

Building Aggressively Compatible Android Games

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Feedback: <http://goo.gl/8dfXH>
Twitter: #Android





HELLO
my name is
Chris

ROBOT INVADER!

IN
TECHNOTOUCH



Monster Robot
100 Feet High!





All Android Market listings



[Replica Island v1.4](#)

Games: Arcade & Action

[In-app Products](#)

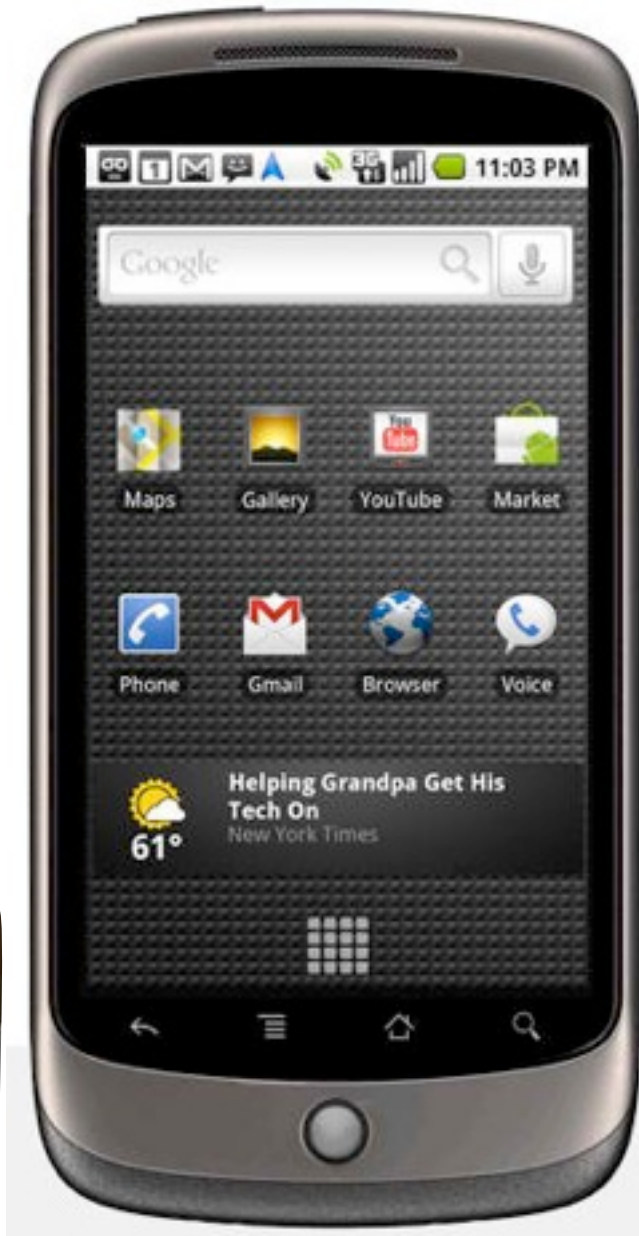
(17562) ★★★★★

[Comments](#)

1746334 total

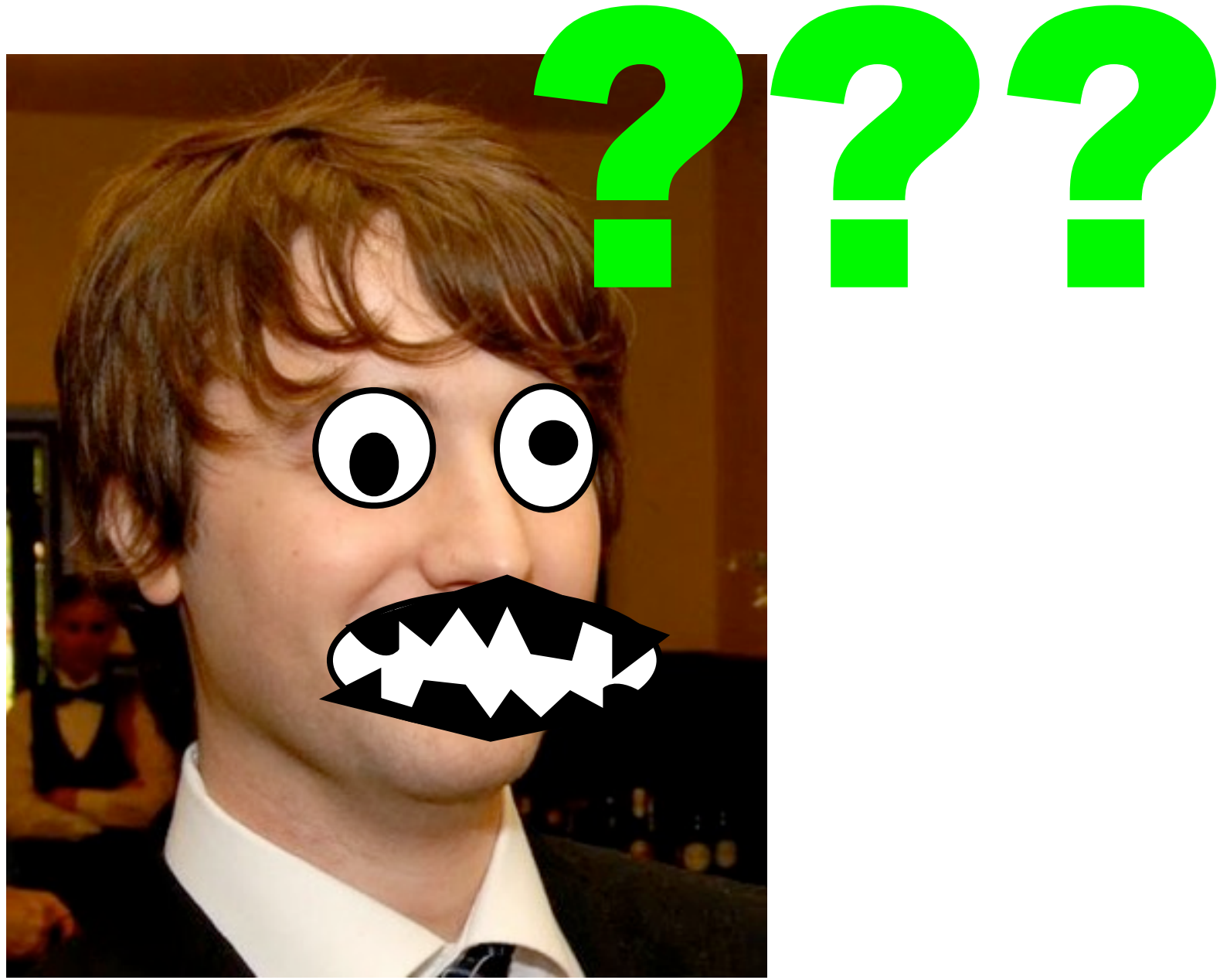
224351 active installs

[Statistics](#)

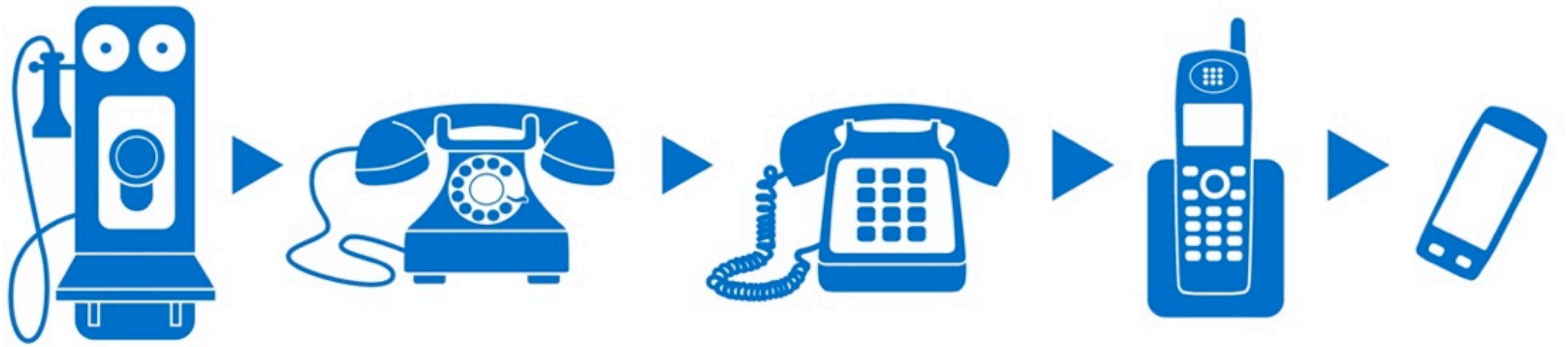












ANDROID

compatibility program

Android 2.3 Compatibility Definition

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compatibility@android.com

Table of Contents

[1. Introduction](#)

[2. Resources](#)

[3. Software](#)

[3.1. Managed API Compatibility](#)

[3.2. Soft API Compatibility](#)

[3.2.1. Permissions](#)

[3.2.2. Build Parameters](#)

[3.2.3. Intent Compatibility](#)

[3.2.3.1. Core Application Intents](#)

7.1. Display and Graphics

Android 2.3 includes facilities that automatically adjust application assets and UI layouts appropriately for the device, to ensure that third-party applications run well on a variety of hardware configurations [[Resources, 28](#)]. Devices **MUST** properly implement these APIs and behaviors, as detailed in this section.

7.1.1. Screen Configurations

Device implementations **MAY** use screens of any pixel dimensions, provided that they meet the following requirements:

- screens **MUST** be at least 2.5 inches in physical diagonal size
- density **MUST** be at least 100 dpi
- the aspect ratio **MUST** be between 1.333 (4:3) and 1.779 (16:9)
- the display technology used consists of square pixels

Device implementations with a screen meeting the requirements above are considered compatible, and no additional action is necessary. The Android framework implementation automatically computes display characteristics such as screen size bucket and density bucket. In the majority of cases, the framework decisions are the correct ones. If the default framework computations are used, no additional action is necessary. Device implementers wishing to change the defaults, or use a screen that does not meet the requirements above **MUST** contact the Android Compatibility Team for guidance, as provided for in Section 12.

The units used by the requirements above are defined as follows:

- "Physical diagonal size" is the distance in inches between two opposing corners of the illuminated portion of the display.
- "dpi" (meaning "dots per inch") is the number of pixels encompassed by a linear horizontal or vertical span of 1". Where dpi values are listed, both horizontal and vertical dpi must fall within the range.
- "Aspect ratio" is the ratio of the longer dimension of the screen to the shorter dimension. For example, a display of 100x854 pixels would be 854 /



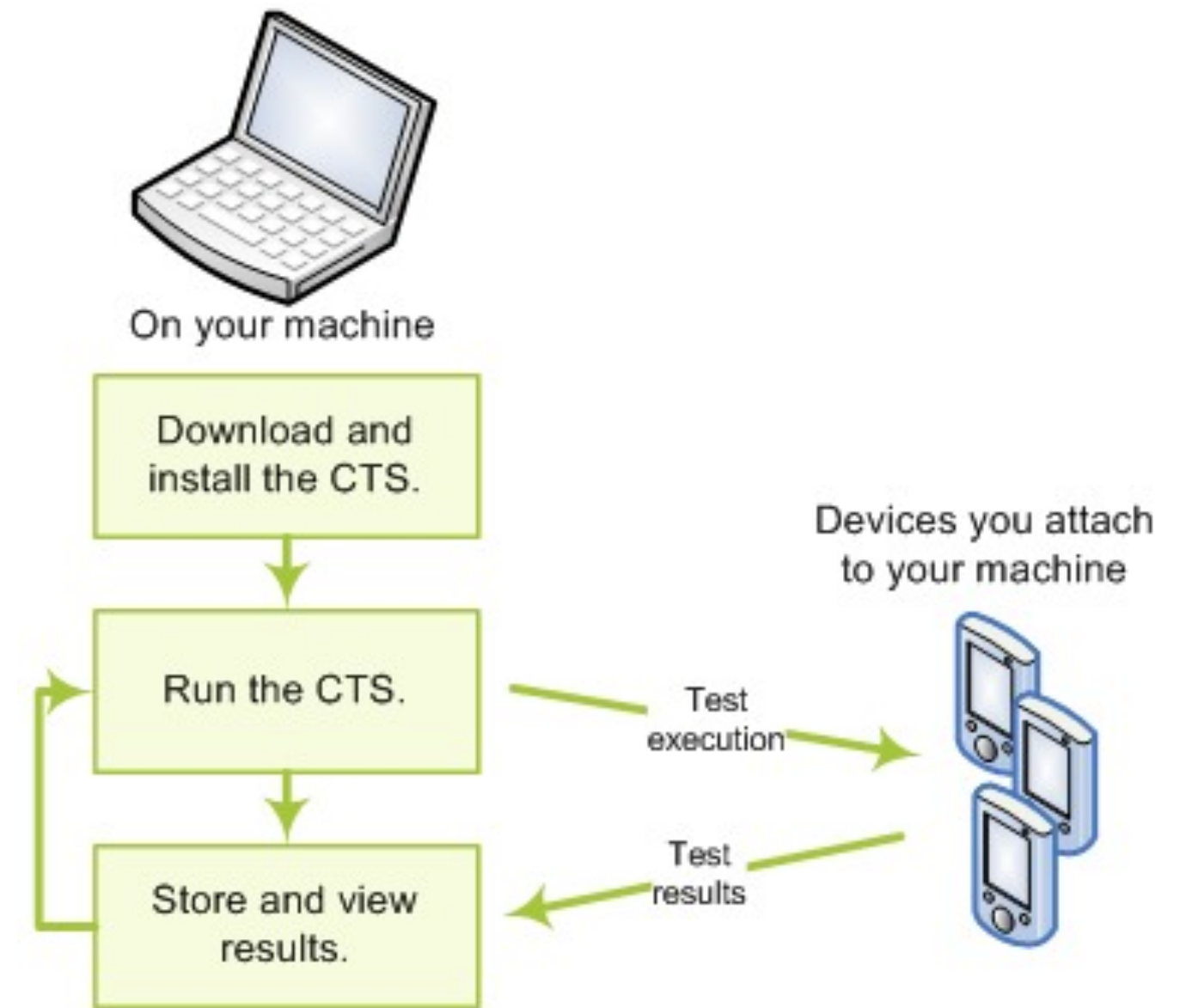


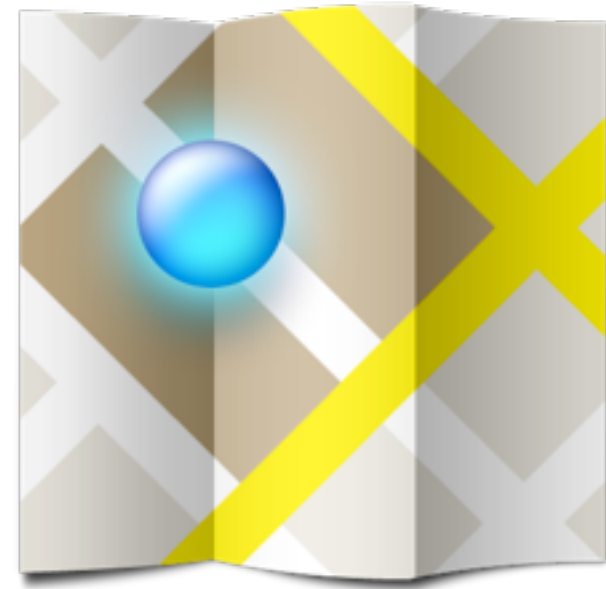
CTS

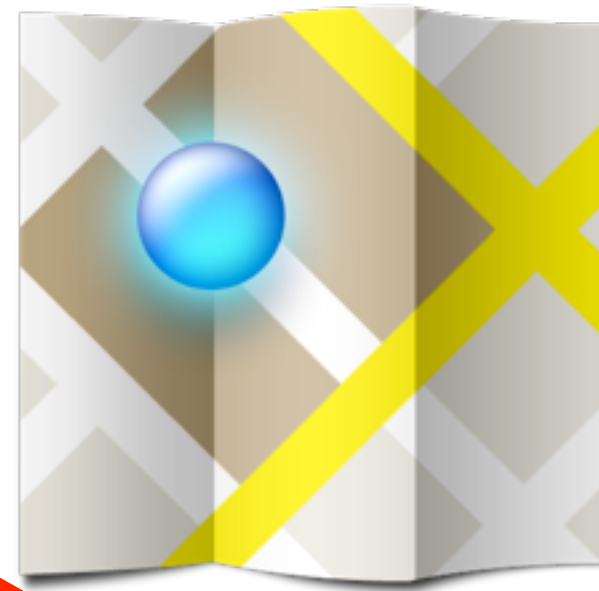
Compatibility Test Suite

Open Source!

<http://source.android.com/compatibility/index.html>



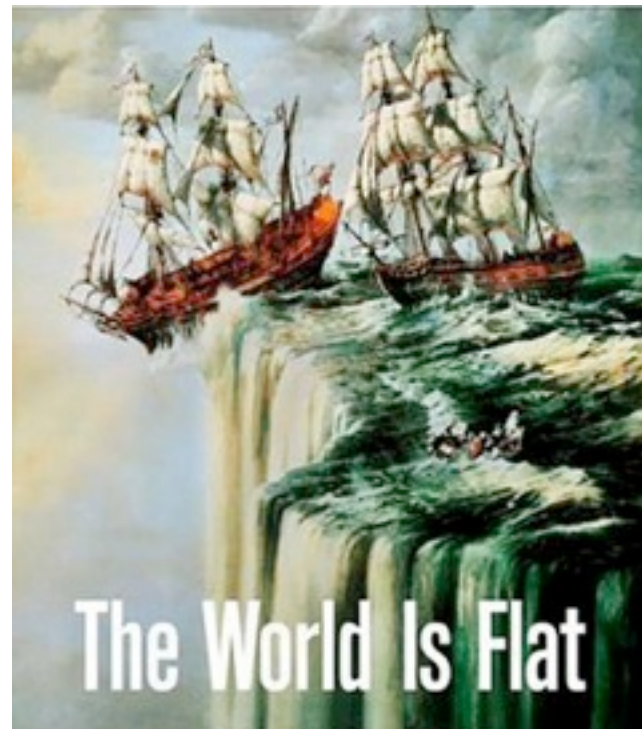




3 Steps To Every Device

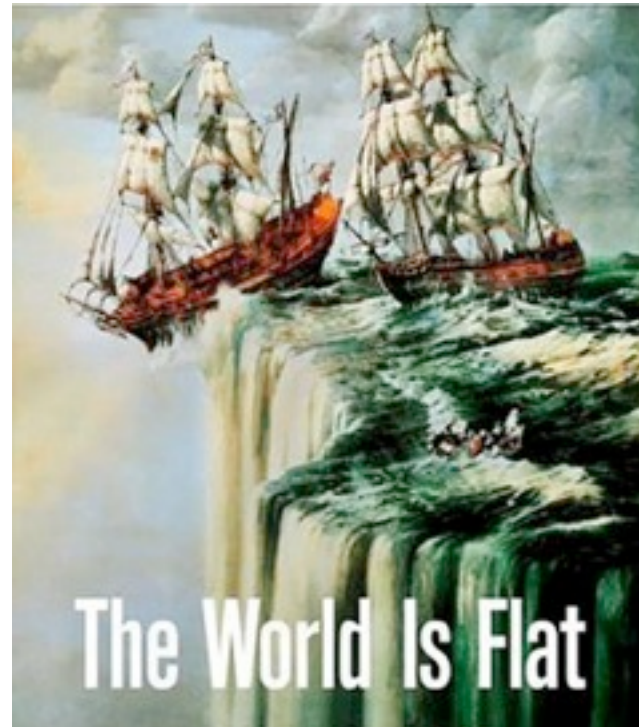
3 Steps To Every Device

#1 Check your assumptions!



3 Steps To Every Device

#1 Check your assumptions!

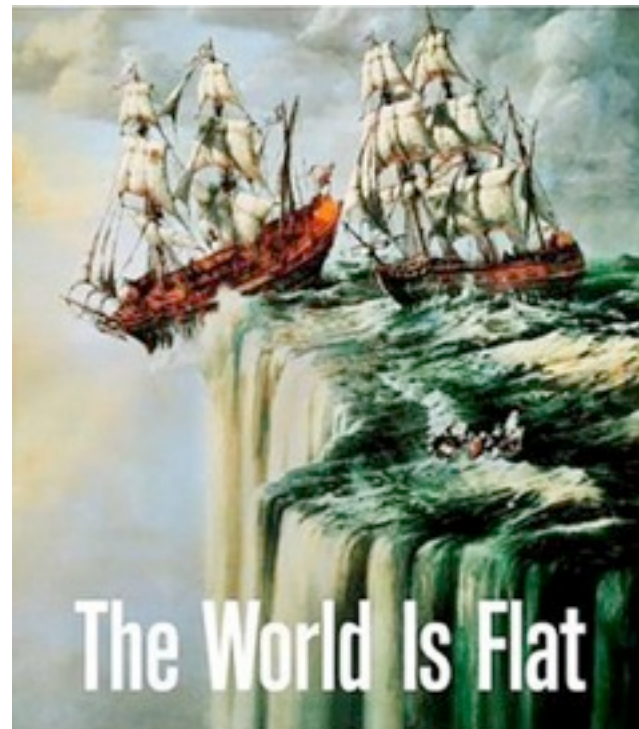


#2 Follow the rules!



3 Steps To Every Device

#1 Check your assumptions!



#2 Follow the rules!

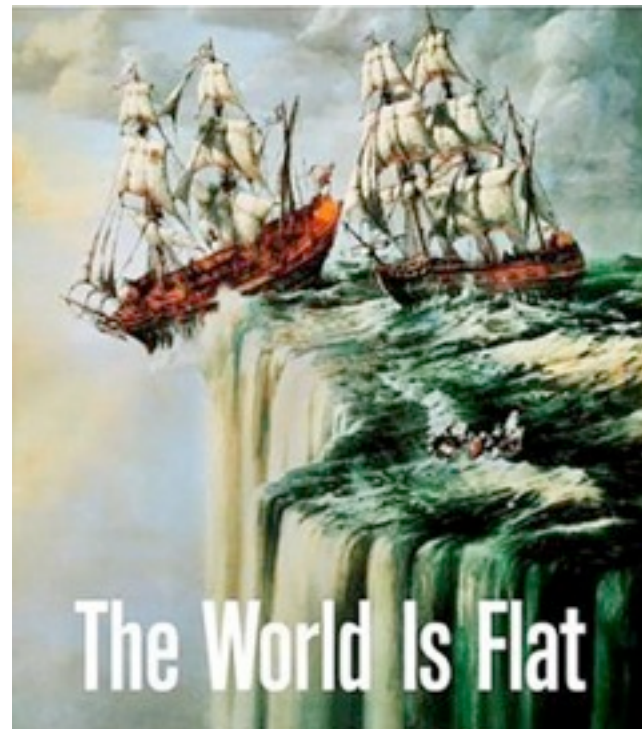


#3 Manage your spec!



3 Steps To Every Device

#1 Check your assumptions!



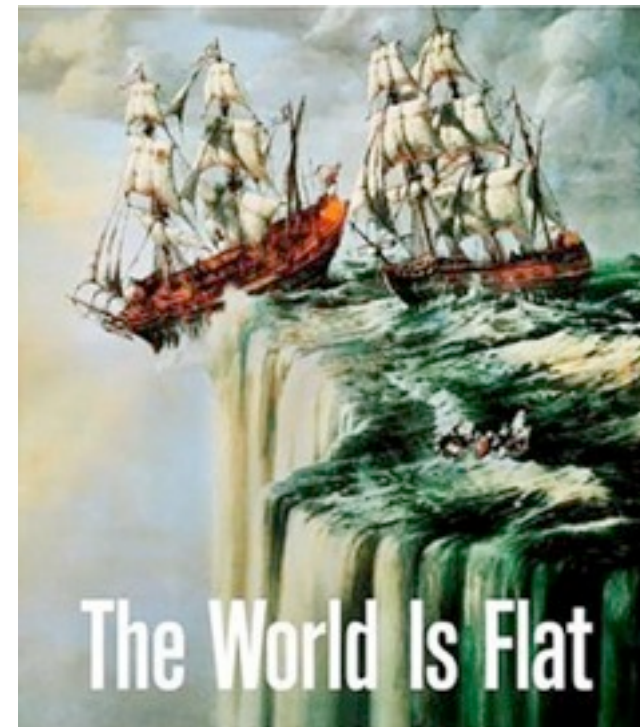
#2 Follow the requirements



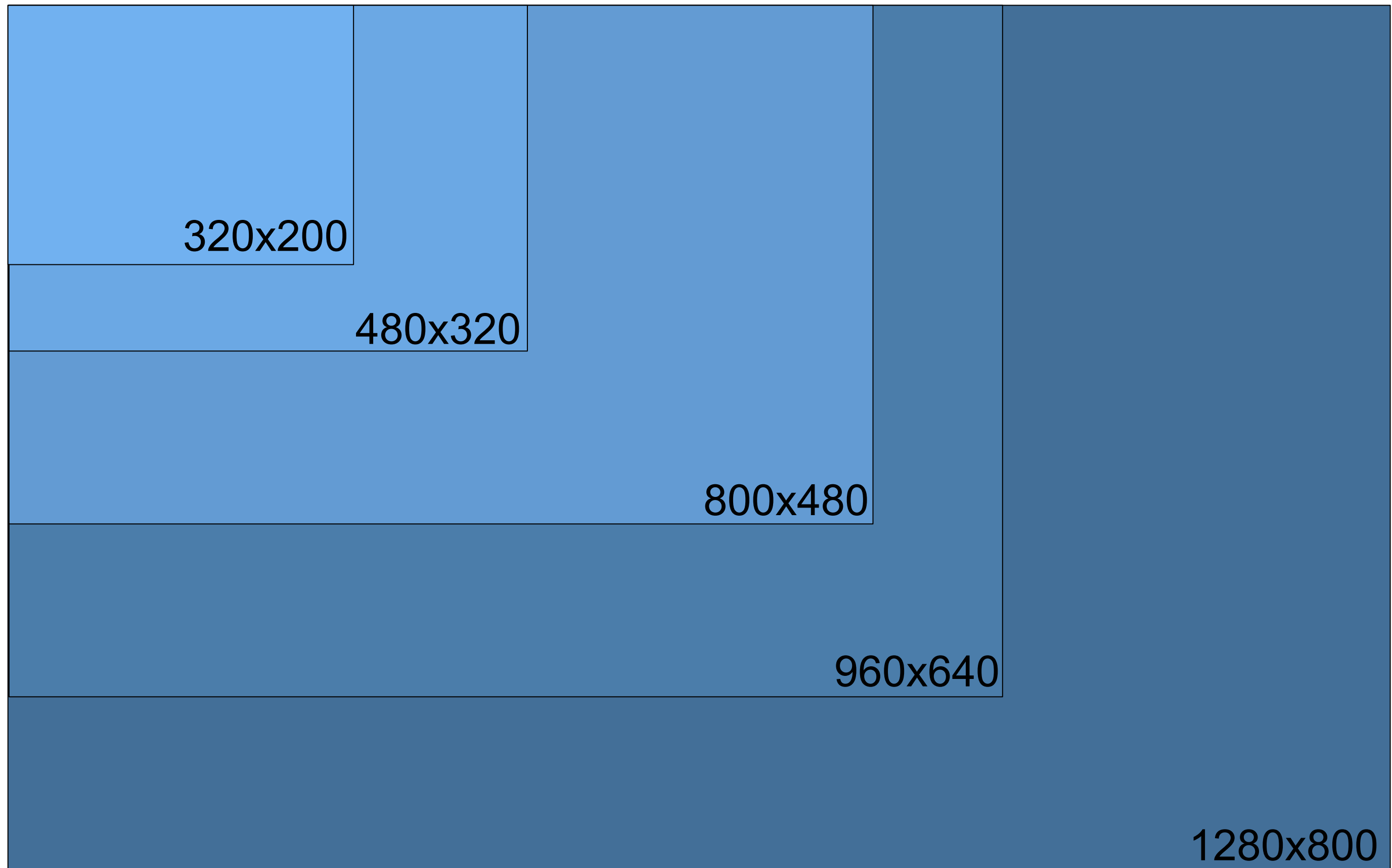
#3 Manage your spec!



#1 Check your assumptions!



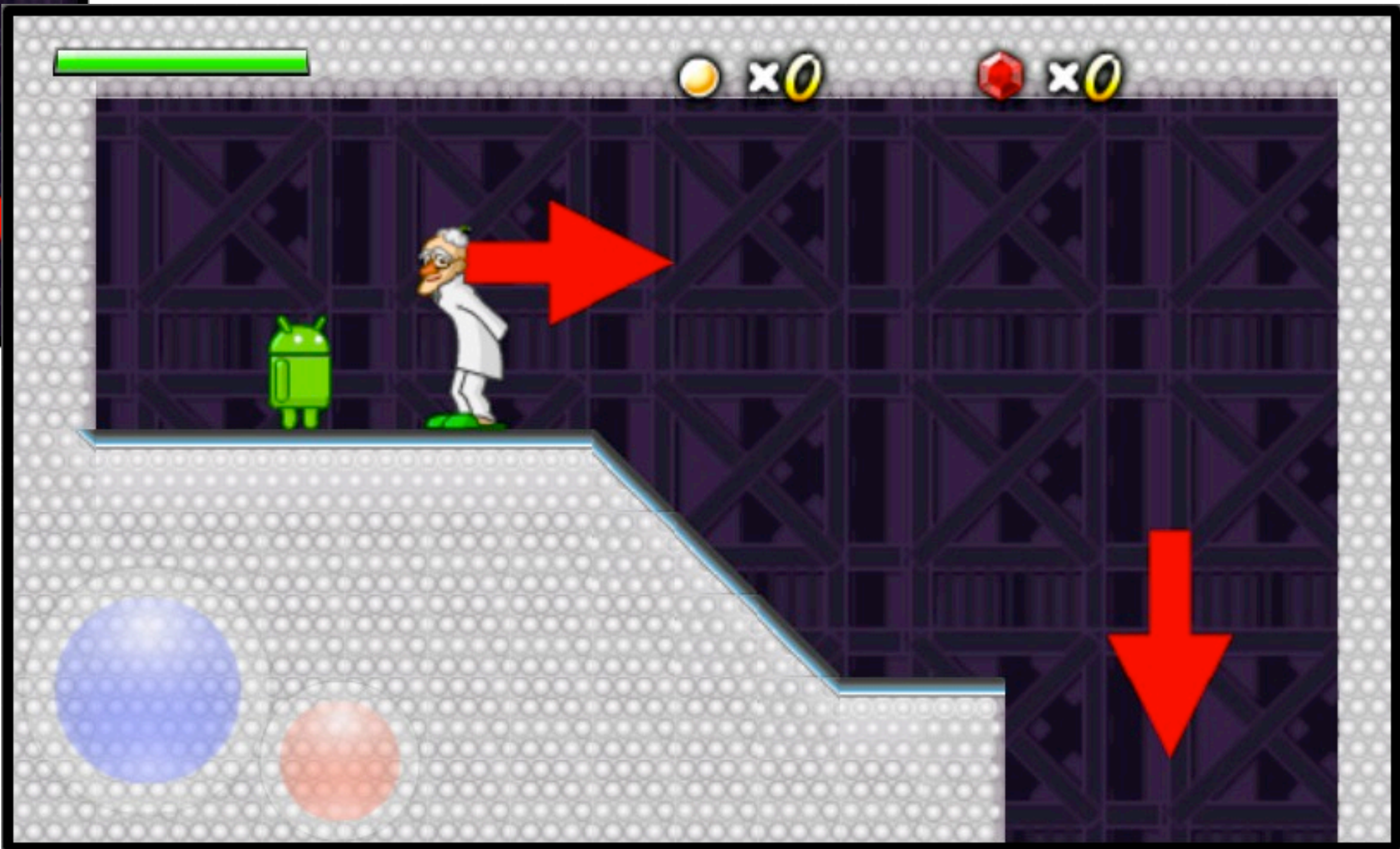






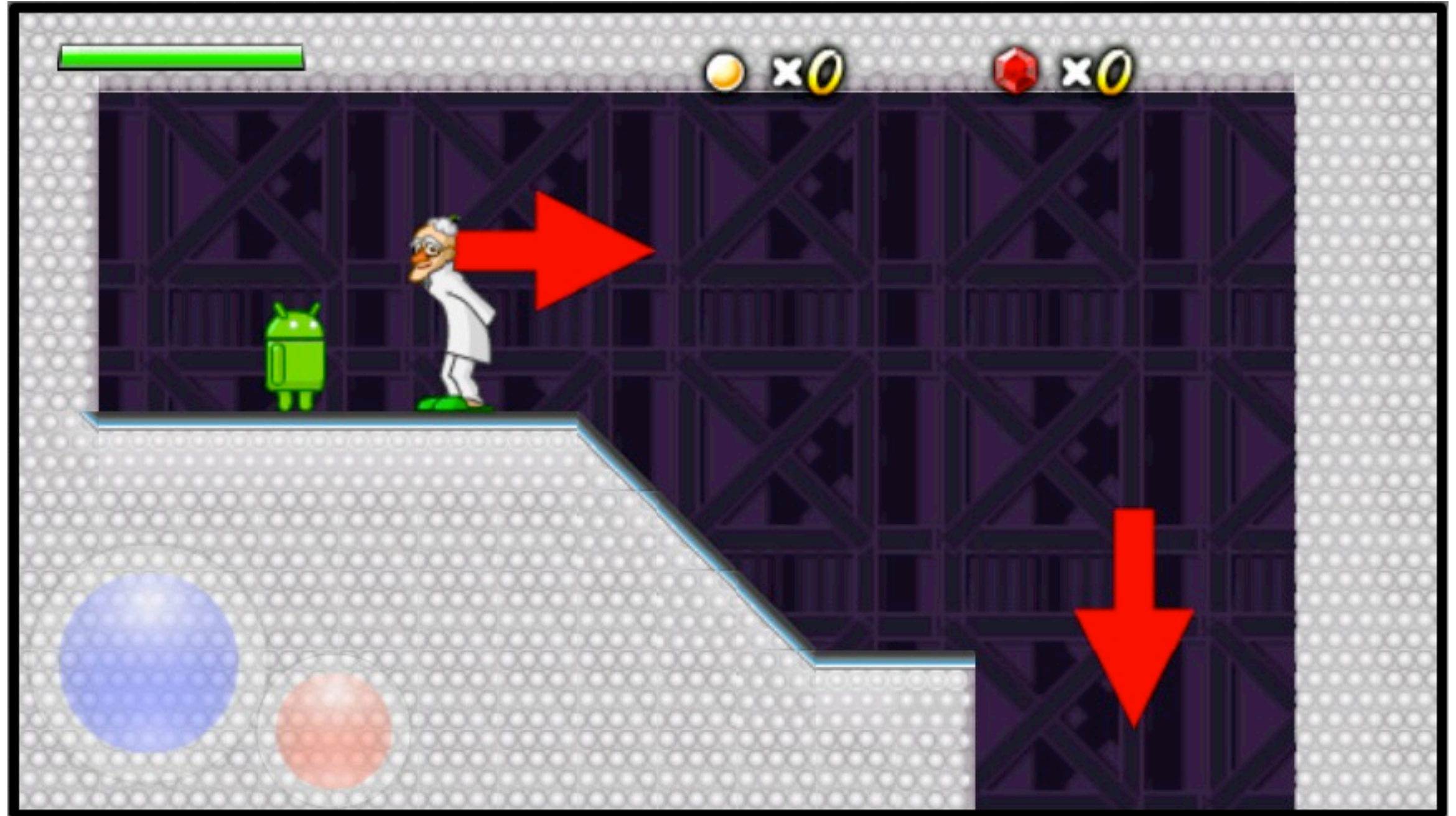
480x320

800x480



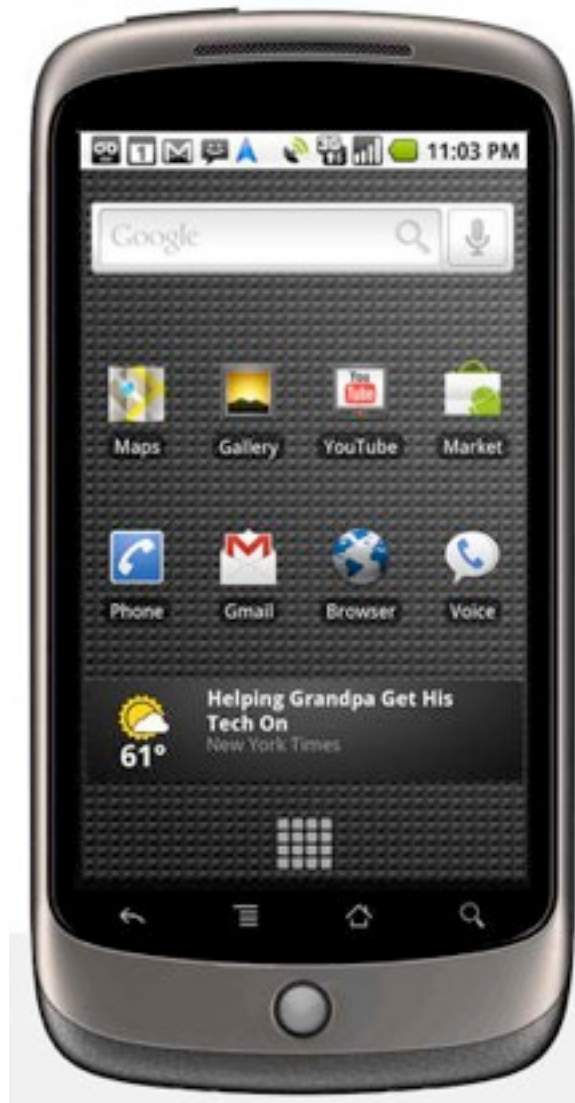


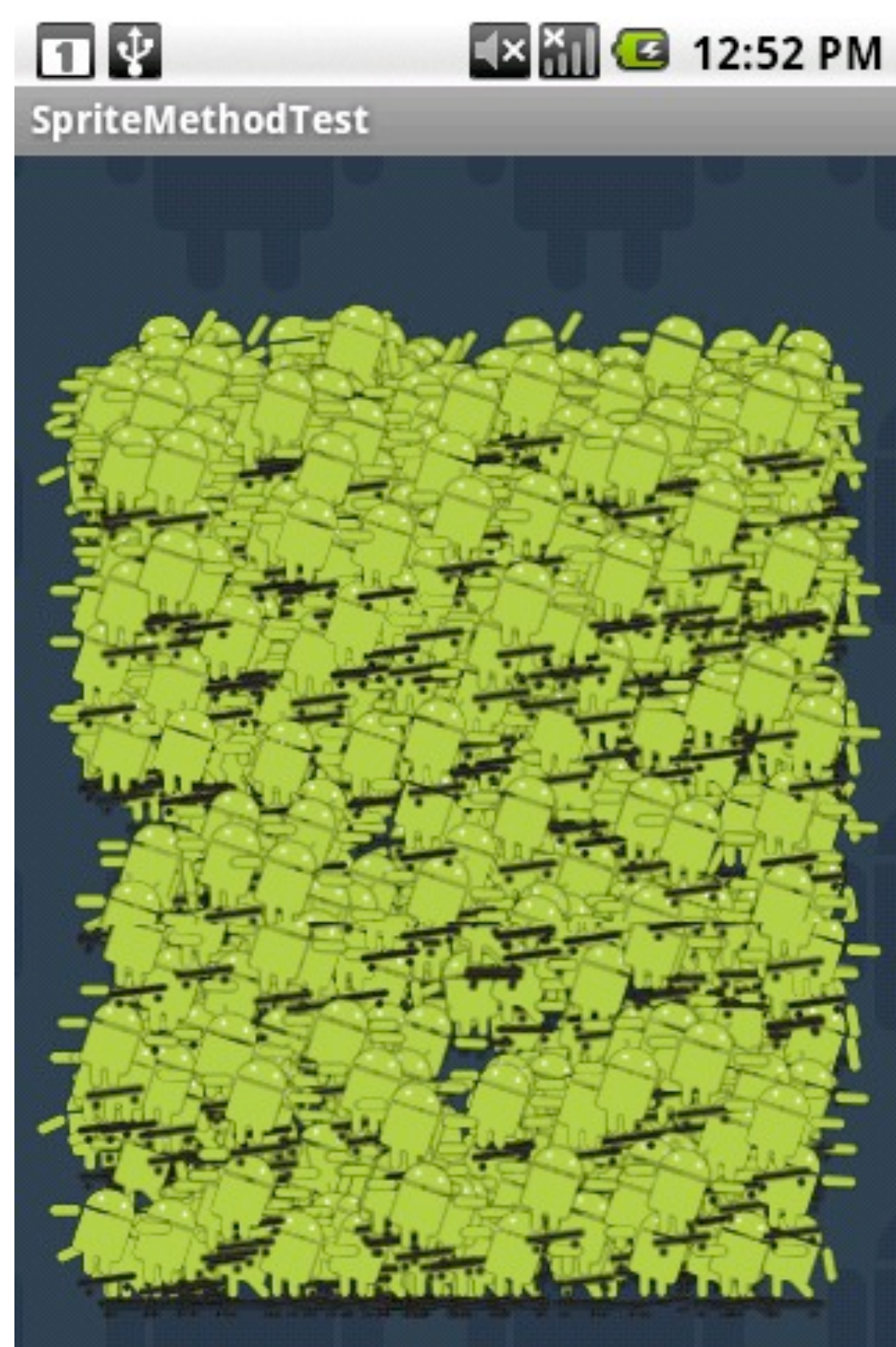
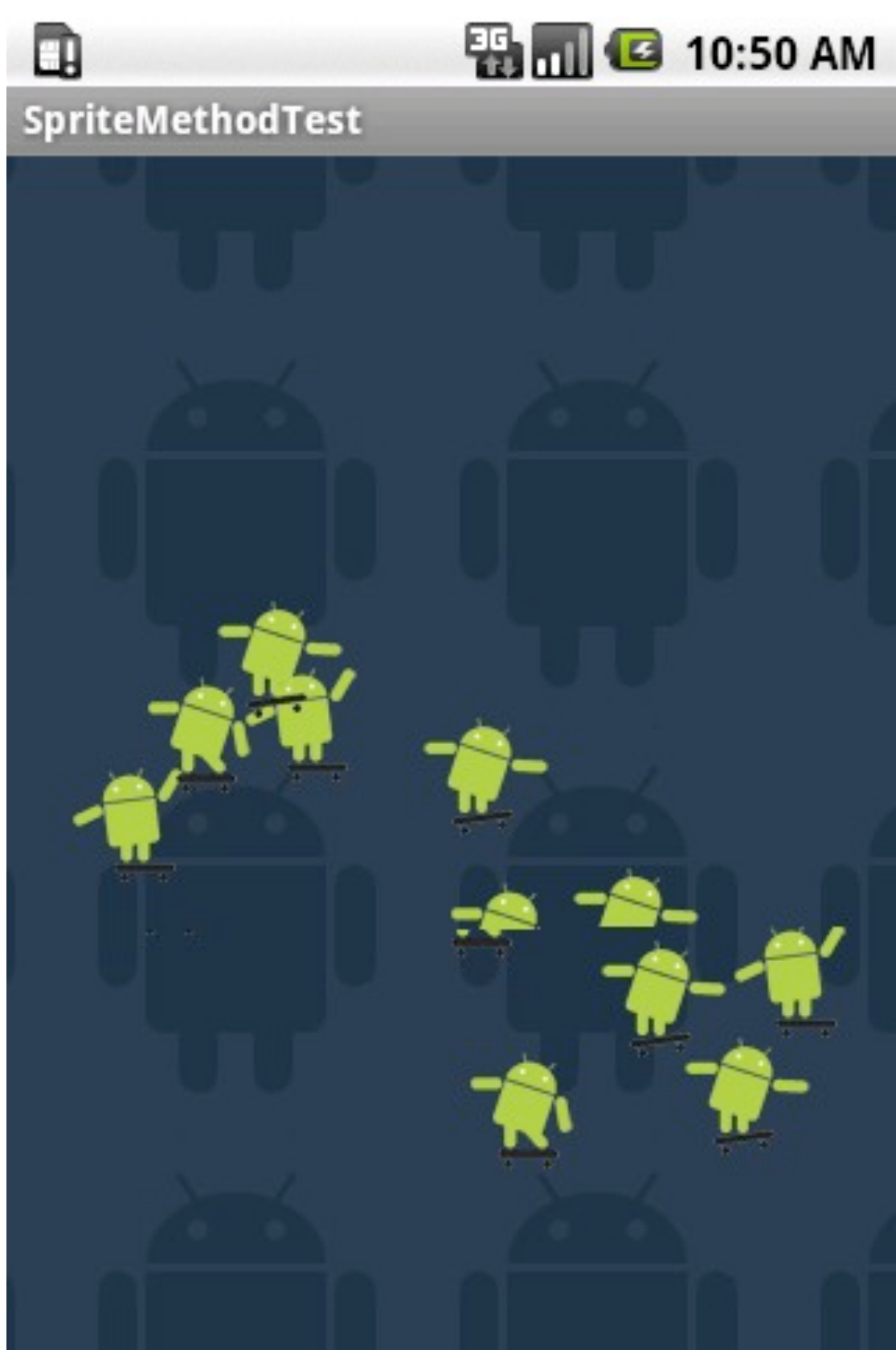
320x200



854x480



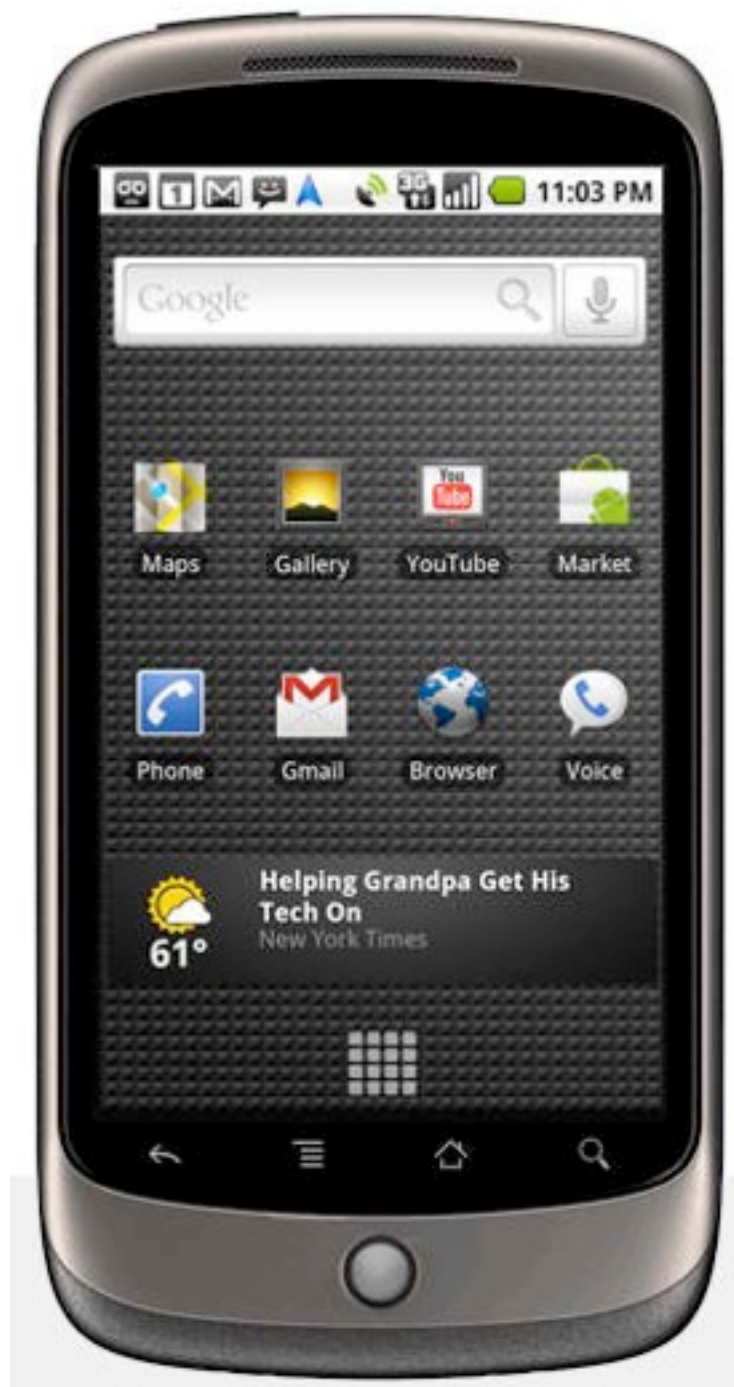




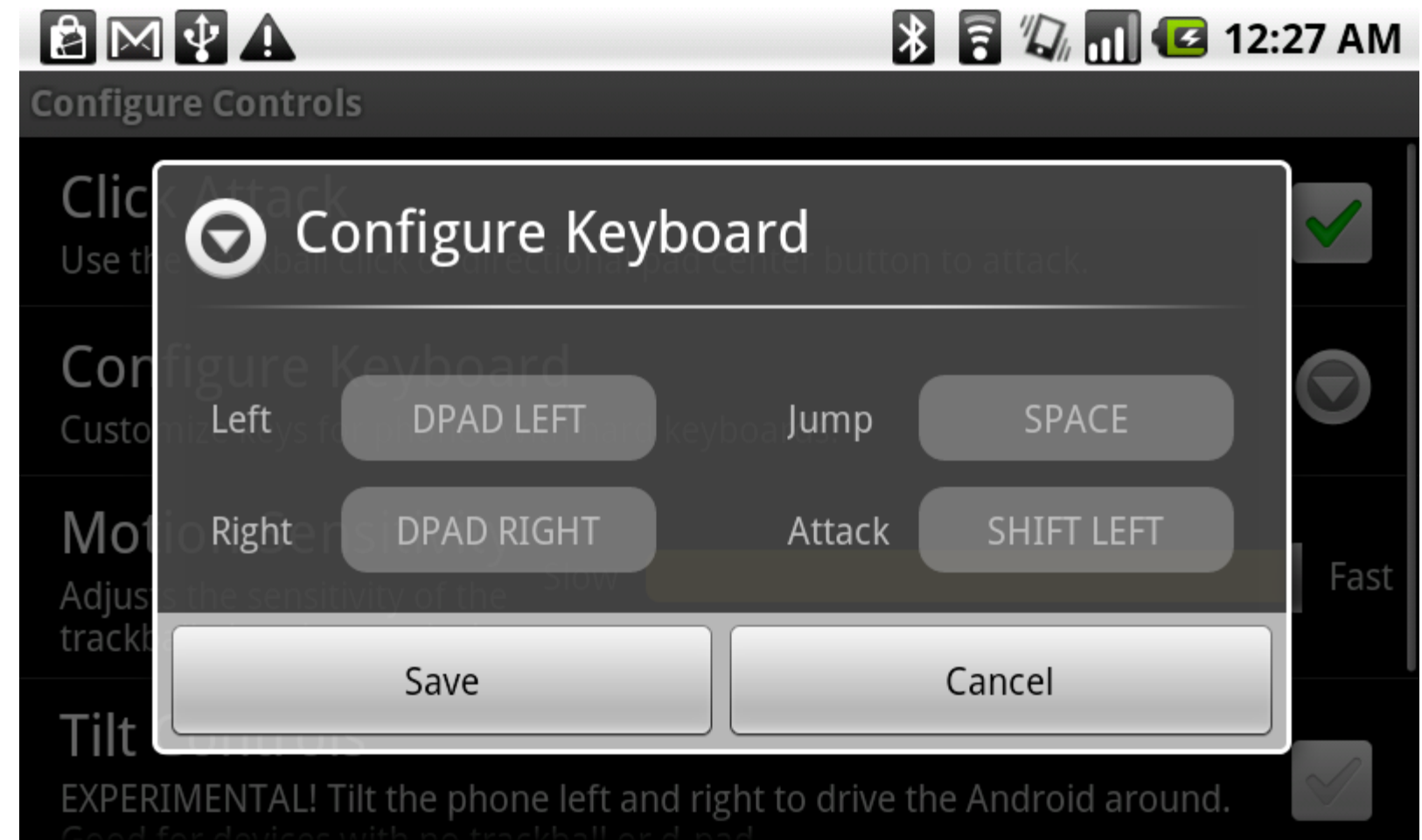
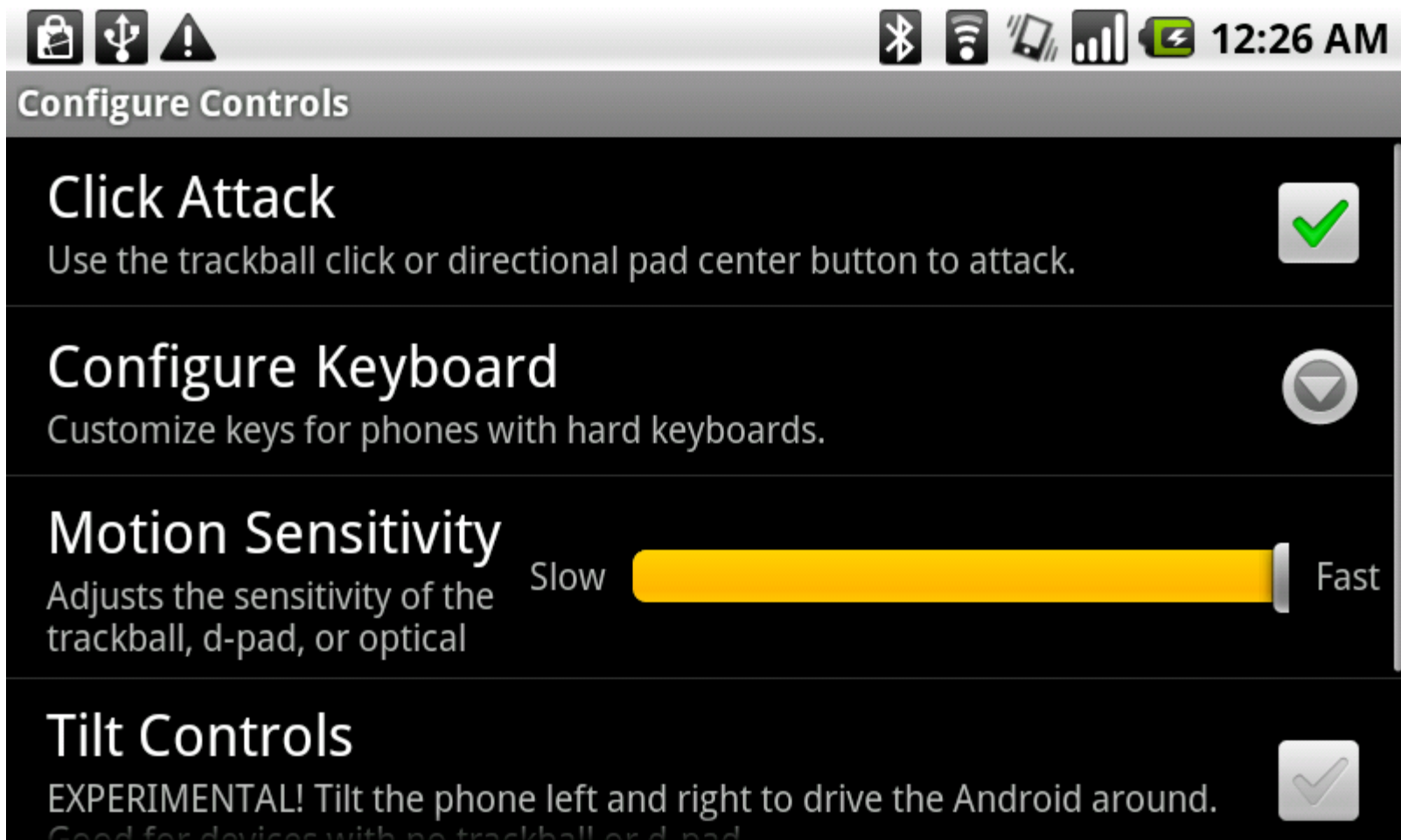






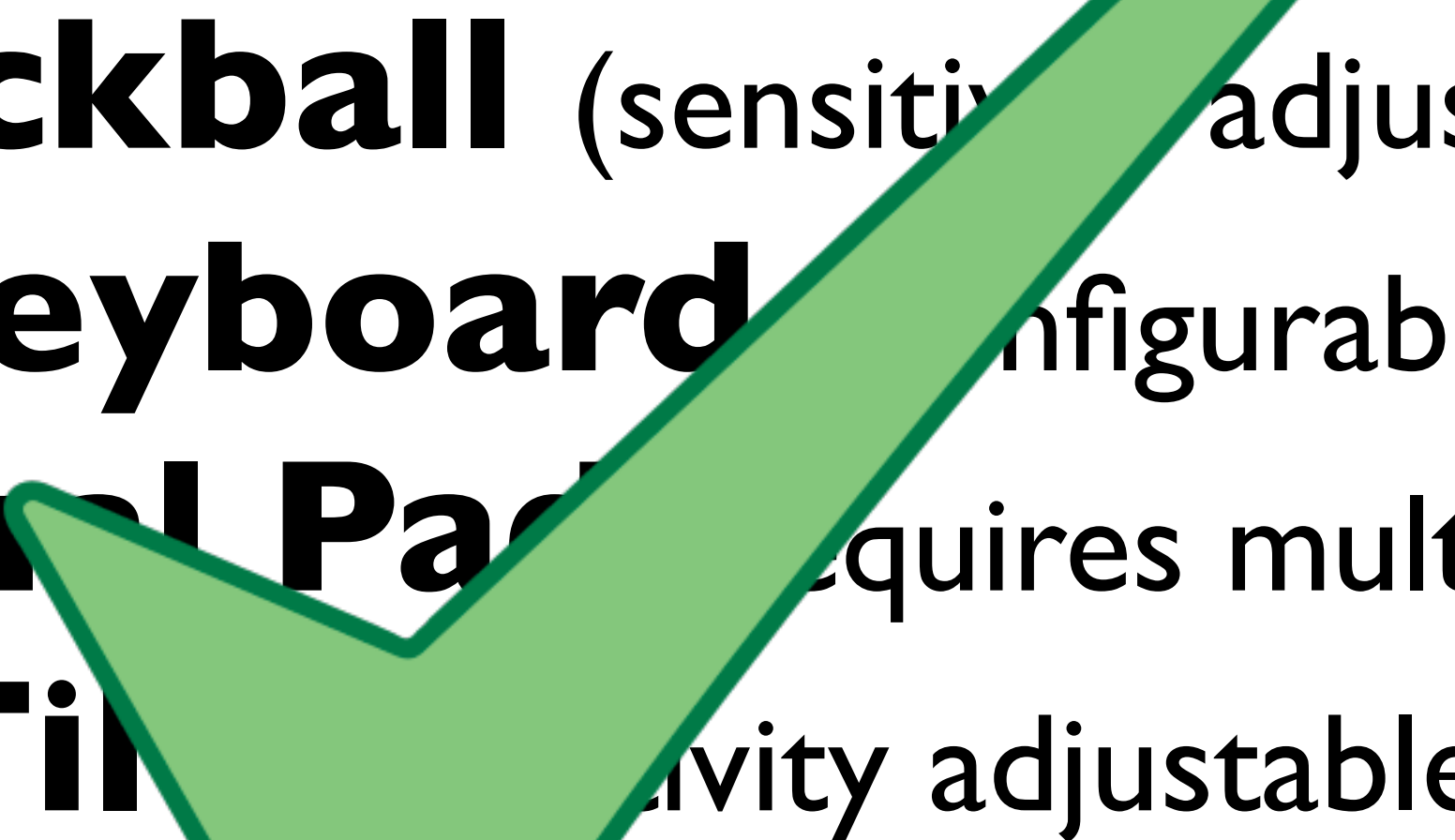






Trackball (sensitivity adjustable)
Keyboard (configurable)
Virtual Pad (requires multitouch)
Tilt (sensitivity adjustable)

Trackball (sensitivity adjustable)
Keyboard (configurable)
Virtual Pad (requires multitouch)
Tilt (sensitivity adjustable)







Jump

Attack

Move



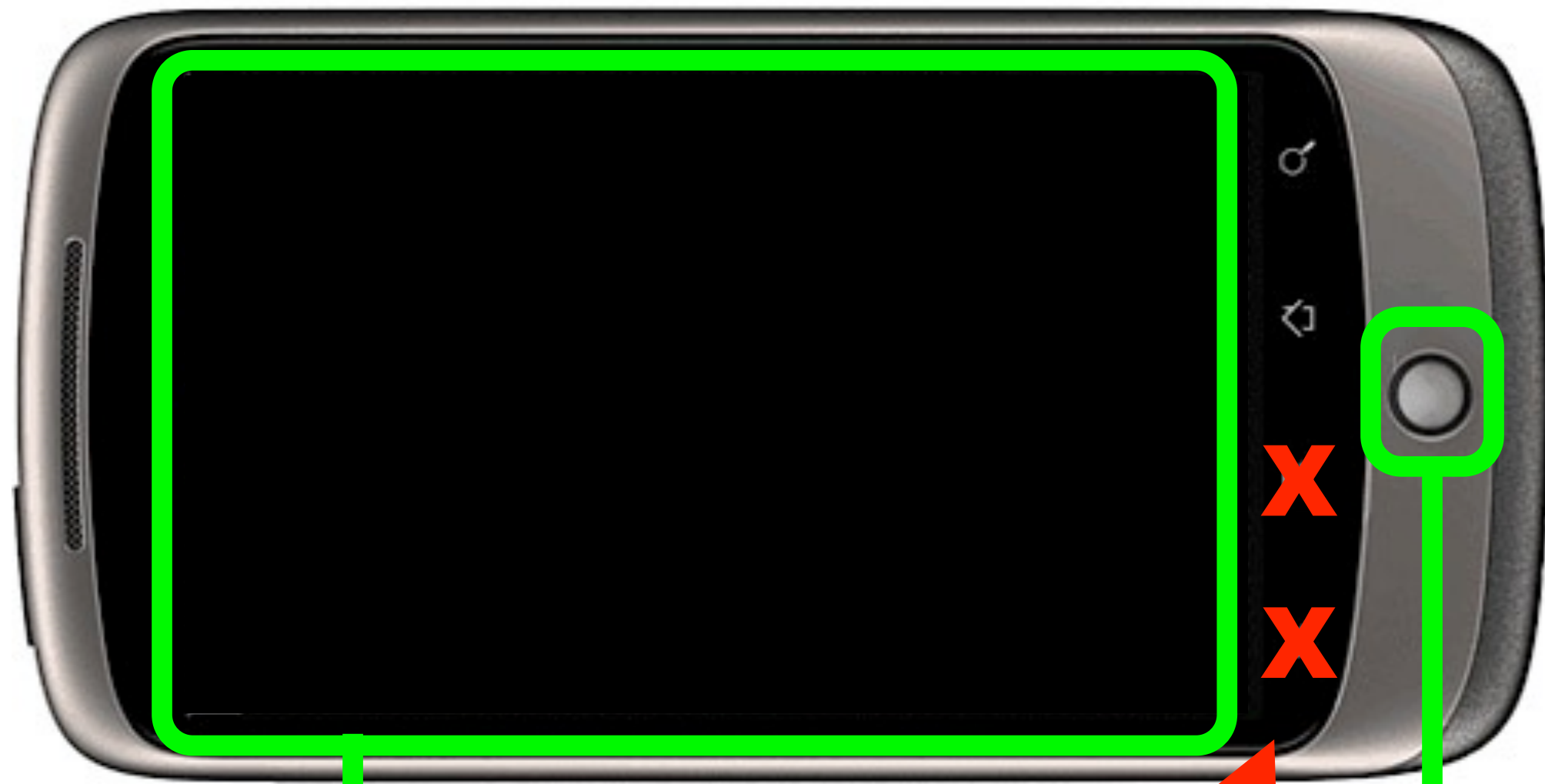










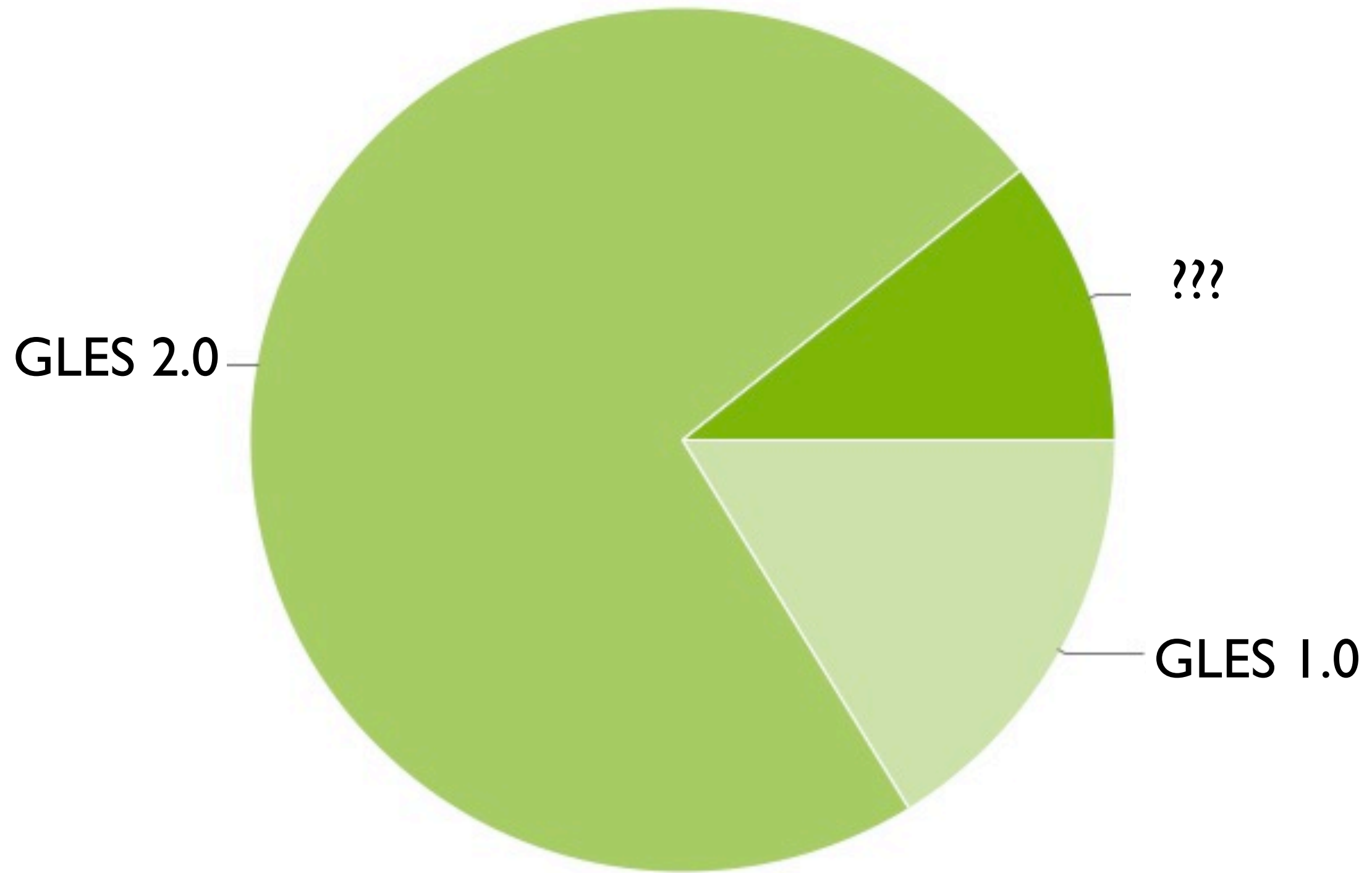


< 400 ms since last event?

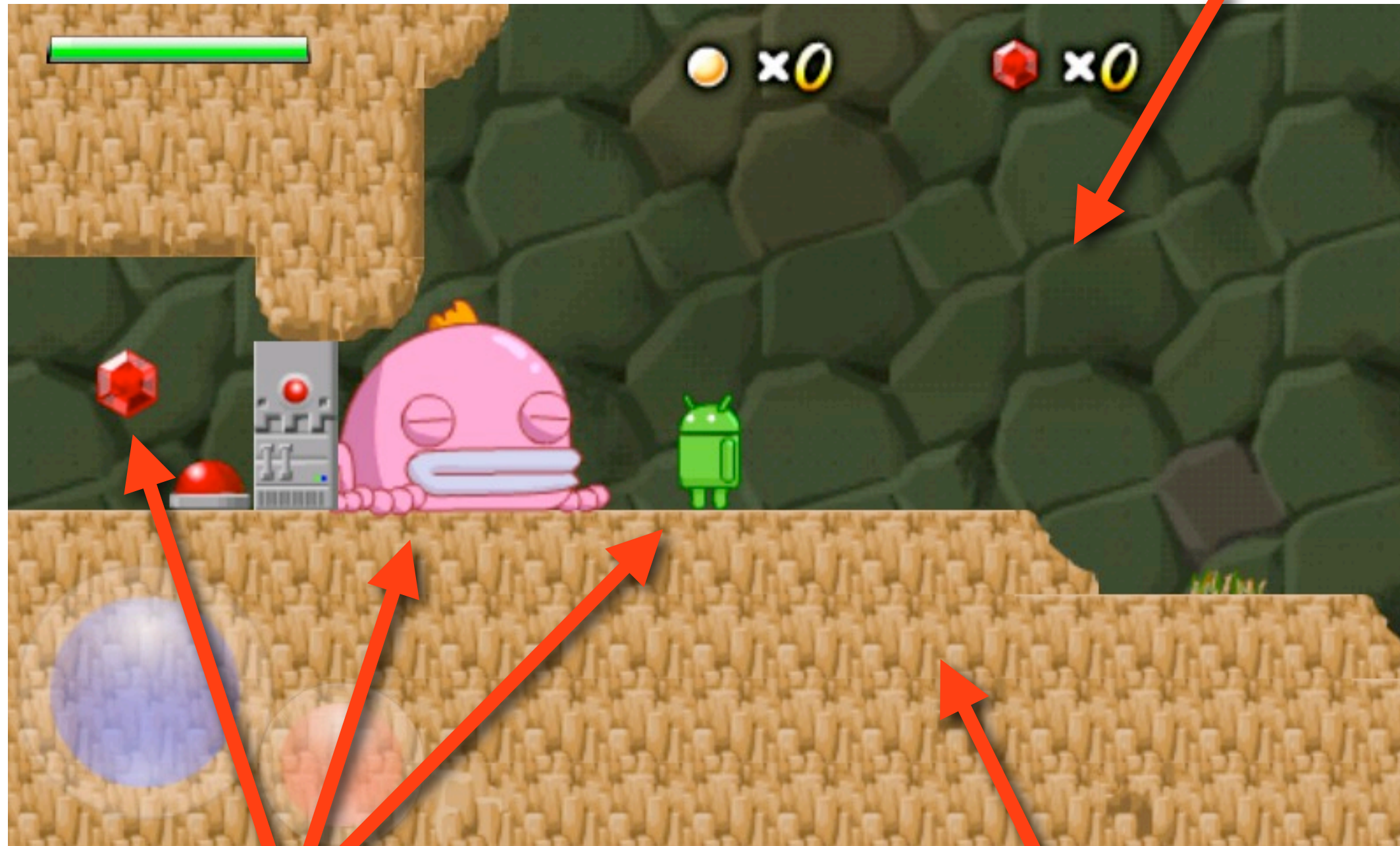




- ui_button_linear_mode.png
- ui_button_options.png
- ui_button_start.png
- ui_button_stomp_off.png
- ui_button_stomp_on.png
- ui_ending_bad_kabocha_background.png
- ui_ending_bad_kabocha_foreground.png
- ui_gem.png
- ui_good_ending_background.png
- ui_good_ending_foreground.png
- ui_locked.png
- ui_movement_slider_base.png
- ui_movement_slider_button_off.png
- ui_movement_slider_button_on.png
- ui_new.png
- ui_paused.png
- ui_pearl.png
- ui_rack_gray.png
- ui_rack_green.png
- ui_rack_red.png
- ui_x.png
- wanda_happy.png**
- wanda_sad.png
- wanda_smile.png
- wanda_surprised.png



Background: draw_texture



Sprites: draw_texture

Tile layers: VBOs

#2 Follow the rules!





Default Orientation: Landscape



Default Orientation: Portrait


```
// Thanks to NVIDIA for this useful canonical-to-screen orientation function.
static void canonicalOrientationToScreenOrientation(
    int displayRotation, float[] canVec, float[] screenVec) {

    final int axisSwap[][] = {
        { 1, -1, 0, 1 }, // ROTATION_0
        {-1, -1, 1, 0 }, // ROTATION_90
        {-1, 1, 0, 1 }, // ROTATION_180
        { 1, 1, 1, 0 } }; // ROTATION_270

    final int[] as = axisSwap[displayRotation];
    screenVec[0] = (float)as[0] * canVec[ as[2] ];
    screenVec[1] = (float)as[1] * canVec[ as[3] ];
    screenVec[2] = canVec[2];
}

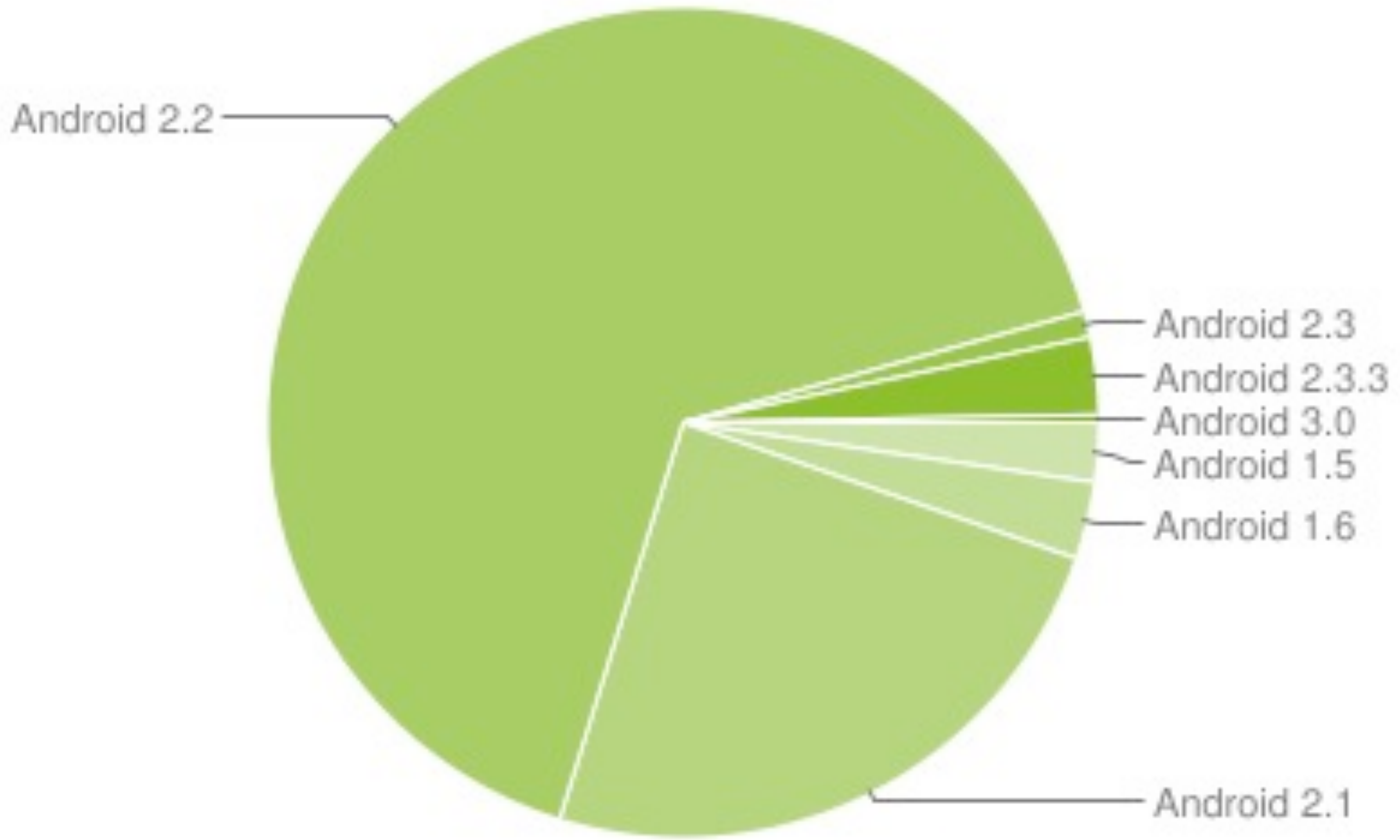
```

http://developer.download.nvidia.com/tegra/docs/tegra_android_accelerometer_v5f.pdf

Never cache!



```
JNIEXPORT void JNICALL Java_com_android_game_surfaceCreated(JNIEnv * env, jobject obj)
```



```
        android:label="@string/app_name"
        android:screenOrientation="landscape"
        android:configChanges="keyboardHidden|orientation" >
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

```
</application>
```

```
    <uses-permission android:name="android.permission.VIBRATE" />
    <uses-permission xmlns:android="http://schemas.android.com/apk/res/android"
        android:name="android.permission.INTERNET" />
```

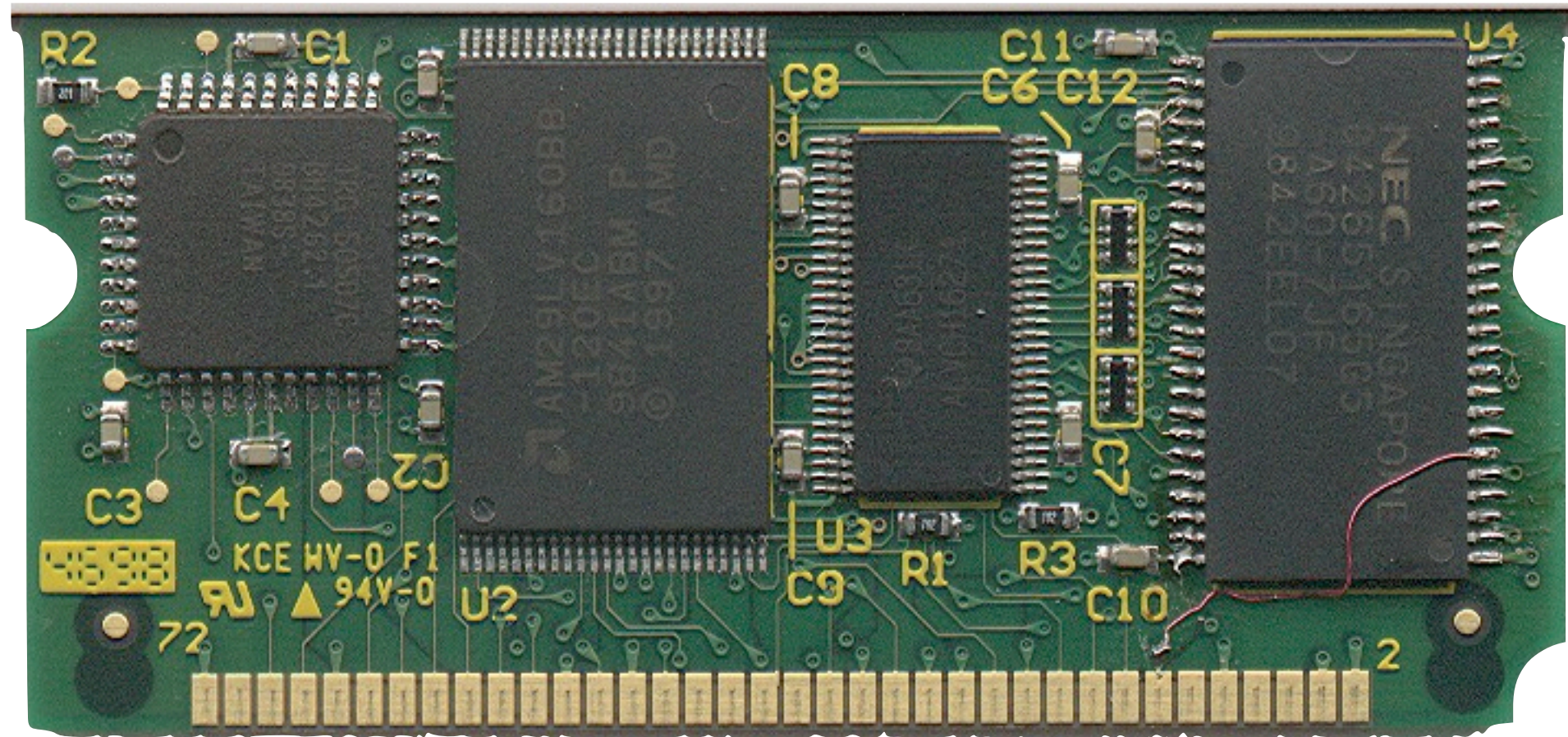
```
    <uses-sdk android:minSdkVersion="3" android:targetSdkVersion="8" />
```

```
    <uses-feature android:name="android.hardware.touchscreen.multitouch" android:required="true" />
```

```
</manifest>
```


Minimum API version to support

API version you compiled against







 Sorry!

The process android.process.
acore has stopped
unexpectedly. Please try again.

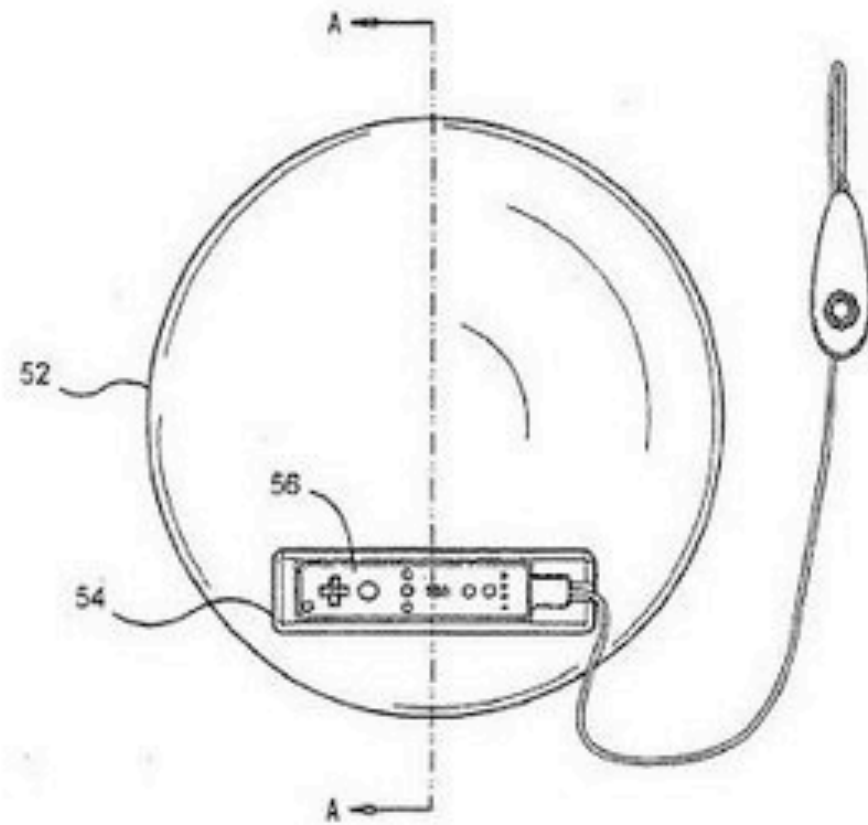
Force close







Fig. 4





#3 Manage your spec!




AndroidManifest.xml

AndroidManifest.xml

```
        android:configChanges="keyboardHidden|orientation" >
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

```
</application>
```

Set this to false if you can
compensate at run time.



```
<uses-permission android:name="android.permission.VIBRATE" />
<uses-permission xmlns:android="http://schemas.android.com/apk/res/android"
    android:name="android.permission.INTERNET" />
```

```
<uses-sdk android:minSdkVersion="3" android:targetSdkVersion="8" />
```

```
<uses-feature android:name="android.hardware.touchscreen.multitouch" android:required="true" />
```

```
</manifest>
```

“I can’t run without multitouch!”



<supports-screens>
<uses-configuration>
<uses-feature>
<uses-library>
<uses-permission>
<uses-sdk>
<compatible-screens>
<supports-gl-texture>

android.hardware.audio.low_latency
android.hardware.bluetooth
android.hardware.camera
android.hardware.camera.autofocus
android.hardware.camera.flash
android.hardware.camera.front
android.hardware.location
android.hardware.location.network
android.hardware.location.gps
android.hardware.microphone
android.hardware.nfc
android.hardware.sensor.accelerometer
android.hardware.sensor.barometer
android.hardware.sensor.compass
android.hardware.sensor.gyroscope
android.hardware.sensor.light
android.hardware.sensor.proximity
android.hardware.telephony
android.hardware.telephony.cdma
android.hardware.telephony.gsm

android.hardware.faketouch
android.hardware.touchscreen
android.hardware.touchscreen.multitouch
android.hardware.touchscreen.multitouch.distinct
android.hardware.touchscreen.multitouch.jazzhand
android.hardware.wifi
android.software.live_wallpaper
android.software.sip
android.software.sip.voip
GL_OES_compressed_ETC1_RGB8_texture
GL_OES_compressed_paletted_texture
GL_AMD_compressed_3DC_texture
GL_AMD_compressed_ATC_texture
GL_EXT_texture_compression_latc
GL_EXT_texture_compression_dxt1
GL_EXT_texture_compression_s3tc
GL_IMG_texture_compression_pvrtc
...


```
<supports-gl-texture android:name="GL_IMG_texture_compression_pvrtc" />
```

```
<uses-feature  
  android:name="android.hardware.touchscreen.multitouch.distinct"  
  android:required="true" />
```

```
<uses-sdk android:minSdkVersion="3" android:targetSdkVersion="5" />
```

```
<compatible-screens>
```

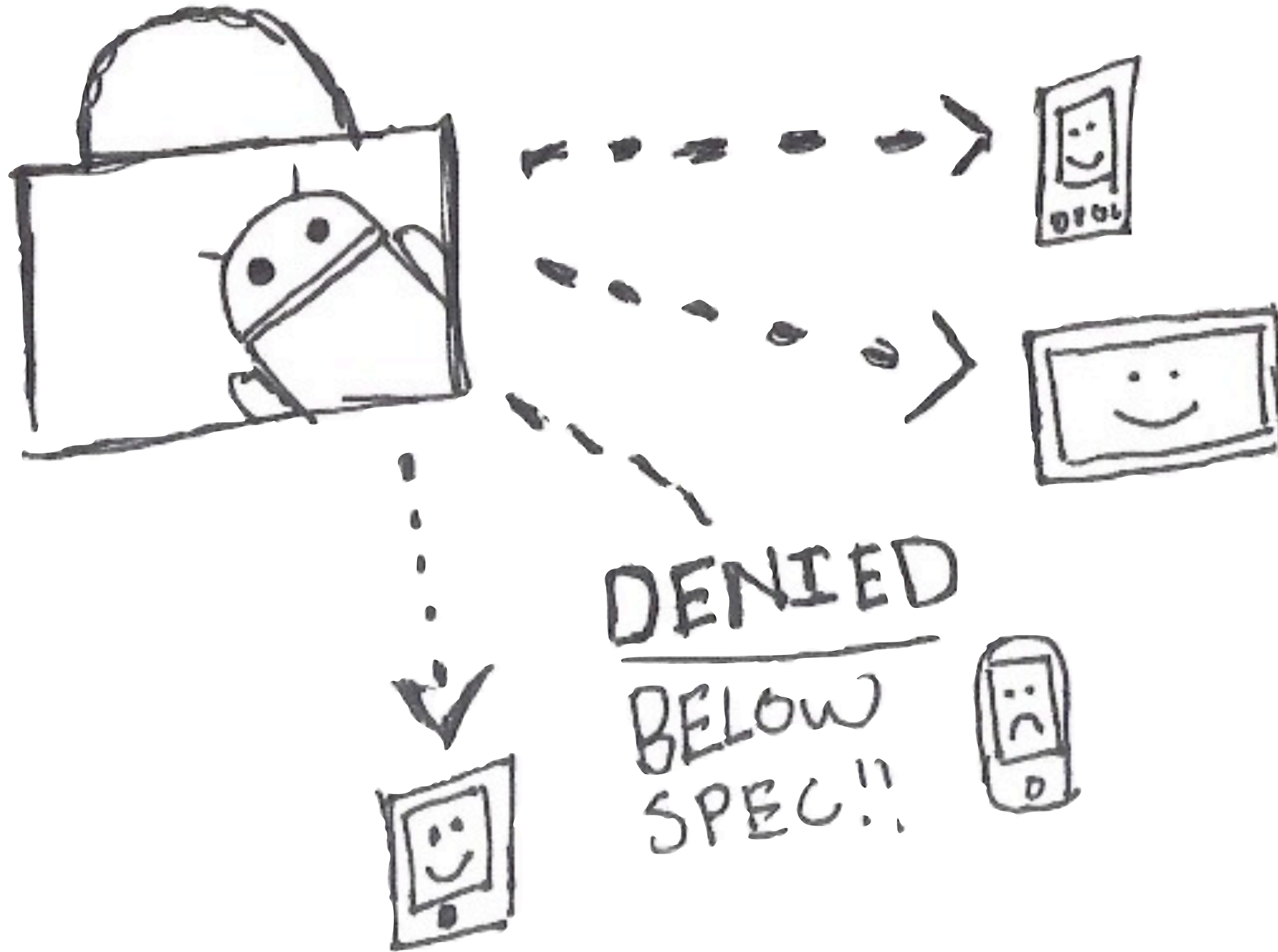
```
  <screen android:screenSize="normal" android:screenDensity="hdpi" />
```

```
  <screen android:screenSize="normal" android:screenDensity="mdpi" />
```

```
  <screen android:screenSize="large" android:screenDensity="ldpi" />
```

```
</compatible-screens>
```

```
<uses-feature android:glEsVersion="0x00020000" />
```





Δ is large!



Δ is much smaller!

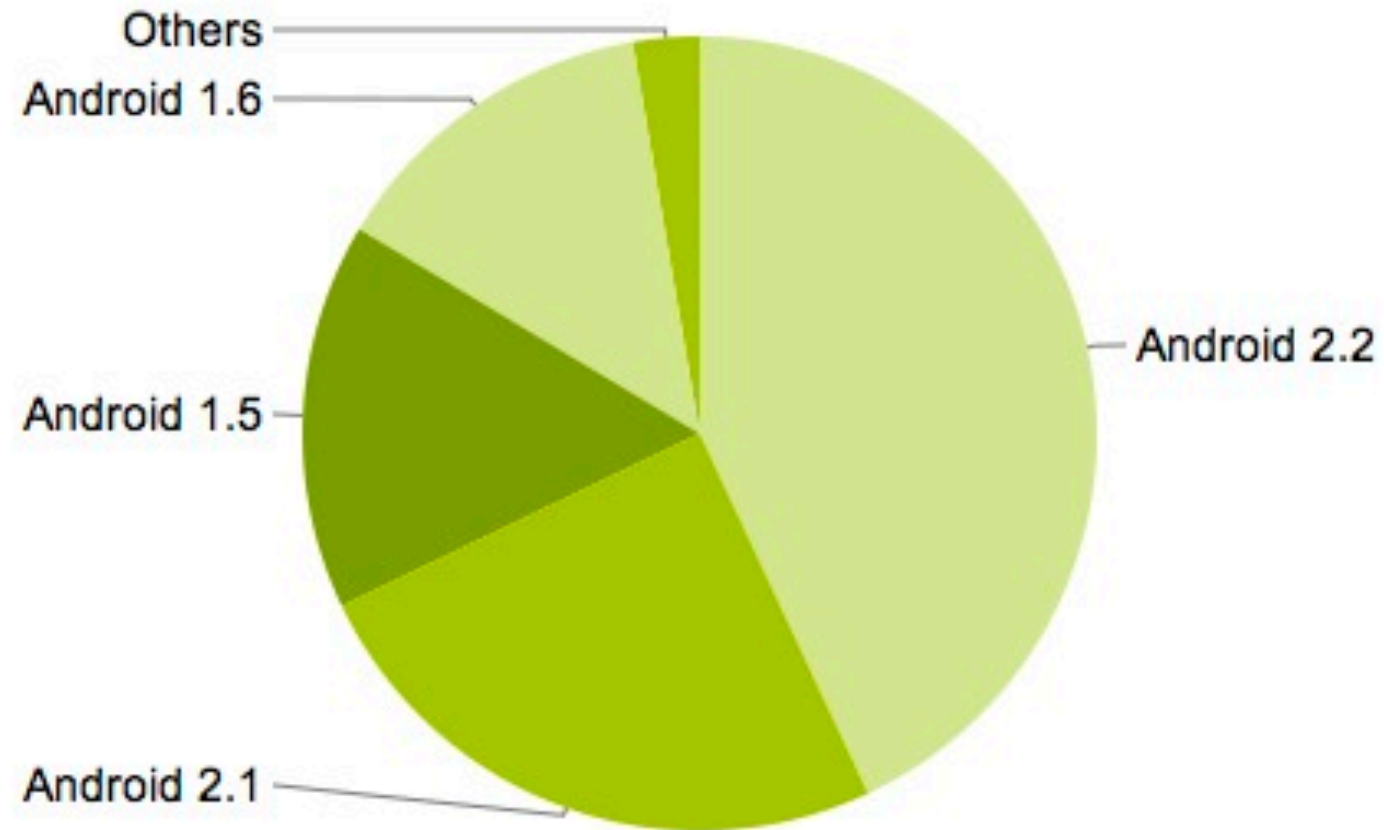
```
<uses-feature android:glEsVersion="0x00020000" />
```



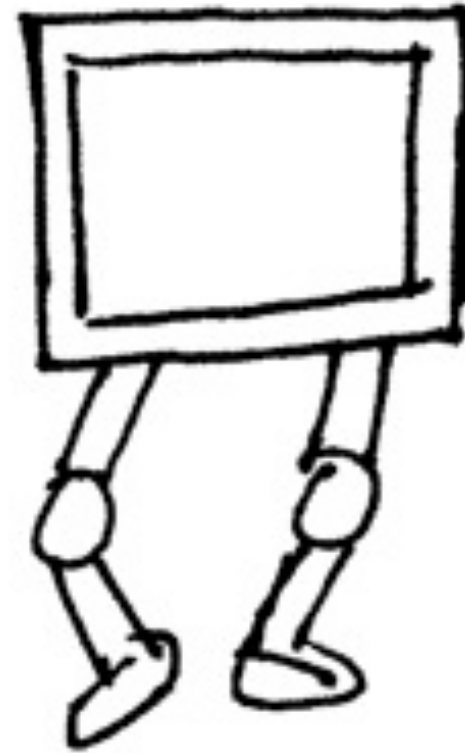
```
<uses-permission android:name="android.permission.VIBRATE"/>  
<uses-permission android:name="android.permission.INTERNET"/>  
<uses-sdk android:minSdkVersion="3" android:targetSdkVersion="8"/>  
  
<supports-screens android:largeScreens="true"  
    android:smallScreens="true"  
    android:anyDensity="true"  
    android:normalScreens="true"/>
```


Attributes breakdown as of May 2, 2011

Platform version



| com.replica.replicaisland | | All apps in my category | |
|---------------------------|----------------------------|-------------------------|-------|
| 1 | Android 2.2 43.0% (96,348) | Android 2.2 | 59.6% |
| 2 | Android 2.1 24.8% (55,562) | Android 2.1 | 27.2% |
| 3 | Android 1.5 15.8% (35,276) | Android 1.6 | 6.7% |
| 4 | Android 1.6 13.7% (30,647) | Android 1.5 | 4.5% |
| 5 | Android 2.3.3 1.2% (2,648) | Android 2.3.3 | 0.8% |
| 6 | Android 2.3 0.3% (697) | Android 2.3 | 0.6% |
| 7 | Android 2.0.1 0.2% (456) | Android 2.0.1 | 0.1% |
| 8 | Android 1.0 0.1% (300) | Android 1.1 | 0.1% |
| 9 | Android 2.0 0.1% (216) | Android 1.0 | 0.1% |
| 10 | Android 3.0 0.0% (20) | Android 2.0 | 0.0% |

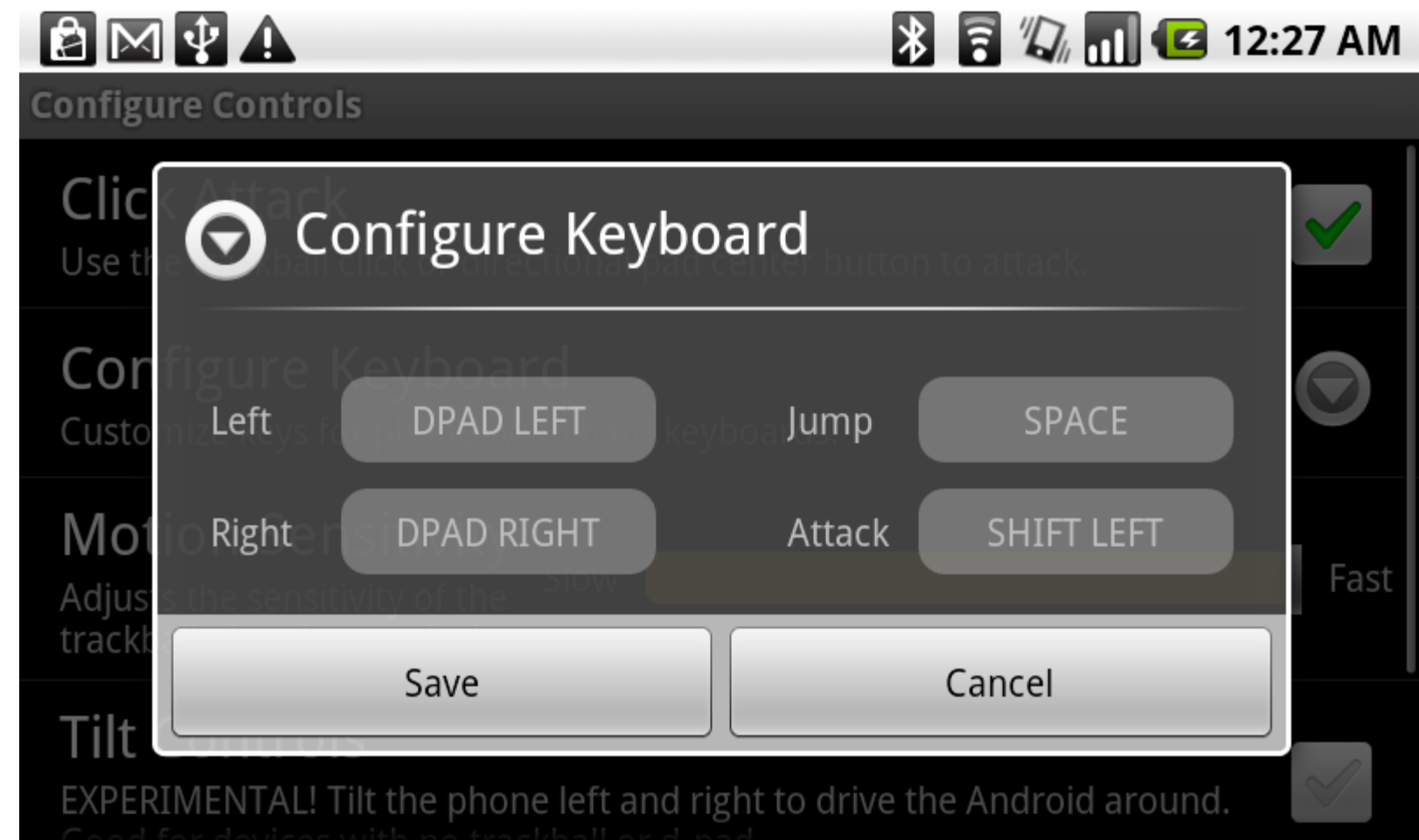
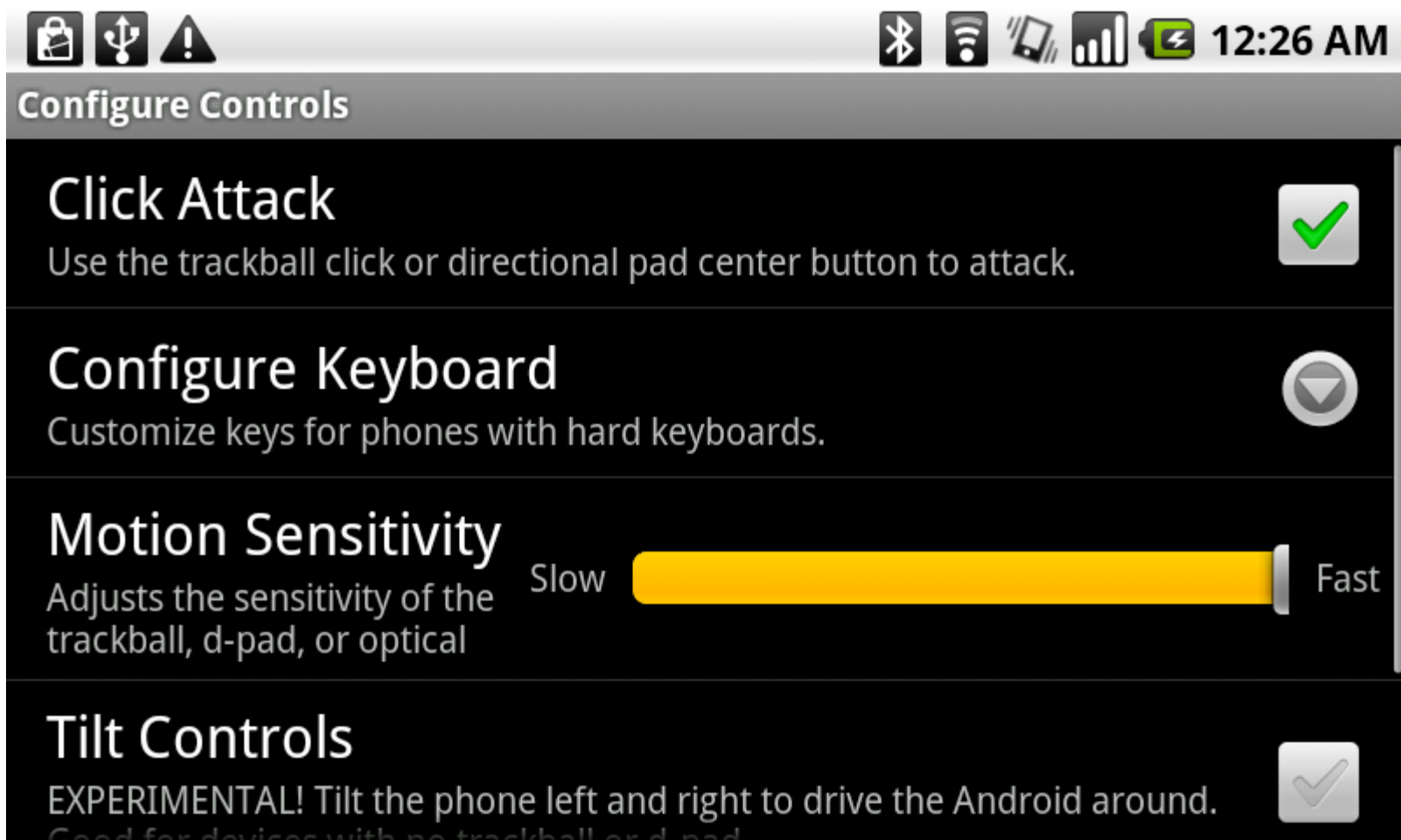


ONLY
PHONES WITH
LEGS!!

3 Steps To Every Device

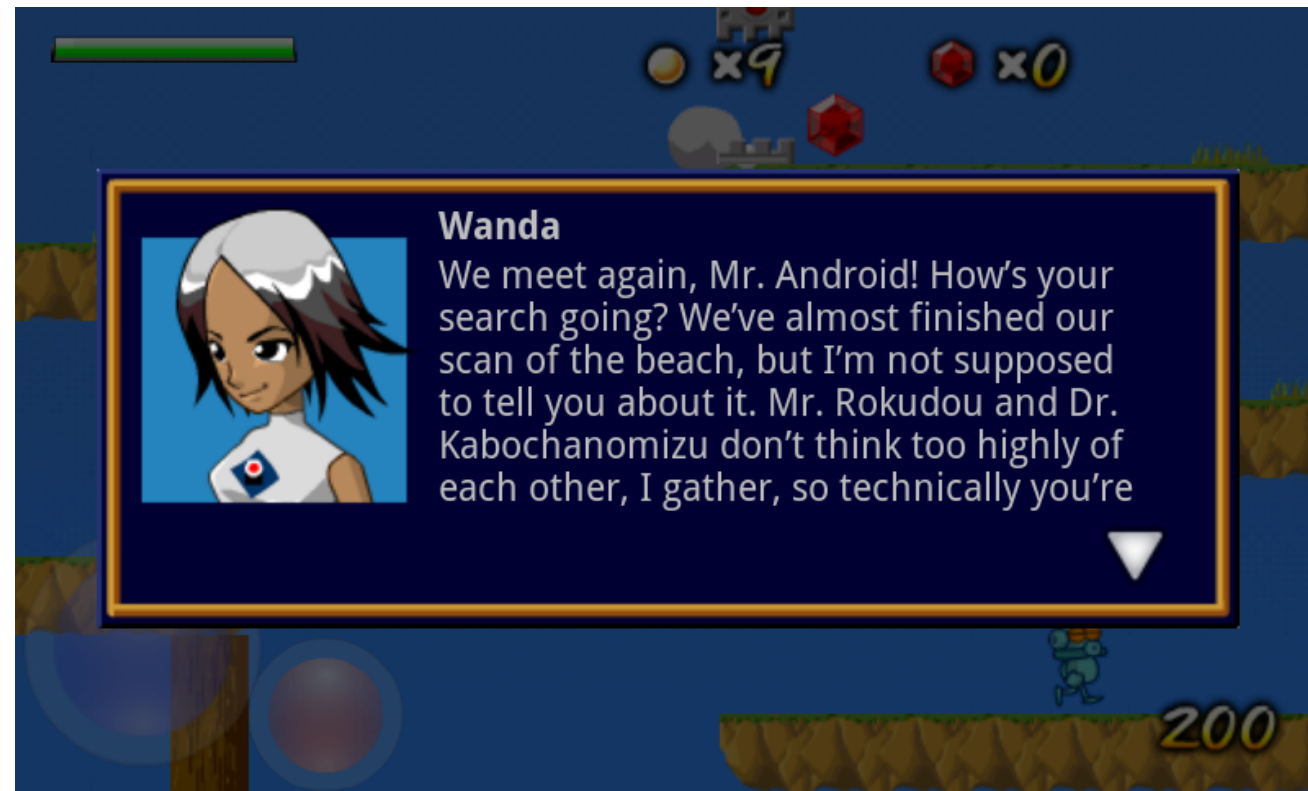


| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I |
| J | K | L | M | N | O | P | Q | R |
| S | T | U | V | W | X | Y | Z | |
| a | b | c | d | e | f | g | h | i |
| j | k | l | m | n | o | p | q | r |
| s | t | u | v | w | x | y | z | |









Log Entry - Monday - Overcast

I met a group of three adventurers today. I thought that I had the island all to myself, and I was so surprised to hear human voices (with Brooklyn accents, no less!) outside my shelter that I knocked over a bamboo support and almost brought the roof down. The group is independent but they are after The Source, just like me. They were nice but I sensed a little bit of competitive tension in the air. They have been here for a month already and have barely penetrated the forest beyond the beach. I am glad to have met them but they pose no immediate threat to my mission. They are fine folks but my skills are far superior.







BABY

No challenge at all.

KIDS

A comfortable ride to the end.

ADULTS

True accomplishment requires hardship.



`SurfaceHolder.setFixedSize(int width, int height)`





RobotInvader.com



ROBOT
invader

@c_pruett

@robotinvader



Feedback: <http://goo.gl/8dfXH>
Twitter: #Android

