

PROGRAMMING HANDHELD SYSTEMS

MULTI-TOUCH & GESTURES

TODAY'S TOPICS

MOTIONEVENTS

TOUCH HANDLING

GESTURES

MOTIONEVENT

REPRESENTS A MOVEMENT IN AN INPUT
DEVICE READING

PEN, TRACKBALL, MOUSE, FINGER

MOTIONEVENT

ACTION CODE

STATE CHANGE THAT OCCURRED

ACTION VALUES

POSITION AND MOVEMENT PROPERTIES, SUCH AS
TIME, SOURCE, LOCATION, PRESSURE, AND MORE

THIS LESSON FOCUSES ON TOUCH EVENTS READ
FROM A TOUCH SCREEN

MULTITOUCH

MULTITOUCH SCREENS EMIT ONE MOVEMENT
TRACE PER TOUCH SOURCE

INDIVIDUAL TOUCH SOURCES ARE CALLED
POINTERS

MULTITOUCH

EACH POINTER HAS A UNIQUE ID FOR AS LONG AS IT IS ACTIVE

MotionEventS CAN REFER TO MULTIPLE POINTERS

EACH POINTER HAS AN INDEX WITHIN THE EVENT, BUT THAT INDEX MAY NOT BE STABLE OVER TIME

SOME MotionEvent ACTIONS

ACTION_DOWN

ACTION_POINTER_DOWN

ACTION_POINTER_UP

ACTION_MOVE

ACTION_UP

ACTION_CANCEL

CONSISTENCY GUARANTEES

FOR TOUCH EVENTS, ANDROID TRIES TO
GUARANTEE THAT TOUCHES

GO DOWN ONE AT A TIME

MOVE AS A GROUP

COME UP ONE AT A TIME OR ARE CANCELLED

APPLICATIONS SHOULD BE TOLERANT TO
INCONSISTENCY

MOTIONEVENT METHODS

getActionMasked()

getActionIndex()

getPointerId(int pointerIndex)

getPointerCount()

getX(int pointerIndex)

getY(int pointerIndex)

findPointerIndex (int pointerId)

HANDLING TOUCH EVENTS ON A VIEW

THE VIEW BEING TOUCHED RECEIVES

`View.onTouchEvent(MotionEvent event)`

`onTouchEvent()` SHOULD RETURN TRUE IF

THE `MotionEvent` HAS BEEN CONSUMED;

FALSE OTHERWISE

HANDLING TOUCH EVENTS WITH A LISTENER

View.OnTouchListener DEFINES TOUCH
EVENT CALLBACK METHODS

View.setOnTouchListener() REGISTERS
LISTENER FOR TOUCH CALLBACKS

HANDLING TOUCH EVENTS WITH A LISTENER

onTouch() CALLED WHEN A TOUCH EVENT, SUCH AS PRESSING, RELEASING OR DRAGGING, OCCURS

onTouch() CALLED BEFORE THE EVENT IS DELIVERED TO THE TOUCHED VIEW

SHOULD RETURN TRUE IF IT HAS CONSUMED THE EVENT; FALSE OTHERWISE

HANDLING MULTIPLE TOUCH EVENTS

MULTIPLE TOUCHES COMBINED TO FORM A
MORE COMPLEX GESTURE

IDENTIFY & PROCESS COMBINATIONS OF
TOUCHES,

FOR EXAMPLE, A DOUBLE TAP

ACTION_DOWN, ACTION_UP, ACTION_DOWN,
ACTION_UP IN QUICK SUCCESSION

MULTI-TOUCH HANDLING



#1 touch →

#2 touch →

#1 lift →

#2 lift →

Action	IDs
ACTION_DOWN	0
ACTION_MOVE ...	0
ACTION_POINTER_DOWN	1
ACTION_MOVE ...	0,1
ACTION_POINTER_UP	0
ACTION_UP	1

MULTI-TOUCH HANDLING



#1 touch →

#2 touch →

#2 lift →

#1 lift →

Action	ID
ACTION_DOWN	0
ACTION_MOVE ...	0
ACTION_POINTER_DOWN	1
ACTION_MOVE ...	0,1
ACTION_POINTER_UP	1
ACTION_UP	0

MULTI-TOUCH HANDLING

➔ #1 touch →

#2 touch →

#3 touch →

#2 lift →

#1 lift →

#3 lift →

Action	ID
ACTION_DOWN	0
ACTION_POINTER_DOWN	1
ACTION_POINTER_DOWN	2
ACTION_MOVE	0,1,2
ACTION_POINTER_UP	1
ACTION_POINTER_UP	0
ACTION_UP	2

TOUCHINDICATETOUCHLOCATION

APPLICATION DRAWS A CIRCLE WHEREVER THE
USERS TOUCHES THE SCREEN

CIRCLE'S COLOR IS RANDOMLY SELECTED

REDRAWS CIRCLES WHEN USER DRAGS
FINGER ACROSS THE SCREEN

TOUCHINDICATE TOUCHLOCATION

THE SIZE OF THE CIRCLES ARE PROPORTIONAL
TO THE NUMBER OF CURRENTLY ACTIVE
TOUCHES



GESTUREDETECTOR

A CLASS THAT RECOGNIZES COMMON TOUCH
GESTURES

SOME BUILT-IN GESTURES INCLUDE CONFIRMED
SINGLE TAP, DOUBLE TAP, FLING

GESTUREDETECTOR

ACTIVITY CREATES A GestureDetector THAT IMPLEMENTS THE GestureDetector.

OnGestureListener interface

ACTIVITY WILL RECEIVE CALLS TO onTouchEvent() WHEN ACTIVITY IS TOUCHED

ONTOUCHEVENT DELEGATES CALL TO GestureDetector.OnGestureListener

TOUCHGESTUREVIEWFLIPPER

SHOWS A TextView DISPLAYING A NUMBER

IF THE USER PERFORMS A RIGHT TO LEFT
“FLING” GESTURE,

THE TextView WILL SCROLL OFF THE SCREEN

A NEW TextView WILL SCROLL IN BEHIND IT



CREATING CUSTOM GESTURES

THE GESTUREBUILDER APPLICATION LETS YOU
CREATE & SAVE CUSTOM GESTURES

COMES BUNDLED WITH SDK

CREATING CUSTOM GESTURES

GestureLibraries SUPPORTS LOADING
CUSTOM GESTURES & THEN RECOGNIZING
THEM AT RUNTIME

CREATING CUSTOM GESTURES

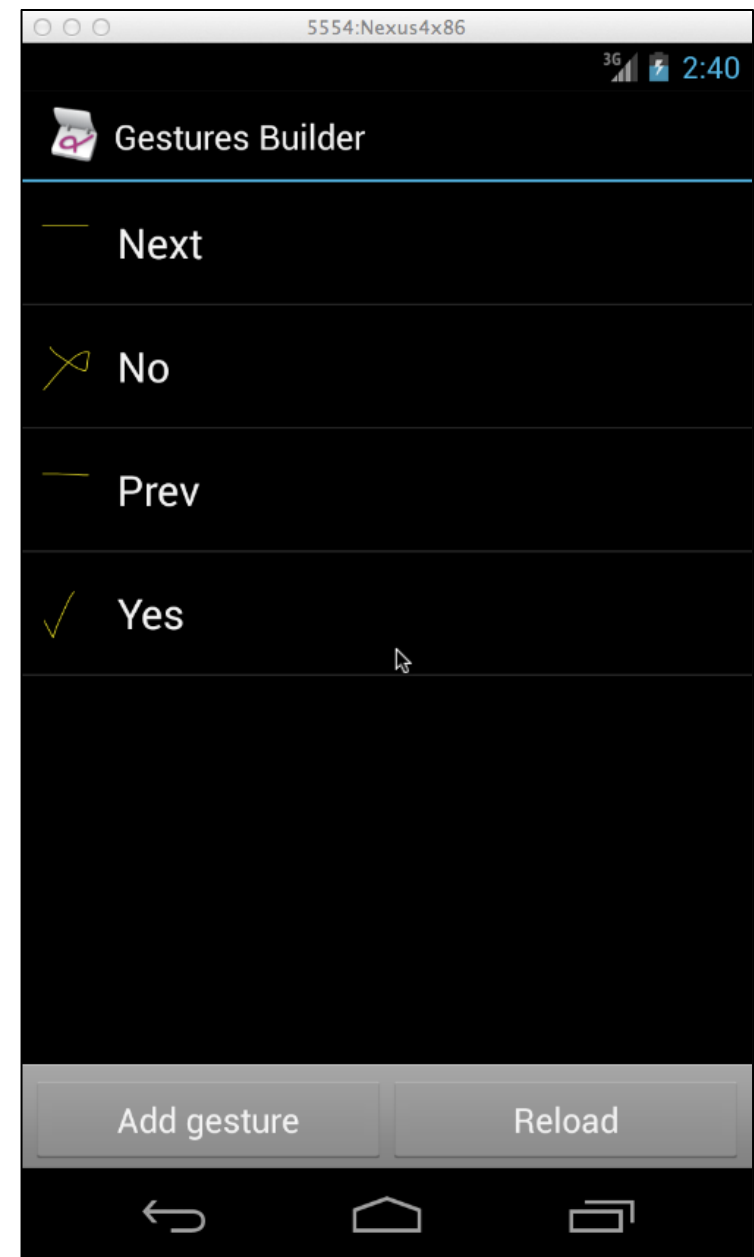
INCLUDE A `GestureOverlayView` IN YOUR LAYOUT

THE OVERLAY INTERCEPTS USER GESTURES AND INVOKES YOUR APPLICATION CODE TO HANDLE THEM

GESTUREBUILDER

STORES GESTURES TO
/mnt/sdcard/gestures

COPY THIS FILE TO
/res/raw DIRECTORY



TOUCHGESTURES

APPLICATION DISPLAYS A SMALL View WITH
A COLORED BACKGROUND

USER CAN SWIPE LEFT AND RIGHT TO CYCLE
BETWEEN DIFFERENT CANDIDATE BACKGROUND
COLORS

CAN MAKE AN CHECK OR X-LIKE GESTURE TO
SET OR CANCEL THE APPLICATION'S CURRENT
BACKGROUND COLOR



NEXT TIME

MULTIMEDIA