

ATLS 4120: Mobile Application Development

Week 3: UIKit Framework

Frameworks

- Cocoa Touch includes frameworks for incorporating technologies, services, and features into your apps
- Frameworks provide the code and resources needed in your development

Foundation Framework

- The Foundation framework is the foundational toolkit for iOS programming
- Provides dozens of classes and protocols for a variety of purposes

UIKit Framework

- The UIKit Framework provides the classes needed to construct and manage an application's user interface for iOS <https://developer.apple.com/documentation/uikit>
 - Creating common UI elements
 - Drawing to the screen
 - Event handling
 - Present text and web content
 - Handle touch and motion based events
- Apple developed a set of user interface controls that work well on the iPhone and iPad.
- You won't find a checkbox, radio button, or drop down menu in any native app.
- UIView class <https://developer.apple.com/documentation/uikit/uiview> (User Interface Views and Controls)
 - A view is the rectangular area on the screen
 - Views display content
 - Views handle touch events (notice it inherits from UIResponder)
 - Hierarchical
 - One superview
 - May have many (or none) subviews
 - Hierarchy is usually constructed in Interface Builder
 - Subviews are displayed on top of its parent view
 - UIWindow class
 - Subclass of UIView
 - Apps only have a single window
 - It's created automatically at run time
 - UIImageView (class reference)
 - UILabel (class reference)
- Controls
 - UIControl (class reference)
 - All iOS controls are subclasses of the UIControl class
 - Can't use UIControl directly
 - UIButton (class reference)
 - UISwitch (class reference)
 - A switch is used to turn on and off a setting or feature.
 - It toggles between Boolean values **true** and **false**
 - **isOn** property is of type Bool that is **true** when it's on otherwise it's **false**.
 - UISlider (class reference)
 - A slider is used to specify a numeric value within a range of values.

- **value** property is a Float that stores the value.
- UISegmentedControl (class reference)
 - A segmented control is a multiple choice control that allows users to select a single value.
 - Behaves similarly to a radio button.
 - **selectedSegmentIndex** is a property that stores an Int for the selected index. Starts at 0.
 - Plain, bordered, bar, bezeled
- UITextField (class reference)
 - Displays an editable one line text area
- And others that we'll be exploring this semester
- Interface controls are used in three modes
 - Passive
 - store a value but don't trigger an action
 - Text field
 - Active
 - trigger an action
 - buttons
 - Static
 - inactive
 - Image view, labels
- Most UI controls can act in all three modes

There are many other frameworks as well. We'll be exploring some of these later in the semester.

- Audio, video, mapping, graphical, etc.

Human Interface Guidelines

Apple's Human Interface Guidelines provide information on designing and building iOS apps. Following these guidelines provide a consistent look and feel for iOS apps and must be adhered to for apps to get approved for the app store.

<https://developer.apple.com/ios/human-interface-guidelines/overview/themes/>

There are guidelines for how to use the controls in UIKit.

Labels <https://developer.apple.com/design/human-interface-guidelines/ios/controls/labels/>

Switch <https://developer.apple.com/design/human-interface-guidelines/ios/controls/switches/>

Slider <https://developer.apple.com/design/human-interface-guidelines/ios/controls/sliders/>

Segmented control <https://developer.apple.com/design/human-interface-guidelines/ios/controls/segmented-controls/>

We'll be talking more about app design next week.

Beatles

(beatles)

New Project, Single View application.

We will use 3 images of close to the same size, around 400x400.

Select the Images.xcassets item and drag your images in (or click the plus button in the lower-left corner of the editing area and select New Image Set to create a spot for your image) .

Copy the main picture into the 3x spot(Beatles_Abbey_Road.png) and rename the image to beatles_abbey_road. (you should also create one for 2 x and 1x).

Repeat the process 2 more times for beatles1.png and beatles2.png and rename those to beatles1 and beatles2 respectively.

We're giving them each a unique name, so we can refer to it elsewhere in the project.

Go into the Main storyboard.

Add an image view. It will try to scale to fit the whole view. Don't worry about the size yet.

In the attributes inspector choose Beatles_Abbey_Road for the image.

Click off the image view and then select it again.

Size it by Editor | Size to Fit Content. This changes the size of the image view to be the size of the image.

Once it's resized, move it to be centered at the top of the view.

In the attributes inspector under View in Mode choose Aspect Fit. This will help with your other images if they don't all have the same aspect ratio it will make sure it keeps their aspect ratio.

Add a label right under it and change the text to say The Beatles.

Add a segmented control with two segments named Early 60s and Late 60s.

Look at the attributes inspector and note the segments are numbered 0 and 1.

Connections

Connect the image and label as outlets since we'll be changing the image and the text in the label.

Open the assistant editor and make the connections to ViewController.swift.

Name the image beatlesImage, the rest is fine.

Name the label titleLabel, the rest is fine.

This should add in the ViewController.swift file

```
@IBOutlet weak var beatlesImage: UIImageView!
@IBOutlet weak var titleLabel: UILabel!
```

The segmented control needs to be an outlet so we can access which segment is chosen.

Connect the control as an outlet called imageControl.

It also needs to be connected as an action so we can change the image when the user chooses a segment.

Then make an Action connection named changeInfo, type UISegmentedControl, event is value changed.

This created in the swift file

```
@IBOutlet weak var imageControl: UISegmentedControl!
@IBAction func changeInfo(_ sender: UISegmentedControl) {
}
```

Now let's implement the method so different images show depending on when segment is chosen.

```
@IBAction func changeInfo(_ sender: UISegmentedControl) {
    if imageControl.selectedSegmentIndex==0 {
        titleLabel.text="Young Beatles"
        beatlesImage.image=UIImage(named: "beatles1")
    }
    else if imageControl.selectedSegmentIndex==1 {
        titleLabel.text="Not so young Beatles"
        beatlesImage.image=UIImage(named: "beatles2")
    }
}
```

I really don't want either segment to be chosen initially. Go into the storyboard, select the segmented control and in the attributes inspector chose Segment 0 and uncheck Selected. If neither segment is selected then neither will be initially selected.

Switch

Go back into the storyboard and add a switch. Make its State Off.

Put a label next to it that says Capitalization so the user knows what the switch does.

Connect the switch as an Outlet called capitalSwitch so we can easily access its value.

Now connect it as an Action and name it updateFont, type UISwitch, event Value Changed.

Go into the swift file to implement the method.

```
@IBAction func updateFont(_ sender: UISwitch) {
    if capitalSwitch.isOn {
        titleLabel.text=titleLabel.text?.uppercased()
    } else {
        titleLabel.text=titleLabel.text?.lowercased()
    }
}
```

(capitalized() does mixed case)

Slider

Add a slider to control the font size so a min of around 6 and a max of 22 is good. Initial can be 16 or something mid-sized. Change these in the attributes inspector.

Add a label next to it to show the font size value. You can use that initial value in the label field.

Connect the label as an outlet called fontSizeLabel.

Connect the slider as an action called changeFontSize, type UISlider, event Value Changed.

Now implement the method.

```
@IBAction func changeFontSize(_ sender: UISlider) {
    let fontSize=sender.value
    fontSizeNumberLabel.text=String(format: "%.0f", fontSize)
    let fontSizeCGFloat=CGFloat(fontSize)
    titleLabel.font=UIFont.systemFont(ofSize: fontSizeCGFloat) }
}
```

Create a constant called fontSize with the UISlider value.

The text label text property expects a string so we use the String class format initializer to convert the slider value which is a float to a string.

To change the font of the label we have to create a UIFont object with the new font size.

The UIFont class method systemFont(ofSize:) returns a UIFont object.

We cast the slider value which is a float to a CGFloat which is the required parameter type for systemFont(ofSize:). This returns a UIFont object that we assign to the font property of titleLabel.

Now you'll notice that almost everything works but if you change the image then we lose the caps setting. That's because we're changing the label's text and not taking case into account.

We don't want to rewrite the code to check the caps switch so instead we're going to separate out that code into helper methods that we can easily call whenever we need them.

So let's move the image code into a helper method updateImage() and the caps code into a method updateCaps()

```

func updateImage() {
    if imageControl.selectedSegmentIndex==0 {
        titleLabel.text="Young Beatles"
        beatlesImage.image=UIImage(named: "beatles1.png")
    }
    else if imageControl.selectedSegmentIndex==1 {
        titleLabel.text="Not so young Beatles"
        beatlesImage.image=UIImage(named: "beatles2.png")
    }
}

func updateCaps() {
    if capitalSwitch.on {
        titleLabel.text=titleLabel.text?.uppercased()
    } else {
        titleLabel.text=titleLabel.text?.lowercased()
    }
}

```

Then the methods will call those.

```

@IBAction func changeInfo(_ sender: UISegmentedControl) {
    updateImage()
    updateCaps()
}
@IBAction func updateFont(_ sender: UISwitch) {
    updateCaps()
}

```

Don't forget the launch screen, app icons, and set up constraints for the layout.

Layout

Embed the switch and its label in a stack view and also the slider and its label in a stack view. Add spacing as needed.

Then select both those stack views along with the segmented control and embed in a stack view. Add spacing as needed.

Select the label and image view and embed those in a stack view. Add spacing as needed.

Now select both stack views and embed those in a stack view. Add spacing as needed.

Now we only have the 1 top level stack view to position.

Align center x and align top for the Y position.

Also add a leading and trailing constraint to make sure there's a margin to the edge.

Why all these stack views? You'll see that these modular stack views will be helpful in the compact | compact size class.

Look at it on a smaller phone and by changing the spacing values and the top value you should be able to get it to fit.

But this vertical layout won't work in landscape so we'll vary the layout for the w Compact h Compact size class.

Change the size class to w Compact h Compact (such as iPhone 4s landscape).

Click Vary for Traits and select both width and height to target compact width and height size classes.

Notice the bottom bar turns blue meaning we are editing ONLY for this size class.

Select the top level stack view and go into the attributes inspector.

Click the + next to axis to add a variance for this size class and change it to horizontal.

Now it will lay out the two embedded stack view horizontally and in that one step the layout works.

But to make it perfect uninstall the constraints on the top level stack view.

Add a vertical in container constraint.

For horizontal add a leading constraint. That might cause the right side to off the right on the smaller phones.

Add a trailing constraint. This will give you an error because it can't do both. Make the trailing constraint \leq and it should resolve the error and look good.

If you want the buttons to align to the top of the image, and the slider to be aligned with the text label you could add a variance for the stack view's alignment and change it to fill, but this will stretch the buttons.

Instead, select the stack view that has the buttons, segmented control, and slider and add a variance for Spacing. Increase that value until the stack view has a height that matches the stack view with the image and text and it will all be aligned.

Lab: Create an app that uses a segmented control, switch, and slider to change an image and the contents of a label including the text, text size, capitalization, and either font or text color. Your app should work for all size iPhones in portrait and landscape orientation. Don't forget your app icons and launch screen.