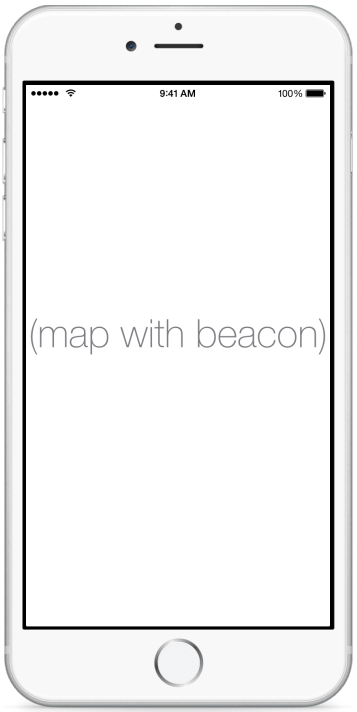
Found
Lesson 4

Description

Use Map Kit and Core Location to "zoom in" on a map location.



Learning Outcomes

- Practice establishing outlet connections between a view and controller.
- Describe the concepts of delegates and delegation, and relate delegation to Swift protocols.
- Discover functions and datatypes within the Map Kit and Core Location frameworks.

Vocabulary

Map Kit	`MKMapView`	enumeration
`MKMapViewDelegate`	delegate	protocol
protocol adoption	`CLLocationCoordinate2D`	`MKCoordinateRegion`
structure		

Materials

- **Found Lesson 4** Xcode project
- **Delegates and Delegation** presentation
- **Protocols** presentation

Opening

How can we get the map to zoom in on our location?

Agenda

- Discuss how, by default, a map view does not automatically zoom the map to the current location.
- Using the Xcode Documentation and API Reference (⇧⌘0), explore the `MKMapView` class reference, the `setUserTrackingMode:animated:` method, and the `MKUserTrackingMode` enumeration.
- Add an import statement for Map Kit above the `ViewController` class definition.

```
import MapKit
```

- Using Interface Builder and the Assistant Editor (⌥⌘↩), drag a connection from the map view to create an outlet in the `ViewController` class.

```
@IBOutlet weak var mapView: MKMapView!
```

- Add a call to `setUserTrackingMode:animated:` in `viewDidLoad`.

```
override func viewDidLoad() {
   super.viewDidLoad()
   mapView.setUserTrackingMode(.Follow, animated: true)
}
```

- Run the app (⌘R), and observe the map "zoomed in" on the location.
- Discuss how one might wish to zoom the map at a scale that is different from the default zoom level provided by the map view.
- Using the Xcode Documentation and API Reference (⇧⌘0), explore the `MKMapViewDelegate` protocol reference, and the `mapView:didUpdateUserLocation:` method.
- Using Interface Builder, control-drag a connection from the Map View to the View Controller in the Document Outline (⧈), specifying the View Controller as the Map View `delegate`.
- Present the concept of delegates and delegation.
- Declare the adoption of the `MKMapViewDelegate` protocol for the `ViewController` class.

```
class ViewController: UIViewController, MKMapViewDelegate {
```

- Present the concept of protocols.

- Add an implementation of `mapView:didUpdateUserLocation:` to the `ViewController`.

```
func mapView(mapView: MKMapView!, didUpdateUserLocation userLocation:
   MKUserLocation) {
   let center = CLLocationCoordinate2D(latitude:
      userLocation.coordinate.latitude,
      longitude: userLocation.coordinate.longitude)
   let width = 1000.0 // meters
   let height = 1000.0
   let region = MKCoordinateRegionMakeWithDistance(center, width,
      height)
   mapView.setRegion(region, animated: true)
}
```

- Explain how the map view calls the `mapView:didUpdateUserLocation:` method in its `delegate` when the user location is updated.
- Using the Xcode Documentation and API Reference (⇧⌘**0**), explore the `CLLocationCoordinate2D` structure, `MKCoordinateRegion` structure, and the `MKCoordinateRegionMakeWithDistance` function.
- Explain how an `MKCoordinateRegion` consists of a `center`, `width` and `height`; and how the `MKMapView` `setRegion:animated:` method receives a "square region" for configuring the map display.
- Run the app (⌘**R**), and observe the map "zoomed in" on the location.

Closing

With the map view constantly tracking the current location of the device, how might the feature affect the device battery life?

Modifications and Extensions

- Investigate the `CLLocationDegrees`, `CLLocationCoordinate` and `MKCoordinateSpan` datatypes. Within the `mapView:didUpdateUserLocation:` method, create a `CLLocationCoordinate2D` variable from the `MKUserLocation`, create a `MKCoordinateSpan` variable, and use these to create a `MKCoordinateRegion`.

Resources

Location and Maps Programming Guide https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/LocationAwarenessPG/Introduction/Introduction.html

MKMapView Class Reference http://developer.apple.com/library/ios/documentation/MapKit/Reference/MKMapView_Class/MKMapView/MKMapView.html

Creating an Outlet Connection https://developer.apple.com/library/ios/recipes/xcode_help-IB_connections/chapters/CreatingOutlet.html

Setting an Object's Delegate https://developer.apple.com/library/ios/recipes/xcode_help-IB_objects_media/Chapters/set_object_delegate.html

Cocoa Core Competencies: Delegation http://developer.apple.com/library/ios/documentation/general/conceptual/DevPedia-CocoaCore/Delegation.html

The Swift Programming Language: Protocols https://developer.apple.com/library/ios/documentation/Swift/Conceptual/Swift_Programming_Language/Protocols.html

MKMapViewDelegate Protocol Reference https://developer.apple.com/library/ios/documentation/MapKit/Reference/MKMapViewDelegate_Protocol/index.html

Core Location Functions Reference https://developer.apple.com/library/ios/documentation/CoreLocation/Reference/CoreLocationFunctions/index.html

Map Kit Functions Reference https://developer.apple.com/library/ios/documentation/MapKit/Reference/MapKitFunctionsReference/index.html

Map Kit Data Types Reference https://developer.apple.com/library/ios/documentation/MapKit/Reference/MapKitDataTypesReference/index.html

Core Location Data Types Reference https://developer.apple.com/library/ios/documentation/CoreLocation/Reference/CoreLocationDataTypesRef/index.html