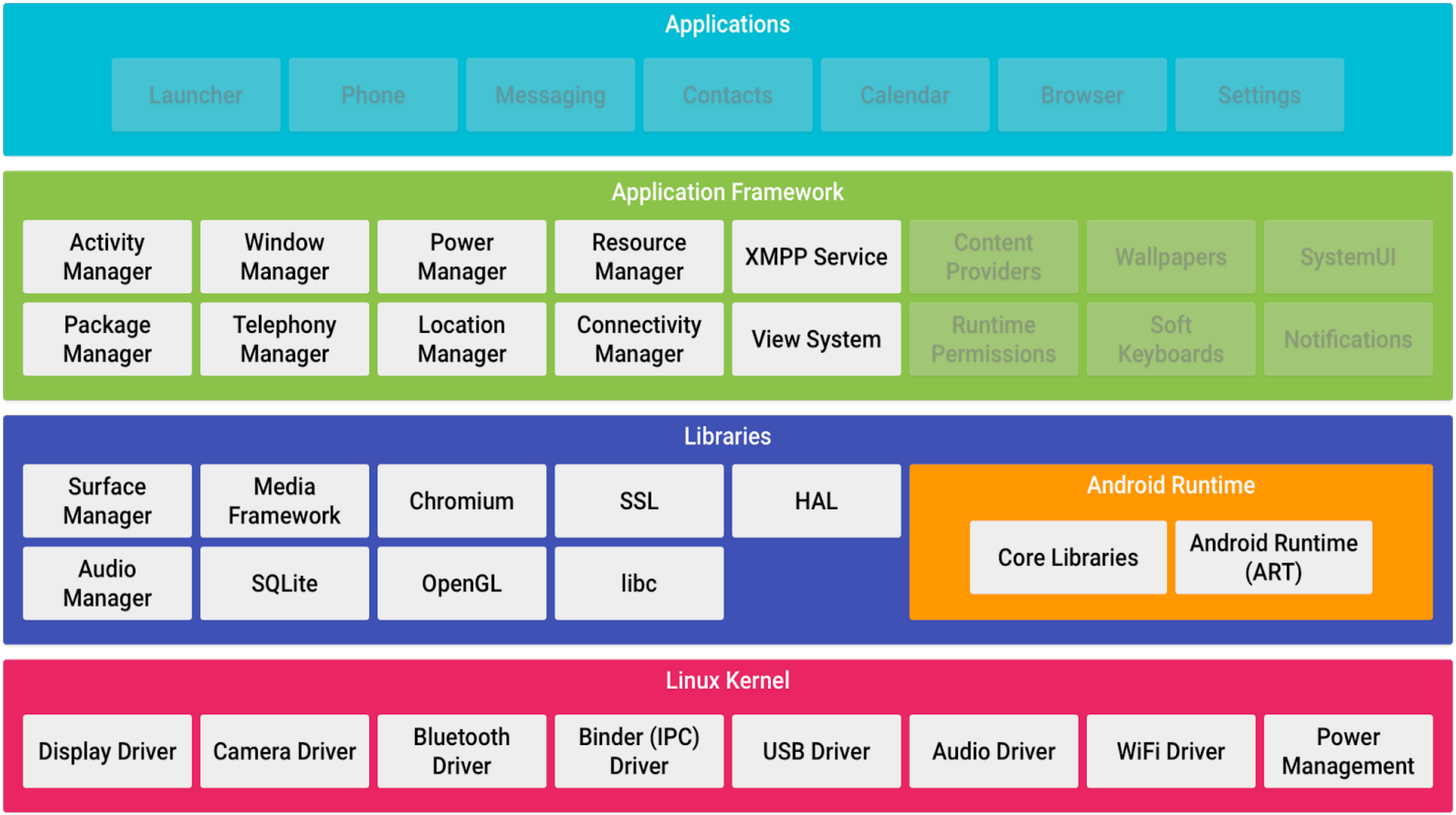
Subset API

Custom Hardware

Single Purpose Device

OTA Deploy


Applications
Launcher
Phone
Messaging
Contacts
Calendar
Browser
Settings
Application Framework
Activity Manager
Window Manager
Power Manager
Resource Manager
XMPP Service
Content Providers
Wallpapers
SystemUI
Package Manager
Telephony Manager
Location Manager
Connectivity Manager
View System
Runtime Permissions
Soft Keyboards
Notifications
Libraries
Surface Manager
Media Framework
Chromium
SSL
HAL
Audio Manager
SQLite
OpenGL
libc
Android Runtime
Core Libraries
Android Runtime (ART)
Linux Kernel
Display Driver
Camera Driver
Bluetooth Driver
Binder (IPC) Driver
USB Driver
Audio Driver
WiFi Driver
Power Management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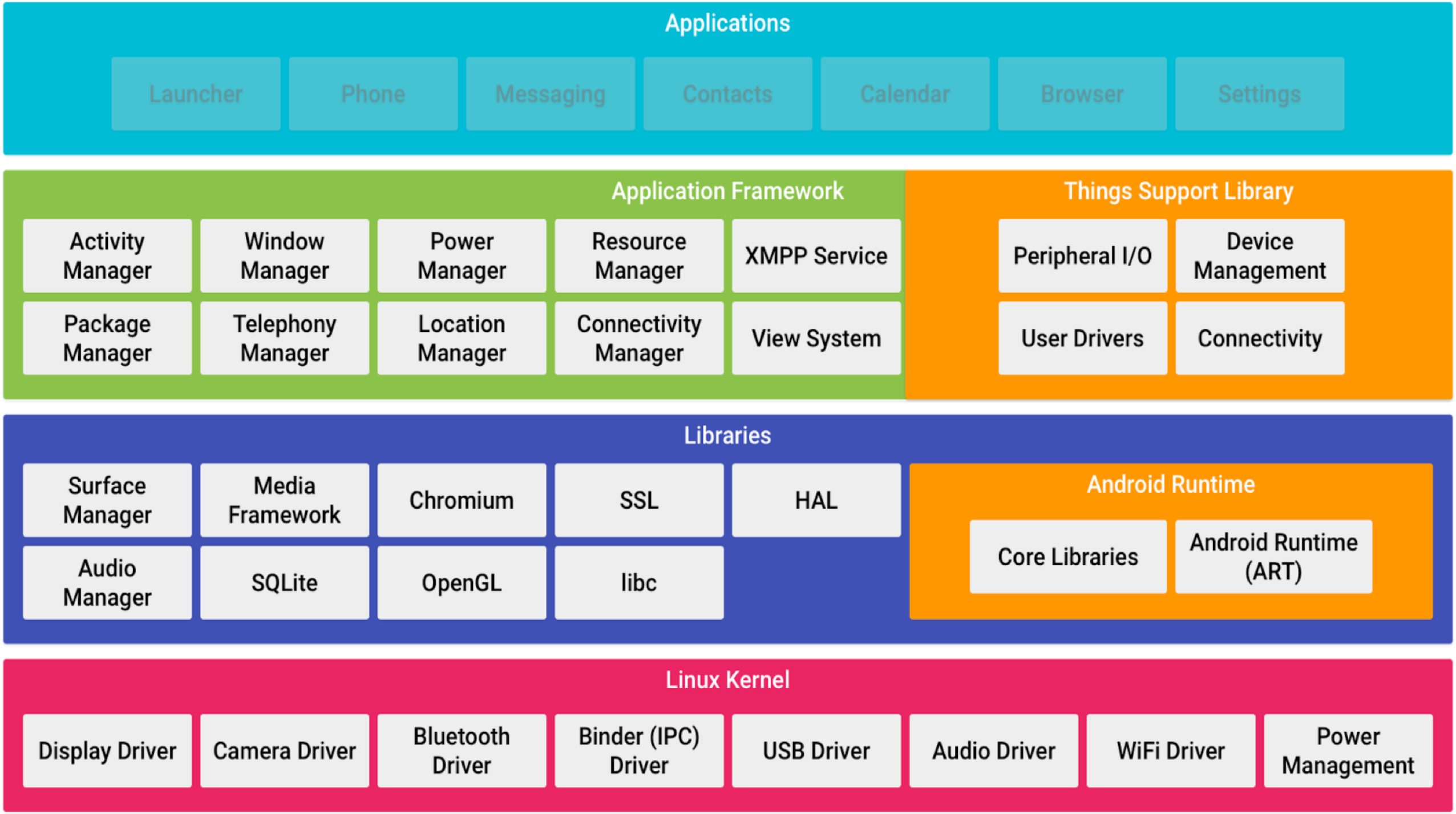
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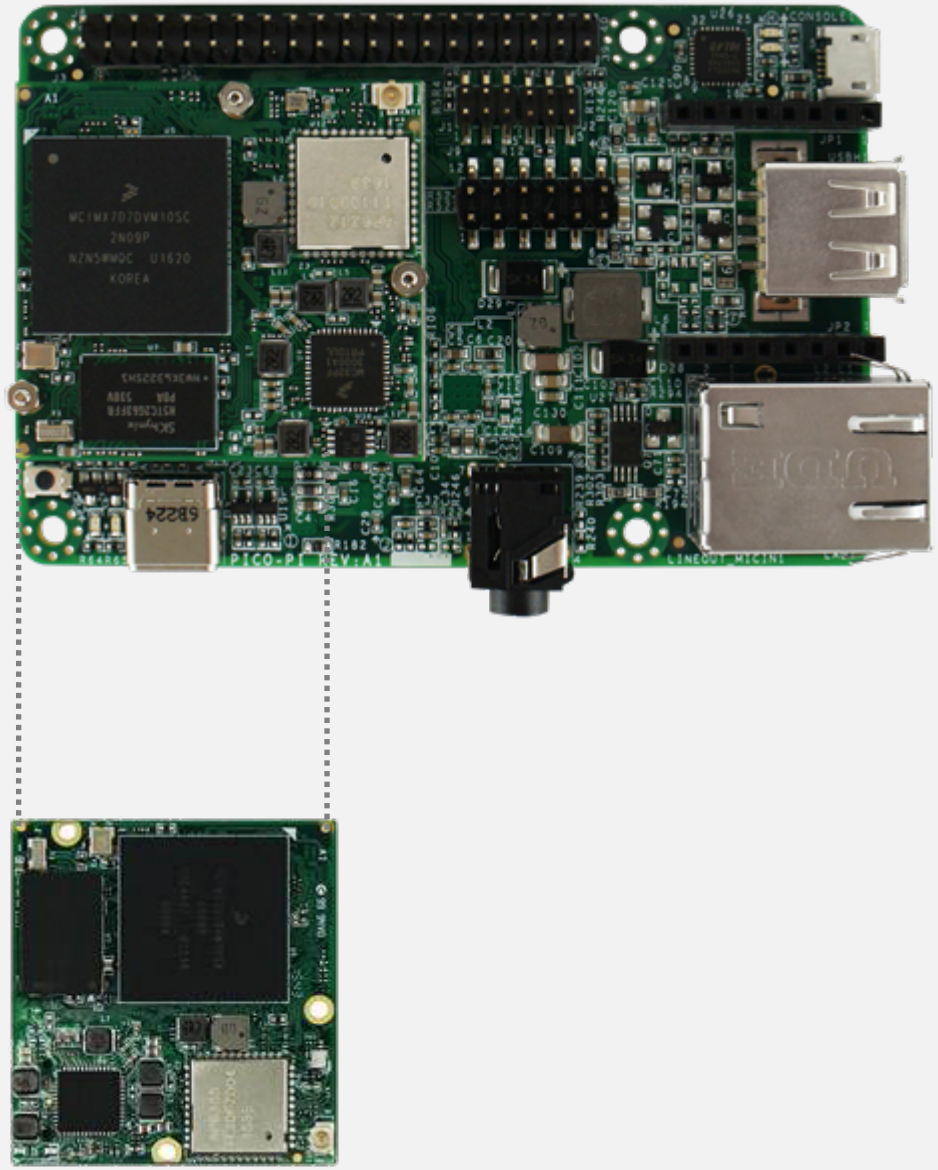

SoM
Architecture

Google
Managed BSP

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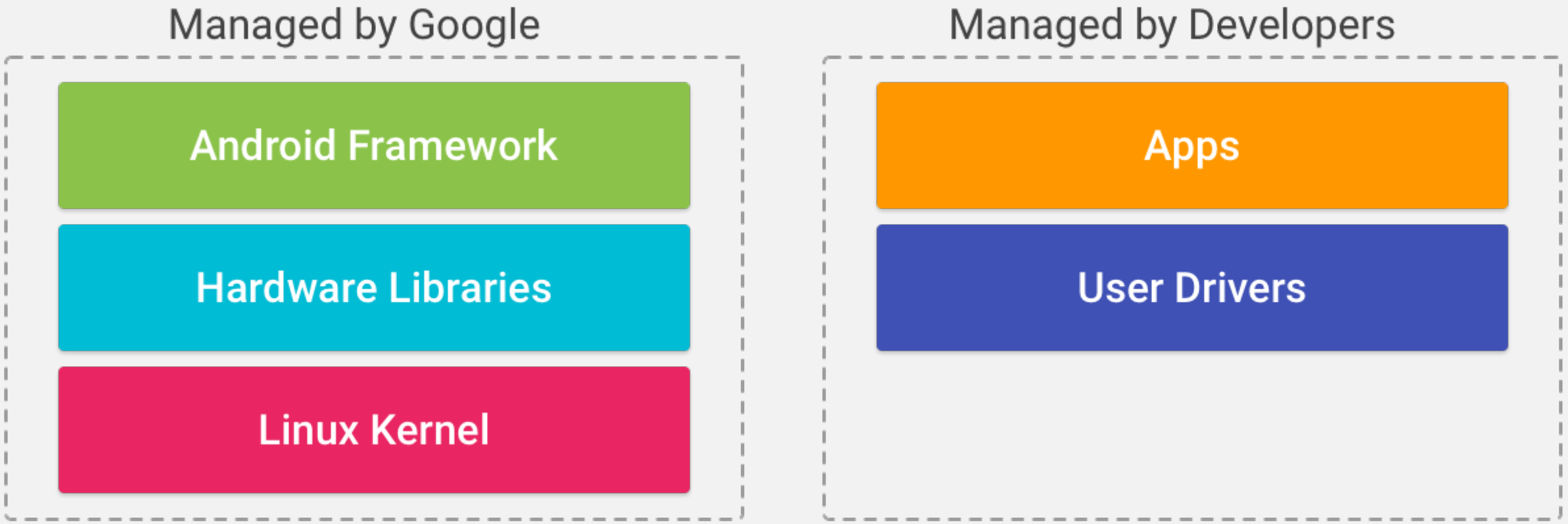
Easy and Secure Deployment



Easy and Secure Deployment

Signed Images

Verified Boot

A/B Rollback Protection

Automatic Security Updates

Android Things Console

Manage
IoT Product

Download
And Install

Build OEM
Factory Images

OTA
Update

partner.android.com/things/console

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androidthings

Tommy's Android Things

PRODUCT SETTINGS | FACTORY IMAGES | OTA UPDATES

Product settings

Product name

Tommy's Android Things

Product description

Tommy's First Android Things Project

SOM type

Raspberry Pi 3

CREATE STARTER BUILD

OEM partition size

32 MB

Include these Google services

- [x] Google Play Services

SAVE CHANGES

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Tommy's Android Things

PRODUCT SETTINGS | FACTORY IMAGES | OTA UPDATES

Bundles

UPLOAD

	ID	Filename	Size	Date uploaded
◉	1	v1.zip	661 KB	Nov 3, 2017
○	*0*	Empty bundle	---	---

Android Things versions

	OS build	OS version	Date uploaded
◉	OIR1.170720.017	0.5.1-devpreview(latest)	Aug 24, 2017
○	OIR1.170720.015	0.5.0-devpreview	Aug 10, 2017
○	NIH40K	0.4.1-devpreview	Jun 15, 2017

CREATE BUILD CONFIGURATION

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Tommy's Android Things

PRODUCT SETTINGS | FACTORY IMAGES | OTA UPDATES

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PUSH UPDATE

CANCEL

Android Things for Developers

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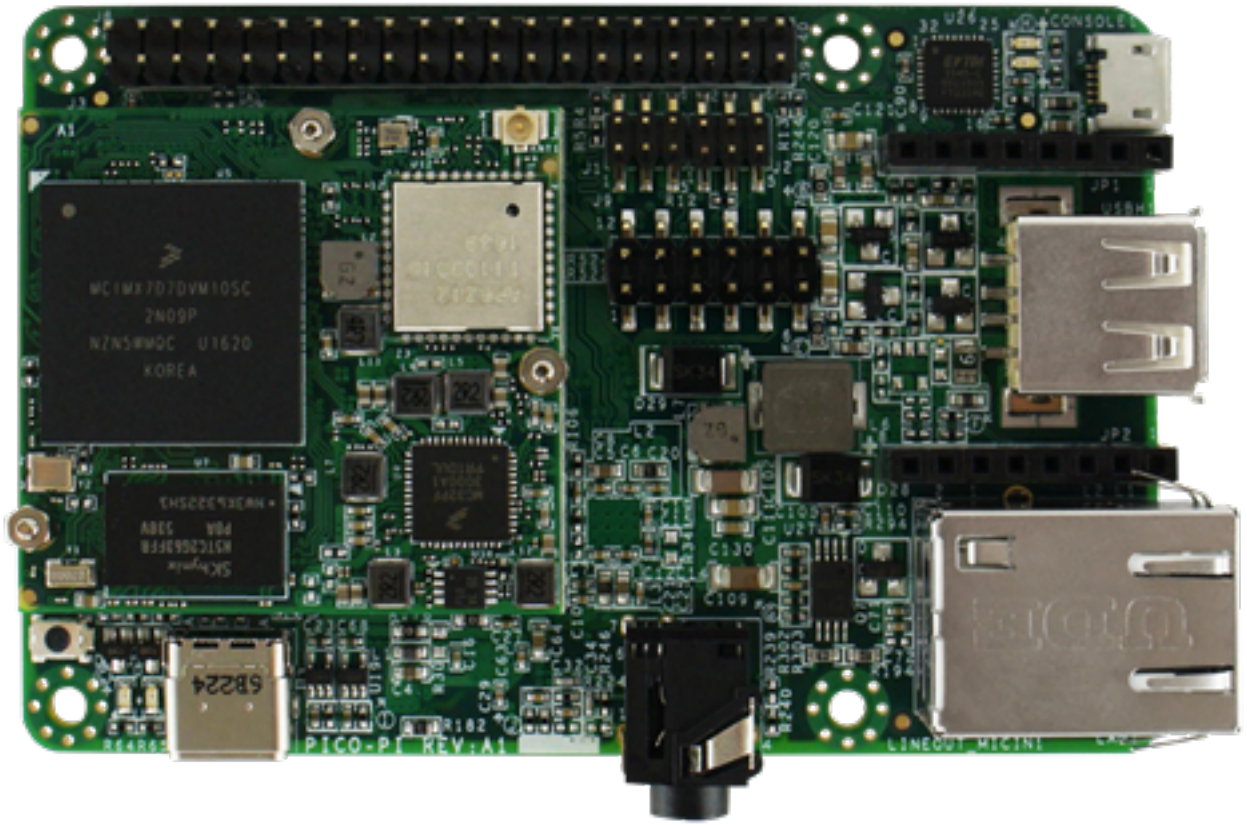
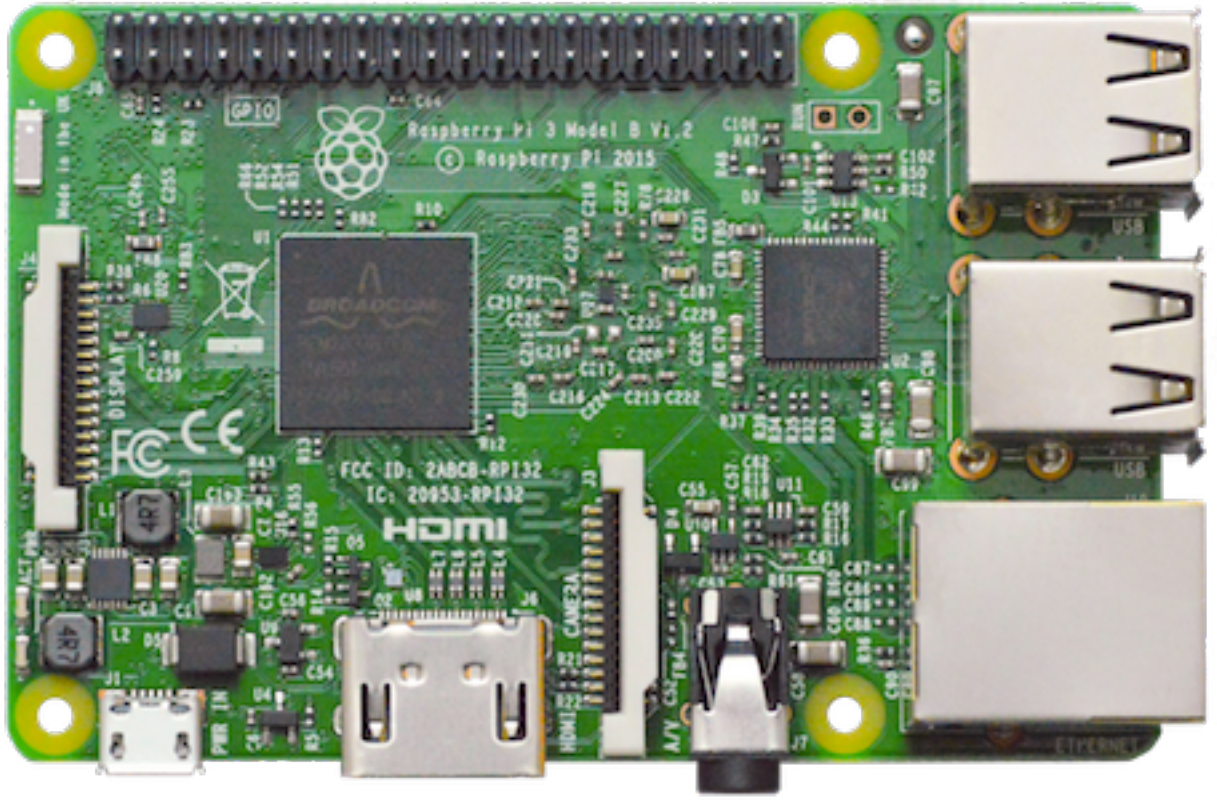
Developer Kits



NXP Pico i.MX7D



Raspberry Pi 3

developer.android.com/things/hardware/developer-kits.html

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Hardware Integration

Peripheral I/O – Low Level Access

- GPIO
- PWM
- I²C
- SPI
- UART
- I²S

Peripheral Driver Library – GitHub

- Button
- GPS
- RGB Led Strip
- PWM Servo
- Temperature Sensor
- Capacitive Touch Buttons

+ many more . . .

bit.ly/androidthings-github

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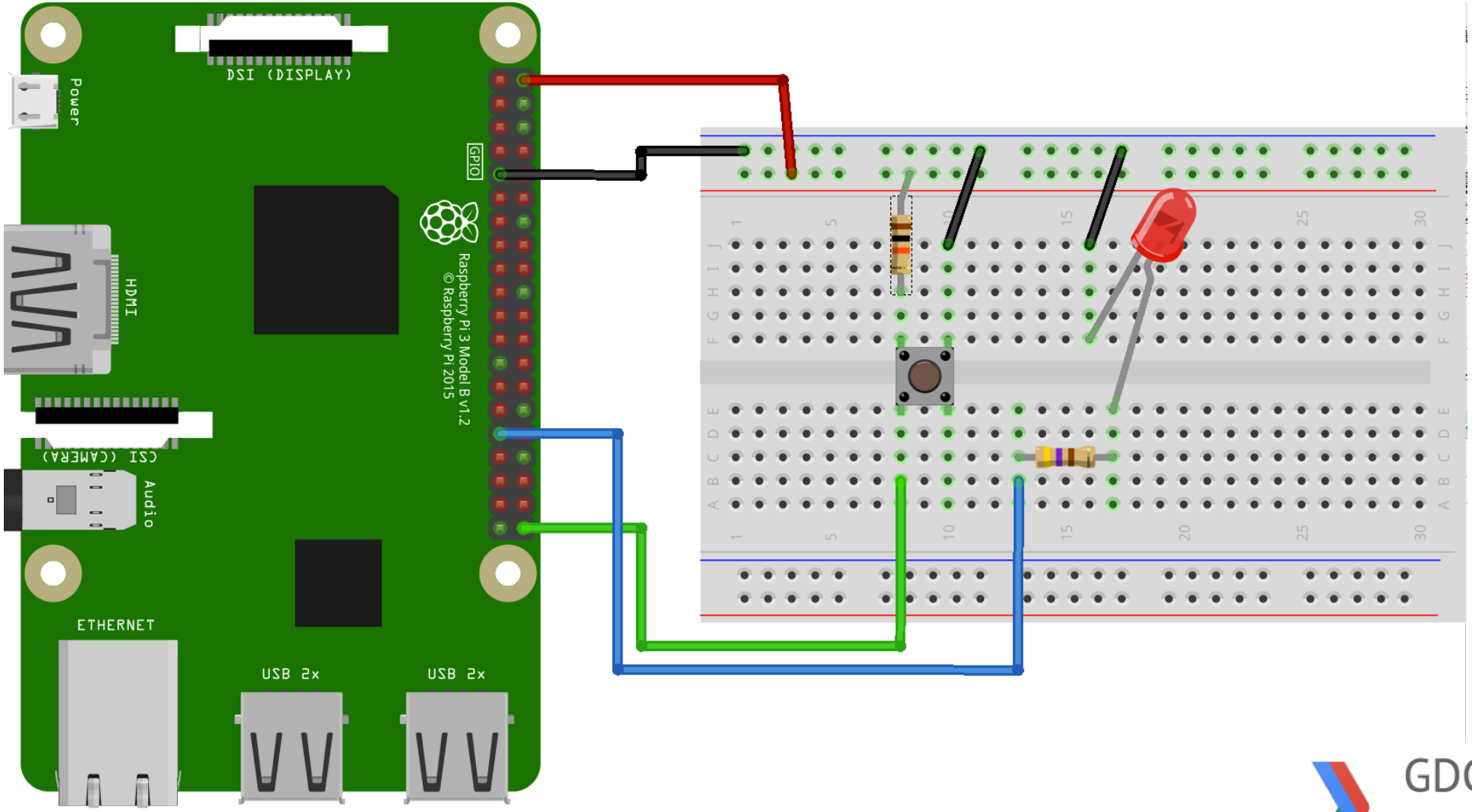
Let’s Build Android Things App



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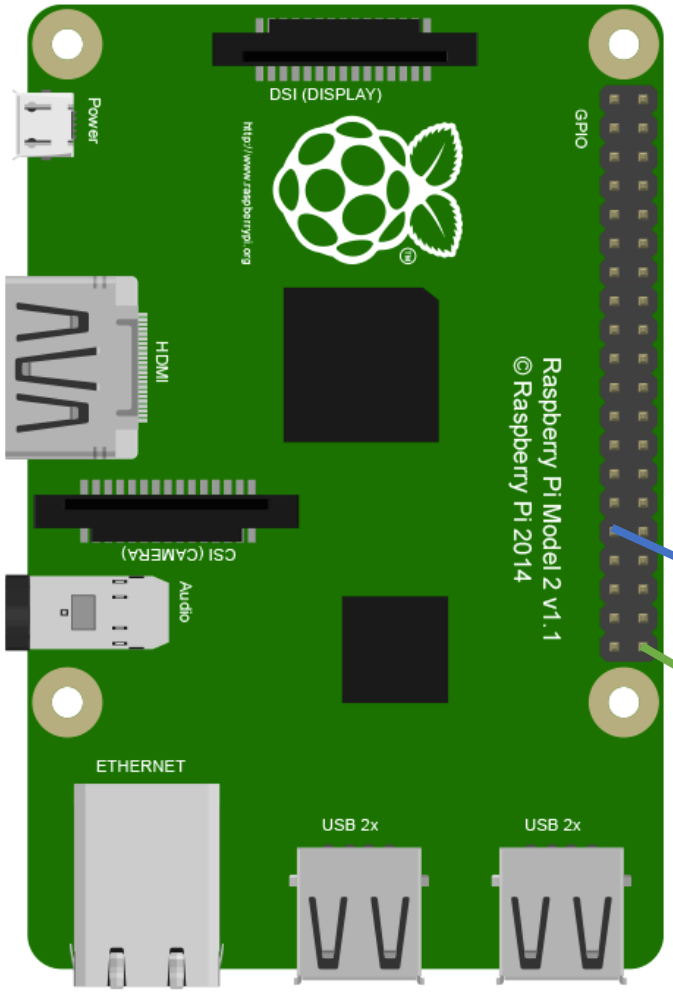
Pinout Diagram



Raspberry Pi 2 Model B (J8 Header) pinout

WiringPi	BCM(Name)	Physical		Physical	BCM(Name)	WiringPi
	3v3 Power	1	2		5v Power	
8	BCM 2 (SDA)	3	4		5v Power	
9	BCM 3 (SCL)	5	6		Ground	
7	BCM 4 (GPCLK0)	7	8		BCM 14 (TXD)	15
	Ground	9	10		BCM 15 (RXD)	16
0	BCM 17	11	12		BCM 18 (PCM_C)	1
2	BCM 27 (PCM_D)	13	14		Ground	
3	BCM 22	15	16		BCM 23	4
	3v3 Power	17	18		BCM 24	5
12	BCM 10 (MOSI)	19	20		Ground	
13	BCM 9 (MISO)	21	22		BCM 25	6
14	BCM 11 (SCLK)	23	24		BCM 8 (CE0)	10
	Ground	25	26		BCM 7 (CE1)	11
	BCM 0 (ID_SD)	27	28		BCM 1 (ID_SC)	
21	BCM 5	29	30		Ground	
22	BCM 6	31	32		BCM 12	26
23	BCM 13	33	34		Ground	
24	BCM 19 (MISO)	35	36		BCM 16	27
25	BCM 26	37	38		BCM 20 (MOSI)	28
	Ground	39	40		BCM 21 (SCLK)	29

BCM21
– Button

BCM6
- LED

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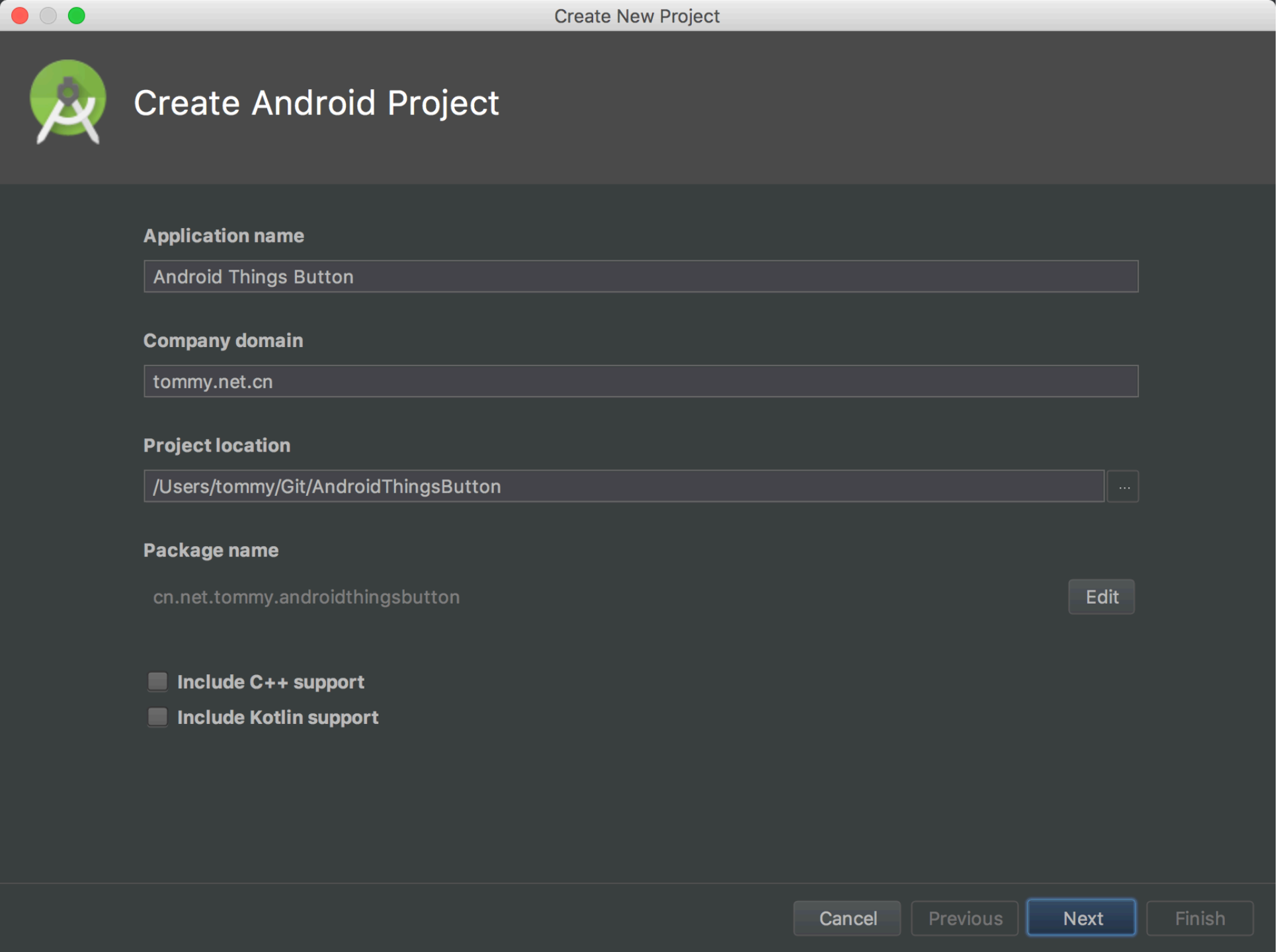

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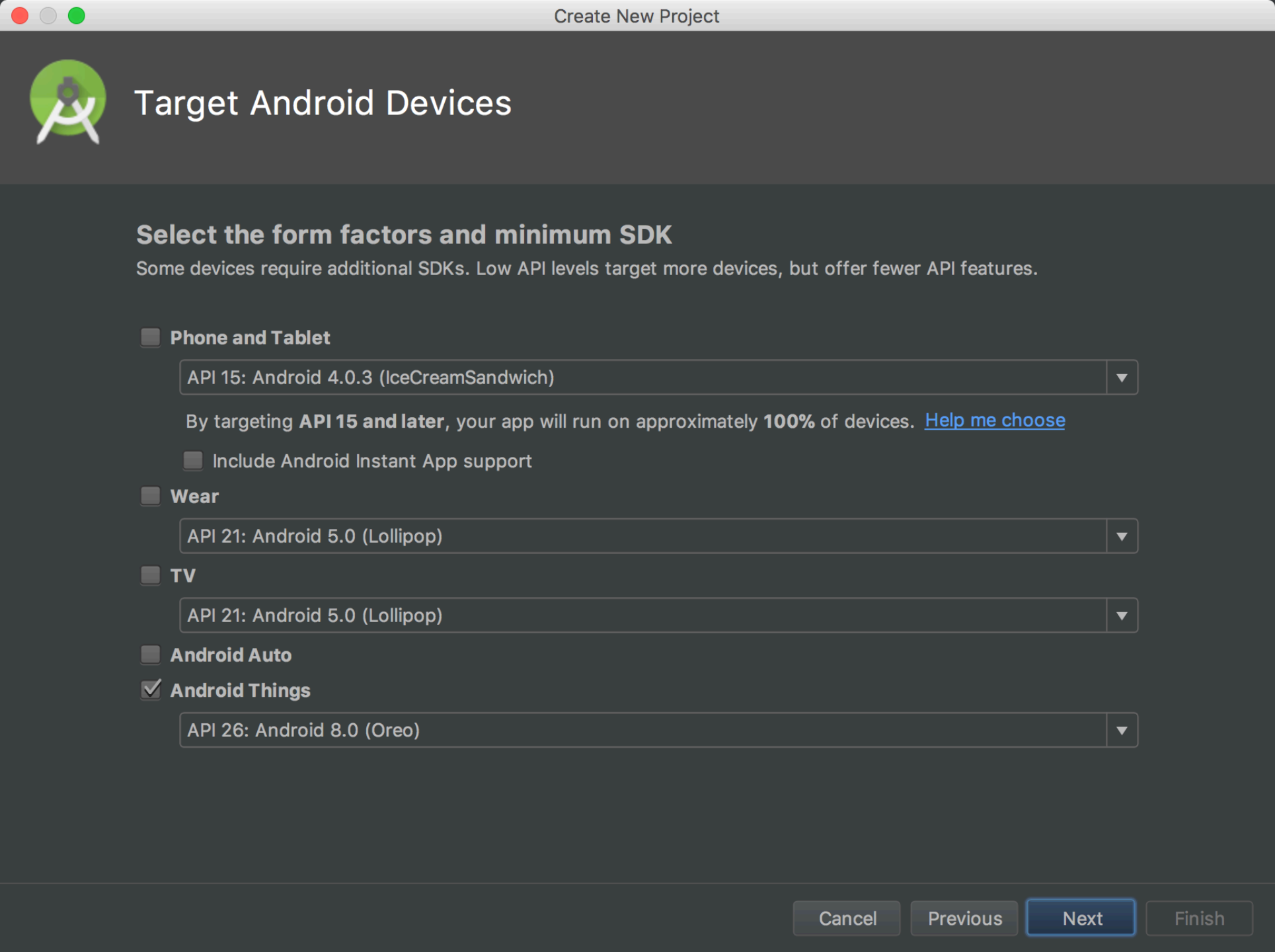

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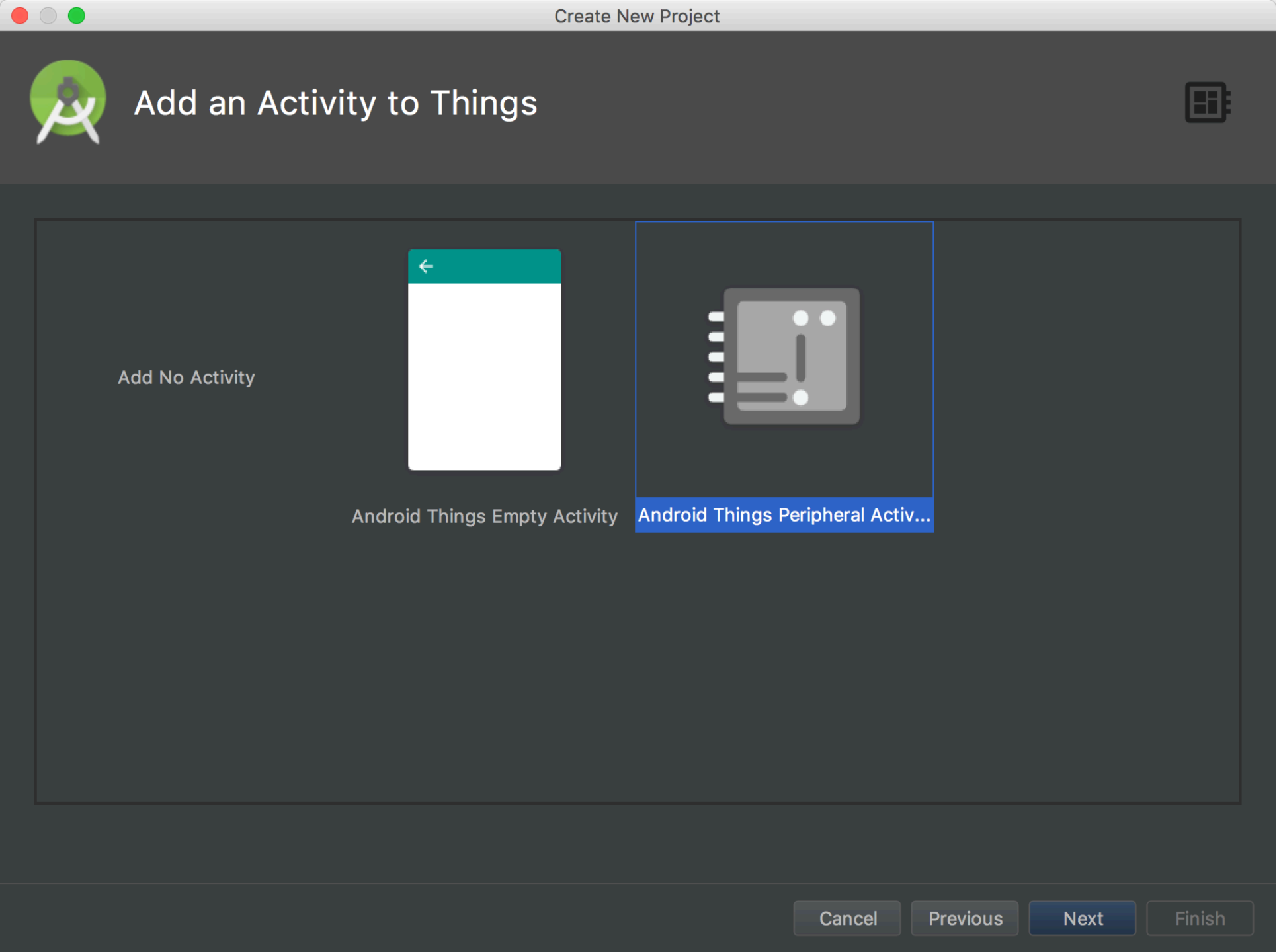

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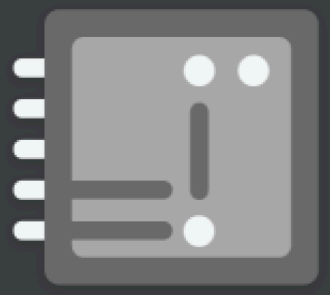
Create New Project

Configure Activity



Creates a new activity for Android Things with peripherals

Activity Name

MainActivity

Show available peripherals

Inputs

- [x] Button
- [ ] Capacitive touch buttons (cap12xx)

If true, dependencies and corresponding code to support buttons will be generated.

Cancel | Previous | Next | Finish

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```
// Automatically added in app level build.gradle

implementation 'com.google.android.things.contrib:driver-button:0.3'
compileOnly 'com.google.android.things:androidthings:+'
```

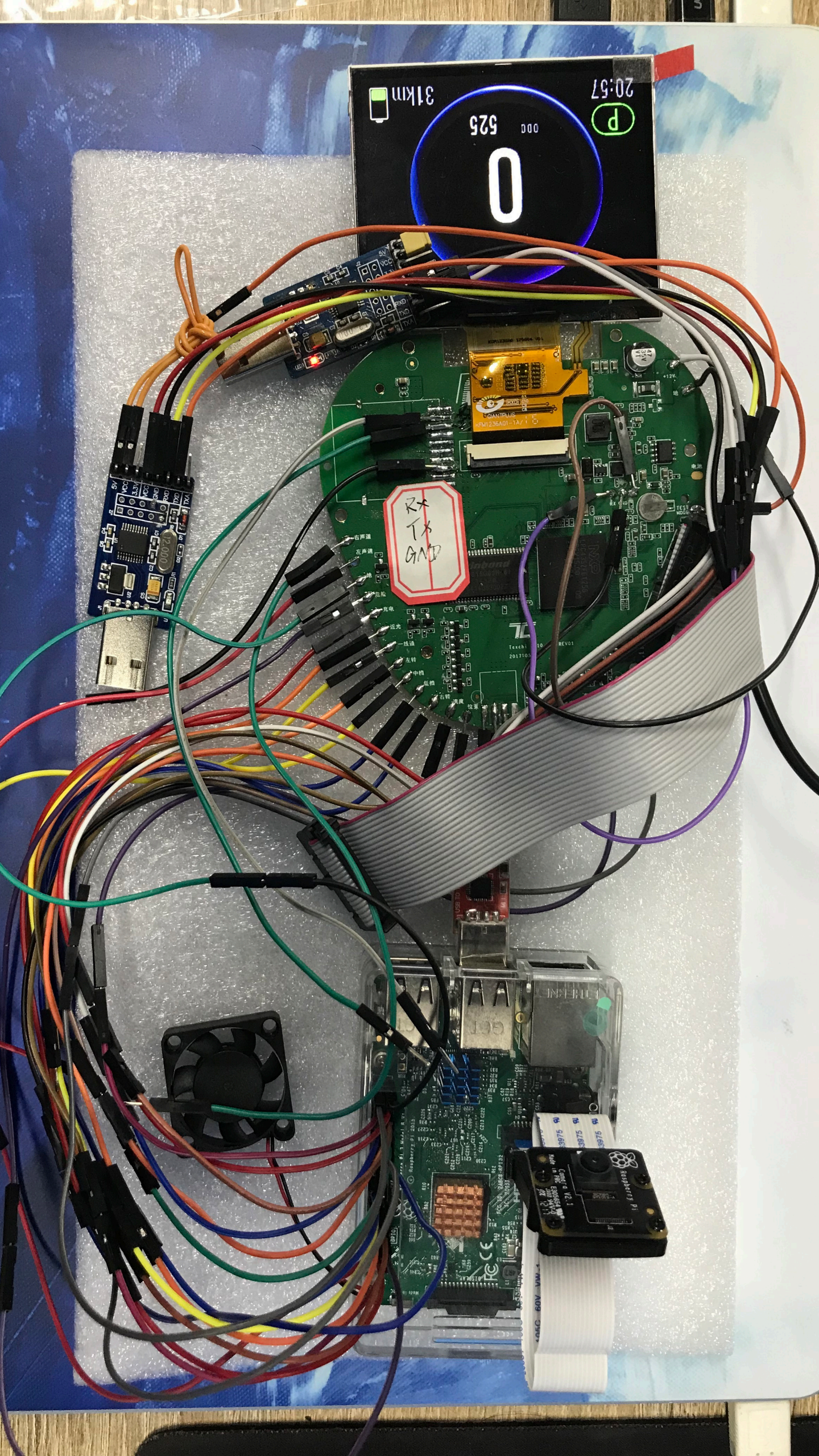
```
<!-- Automatically added in AndroidManifest.xml -->

<application>
    <uses-library android:name="com.google.android.things" />

    <activity android:name=".MainActivity">
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />

            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />

            <category android:name="android.intent.category.IOT_LAUNCHER" />
            <category android:name="android.intent.category.DEFAULT" />
        </intent-filter>
    </activity>
</application>
```

```java
private static final String gpioButtonPinName = "BCM21";


mButton = new Button(gpioButtonPinName,
        // low signal indicates the button is pressed
        // use with a pull-up resistor
        Button.LogicState.PRESSED_WHEN_LOW
);
mButton.setOnButtonEventListener(new Button.OnButtonEventListener() {
    @Override
    public void onButtonEvent(Button button, boolean pressed) {
        setLedValue(pressed);
    }
});


// In onDestroy()
mButton.close();
```

```
private static final String gpioLedPinName = "BCM6";


PeripheralManagerService service = new PeripheralManagerService();
mLed = service.openGpio(gpioLedPinName);
mLed.setDirection(Gpio.DIRECTION_OUT_INITIALLY_LOW);


mLed.setValue(value);


// In onDestroy()
mLed.close();
```

Android Things Examples

hackster.io/google


20:57
P
525
0
31km
RX
TX
GND

Why Android Things?

The Power of Android

Managed by Google

Automatic and Secure

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android things