## Announcement

- Final Project Updates on Wednesday
- Final Project Update code due by start of class on Wednesday



## Today's Topics

- Camera
- Gesture Recognition
- Audio and Video in iOS
- Design Video

# Using the Camera in iOS



## iOS Camera Topics

- Take photos and videos with camera
- Save photos and videos to Camera Roll album
- Access photos and videos from Camera Roll

## Taking pictures with the camera

- Instantiate and modally present the camera interface using **UIImagePickerController** class
- System supplied user interface for taking pictures and movies
- Image picker controller manages user interactions and delivers results to delegate object



## Accessing Camera

- Use UIImagePickerController to access your camera
- Set sourceType to .camera

```
let picker = UIImagePickerController()
picker.delegate = self
picker.sourceType = .camera
present (picker, animated: true, completion: nil)
```

## Accessing Photo Library

- **Use UIImagePickerController to access your photo library**
- **Set sourceType to .photoLibrary**

```
let picker = UIImagePickerController()
picker.delegate = self
picker.sourceType = .photoLibrary
present (picker, animated: true, completion: nil)
```



## Saving content to Photo Library

- **Use the UIImageWriteToSavedPhotosAlbum method to save an image to the photo library**

```
UIImageWriteToSavedPhotosAlbum(imageDisplay.image!,self,
#selector(ViewController.image(image:didFinishSavingWithError:contextInfo:)),nil)
```

- **Optionally compress the image with UIImageJPEGRepresentation**

```
let imageData = UIImageJPEGRepresentation(imageDisplay.image!, 0.6)
let compressedImage = UIImage(data: imageData)
UIImageWriteToSavedPhotosAlbum(compressedImage!,self,
  #selector(ViewController.image(image:didFinishSavingWithError:contextInfo:)),nil)
```

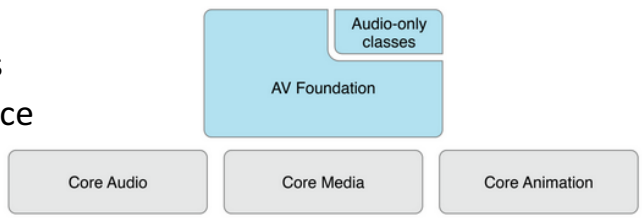
## Info.plist Settings

- **You must add the following settings to your info.plist to access the camera and photo library**
  - Privacy – Camera Usage Description
  - Privacy – Photo Library Usage Description



## AVFoundation

- **Provides a large number of additional camera and video configurations**
- **Create an AVCaptureSession**
  - Allows you coordinate data flow between inputs and outputs (microphone and camera to image or video)
- **Supports many additional features**
  - Exposure
  - Flash modes
  - White Balance



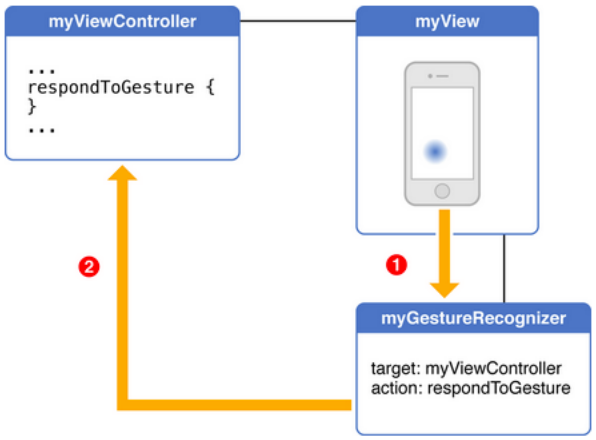
# Camera Demo



# Gesture Recognition in iOS

- **iOS provides several built in gesture recognizers**
  - Tapping
  - Pinching
  - Panning
  - Swiping
  - Long press
- **No need to define your own "gestures" using touches began, touches moved, and touches ended**

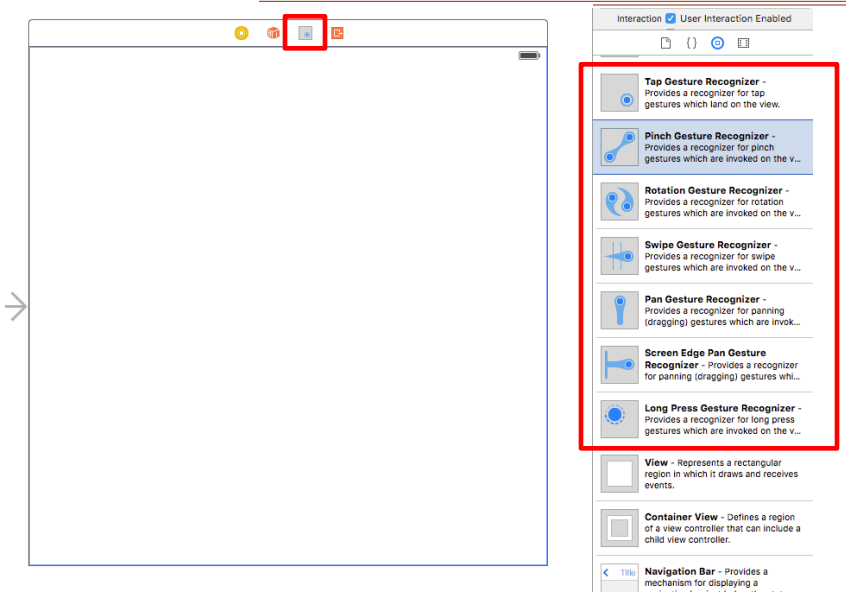
# Gesture Recognition




https://developer.apple.com/library/content/documentation/EventHandling/Conceptual/EventHandlingiPhoneOS/GestureRecognizer_basics/GestureRecognizer_basics.html



# Add gestures via Storyboard



# Add Gestures Programmatically

- **//Implement right swipe detection**

```
let swipeRight = UISwipeGestureRecognizer(target: self, action:
#selector(ViewController.respondToSwipeGesture(_:)))
swipeRight.direction = .right
self.view.addGestureRecognizer(swipeRight)
```

- **//Implement down swipe detection**

```
let swipeDown = UISwipeGestureRecognizer(target: self, action:
#selector(ViewController.respondToSwipeGesture(_:)))
swipeDown.direction = .down
self.view.addGestureRecognizer(swipeDown)
```

- **//Handle swipe detection**

```
func respondToSwipeGesture(_ gesture: UIGestureRecognizer) {
}
```



# Gestures Demo

# Audio and Video in iOS



## Uses for Audio

- **Sound effects**
  - button clicks
  - alert sounds
  - short sounds accompanying user actions
- **Arbitrary length sounds (music, podcasts, spoken content)**
- **Streamed content from web services**
- **Recording audio**

## How to do it?

- **Could be complex:**
  - Potentially multiple simultaneous sources
  - Numerous possible outputs
  - Dynamic events, often out of user's control
  - Different priorities for seemingly similar actions
- **The OS manages the sound system**
  - You can ask for behavior, but the OS has control



## CoreAudio

- **High level, easy to use**
  - System Sound API - short sounds
  - AVAudioPlayer class - ObjC, simple API
- **Lower level, takes more effort but much more control**
  - Audio Toolbox - recording and playback, streaming, full control
  - Audio Units - processing audio
  - OpenAL - 3D positional sound
- **Which one you use depends on what you're trying to do**
  - Many of you are fine with System Sounds and AVAudioPlayer

# Playing Short Sounds

- "short" means less than 5 seconds
- Very simple API, but has restrictions
  - No looping
  - No volume control
  - Immediate playback
  - Limited set of formats
  - Linear PCM or IMA4
  - .caf, .aif or .wav file



# Playing Short Sounds

- Two step process
  - Register the sound, get a "sound ID" in return
  - Play the sound
  - Optionally can get callback when sound finishes playing

```
var soundID: SystemSoundID
let fileURL = CFBundleCopyResourceURL(CFBundleGetMainBundle(), "mySound" as
    CFString!, "caff" as CFSTring!, nil)
// First register the sound
AudioServicesCreateSystemSoundID (fileURL!, &soundID);

// Then you can play the sound
AudioServicesPlaySystemSound (soundID);
```

## Converting Sounds

- Command line utility to convert sounds
  /usr/bin/afconvert
- Supports wide variety of input and output formats
- See man page for details
- Easily convert sounds to System Sounds formats

/usr/bin/afconvert -f aiff -d BEI16 input.mp3 output.aif



## AVAudioPlayer

- Play longer sounds (> 5 seconds)
- Locally stored files or in-memory (no network streaming)
- Can loop, seek, play, pause
- Provides metering
- Play multiple sounds simultaneously
- Cocoa-style API
  - Initialize with file URL or data
  - Allows for delegate
- Supports many more formats
  - Everything the AudioFile API supports

# AVAudioPlayer

- **Create from file URL or data**
- **Simple methods for starting/stopping**

```
var player = AVAudioPlayer()
let url = Bundle.main.url(forResource: “myAudio”, withExtension: “mp3”)!
do {
player = try AVAudioPlayer(contentsOf: url, fileTypeHint: nil)
}
catch let error as NSError {print(error.description) }

player.numberOfLoops = 1
player.prepareToPlay()
player.play()
```



# AVAudioPlayerDelegate

- **Told when playback finishes**
- **Informed of audio decode errors**
- **Given hooks for handling interruptions**
  - Incoming phone calls

## OpenAL

- **High level, cross-platform API for 3D audio mixing**
  - Great for games
  - Mimics OpenGL conventions
- **Models audio in 3D space**
  - Buffers: Container for Audio
  - Sources: 3D point emitting Audio
  - Listener: Position where Sources are heard
- **More Information: http://www.openal.org/**



## Frameworks and APIs

- **MediaPlayer**
  - Allows you to find and player user-installed media items
    - Songs, podcasts, audio books
  - Play custom movies
    - Cut scenes in games
- **AVFoundation**
  - Record, edit, and play audio and video
  - Configure audio sessions
  - Respond to changing device environment
- **AudioToolbox**
  - Record or play audio
  - Convert formats
  - Parse audio streams
  - Configure audio session

## Playing Video

- **Uses for Video:**
  - Provide cut-scene animation in a game
  - Stream content from web sites
  - Play local movies
- **Play videos from application bundle or remote URL**
  - Always full screen
  - Configurable scaling modes
  - Optional controls
- **Supports:**
  - .mov, .mp4, .m4v, .3gp



## Audio Demo

# Video Demo