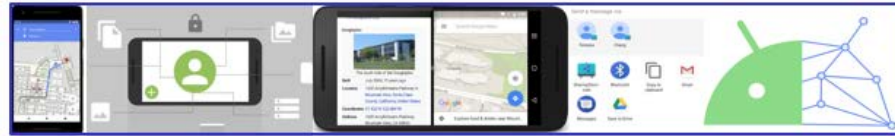
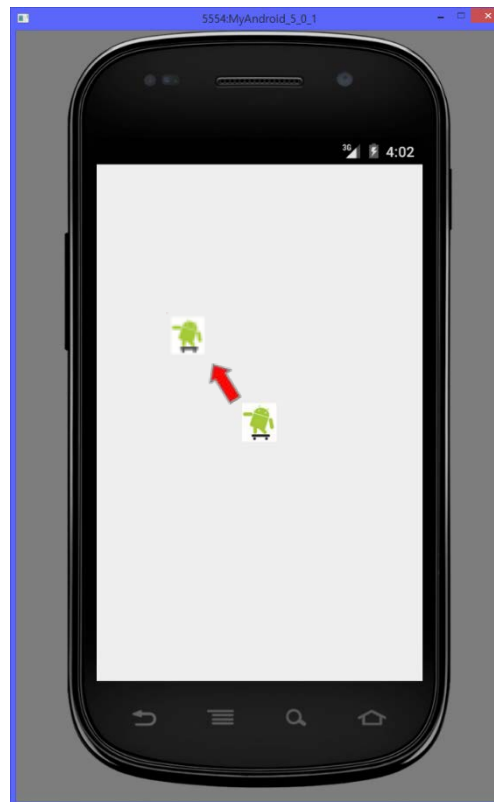




# android



## Graphic 2D

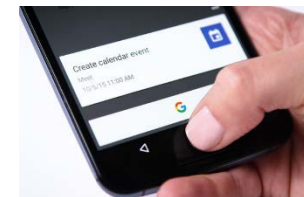
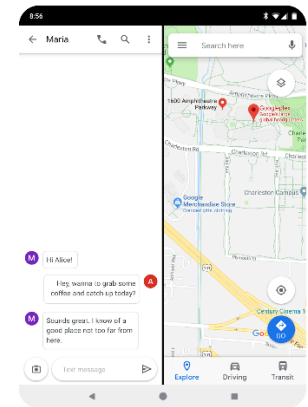
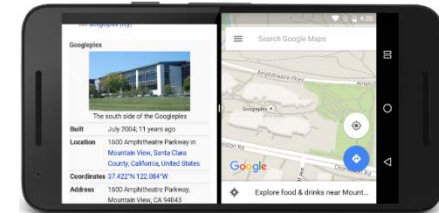




# 학습 목표

## ■ 교육 목표

- ❖ CustomView 구현
- ❖ Keyboard 입력 처리
- ❖ Touch Screen 처리
- ❖ 실습 I
  - ◆ Android Image 화면 중앙 출력 구현
- ❖ 실습 II
  - ◆ Android KeyEvent 처리 구현 I
- ❖ 실습 III
  - ◆ Android KeyEvent 처리 구현 II
- ❖ 실습 IV
  - ◆ Android Screen Touch Event 처리 구현





# Android Image

## ■ Android 지원 Image 형식

### ❖ JPEG

◆ Joint Photographic Experts Group

### ❖ PNG

◆ Portable Network Graphics

### ❖ GIF

◆ Graphics Interchange Format

### ❖ BMP

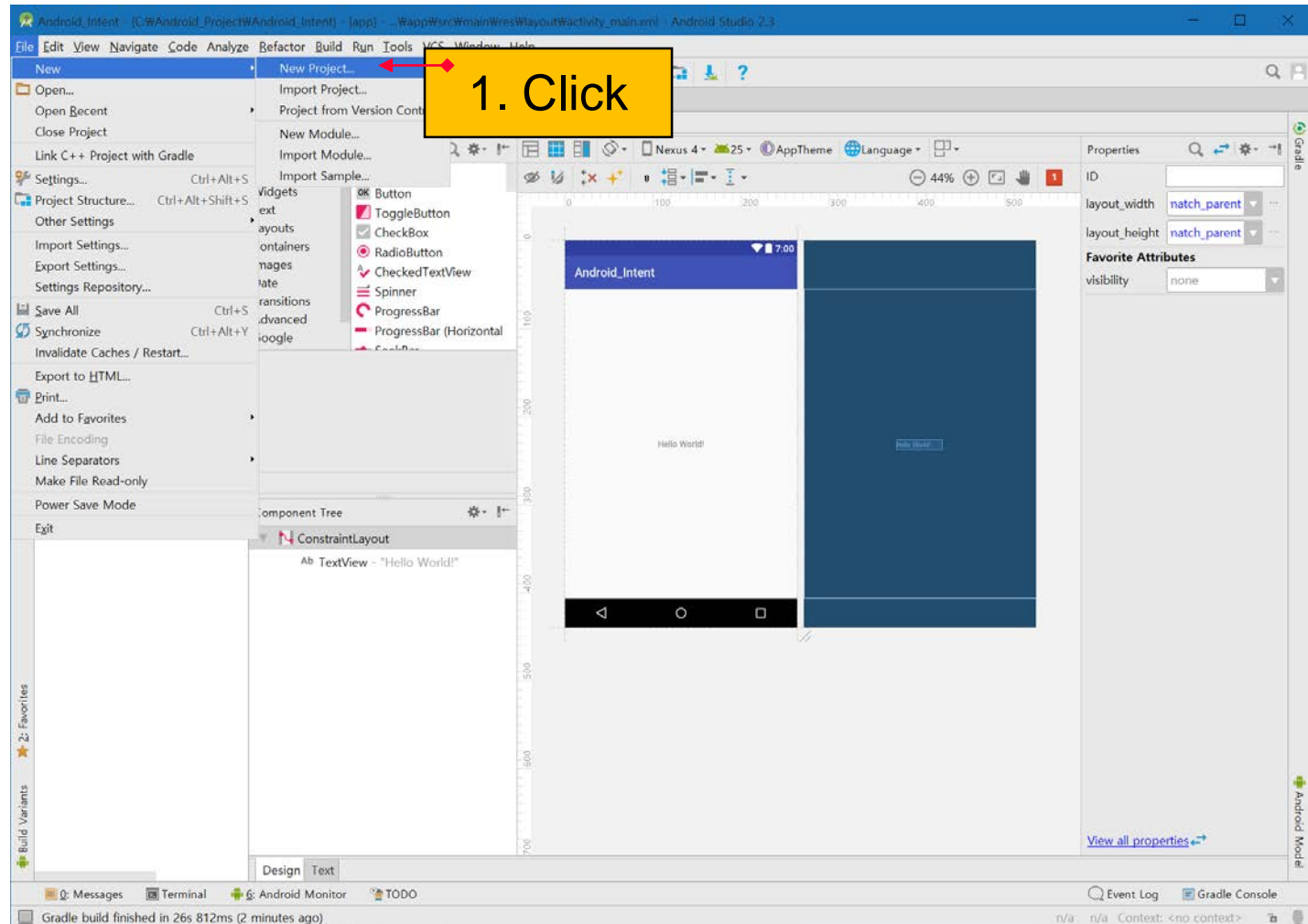




# Android Custom View 구현 (1)

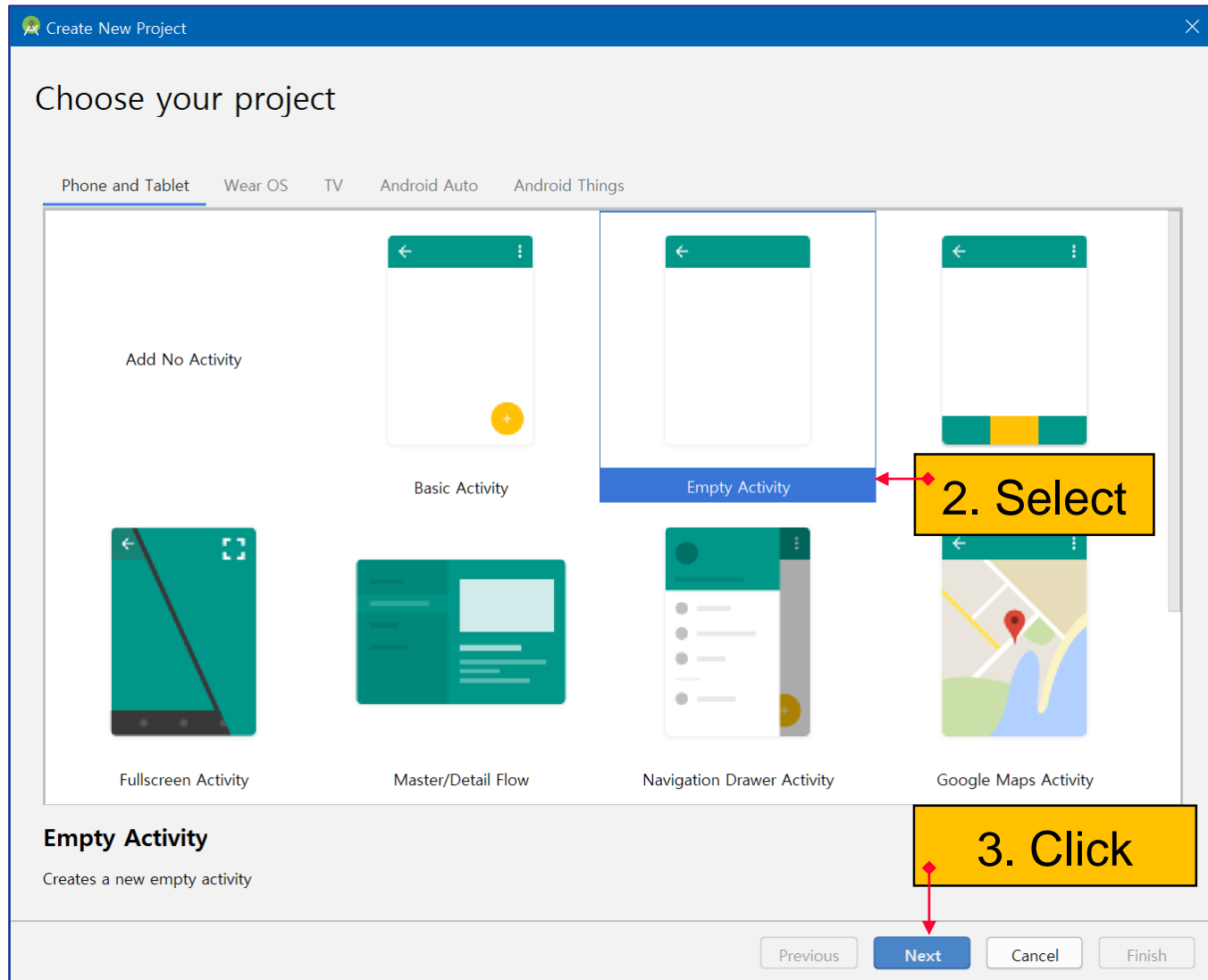
## ■ Android 프로젝트 생성

❖ 프로젝트 명 : Android\_Image





# Android Custom View 구현 (2)





# Android Custom View 구현 (3)

Create New Project

Configure your project

Name  
Android\_Image

Package name  
com.inhatc.android\_image

Save location  
C:\Android\_Project\Android\_Image

Language  
Java

Minimum API level  
API 26: Android 8.0 (Oreo)

☐ This project will support instant apps

☐ Use AndroidX artifacts

Empty Activity

Creates a new empty activity

Previous Next Cancel Finish

4. Input "Android\_Image"

5. Input "com.inhatc.android\_image"

6. Select

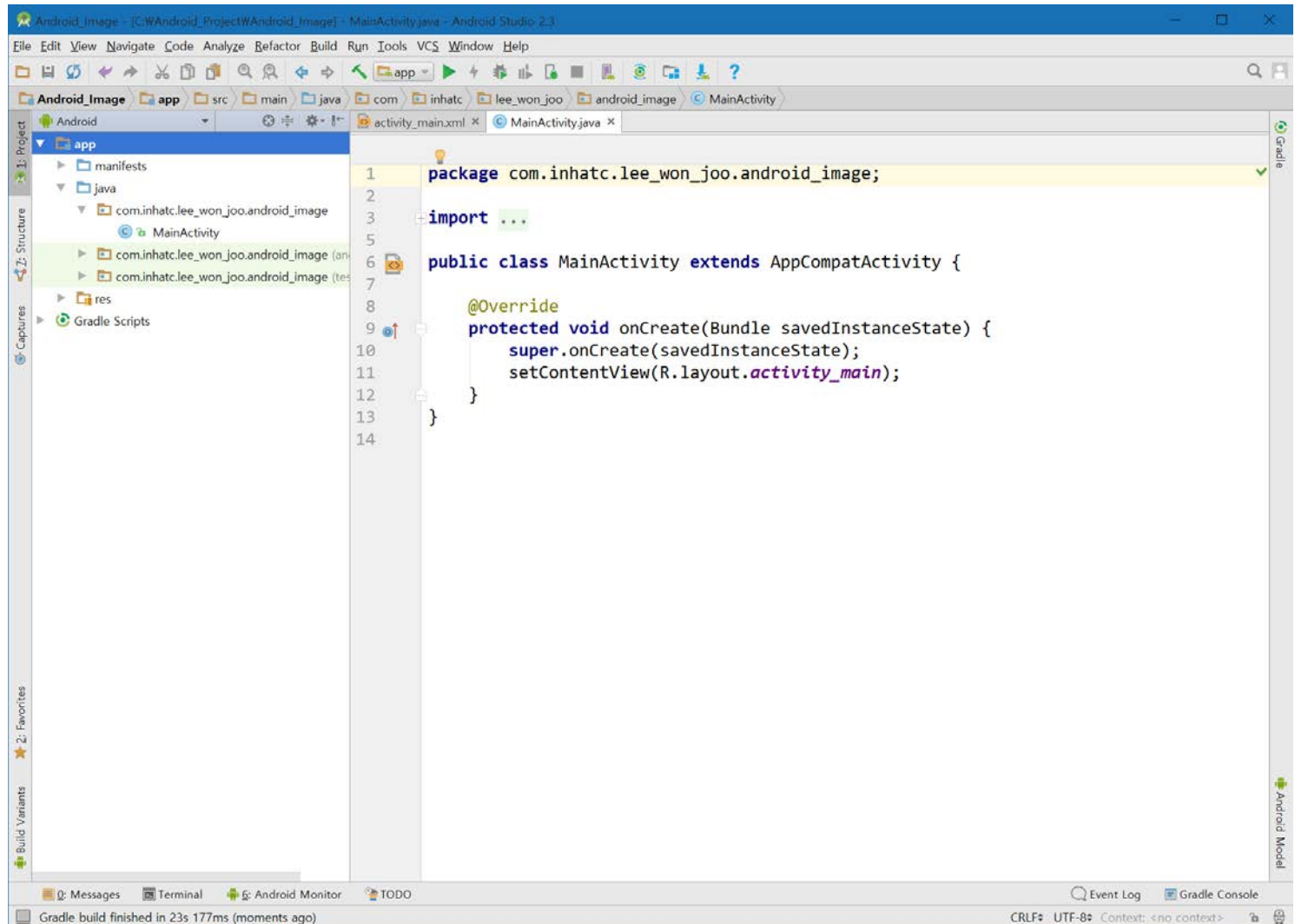
7. Select

8. Click



# Android Custom View 구현 (4)

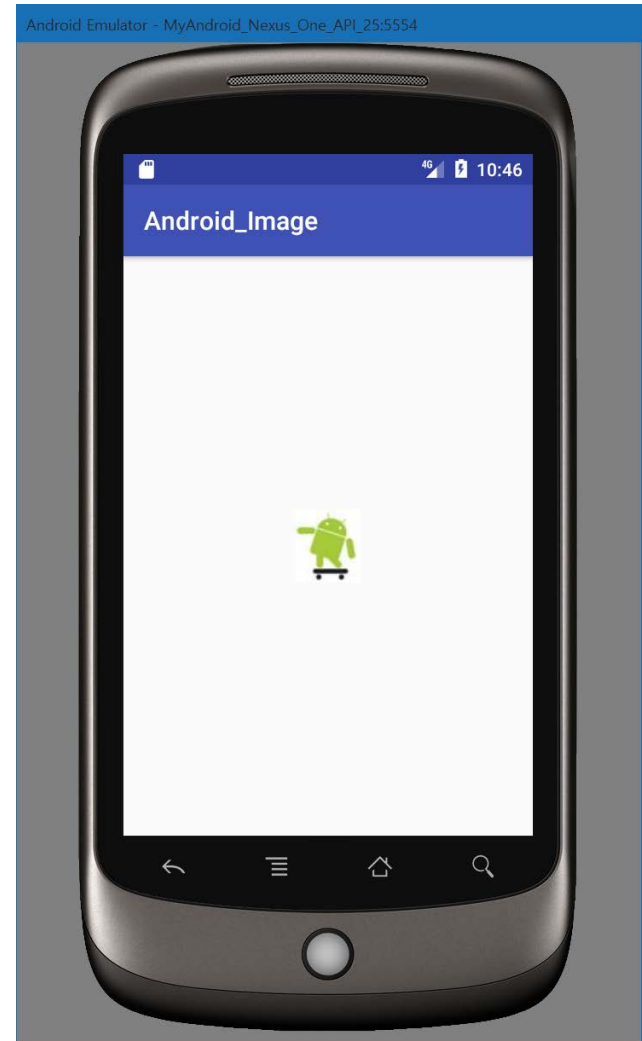
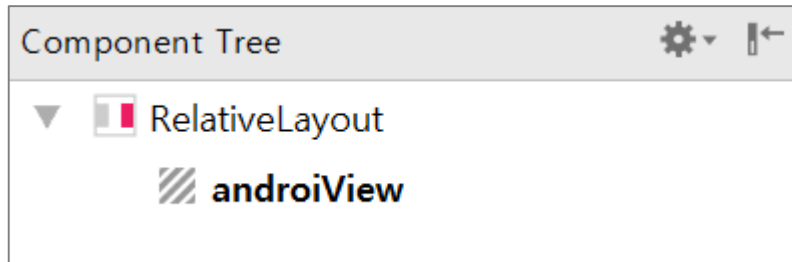
## ❖ Android 프로젝트 생성 완료





# Android Custom View 구현 (5)

## ■ UI 설계







# Android Custom View 구현 (6)

## ❖ TextView 삭제

9. 마우스  
오른쪽 버튼 Click

10. Click

Android Image [C:\Android Project\Android Image] [app] ...\Wapp\src\main\res\layout\activity\_main.xml - Android Studio 2.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Android Image app src main res layout activity\_main.xml

Component Tree

- Android
- app
- manifests
- java
- com.inhatc.lee\_won\_joo.android\_image
- MainActivity
- com.inhatc.lee\_won\_joo.android\_image (an
- com.inhatc.lee\_won\_joo.android\_image (te
- res
- Gradle Scripts

TextView - "Hello World!"

Properties

layout\_width wrap\_content

layout\_height wrap\_content

TextView

text Hello World!

contentDesc...

textAppear... Material Small

Favorite Attributes

accessibilityT... none

visibility none

Ctrl+X

Ctrl+C

Ctrl+V

Delete

Select

Morphing

Save Screenshot...

Refactor

Go To Declaration

Ctrl+B

Gradle Console

Gradle build finished in 1m 7s 546ms (a minute ago)

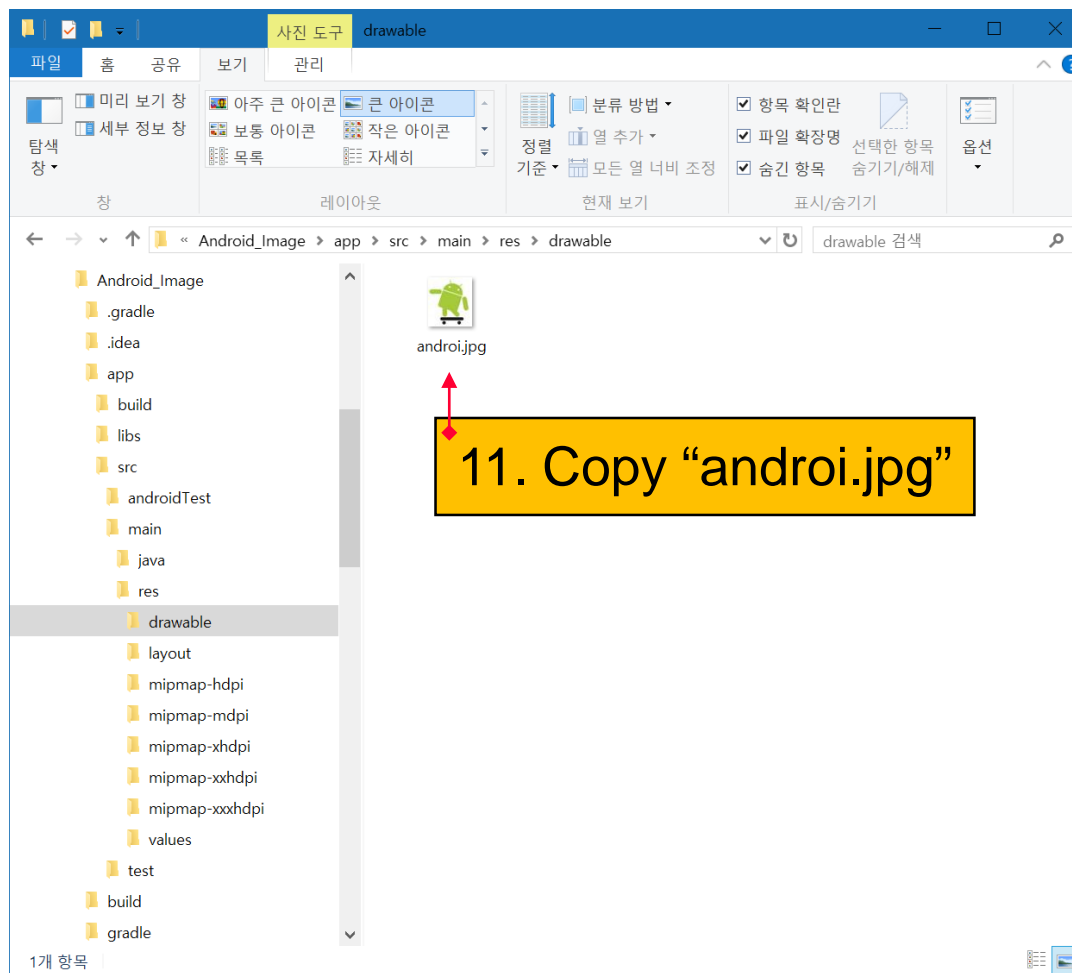


# Android Custom View 구현 (7)

## ❖ Image 파일 복사

◆ C:\Android\_Studio\Project\Android\_Image\app\src\main\res\drawable

◆ androi.jpg

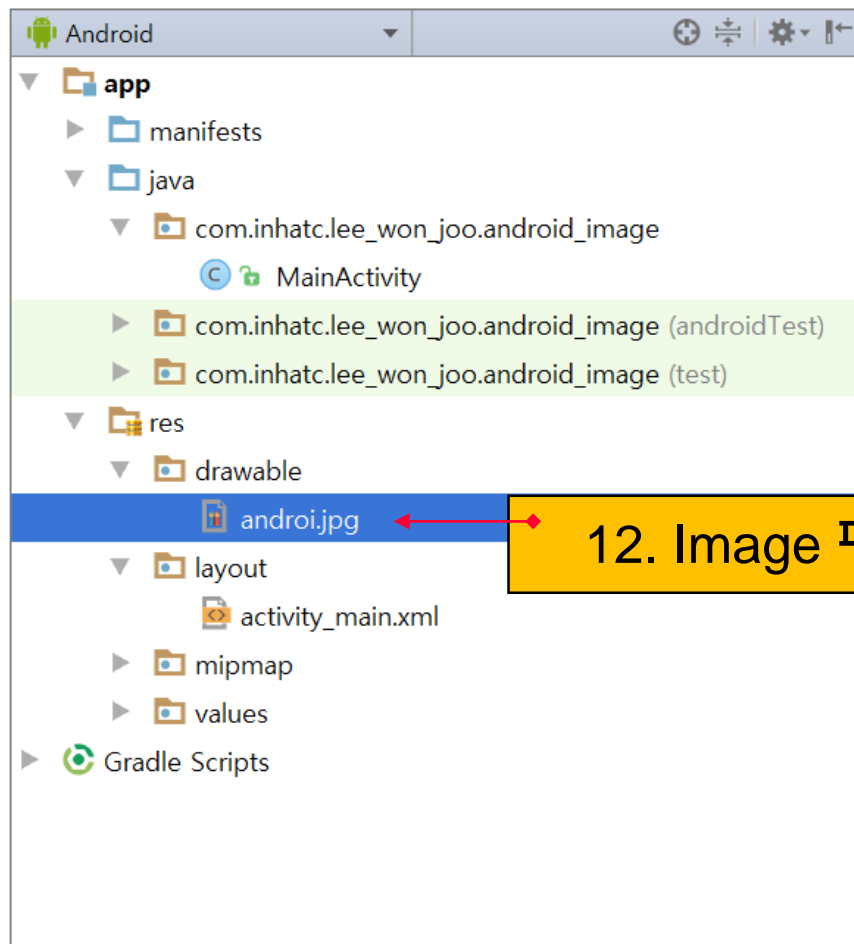




# Android Custom View 구현 (8)

## ❖ Image 파일 저장

◆ android.jpg



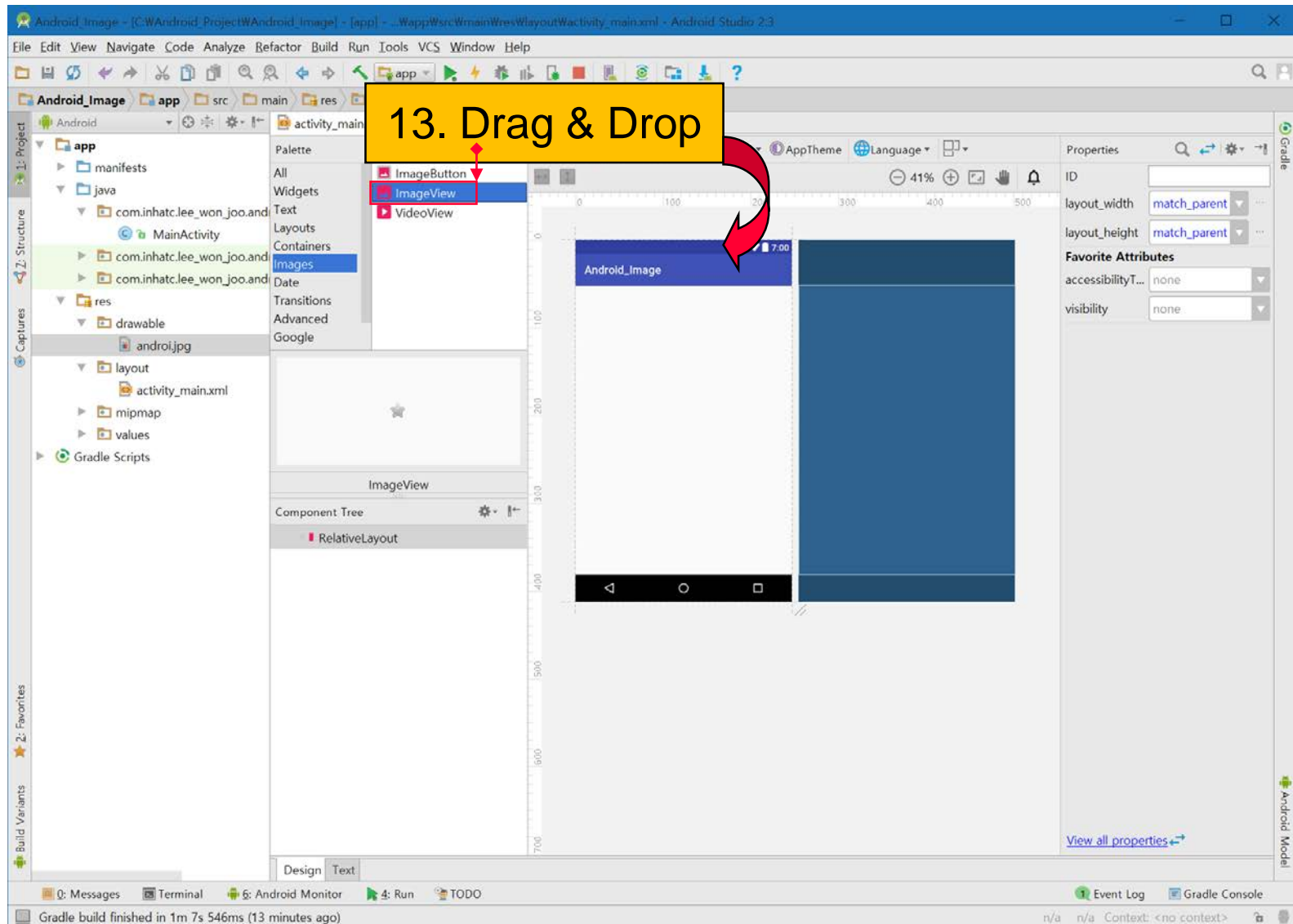
12. Image 파일 확인





# Android Custom View 구현 (9)

## ❖ ImageView 추가





# Android Custom View 구현 (10)

## ❖ ImageView : src 속성

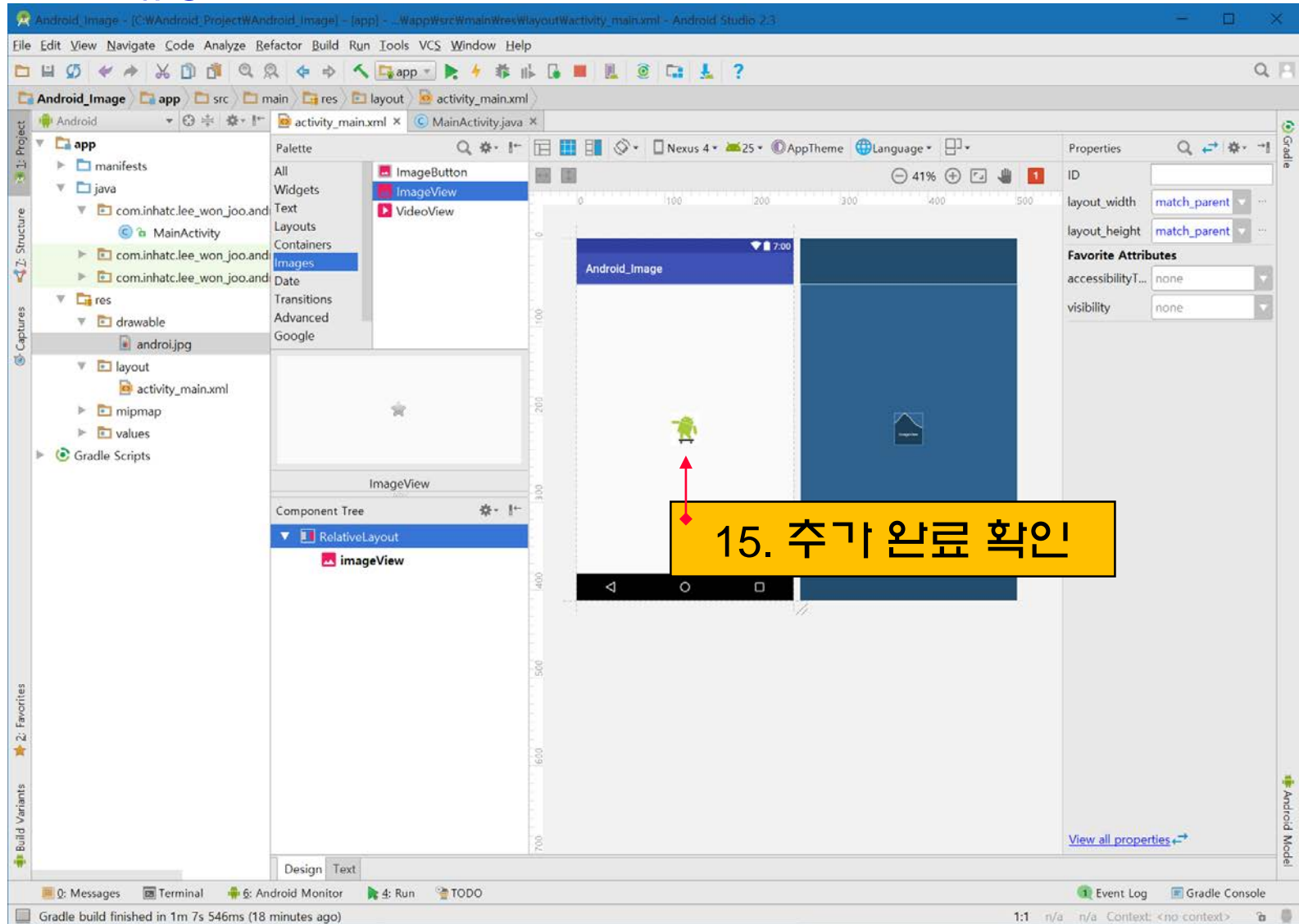
The screenshot shows the Android Studio IDE with the 'Resources' dialog open. The dialog lists various drawable resources, including 'android.jpg'. The 'android.jpg' resource is selected, and its preview is shown on the right. A yellow box with the text '14. Click' and a red arrow points to the 'OK' button at the bottom right of the dialog.

14. Click



# Android Custom View 구현 (11)

## ❖ android.jpg 추가







# Android Custom View 구현 (12)

## ■ activity\_main.xml 수정

### ❖ Andrioview 추가

```
activity_main.xml ×
1 <?xml version="1.0" encoding="utf-8"?>
2 <RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context="com.inhatc.lee_won_joo.android_image.MainActivity">
8
9   <ImageView
10     android:id="@+id/imageView"
11     android:layout_width="wrap_content"
12     android:layout_height="wrap_content"
13     app:srcCompat="@drawable/androi"
14     android:layout_centerVertical="true"
15     android:layout_centerHorizontal="true" />
16 </RelativeLayout>
17
```

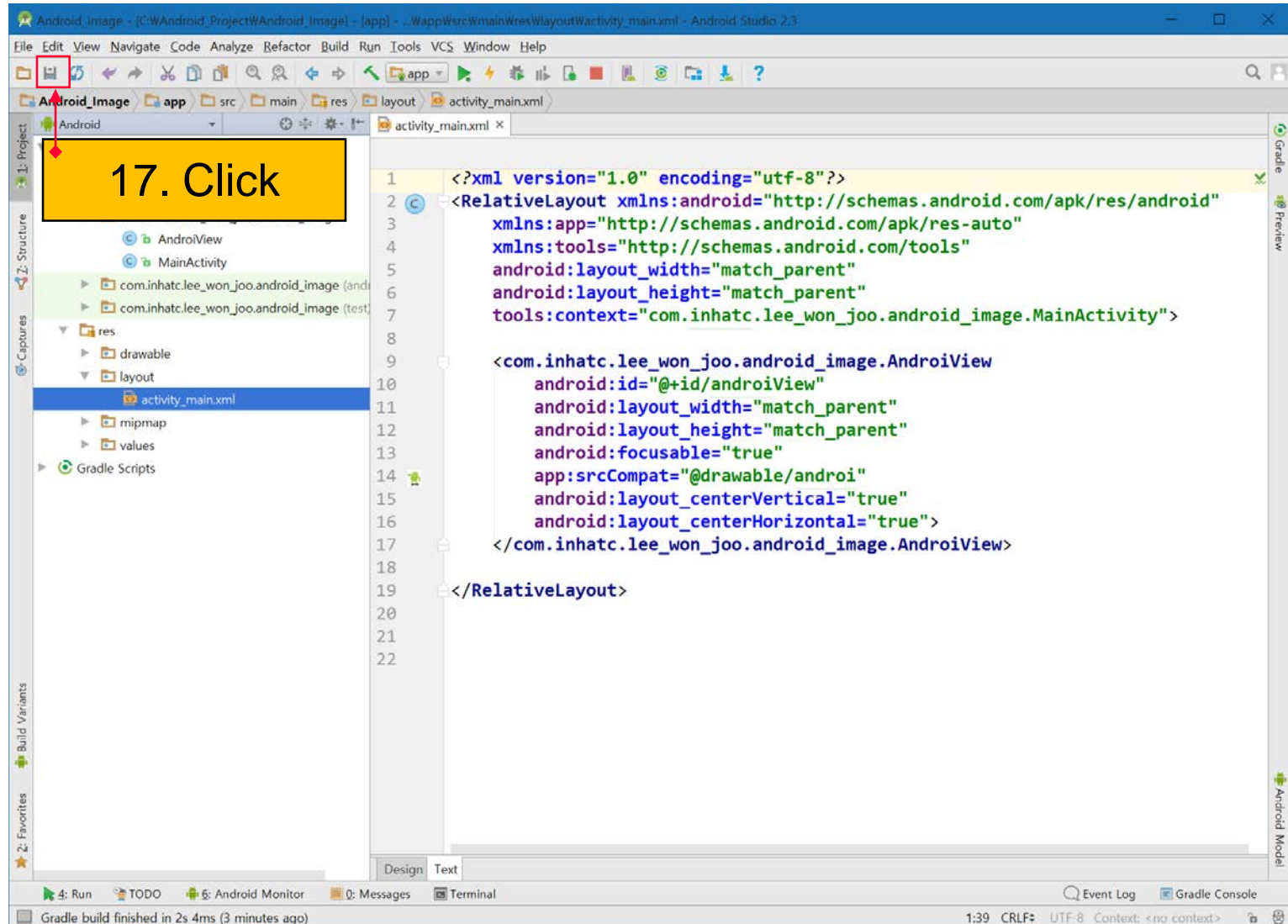
16. 수정

```
9 <com.inhatc.lee_won_joo.android_image.Andrioview
10   android:id="@+id/androiView"
11   android:layout_width="match_parent"
12   android:layout_height="match_parent"
13   android:focusable="true"
14   app:srcCompat="@drawable/androi"
15   android:layout_centerVertical="true"
16   android:layout_centerHorizontal="true">
17 </com.inhatc.lee_won_joo.android_image.Andrioview>
```



# Android Custom View 구현 (13)

## ❖ activity\_main.xml 저장







# Android Custom View 구현 (14)

## ■ styles.xml 수정

### ❖ Delete windows titlebar

```
styles.xml x
Edit all themes in the project in the theme editor. Open editor Hide notification
1 <resources>
2
3     <!-- Base application theme. -->
4     <style name="AppTheme" parent="Theme.AppCompat.Light.DarkActionBar">
5         <!-- Customize your theme here. -->
6         <item name="colorPrimary">@color/colorPrimary</item>
7         <item name="colorPrimaryDark">@color/colorPrimaryDark</item>
8         <item name="colorAccent">@color/colorAccent</item>
9         <item name="windowNoTitle">true</item>
10    </style>
11
12 </resources>
13
```

18. Coding





# Android Custom View 구현 (15)

## ■ MainActivity.java 수정

### ❖ TitleBar 제거

```
MainActivity.java x
1 package com.inhatc.lee_won_joo.android_image;
2
3 import ...
4
5
6
7 public class MainActivity extends AppCompatActivity {
8
9     @Override
10    protected void onCreate(Bundle savedInstanceState) {
11        super.onCreate(savedInstanceState);
12        requestWindowFeature(Window.FEATURE_NO_TITLE); //Delete TitleBar
13
14        setContentView(R.layout.activity_main);
15
16
17    }
18 }
19
```

19. Coding



# Android Custom View 구현 (16)

## New Class 추가

20. 마우스  
오른쪽 버튼 Click

21. Click

22. Input "AndroiView"

23. Click

Android Image - [C:\Android\_Project\Android\_Image\src\main\java\com\inhatec\lee\_won\_joo\android\_image\MainActivity.java - Android Studio 2.3.3]

File Edit View Navigate Code Analyze

Android\_Image

app

src

com.inhatec.lee\_won\_joo.android\_image

MainActivity

com.inhatec.lee\_won\_joo.android\_image (android)

com.inhatec.lee\_won\_joo.android\_image (test)

res

Gradle Scripts

New

Link C++ Project with Gradle

Cut Ctrl+X

Copy Ctrl+C

Create New Class

Name: AndroiView

Kind: Class

Superclass:

Interface(s):

Package: com.inhatec.lee\_won\_joo.android\_image

Visibility: ☒ Public ☐ Package Private

Modifiers: ☒ None ☐ Abstract ☐ Final

☐ Show Select Overrides Dialog

OK Cancel Help

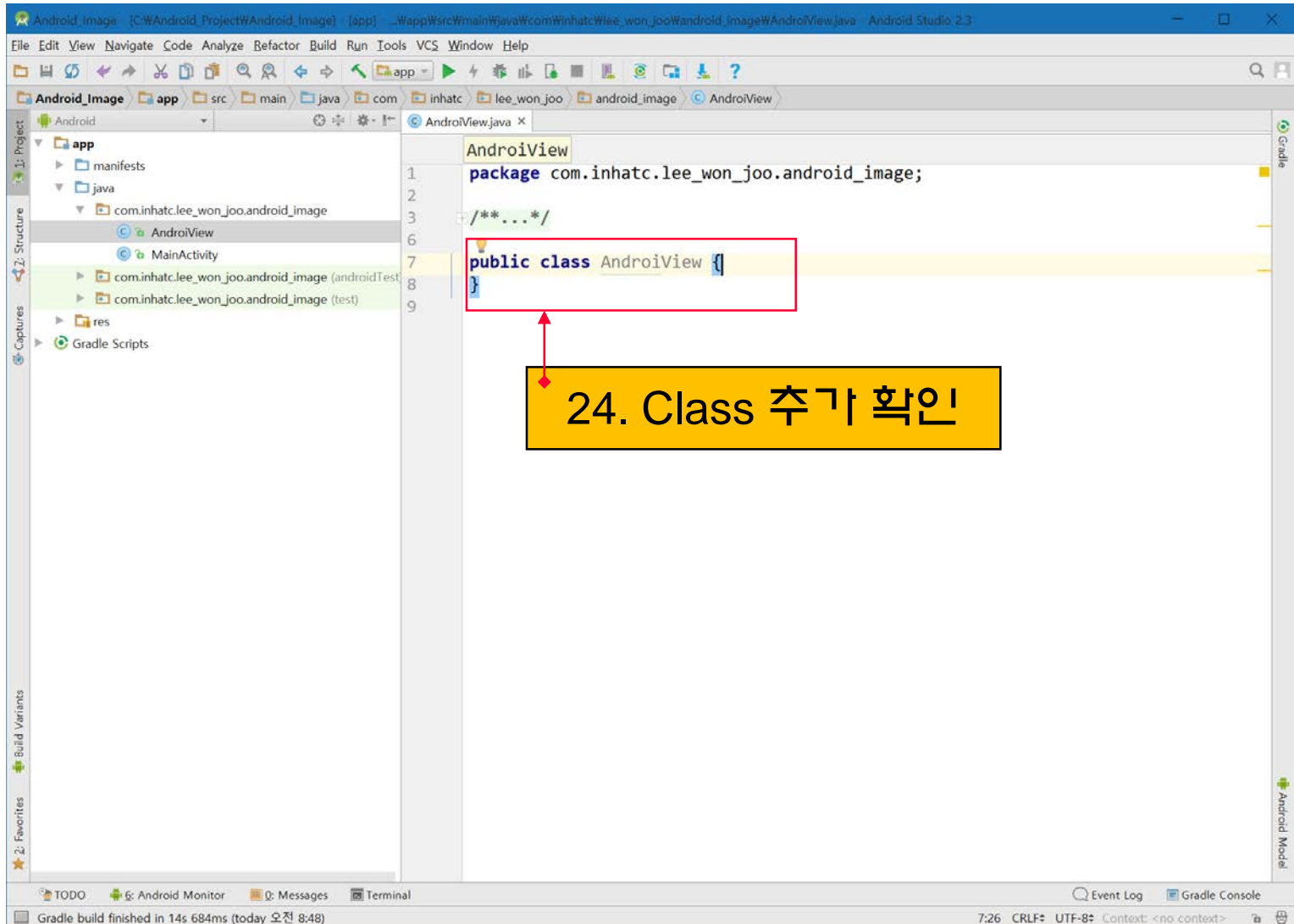
Gradle build finished in 14s 684ms (24 minutes ago)

20:1 CRLF UTF-8 Context: <no context>



# Android Custom View 구현 (17)

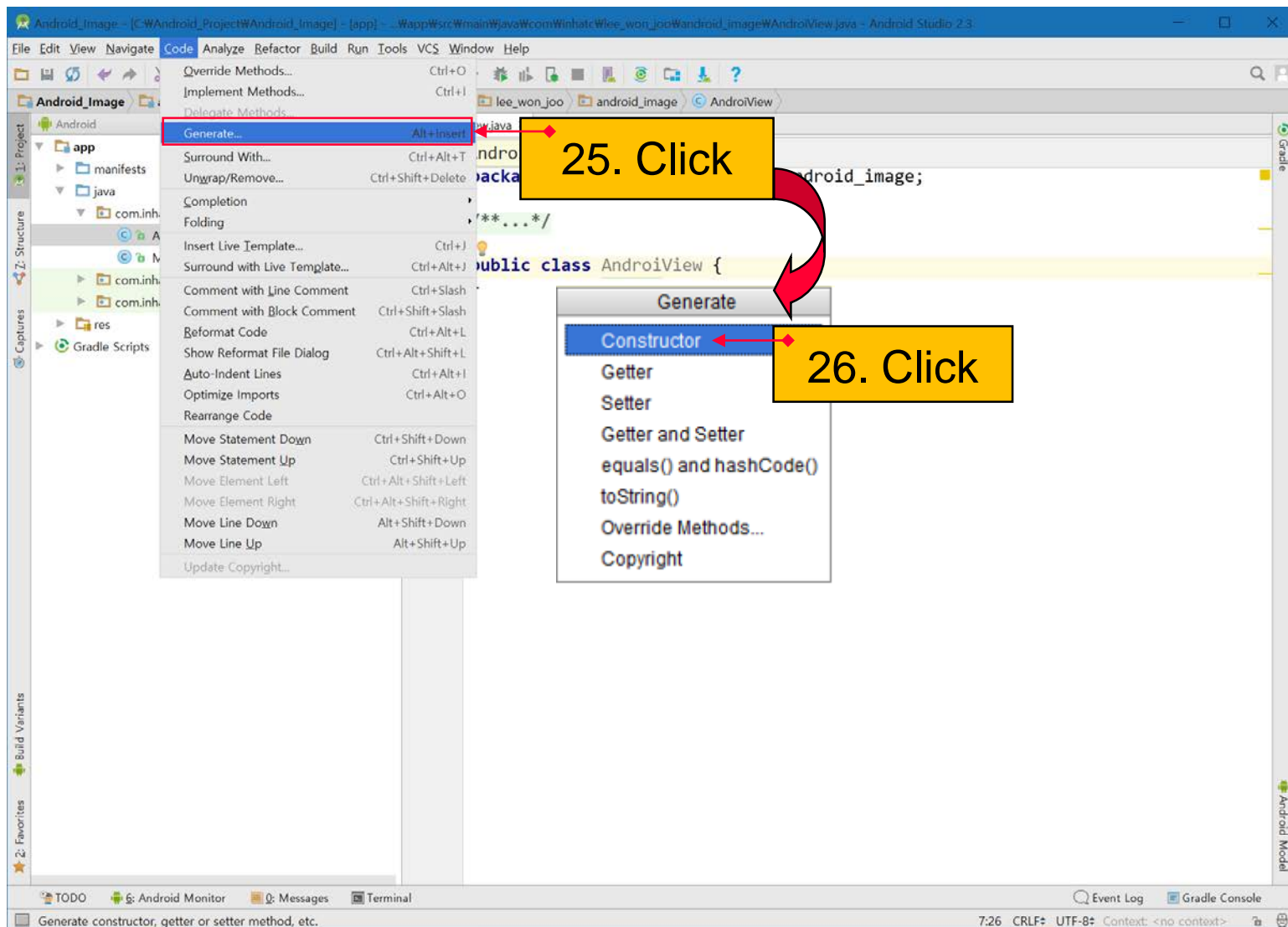
## ❖ AndroiView Class 생성 완료





# Android Custom View 구현 (18)

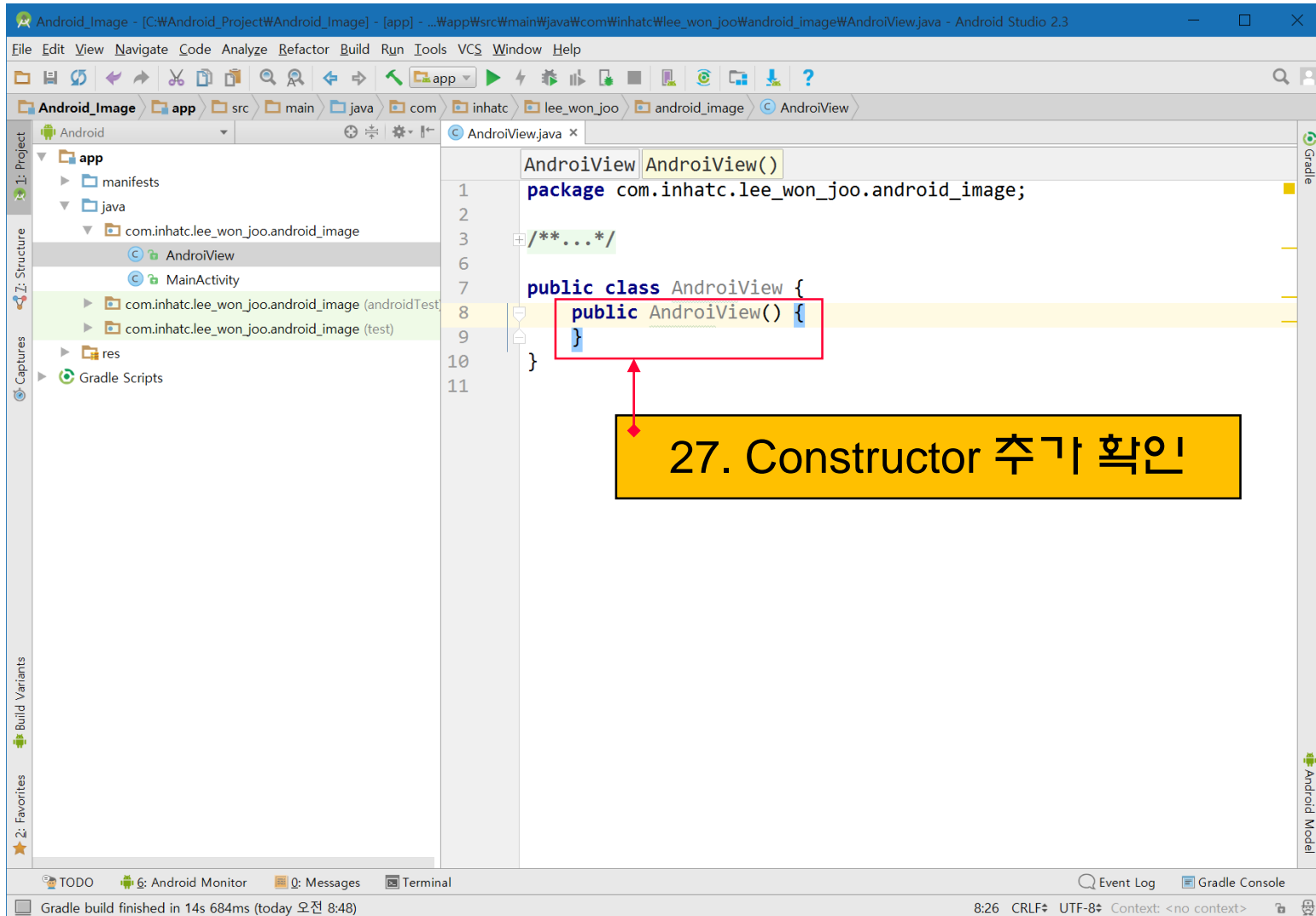
## ❖ AndroiView 생성자 추가





# Android Custom View 구현 (19)

## ❖ Create AndroiView Constructor





# Android Custom View 구현 (20)

## ❖ AndroiView 생성자 수정

```
AndroidView.java x
1 package com.inhatc.lee_won_joo.android_image;
2
3 import android.content.Context;
4 import android.util.AttributeSet;
5 import android.view.View;
6
7 /** ... */
10
11 public class AndroiView extends View {
12     public AndroiView(Context context, AttributeSet attrs) {
13         super(context, attrs);
14     }
15 }
16
```

28. Modify code







# Android Custom View 구현 (21)

## Method 추가

29. Click

30. Click

31. Click

Android Image - [C:\Android\_Project\Android\_Image] - [app] - ...\Wapp\src\main\java\com\Winhate\Wee\_won\_100\android\_image\AndroidView.java - Android Studio 2.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Override Methods...  
Implement Methods...  
Delegate Methods...  
Generate...  
Surround With...  
Unwrap/Remove...  
Completion  
Folding  
Insert Live Template...  
Surround with Live Template...  
Comment with Line Comment  
Comment with Block Comment  
Reformat Code  
Show Reformat File Dialog  
Auto-Indent Lines  
Optimize Imports  
Rearrange Code  
Move Statement Down  
Move Statement Up  
Move Element Left  
Move Element Right  
Move Line Down  
Move Line Up  
Update Copyright...

Select Method to Override/Implement

- computeHorizontalScrollExtent():int
- computeVerticalScrollRange():int
- computeVerticalScrollOffset():int
- computeVerticalScrollExtent():int
- canScrollHorizontally(direction:int):boolean
- canScrollVertically(direction:int):boolean
- onDraw(canvas:Canvas):void**
- onAttachedToWindow():void
- onScreenStateChanged(screenState:int):void
- onRtlPropertiesChanged(layoutDirection:int):void
- canResolveLayoutDirection():boolean
- isLayoutDirectionResolved():boolean
- onDetachedFromWindow():void

☒ Copy JavaDoc  
☒ Insert @Override

OK Cancel

Override base class methods in the current class

15:5 CRLF UTF-8 Context: <no context>





# Android Custom View 구현 (22)

```
AndroidView.java x
1 package com.inhatc.lee_won_joo.android_image;
2
3 import android.content.Context;
4 import android.graphics.Canvas;
5 import android.util.AttributeSet;
6 import android.view.View;
7
8 /** ... */
11
12 public class AndroiView extends View {
13     public AndroiView(Context context, AttributeSet attrs) {
14         super(context, attrs);
15     }
16
17     /** ... */
22     @Override
23     protected void onDraw(Canvas canvas) {
24         super.onDraw(canvas);
25     }
26
27 }
28
```

32. onDraw(Canvas) method 추가 확인



# Android Custom View 구현 (23)

## ❖ AndroiView.java 수정

```
AndroidView.java x
13 public class AndroiView extends View {
14     Drawable imgAndroi;           //image object
15     int ix, iy;                   //Width, Height variable
16     int imgWidth, imgHeight;     //Image Width, Height variable
17
18     public AndroiView(Context context, AttributeSet attrs) {
19         super(context, attrs);
20
21         imgAndroi=this.getResources().getDrawable(R.drawable.androi);
22         imgWidth = imgAndroi.getIntrinsicWidth();
23         imgHeight = imgAndroi.getIntrinsicHeight();
24         ix = 0;
25         iy = 0;
26     }
27
28     /**...*/
29     @Override
30     protected void onDraw(Canvas canvas) {
31
32         imgAndroi.setBounds(ix, iy, ix+imgWidth, iy+imgHeight);
33         imgAndroi.draw(canvas);
34
35         super.onDraw(canvas);
36     }
37 }
38
39
40
41
42 }
```

33. Coding



# Android Custom View 구현 (24)

## ❖ Android 프로젝트 실행

The screenshot shows the Android Studio 2.3 interface. The 'Run' menu is open, and the 'Run' option is highlighted. A yellow callout box labeled '34. Click' points to the 'Run' menu item. The 'Select Deployment Target' dialog is open, showing 'Connected Devices' and 'Available Virtual Devices'. The 'MyAndroid\_Nexus One API 25' device is selected. A yellow callout box labeled '35. Click' points to the selected device. At the bottom of the dialog, the 'OK' button is highlighted. A yellow callout box labeled '36. Click' points to the 'OK' button.

34. Click

35. Click

36. Click

# Android Custom View 구현 (25)

❖ 실행 결과



# 실습 I : Android Image 화면 중앙 출력 구현

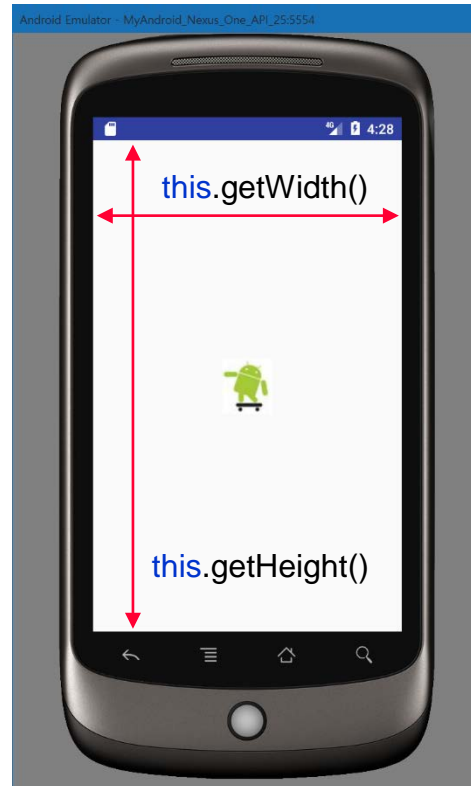
## ■ Android\_Image (실습 시간 : 20분)

❖ 아래 그림과 같이 Androi(🤖) 이미지가 화면 중앙에 나타나도록 AndroiView.java 파일을 Coding 하시오.

◆ `onSizeChanged(int w, int h, int oldw, int oldh)` method 추가

◆ `ix, iy` 수정

- `this.getWidth()`
- `this.getHeight()`





# Android Image 화면 중앙 출력 구현 (1)

❖ `onSizeChanged(int w, int h, int oldw, int oldh)` method 추가

1. Click

2. Click

3. Click

Android Image - [C:\Android\_Project\Android\_Image] - [app] - WappWsrc\Main\Java\Wcom\Winhatc\Wlee\_won\_joo\Wandroid\_image\WAndroidView.java - Android Studio 2.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Override Methods...  
Implement Methods...  
Delegate Methods...  
Generate...  
Surround With...  
Unwrap/Remove...  
Completion  
Folding  
Insert Live Template...  
Surround with Live Template...  
Comment with Line Comment  
Comment with Block Comment  
Reformat Code  
Show Reformat File Dialog  
Auto-Indent Lines  
Optimize Imports  
Rearrange Code  
Move Statement Down  
Move Statement Up  
Move Element Left  
Move Element Right  
Move Line Down  
Move Line Up  
Update Copyright...

Select Methods to Override/Implement

- onTouchEvent(event:MotionEvent):boolean
- cancelLongPress():void
- setTouchDelegate(delegate:TouchDelegate):void
- getTouchDelegate():TouchDelegate
- bringToFront():void
- onScrollChanged(l:int, t:int, oldl:int, oldt:int):void
- onSizeChanged(w:int, h:int, oldw:int, oldh:int):void**
- dispatchDraw(canvas:Canvas):void
- setScrollX(value:int):void
- setScrollY(value:int):void
- getDrawingRect(outRect:Rect):void
- getMatrix():Matrix
- getCameraDistance():float

☒ Copy JavaDoc  
☒ Insert @Override

OK Cancel

42:1 CRLF UTF-8 Context: <no context>



# Android Image 화면 중앙 출력 구현 (2)

❖ `onSizeChanged(int w, int h, int oldw, int oldh)` method 추가

```
AndroidView.java x
1  package com.inhatc.lee_won_joo.android_image;
2
3  import ...
9
10 /**...*/
13
14 public class AndroiView extends View {
15     Drawable imgAndroi;           //image object
16     int ix, iy;                   //Width, Height variable
17     int imgWidth, imgHeight;      //Image Width, Height variable
18
19     public AndroiView(Context context, AttributeSet attrs) {...}
28
29     /**...*/
34     @Override
35     protected void onDraw(Canvas canvas) {...}
42
43     /**...*/
53     @Override
54     protected void onSizeChanged(int w, int h, int oldw, int oldh) {
55
56         ①
57
58         super.onSizeChanged(w, h, oldw, oldh);
59
60     }
```

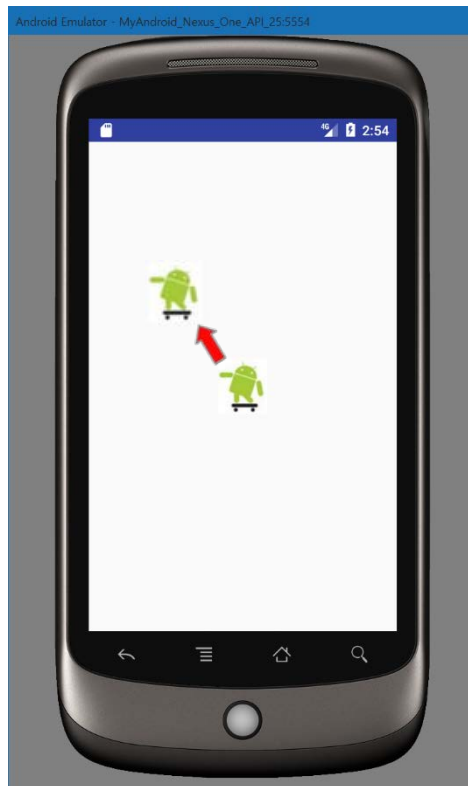
4. Coding

# 실습 II : Android KeyEvent 처리 구현 I

## ■ Android\_Image (실습 시간 : 20분)

❖ 아래 그림과 같이     Key에 따라 android() 이미지의 위치를 이동하도록 AndroiView.java 파일을 Coding 하시오.

◆ onKeyDown(int, KeyEvent) method 추가







# 실습 II : Android KeyEvent 처리 구현 I (1)

❖ onKeyDown(int keyCode, KeyEvent event) method 추가

1. Click

2. Click

3. Click

Android Image - [C:\WAndroid\_Project\WAndroid\_Image] - [app] - \Wapp\src\main\java\Wcom\Winhate\Wlee\_won\_joo\Wandroid\_image\WAndroidView.java - Android Studio 2.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Override Methods...  
Implement Methods...  
Delegate Methods...  
Generate...  
Surround With...  
Unwrap/Remove...  
Completion  
Folding  
Insert Live Template...  
Surround with Live Template...  
Comment with Line Comment  
Comment with Block Comment  
Reformat Code  
Show Reformat File Dialog  
Auto-Indent Lines  
Optimize Imports  
Rearrange Code  
Move Statement Down  
Move Statement Up  
Move Element Left  
Move Element Right  
Move Line Down  
Move Line Up  
Update Copyright...

Select Methods to Override/Implement

- getWindowVisibility():int
- getWindowVisibleDisplayFrame(outRect:Rect):void
- dispatchConfigurationChanged(newConfig:Configuration):void
- onConfigurationChanged(newConfig:Configuration):void
- isInTouchMode():boolean
- onKeyPreIme(keyCode:int, event:KeyEvent):boolean
- onKeyDown(keyCode:int, event:KeyEvent):boolean**
- onKeyLongPress(keyCode:int, event:KeyEvent):boolean
- onKeyUp(keyCode:int, event:KeyEvent):boolean
- onKeyMultiple(keyCode:int, repeatCount:int, event:KeyEvent):boolean
- onKeyShortcut(keyCode:int, event:KeyEvent):boolean
- onCheckIsTextEditor():boolean
- onCreateInputConnection(outAttrs:EditorInfo):InputConnection

☒ Copy JavaDoc  
☒ Insert @Override

OK Cancel

super.onDraw(canvas);



# 실습 II : Android KeyEvent 처리 구현 I (2)

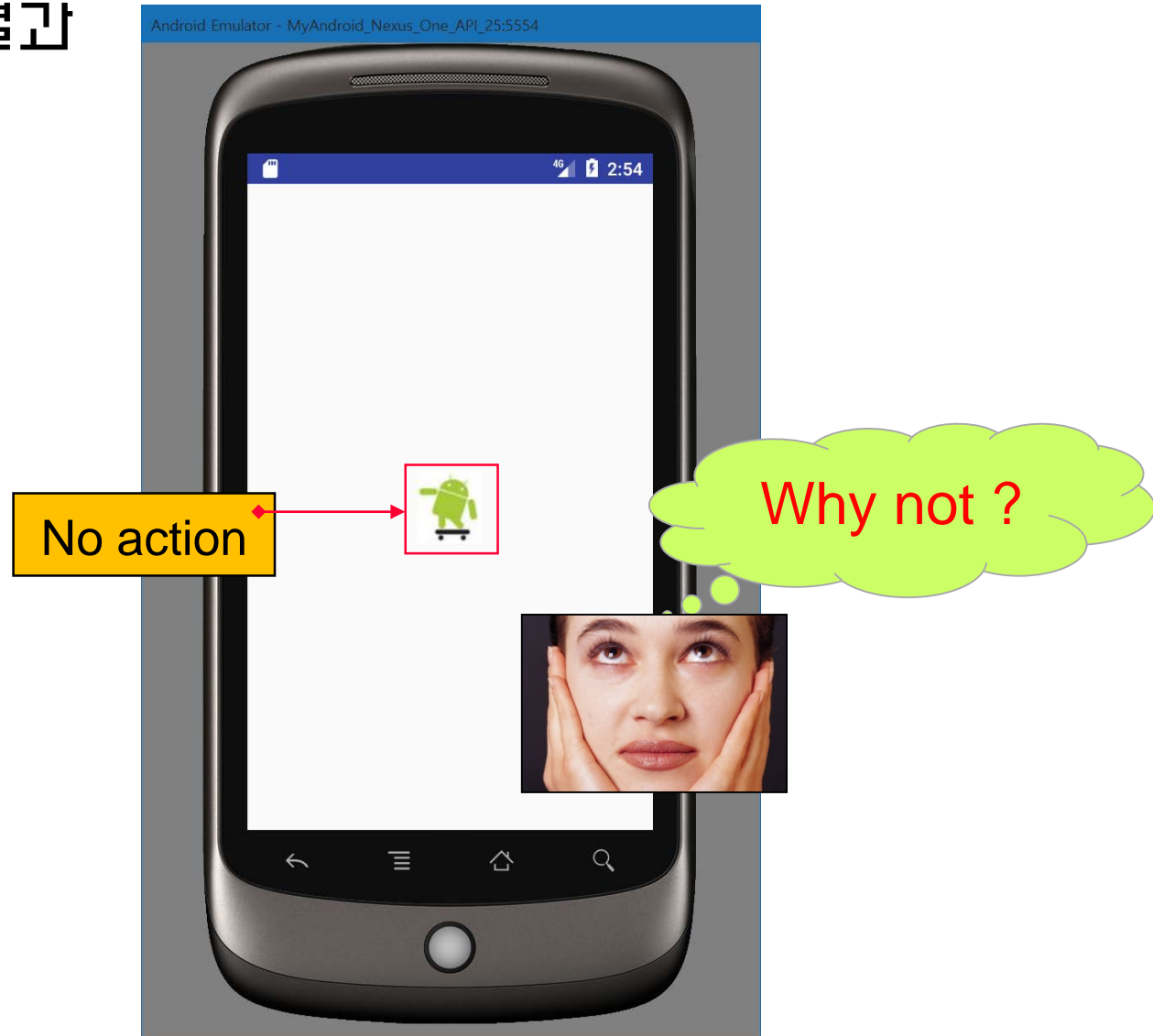
```
AndroidView.java x
43  /**...*/
53  @Override
54  protected void onSizeChanged(int w, int h, int oldw, int oldh) {...}
61
62  /**...*/
76  @Override
77  public boolean onKeyDown(int keyCode, KeyEvent event) {
78
79      switch(keyCode)
80      {
81          case KeyEvent.KEYCODE_DPAD_LEFT:
82              ix -= 15;
83              break;
84
85              1
86
87
88
89
90          case KeyEvent.KEYCODE_DPAD_DOWN:
91              iy += 15;
92              break;
93      }
94      this.invalidate();
95
96      return super.onKeyDown(keyCode, event);
97  }
98  }
```

4. Coding



# 실습 II : Android KeyEvent 처리 구현 I (3)

## ■ 실행 결과



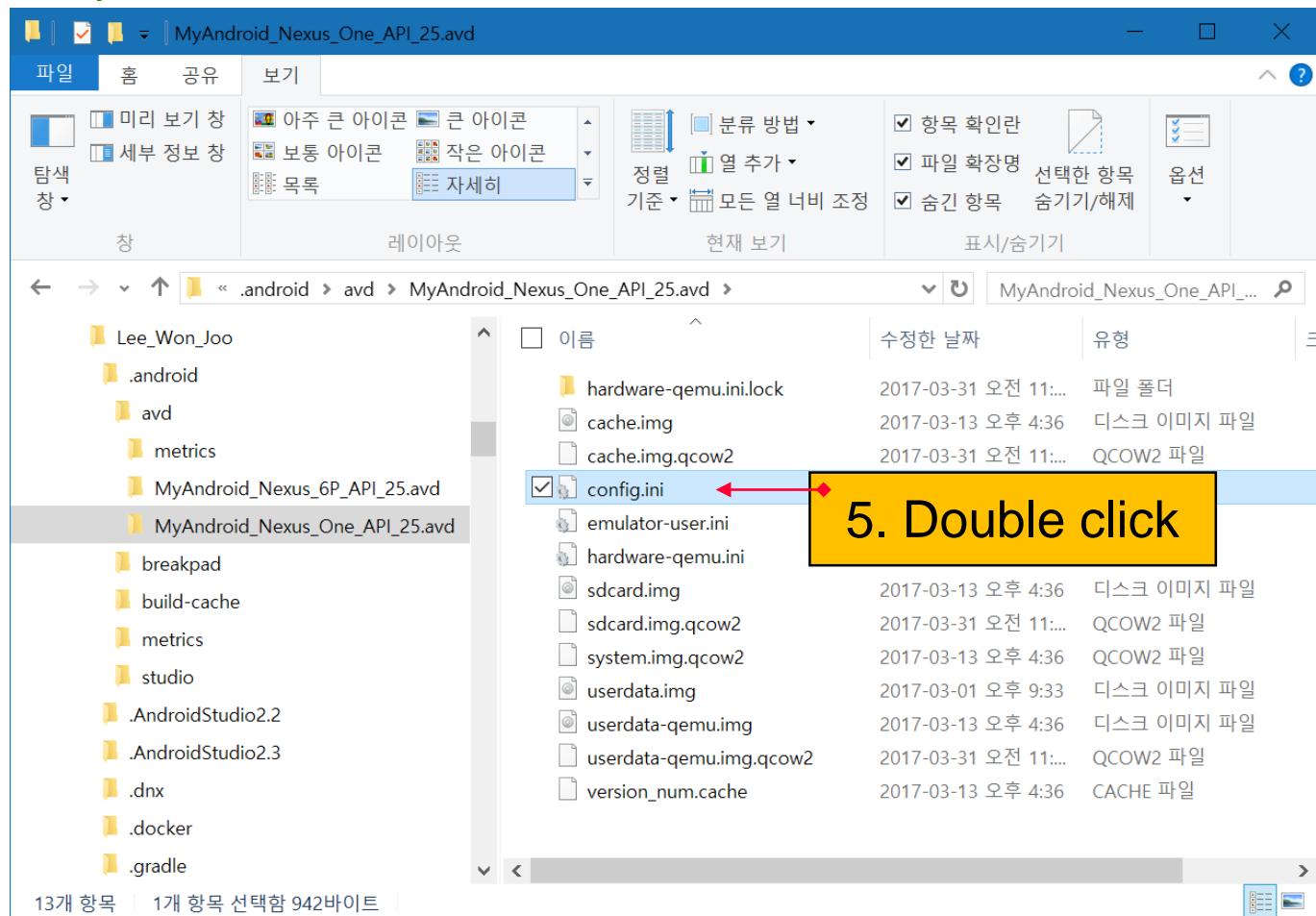


# 실습 II : Android KeyEvent 처리 구현 I (4)

## ■ AVD Config.ini 파일

❖ C:\Users\Won-Joo\.android\avd\

◆ MyAndroid\_Nexus\_One\_API\_25.avd





# 실습 II : Android KeyEvent 처리 구현 I (5)

## ■ AVD Config.ini 파일

❖ hw dPad = yes

6. Modify

```
avd.ini.encoding=UTF-8
AvdId=MyAndroid_5_0_1
abi.type=armeabi-v7a
avd.ini.displayName=MyAndroid_5.0.1
disk.dataPartition.size=200M
hw.accelerometer=yes
hw.audioInput=yes
hw.battery=no
hw.camera.back=none
hw.camera.front=none
hw.cpu.arch=arm
hw.cpu.model=cortex-a8
hw.dPad=no
hw.device.hash2=MD5:e4aa1843c1036cf7c41ef163fc4d1028
hw.device.manufacturer=Google
hw.device.name=Nexus S
hw.gps=yes
hw.gpu.enabled=yes
hw.keyboard=yes
hw.lcd.density=240
hw.mainKeys=yes
hw.ramSize=343
hw.sdCard=yes
hw.sensors.orientation=yes
hw.sensors.proximity=yes
hw.trackBall=no
image.sysdir.1=system-images\android-21\google_apis\armeabi-v7a\
runtime.network.latency=none
runtime.network.speed=full
runtime.scalefactor=auto
sdcard.size=100M
skin.dynamic=no
skin.name=nexus_s
skin.path=C:\Program Files\Android\Android Studio\plugins\android
\lib\device-art-resources\nexus_s
snapshot.present=no
tag.display=Google APIs
tag.id=google_apis
vm.heapSize=32
```

hw.dPad=yes



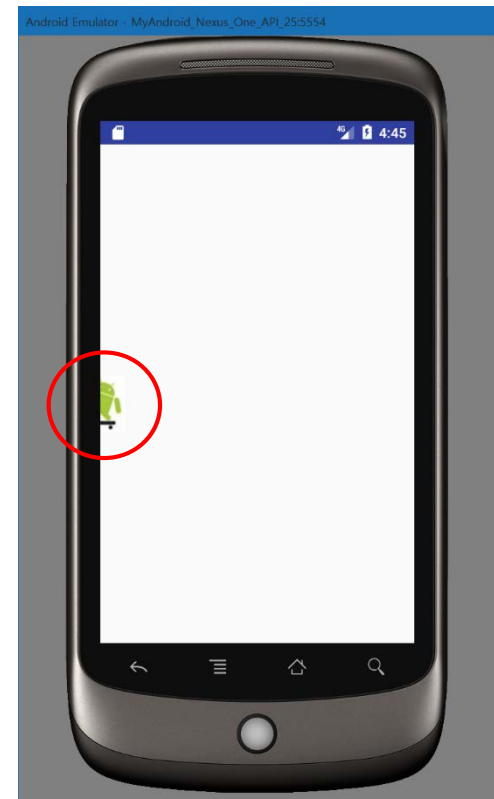


## 실습 III : Android KeyEvent 처리 구현 II

### ■ Android\_Image (실습 시간 : 20분)

- ❖ 아래 그림과 같이     Key에 따라 android() 이미지의 위치를 이동할 때 **화면의 범위를 벗어나지 않도록** AndroidView.java 파일을 Coding 하시오.

◆ onKeyDown(int, KeyEvent) method 수정





# Android KeyEvent 처리 구현 II

```
AndroidView.java x
62  /**...*/
76  @Override
77  public boolean onKeyDown(int keyCode, KeyEvent event) {
78
79      switch(keyCode)
80      {
81          case KeyEvent.KEYCODE_DPAD_LEFT:
82              ix -= 15;
83              if (ix <= 0) ix = 0;
84              break;
85          case KeyEvent.KEYCODE_DPAD_RIGHT:
86              ix += 15;
87              1
88              break;
89          case KeyEvent.KEYCODE_DPAD_UP:
90              iy -= 15;
91              if (iy <= 0) iy = 0;
92              break;
93          case KeyEvent.KEYCODE_DPAD_DOWN:
94              iy += 15;
95              2
96              break;
97      }
98      this.invalidate();
99
100     return super.onKeyDown(keyCode, event);
101 }
102 }
```

Coding

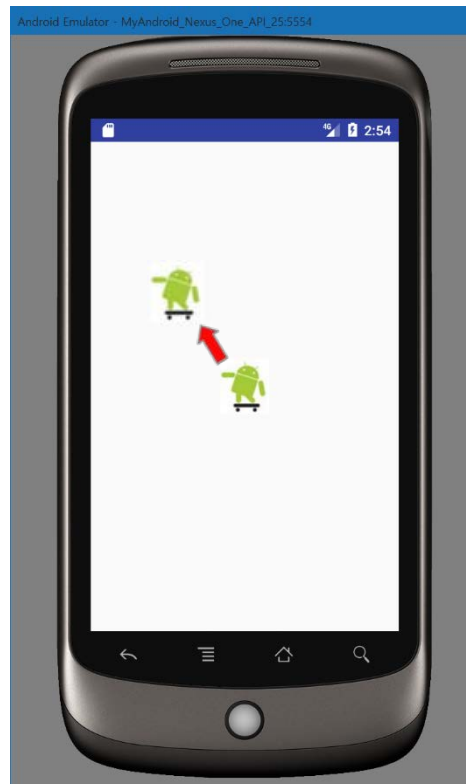


# 실습 IV : Android Screen Touch Event 처리 구현

## ■ Android\_Image (실습 시간 : 20분)

❖ 아래 그림과 같이 screen을 touch한 위치로 android(🤖) 이미지를 이동하도록 AndroiView.java 파일을 Coding 하시오.

◆ onTouchEvent(MotionEvent, event) method 추가







# Android KeyEvent 처리 구현 (1)

❖ onTouchEvent(MotionEvent event) method 추가

1. Click

2. Click

3. Click

Android Image - [C:\Android\_Project\Android\_Image] - [app] - ...\Wapp\src\main\java\com\winhate\Whee\_won\_joo\Android\_Image\AndroidView.java - Android Studio 2.3

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Android Image

Project

Android

app

manifests

java

com.inhatech

com.inhatech

com.inhatech

res

drawable

layout

activity

mipmap

values

color

string

style

Gradle Scripts

Build Variants

Run

Debug

TODO

Android Monitor

Messages

Terminal

Override base class methods in the current class

102:5 CRLF UTF-8 Context: <no context>

Override Methods...

Implement Methods...

Delegate Methods...

Generate...

Surround With...

Unwrap/Remove...

Completion

Folding

Insert Live Template...

Surround with Live Template...

Comment with Line Comment

Comment with Block Comment

Reformat Code

Show Reformat File Dialog

Auto-Indent Lines

Optimize Imports

Rearrange Code

Move Statement Down

Move Statement Up

Move Element Left

Move Element Right

Move Line Down

Move Line Up

Update Copyright...

Select Methods to Override

onSaveInstanceState():Parcelable

onScreenStateChanged(screenState:int):void

onScrollChanged(l:int, t:int, oldl:int, oldt:int):void

onSetAlpha(alpha:int):boolean

onStartTemporaryDetach():void

onTouchEvent(event:MotionEvent):boolean

onTrackballEvent(event:MotionEvent):boolean

onVisibilityAggregated(isVisible:boolean):void

onVisibilityChanged(changedView:View, visibility:int):void

onWindowFocusChanged(hasWindowFocus:boolean):void

onWindowSystemUiVisibilityChanged(visible:int):void

onWindowVisibilityChanged(visibility:int):void

overScrollBy(deltaX:int, deltaY:int, scrollX:int, scrollY:int, scrollRangeX:int, scrollRangeY:int, overScrollAmount:int):boolean

Copy JavaDoc

Insert @Override

OK

Cancel



# Android Screen Touch Event 처리 구현 (2)

```
AndroidView.java x
14 public class AndroiView extends View {
15     Drawable imgAndroi;           //image object
16     int ix, iy;                   //Width, Height variable
17     int imgWidth, imgHeight;      //Image Width, Height variable
18
19     public AndroiView(Context context, AttributeSet attrs) {...}
20
21     /**...*/
22     @Override
23     protected void onDraw(Canvas canvas) {...}
24
25     /**...*/
26     @Override
27     protected void onSizeChanged(int w, int h, int oldw, int oldh) {...}
28
29     /**...*/
30     @Override
31     public boolean onKeyDown(int keyCode, KeyEvent event) {...}
32
33     /**...*/
34     @Override
35     public boolean onTouchEvent(MotionEvent event) {
36         ix = (int)event.getX();    //Touch Screen X-coordinate
37         iy = (int)event.getY();    //Touch Screen Y-coordinate
38         ①
39         return super.onTouchEvent(event);
40     }
41 }
```

4. Coding



# 학습 요약

- CustomView 구현
- Keyboard 입력 처리
- Touch Screen 처리
- 실습 I

❖ Android Image 화면 중앙 출력 구현

- 실습 II

❖ Android KeyEvent 처리 구현 I

- 실습 III

❖ Android KeyEvent 처리 구현 II

- 실습 IV

❖ Android Screen Touch Event 처리 구현



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