

# FingerPainter

## Lesson 2

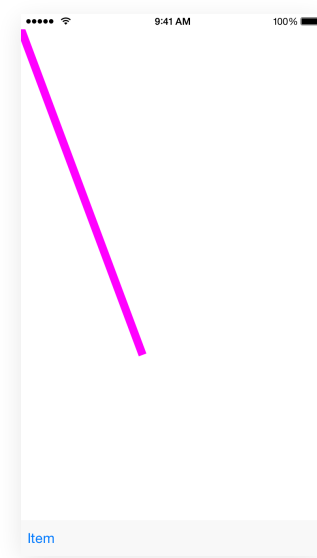


### Description

Override the `UIResponder` methods `touchesBegan:withEvent:` and `touchesMoved:withEvent:` to illustrate how the device responds to moving touches.

### Learning Outcomes

- Describe the inheritance hierarchy of view controllers.
- Implement `UIResponder` methods in a controller to handle touch events.
- Practice creating custom breakpoint actions to print console messages.
- Discover how touching the device screen generates event-driven method calls.



### Vocabulary

inheritance	<code>UIViewController</code>	<code>UIResponder</code>
override	breakpoint	

### Materials

- FingerPainter Lesson 2 Xcode project

### Opening

Using `drawRect:` is ok for simple custom views that don't change very much, but how can we create a custom view that continuously updates as we touch the screen?

## Agenda

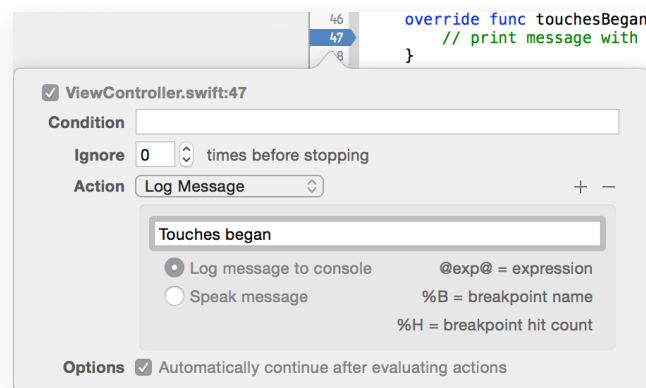
- Discuss the desire to draw a line as the user touches the screen.
- Explain how one approach is to draw a line from point to point as the user drags a finger across the screen.
- Discuss how app view controllers inherit from `UIViewController`, which inherits from `UIResponder`.
- Using the Xcode Documentation and API Reference ([⇧ ⌘ 0](#)), explore the `UIResponder` class reference, drawing attention to the `touchesBegan:withEvent:` and `touchesMoved:withEvent:` methods.
- Discuss how overriding `touchesBegan:withEvent:` and `touchesMoved:withEvent:` in the view controller can facilitate drawing a continuous line as the user drags a finger on the screen.
- In the `ViewController` class, add an implementation of `touchesBegan:withEvent:`.

```
override func touchesBegan(touches: Set<NSObject>,  
    withEvent event: UIEvent) {  
    // print message with breakpoint here  
}
```

- Explain that `touchesBegan:withEvent:` is called as soon as a user touches the screen.
- Add an implementation of `touchesMoved:withEvent:`.

```
override func touchesMoved(touches: Set<NSObject>,  
    withEvent event: UIEvent) {  
    // print message with breakpoint here  
}
```

- Explain that `touchesMoved:withEvent:` is called repeatedly, as the user drags a finger across the screen.
- Add custom breakpoints to the bodies of both the `touchesBegan:withEvent:` and `touchesMoved:withEvent:` methods that use a **Log Message** action to print a console message and automatically continue.



- Run the app (⌘R), click on the screen to simulate a touch, and observe the console (⇧⌘C) output reporting the start of a touch event.
- Click and drag on the Simulator screen to simulate a touch that moves, and observe the console (⇧⌘C) output reporting the movement of a touch.

## Closing

What is the `touches` argument that both the `touchesBegan:withEvent:` and `touchesMoved:withEvent:` methods receive?

## Modifications And Extensions

- Investigate the additional methods in the `UIResponder` class, implement the `touchesEnded:withEvent:` method, and add a custom breakpoint to print a message to the console when the method is called.
- Update the `touchesBegan:withEvent:` and `touchesMoved:withEvent:` methods to print the number of touches on the screen, simulate two touches with the simulator, and describe the number of touches your app prints to the console.

## Resources

Start Developing iOS Apps Today: Finding Information <https://developer.apple.com/library/ios/referencelibrary/GettingStarted/RoadMapiOS/FindingInformation.html>

UIViewController Class Reference [https://developer.apple.com/library/ios/documentation/UIKit/Reference/UIViewController\\_Class/index.html](https://developer.apple.com/library/ios/documentation/UIKit/Reference/UIViewController_Class/index.html)

UIResponder Class Reference [http://developer.apple.com/library/ios/documentation/uikit/reference/UIResponder\\_Class/Reference/Reference.html](http://developer.apple.com/library/ios/documentation/uikit/reference/UIResponder_Class/Reference/Reference.html)

Event Handling Guide for iOS <https://developer.apple.com/library/ios/documentation/EventHandling/Conceptual/EventHandlingiPhoneOS/Introduction/Introduction.html>

Setting Breakpoint Actions and Options [http://developer.apple.com/library/ios/recipes/xcode\\_help-breakpoint\\_navigator/articles/setting\\_breakpoint\\_actions\\_and\\_options.html](http://developer.apple.com/library/ios/recipes/xcode_help-breakpoint_navigator/articles/setting_breakpoint_actions_and_options.html)