Gesture Recognizers

Dr. Sarah Abraham

University of Texas at Austin
CS329e
Spring 2020

Controller Interfaces

✤ Allow humans to issue commands to computer

  ✤ Mouse

  ✤ Keyboard

  ✤ Microphone

  ✤ Tablet

Touch-based Interfaces

✤ User interacts with screen using touch

✤ Touch has position and direction

✤ Pattern of touch recognized by hardware and OS

✤ App provides context to patterns to create use-cases

Gestures

✤ Touch patterns based on iOS Human Interface Guidelines

✤ Gestures have expected responses that apps should try to conform to

✤ <https://developer.apple.com/ios/human-interface-guidelines/interaction/gestures/>

Tap

Briefly touch surface with fingertip

Double tap

Rapidly touch surface twice with fingertip

Drag

Move fingertip over surface without losing contact

Flick

Quickly brush surface with fingertip

Pinch

Touch surface with two fingers and bring them closer together

Spread

Touch surface with two fingers and move them apart

Press

Touch surface for extended period of time

Press and tap

Press surface with one finger and briefly touch surface with second finger

http://www.lukew.com/ (Luke Wrobleski)

Receiving Gestures as Events

1. Hardware notifies operating system about user action

2. OS builds `UITouch` object from touch information

3. `UITouch` object placed inside `UIEvent` object

4. `UIEvent` sent to application

5. `UIResponder` handles event

iOS Events

✤ Touch events contain one or more finger gestures on-screen

✤ Motion events process orientation and accelerometer information

✤ Remote control events receive commands from device accessories

Multitouch events   Accelerometer events   Remote control events
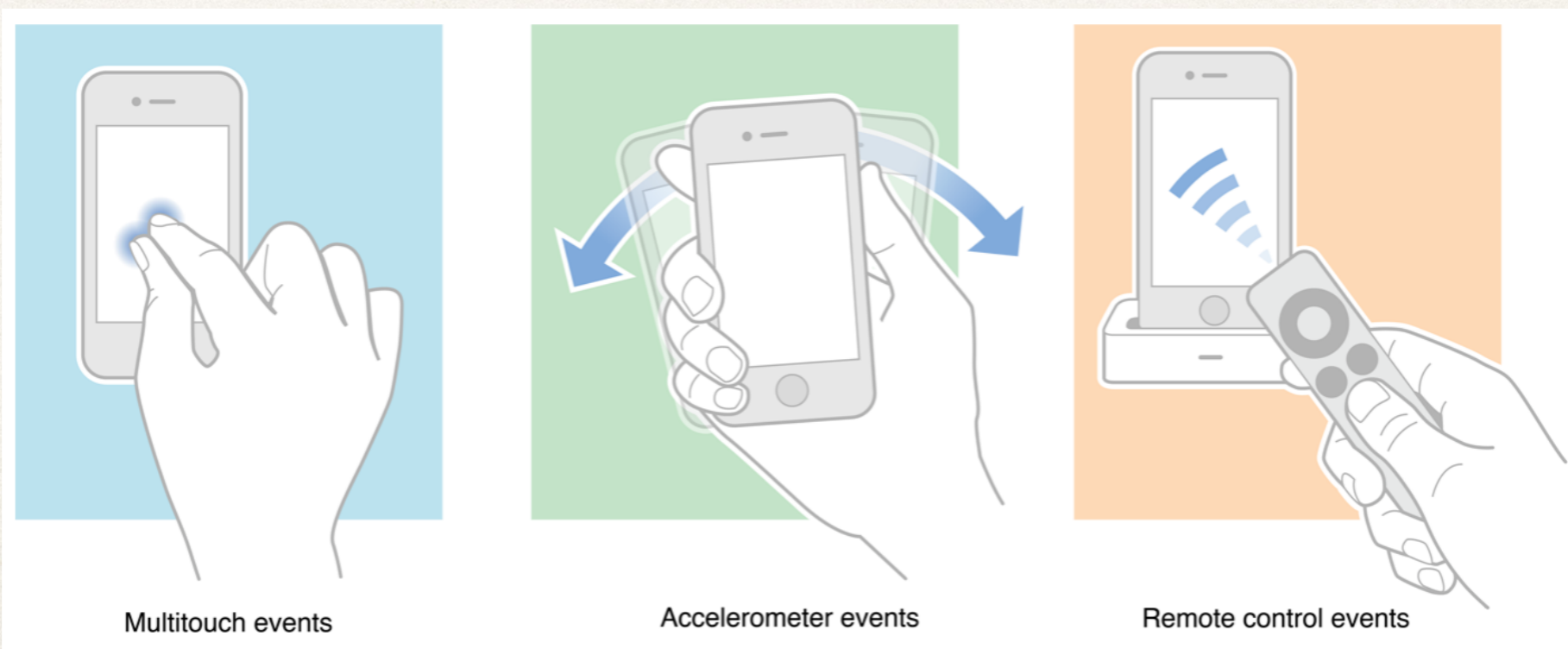
UIResponder

✤ `UIResponder` objects can handle events and recognize touch gestures

  ✤ Includes `UIApplication`, `UIView`, and `UIViewController`
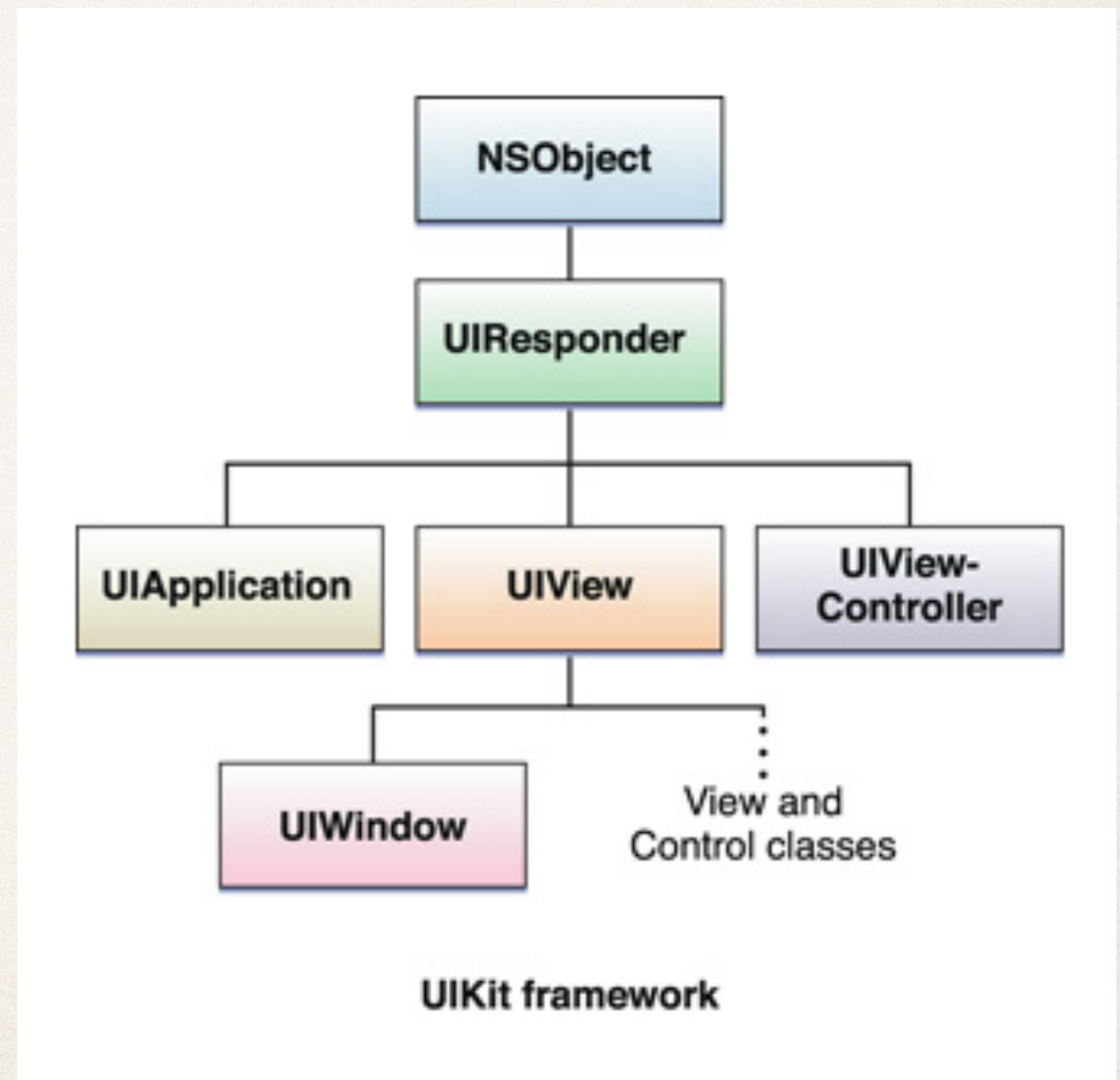
Gesture Recognizers

✤ `UIGestureRecognizer` class associated with a view

✤ Monitor for predefined gestures made in view

✤ Perform an action once a valid gesture is detected
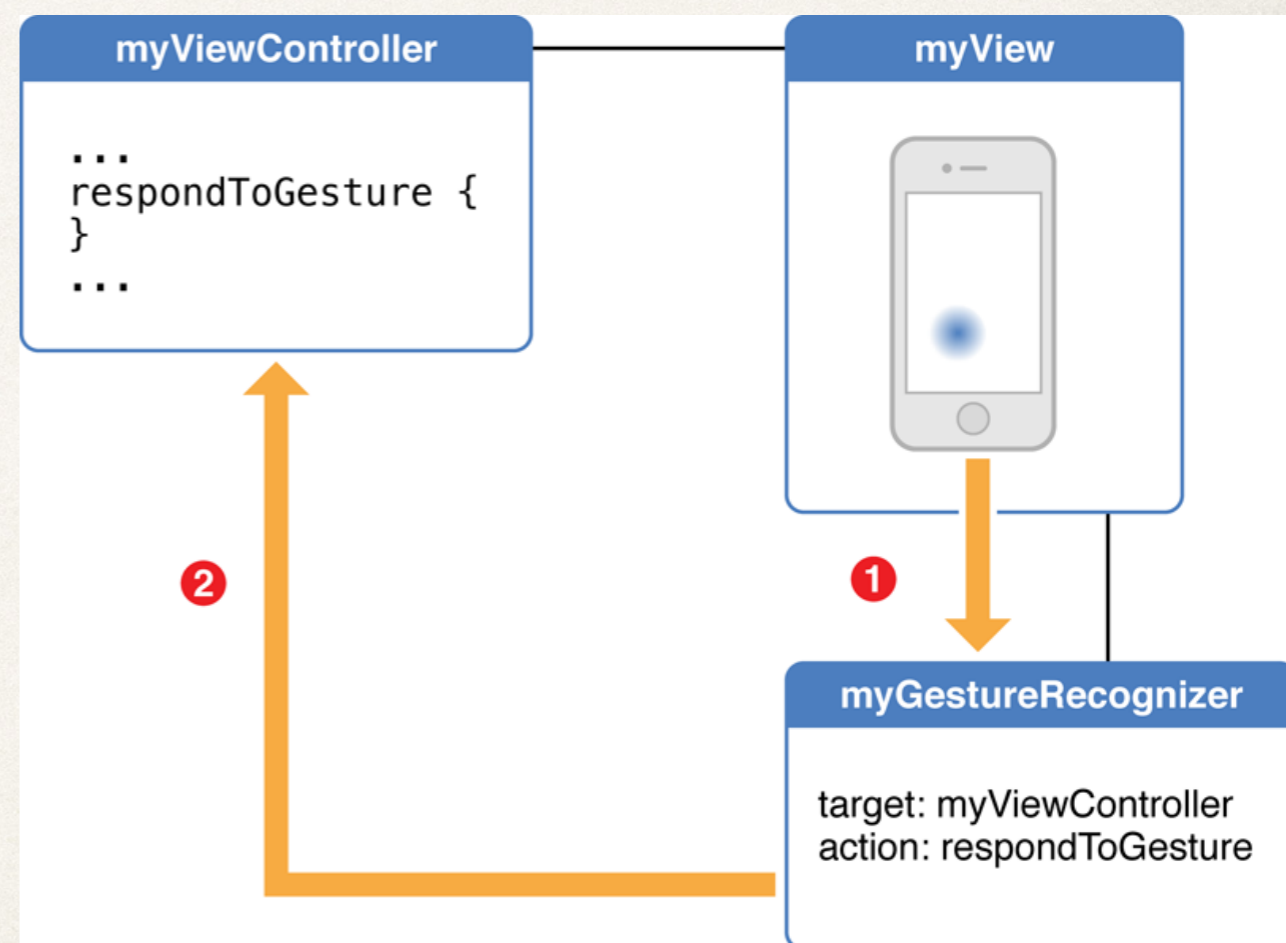
UIGestureRecognizer

1. Add gesture recognizer to view in Storyboard

2. Add event handling to view's view controller in Xcode Editor

    ✤ `@IBAction func respondToGesture (recognizer: [UIGestureRecognizer subclass]) {}`

3. Associate gesture recognizer in Storyboard with event handler

    ✤ Control-click Recognizer

    ✤ Select its view controller to choose function
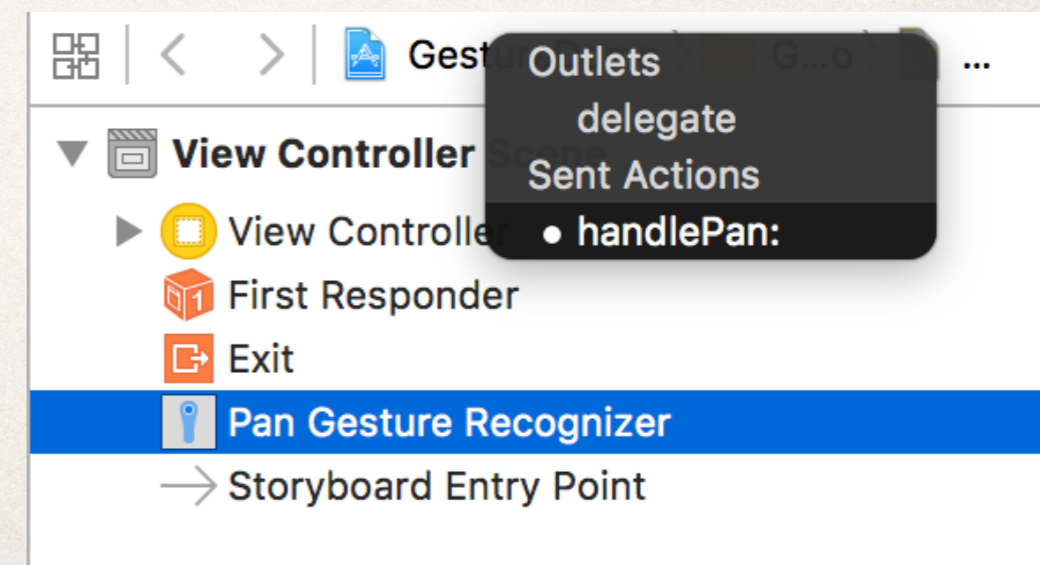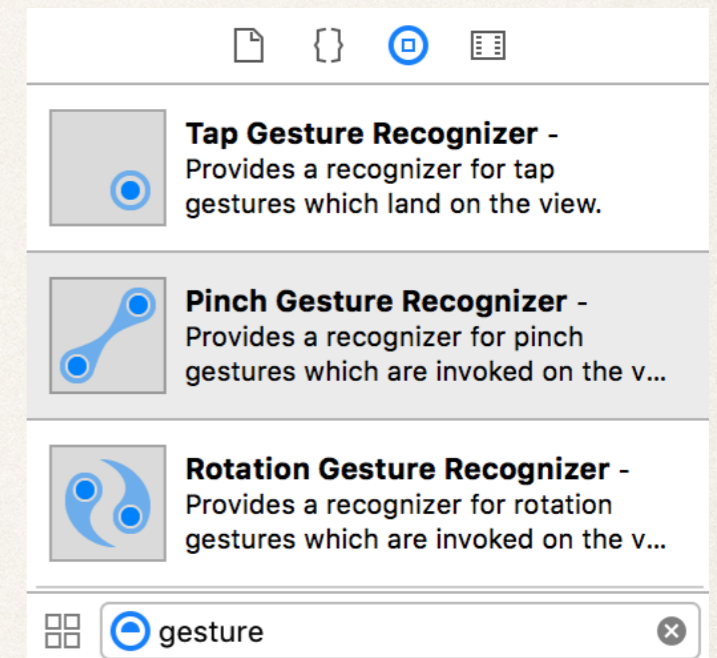
GestureRecognizer Demo

Some Details

✤ Gesture recognizer associated with a single view

✤ Notifies callback function if touch matches a gesture on this view

✤ Multiple gesture recognizers needed for multiple views

✤ Callback handling can be shared between multiple gesture recognizers

✤ View must have "User Interaction Enabled" to recognize gestures

✤ View must have "Multiple Touch" Enabled to handle multitouch gestures

UITapGestureRecognizer

✤ Discrete touch to screen

✤ Single or multiple taps

✤ One or two fingers

✤ Can set number of fingers and number of taps

✤ Often used to select an item

UISwipeGestureRecognizer

* Straight movement in one direction (up, down, left, right)

* Direction property indicates type of swipe

    * Right is default

* Each swipe gesture recognizer only recognizes one type of swipe in one direction

* Used to switch between views or rapidly scroll in a given direction

UIPanGestureRecognizer

✤ Continuous touch across screen

✤ Drag based on one or more fingers moving in a direction

    ✤ User specified minimum and maximum number of fingers to activate gesture

✤ Can track translation and velocity of gesture

✤ Used to move an element on the screen

UIPinchGestureRecognizer

* Continuous touch across screen

* Requires two fingers

* Scale factor based on finger position

* Used to zoom in (pinch apart) or zoom out (pinch together)

UIRotationGestureRecognizer

✤ Continuous touch across screen

✤ Requires two fingers

✤ Rotation (in radians) based on finger position and circular movement relative to each other

✤ Used to rotate a view around a common center

UILongPressGestureRecognizer

* Continuous touch across screen

* One or more fingers

* Press must be held a minimum amount of time before action triggers

* Fingers may not move beyond a specified distance

* Used to select for editing

Instapoll Question: Gestures

✤ What view setting must be updated to allow for gesture controls?

  ✤ Multiple Touches Enabled

  ✤ User Interaction Enabled

  ✤ Autoresize Subviews

  ✤ Multiple Touches Enabled and User Interaction Enabled

  ✤ Multiple Touches Enabled, User Interaction Enabled, and Autoresize Subviews