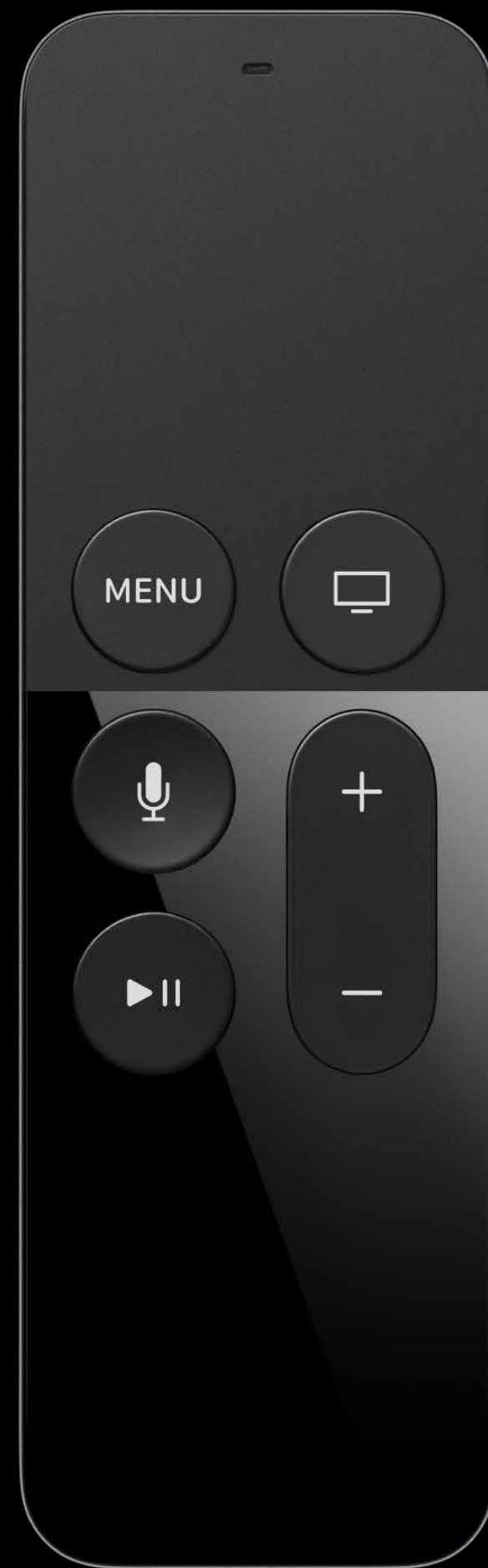


Controlling Game Input for Apple TV

Session 607

JJ Cwik Software Engineer



What's New

tvOS 10

NEW

Apps may require an MFi game controller

Support for up to four MFi game controllers

Apple TV Remote app



Siri Remote



MFi Game Controller

Game Controller Framework

Overview

Adds Siri Remote and MFi game controller support to your game



Game Controller Framework

Overview

Adds Siri Remote and MFi game controller support to your game

Same API for all controllers

- Detect controllers
- Handle connection, disconnection
- Read inputs



Game Controller Framework

Overview

Adds Siri Remote and MFi game controller support to your game

Same API for all controllers

- Detect controllers
- Handle connection, disconnection
- Read inputs

Available for tvOS, iOS and macOS



Detecting Controllers

GCController represents a physical controller

Same class for all controllers



Detecting Controllers

GCController represents a physical controller

Same class for all controllers

Currently-connected controllers:

```
GCController.controllers() // [GCController]
```



Detecting Controllers

GCController represents a physical controller

Same class for all controllers

Currently-connected controllers:

```
GCController.controllers() // [GCController]
```

Connection and disconnection notifications:

```
GCControllerDidConnectNotification
```

```
GCControllerDidDisconnectNotification
```



Siri Remote

GCController



Siri Remote

GCController

- GCMicroGamepad



Siri Remote

GCController

- GCMicroGamepad
- GCMotion



GCMicroGamepad Profile

Dpad (analog or digital)

'A' button (digital)

'X' button (digital)

DPAD



GCMicroGamepad Profile

Dpad (analog or digital)

'A' button (digital)

'X' button (digital)



GCMicroGamepad Profile

Dpad (analog or digital)

'A' button (digital)

'X' button (digital)

'A' button



GCMicroGamepad Profile

Dpad (analog or digital)

'A' button (digital)

'X' button (digital)



GCMicroGamepad Profile

Dpad (analog or digital)

'A' button (digital)

'X' button (digital)

'X' button



GCMicroGamepad Profile

Buttons

Polling

```
let isAPressed = controller.microGamepad?.buttonA.isPressed // Bool  
let isXPressed = controller.microGamepad?.buttonX.isPressed // Bool
```

GCMicroGamepad Profile

Buttons

Polling

```
let isAPressed = controller.microGamepad?.buttonA.isPressed // Bool  
let isXPressed = controller.microGamepad?.buttonX.isPressed // Bool
```

Event callbacks

```
controller.microGamepad?.buttonA.pressedChangedHandler = myButtonAHandler  
controller.microGamepad?.buttonX.pressedChangedHandler = myButtonXHandler
```

GCMicroGamepad Profile

GCControllerDirectionPad

Treated as four buttons

- up, down, left, right

And as two axes

- xAxis, yAxis

DPAD



GCMicroGamepad Profile

GCControllerAxisInput

Polling

```
let dpadX = controller.microGamepad?.dpad.xAxis.value // Float, -1.0 to 1.0  
let dpadY = controller.microGamepad?.dpad.yAxis.value // Float, -1.0 to 1.0
```

GCMicroGamepad Profile

GCControllerAxisInput

Polling

```
let dpadX = controller.microGamepad?.dpad.xAxis.value // Float, -1.0 to 1.0  
let dpadY = controller.microGamepad?.dpad.yAxis.value // Float, -1.0 to 1.0
```

Event callbacks

```
controller.microGamepad?.dpad.valueChangedHandler = myDpadHandler
```

Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing

Provides windowed values (by default)

- Touch start location defines (0, 0)
- Subsequent values relative to start point



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing

Opt-in to get absolute dpad values

Places (0,0) at center of touch surface

```
controller.microGamepad?.reportsAbsoluteDpadValues = true
```



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

DPAD windowing



Siri Remote

Rotation

DPAD (x, y) values reported in portrait

- Regardless of remote orientation
- X right, Y up



Siri Remote

Rotation

DPAD (x, y) values reported in portrait

- Regardless of remote orientation
- X right, Y up



Siri Remote

Rotation

Opt-in to report (x, y) based on orientation

- Portrait
- Landscape left
- Landscape right

```
controller.microGamepad?.allowsRotation = true
```



Siri Remote

Motion

GCMotion

- Gravity vector (x, y, z)
- User acceleration (x, y, z)



Siri Remote

Motion

GCMotion

- Gravity vector (x, y, z)
- User acceleration (x, y, z)

Already filtered



Siri Remote

Motion

GCMotion

- Gravity vector (x, y, z)
- User acceleration (x, y, z)

Already filtered

Fused motion data

- Accelerometer and gyroscope



Siri Remote

Motion

Not intended for

- Vigorous shaking
- Aggressive movements



Menu Button



Menu Button

1. Minimize app and return to Apple TV Home Screen

Menu Button

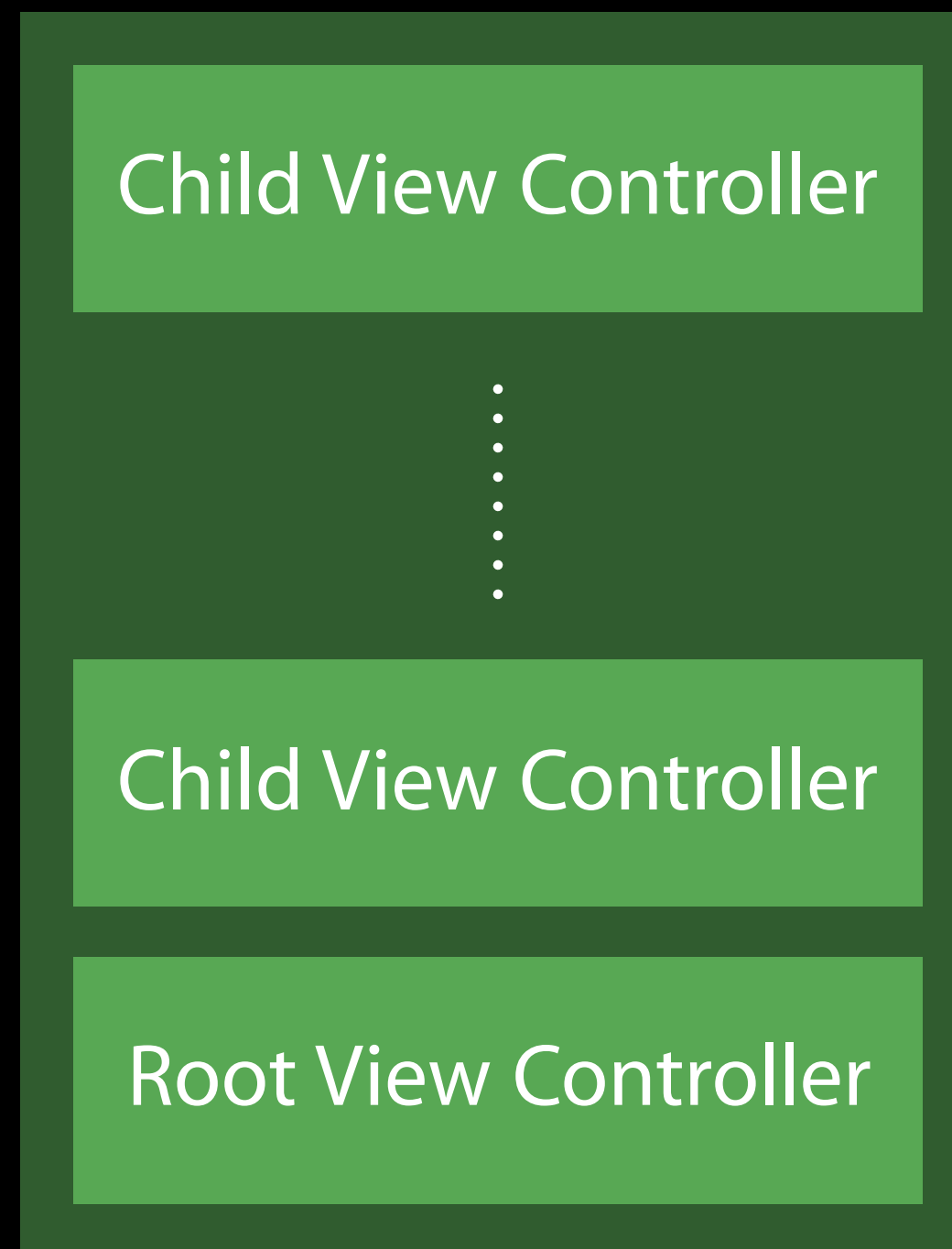
1. Minimize app and return to Apple TV Home Screen
2. Go back one level in app menus

Menu Button

1. Minimize app and return to Apple TV Home Screen
2. Go back one level in app menus
3. Pause / resume gameplay

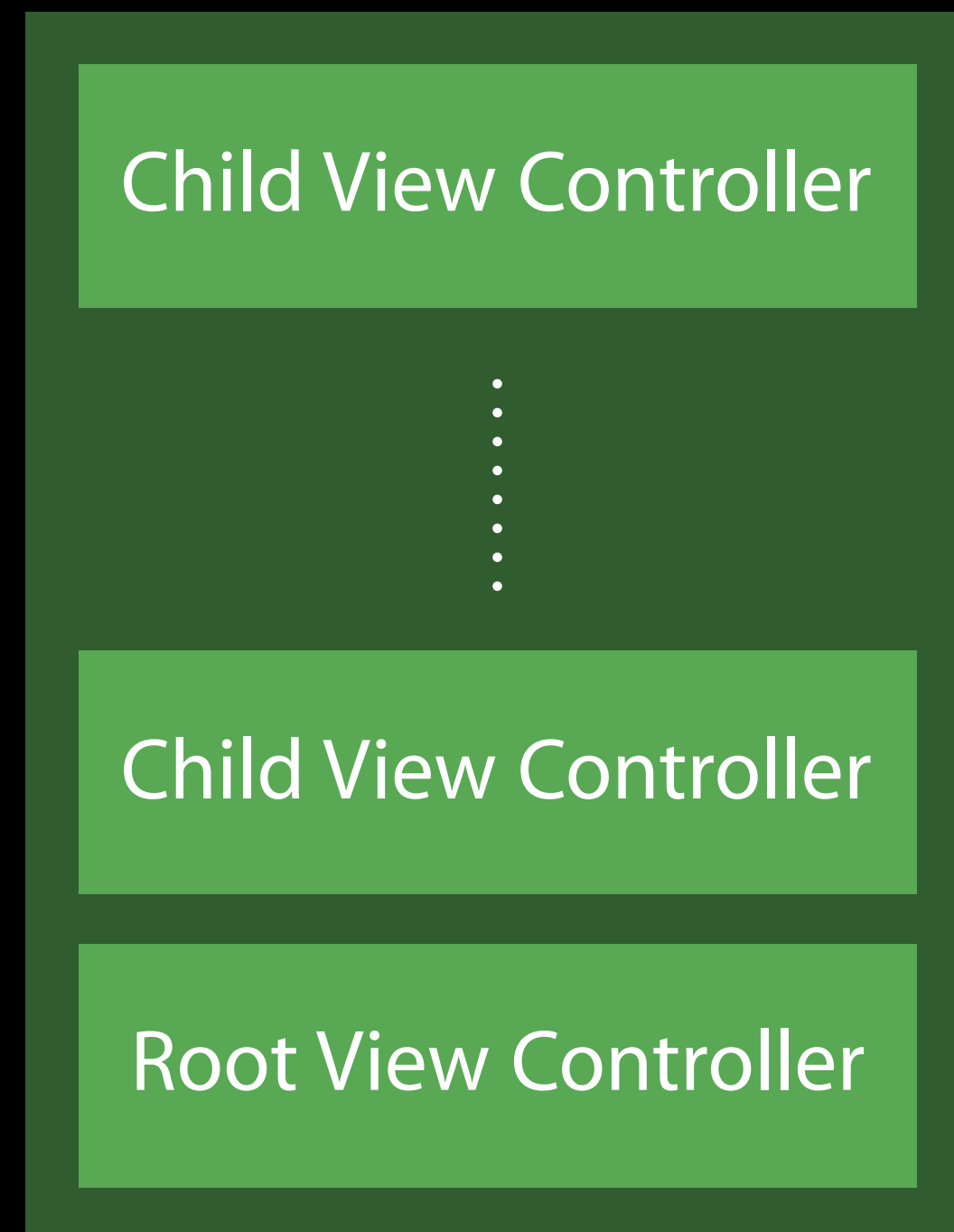
Menu Button

Menu Button

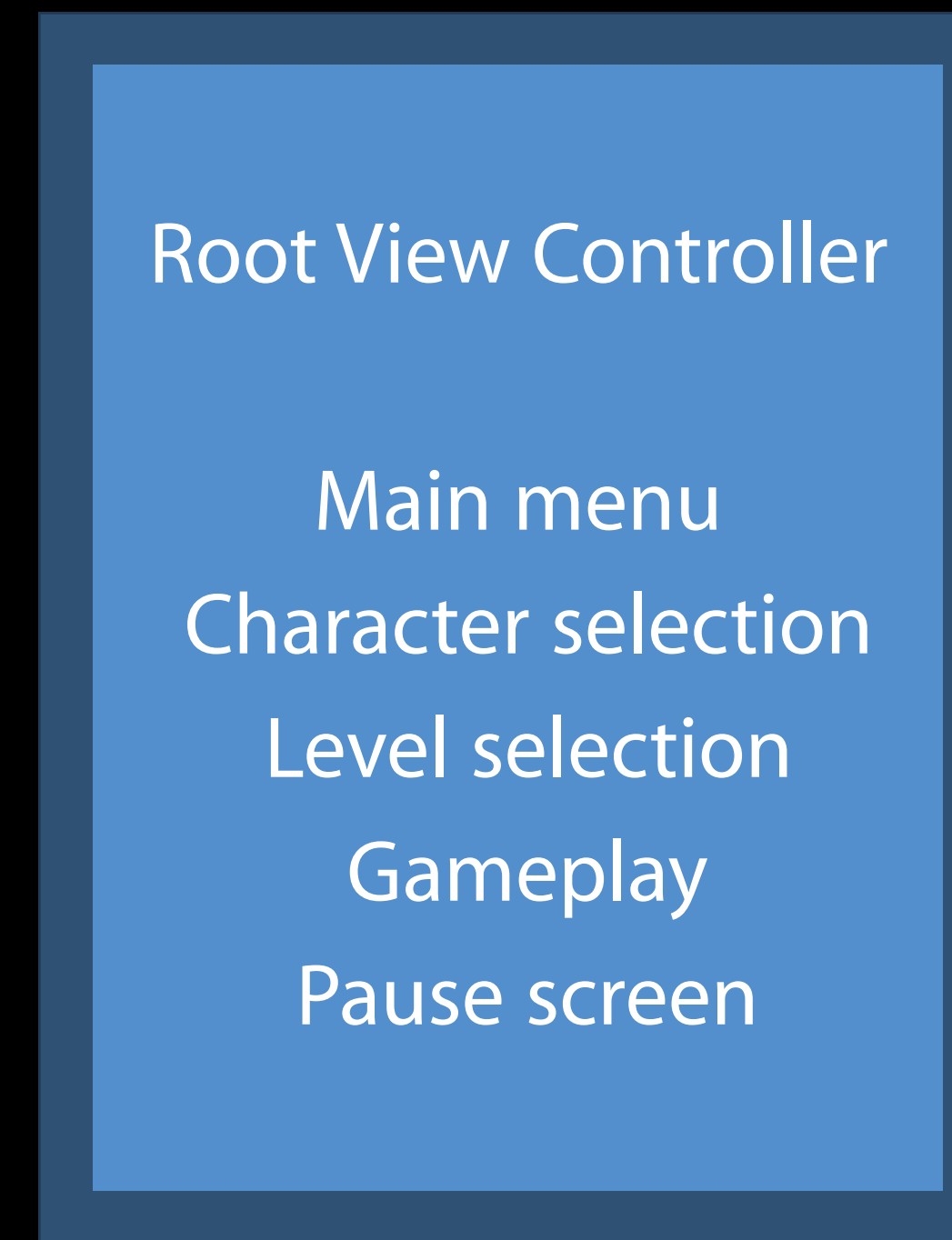


UIKit apps

Menu Button



UIKit apps



Games

Menu Button

GCEventViewController

- For single-view controller games
- Use as your root view controller

Menu Button

GCEventViewController

- For single-view controller games
- Use as your root view controller

```
public var controllerUserInteractionEnabled: Bool
```

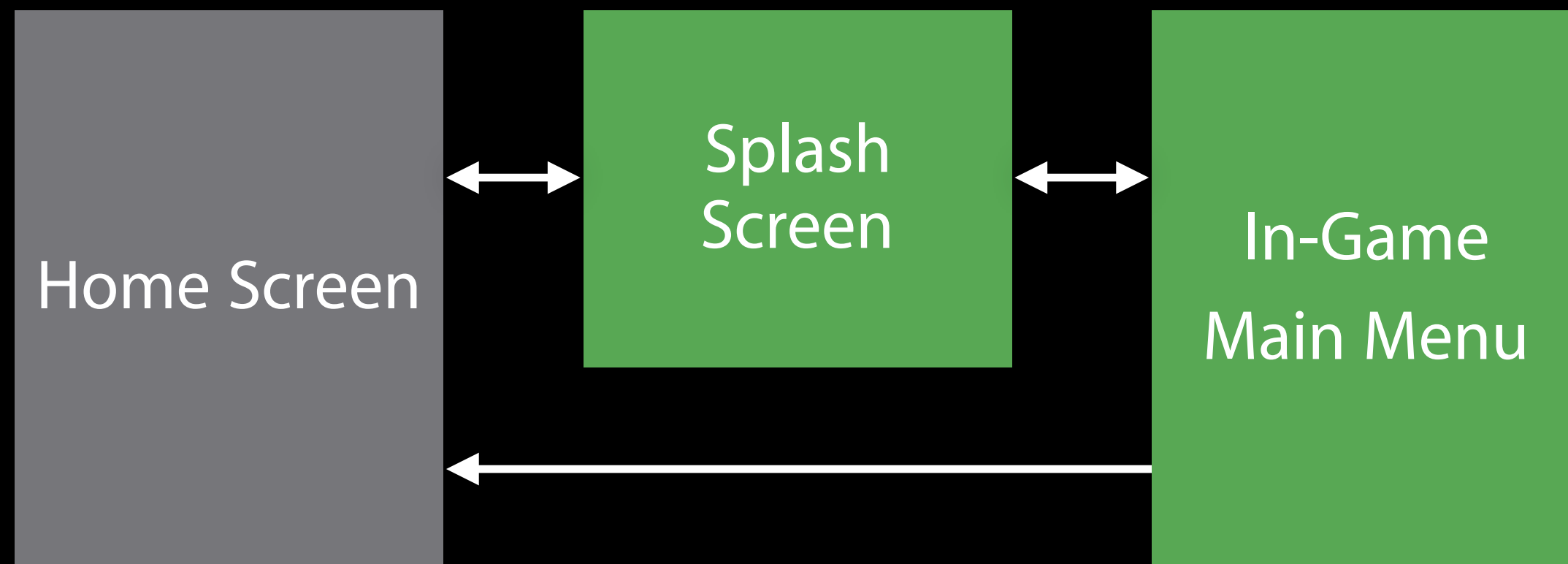
- false: Stay in-game
- true: Return to Home Screen

Menu Button

Managing controllerUserInteractionEnabled

Menu Button

Managing controllerUserInteractionEnabled



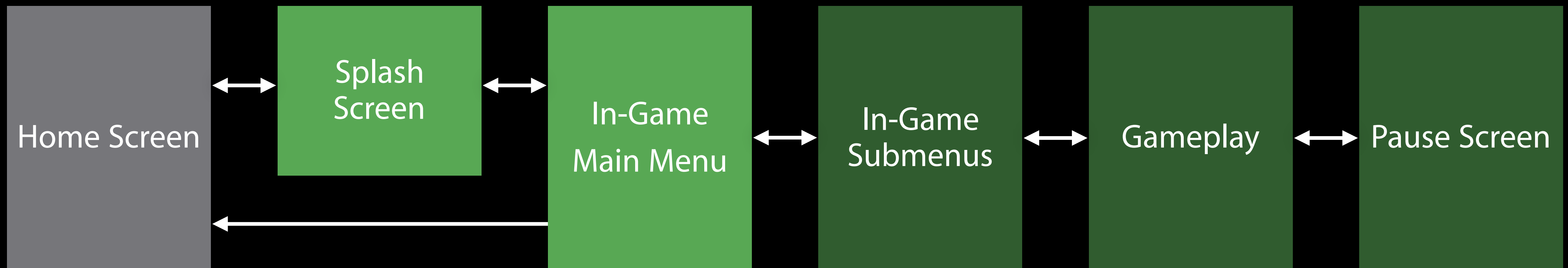
`controllerUserInteractionEnabled:`

true

true

Menu Button

Managing controllerUserInteractionEnabled



controllerUserInteractionEnabled:



Menu Button

Pause handler

```
public var controllerPausedHandler: ((GCController) -> Void)?
```

Called when Menu button pressed

Menu Button

Pause handler

```
public var controllerPausedHandler: ((GCController) -> Void)?
```

Called when Menu button pressed

- In submenus: Go back to previous menu
- In gameplay: Toggle pause state

MFi Game Controller

MFi Game Controller

Optional accessory

Wireless extended gamepad

- DPAD
- ABXY
- 2 thumbsticks
- 2 shoulders
- 2 triggers
- Menu
- Player indicator LEDs



MFi Game Controller

GCExtendedGamepad profile

Property	Type
dpad	GCControllerDirectionPad
leftThumbstick rightThumbstick	
buttonA buttonB buttonX buttonY	GCControllerButtonInput
leftShoulder rightShoulder	
leftTrigger rightTrigger	



MFi Game Controller

Pressure-sensitive

Polling

```
let digital = controller.extendedGamepad?.buttonA.isPressed // Bool
let analog = controller.extendedGamepad?.buttonA.value // Float, 0.0 to 1.0
```

MFi Game Controller

Pressure-sensitive

Polling

```
let digital = controller.extendedGamepad?.buttonA.isPressed // Bool
let analog = controller.extendedGamepad?.buttonA.value // Float, 0.0 to 1.0
```

Event callbacks

```
controller.extendedGamepad?.buttonA.pressedChangedHandler = myButtonAHandler // digital
controller.extendedGamepad?.buttonA.valueChangedHandler = myButtonAHandler // analog
```

Supported Controller Types

tvOS

Siri Remote



Supported Controller Types

tvOS

Siri Remote

Siri Remote and MFi game controllers



Supported Controller Types

tvOS

NEW

Siri Remote

Siri Remote and MFi game controllers

MFi game controllers



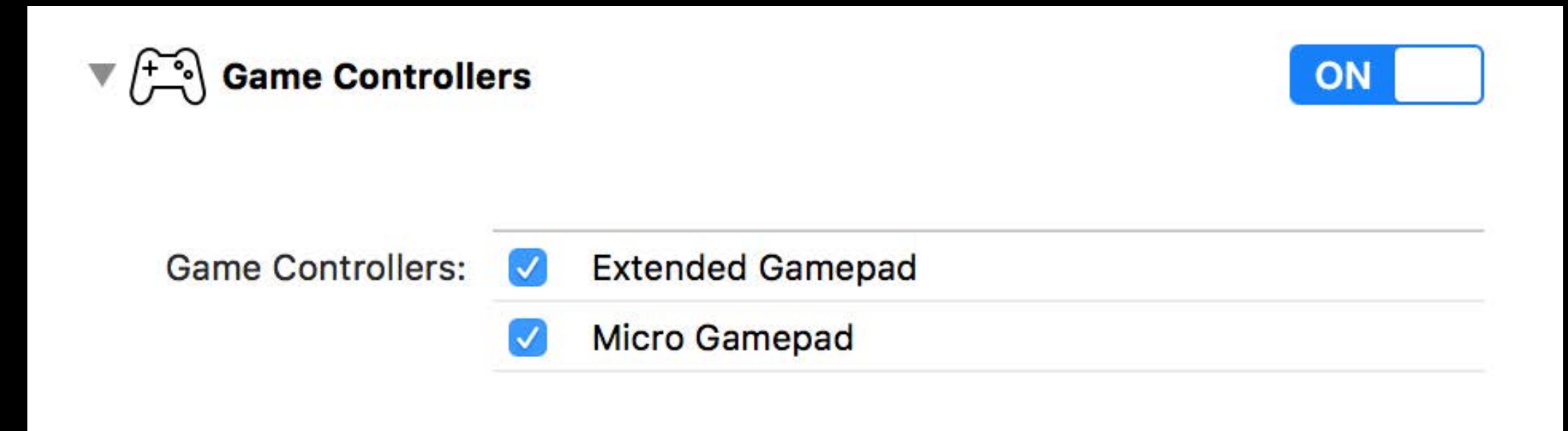
Supported Controller Types

tvOS

Specify in Game Controllers capability in Xcode

Automatically updates Info.plist

Needed for App Review

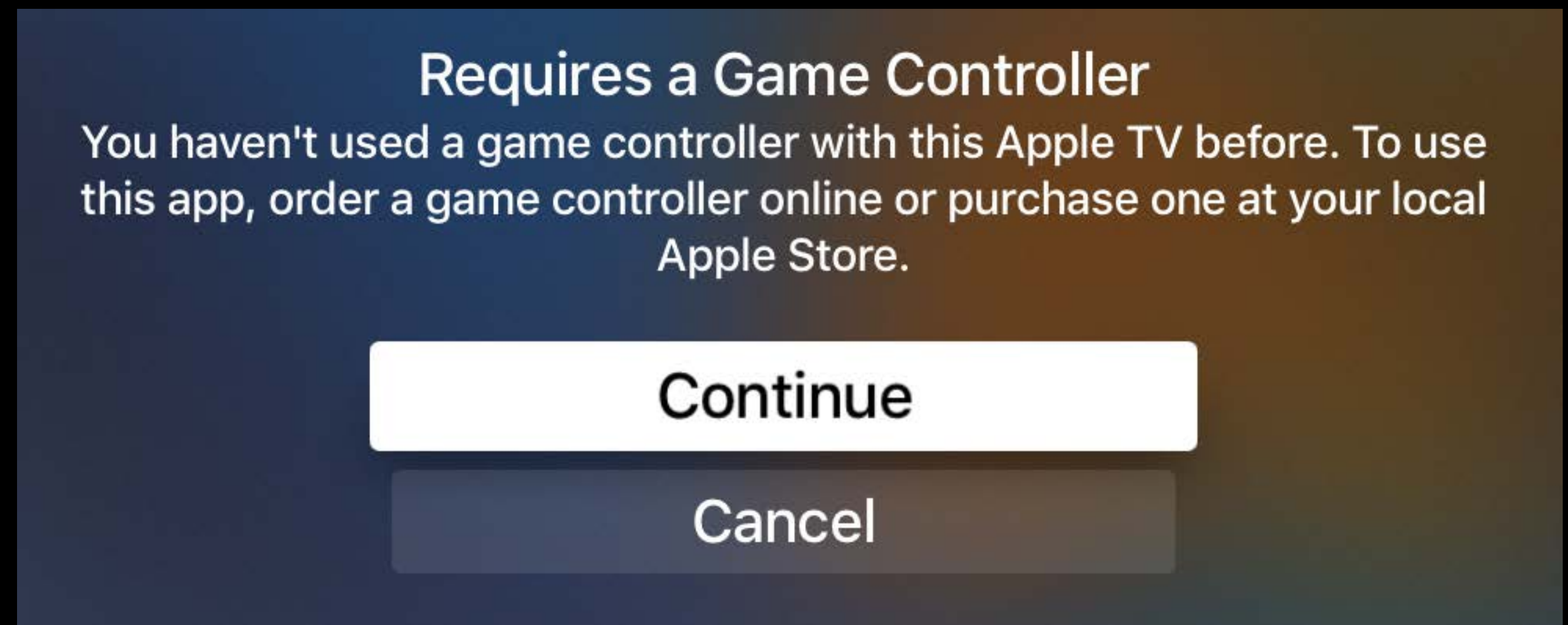


Supported Controller Types

tvOS

App Store

- Badging
- May warn if MFi game controller has not been paired



Requiring MFi Game Controllers

Design considerations

Game may launch with no game controllers connected

NEW

Requiring MFi Game Controllers

NEW

Design considerations

Game may launch with no game controllers connected

Provide feedback to player to connect a game controller

Requiring MFi Game Controllers

NEW

Design considerations

Game may launch with no game controllers connected

Provide feedback to player to connect a game controller

Gracefully handle game controllers that disconnect

Requiring MFi Game Controllers

NEW

Design considerations

Game may launch with no game controllers connected

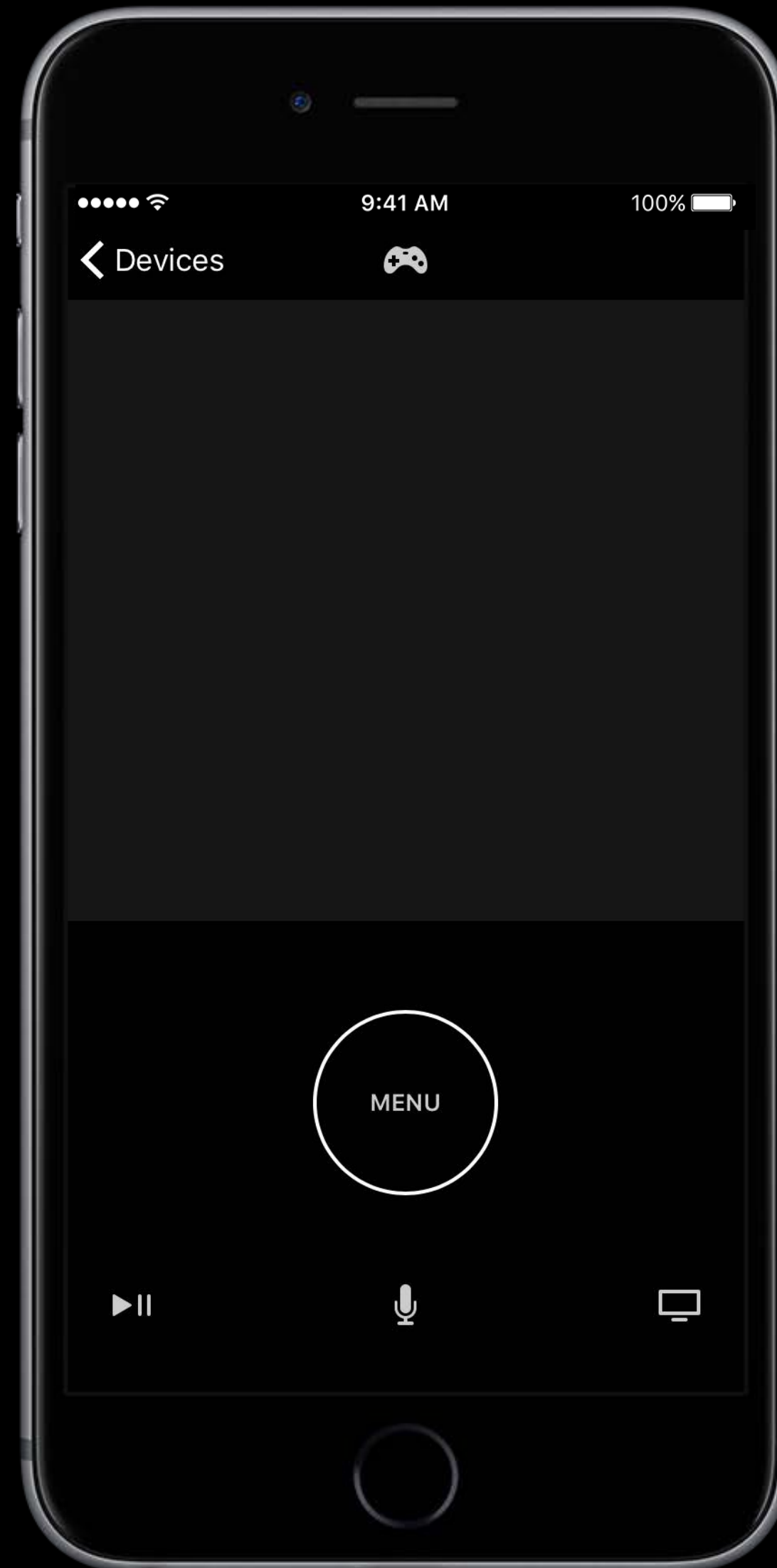
Provide feedback to player to connect a game controller

Gracefully handle game controllers that disconnect

See “Designing for tvOS” (session 802)

Apple TV Remote App

NEW



Apple TV Remote App

GCMicroGamepad, GCMotion

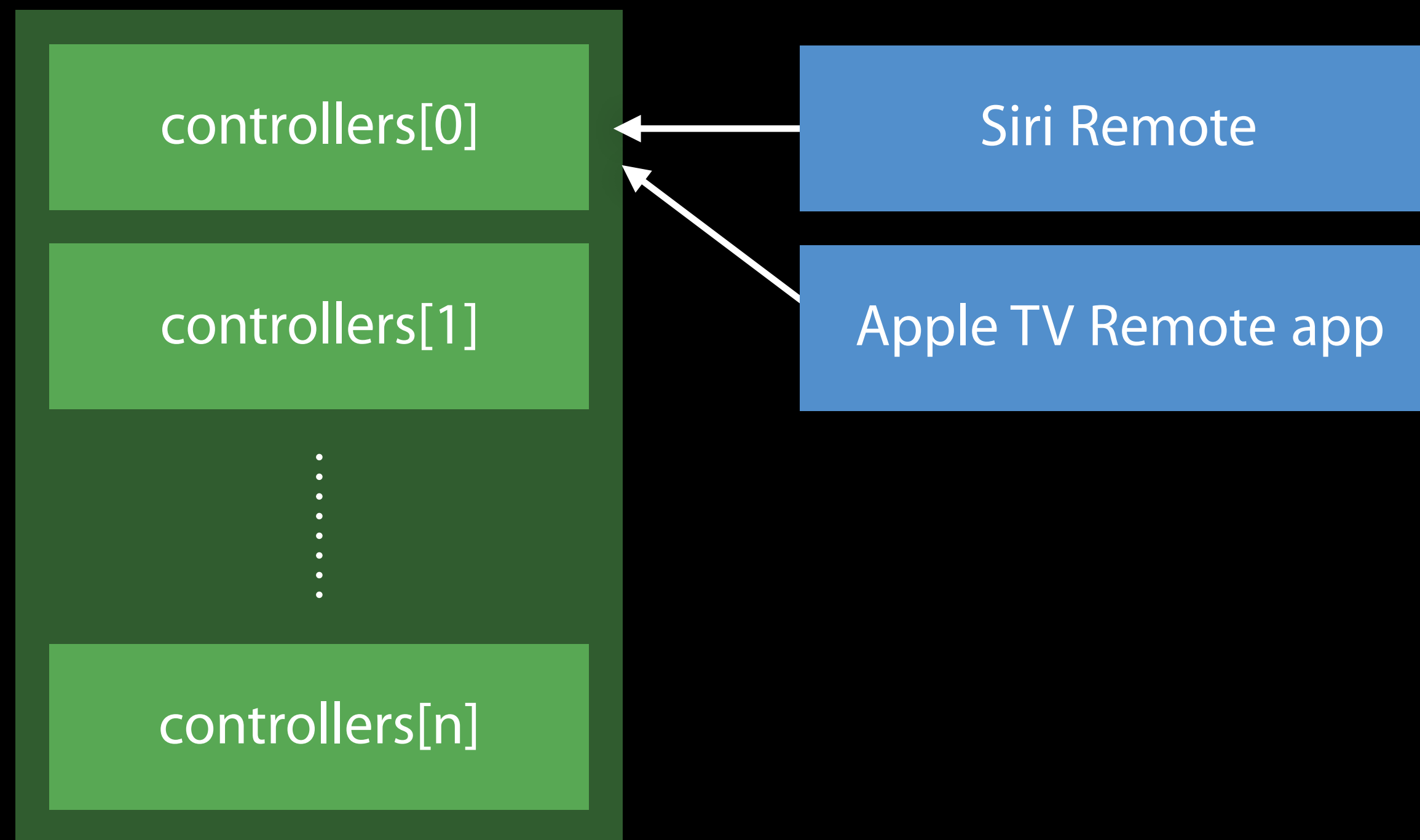
NEW



Apple TV Remote App

Coalescing

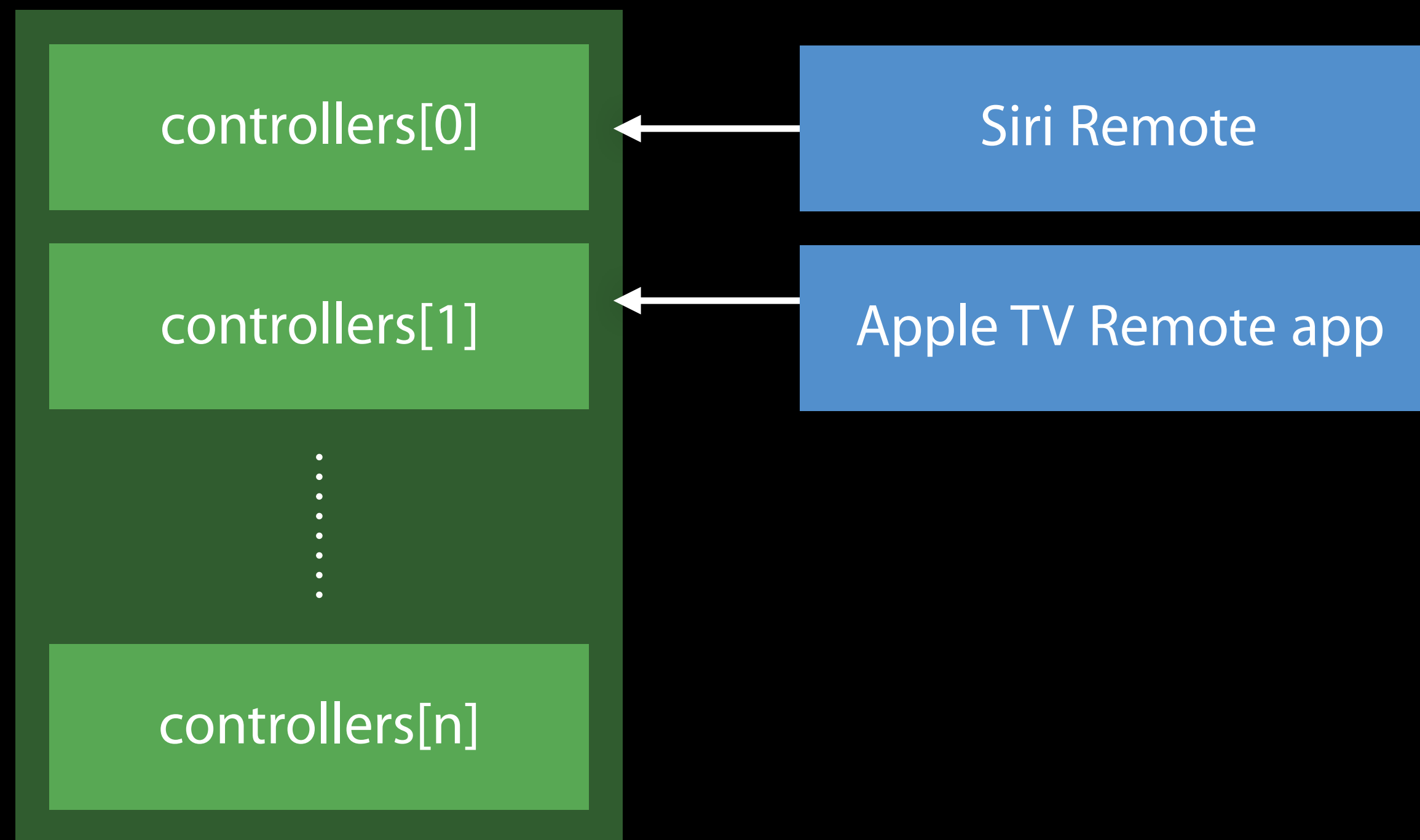
NEW



Apple TV Remote App

Coalescing

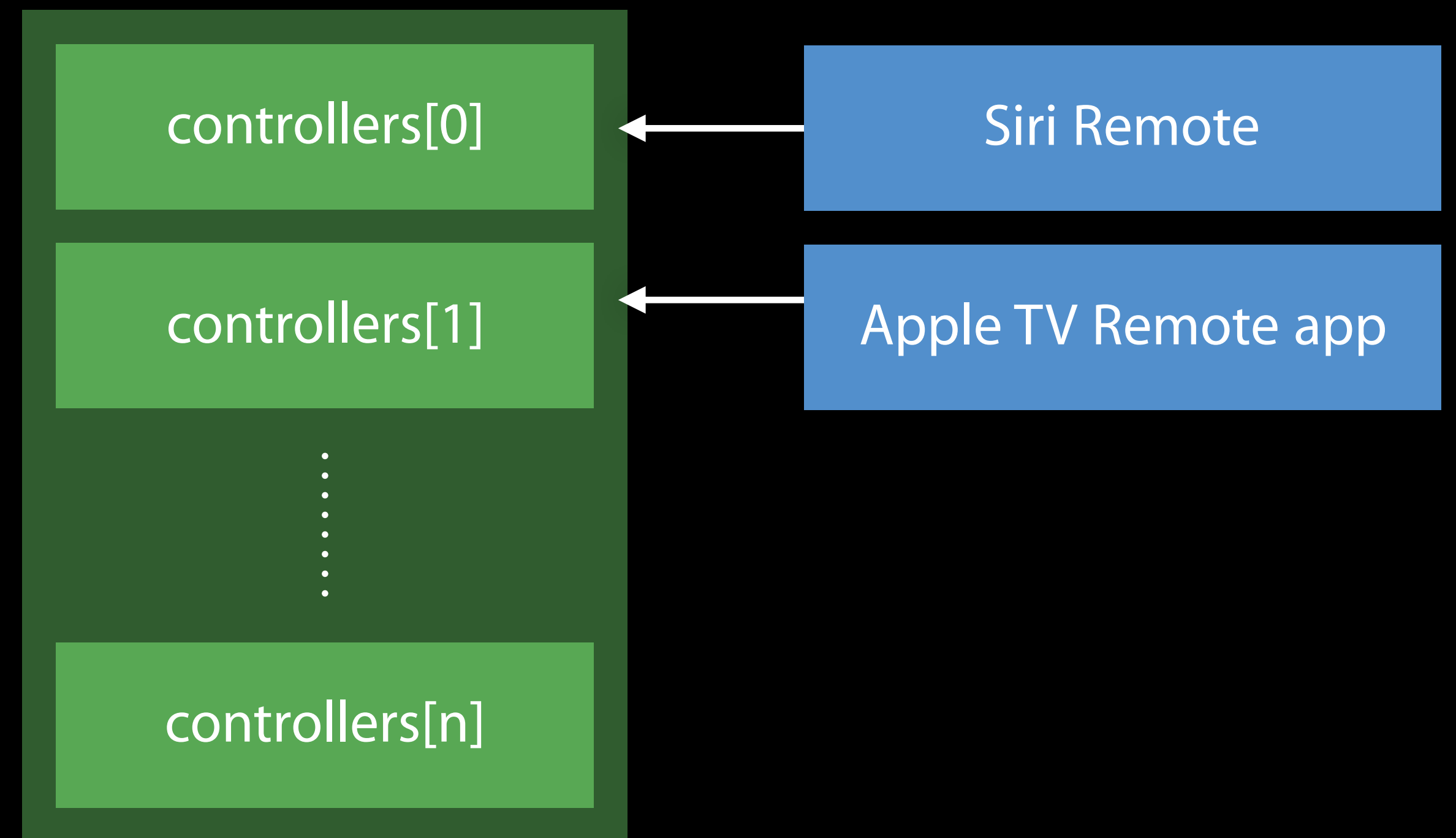
NEW



Apple TV Remote App

Separate remotes

NEW



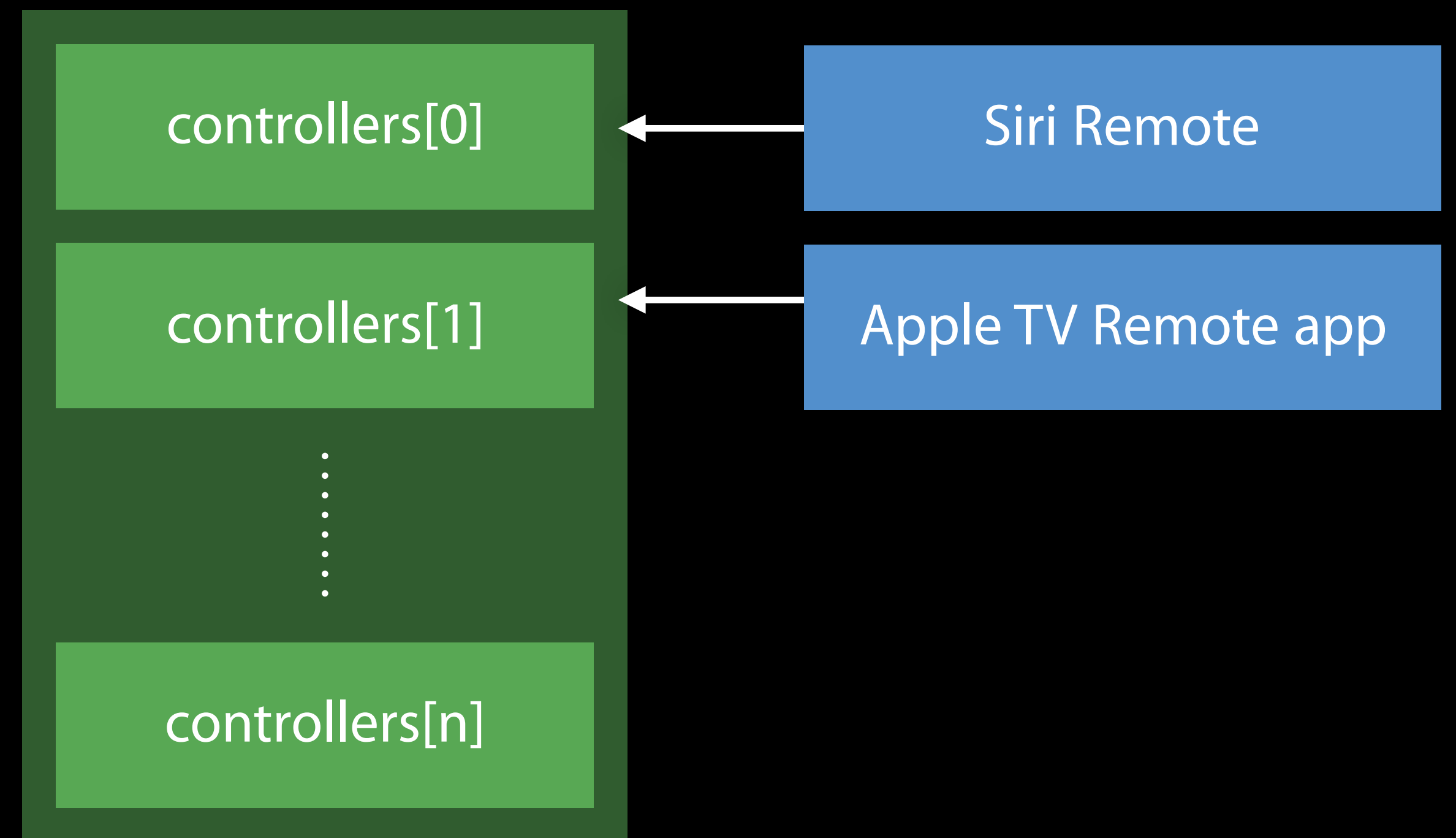
Apple TV Remote App

NEW

Separate remotes

Opt-in to separate Siri Remote and Apple TV Remote app

GCSupportsMultipleMicroGamepads YES
in Info.plist

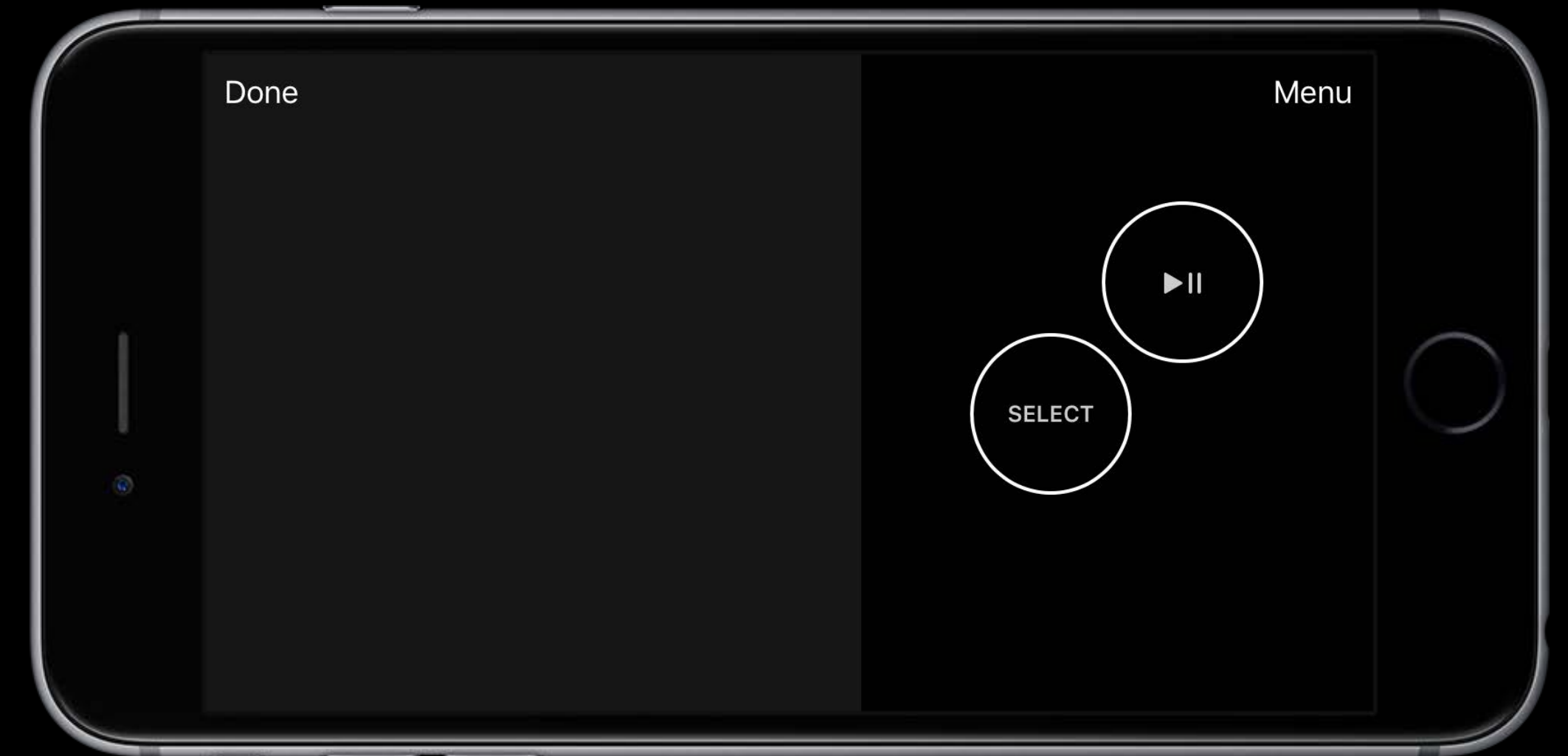


Apple TV Remote App

Design considerations

NEW

Game Controller mode is in landscape



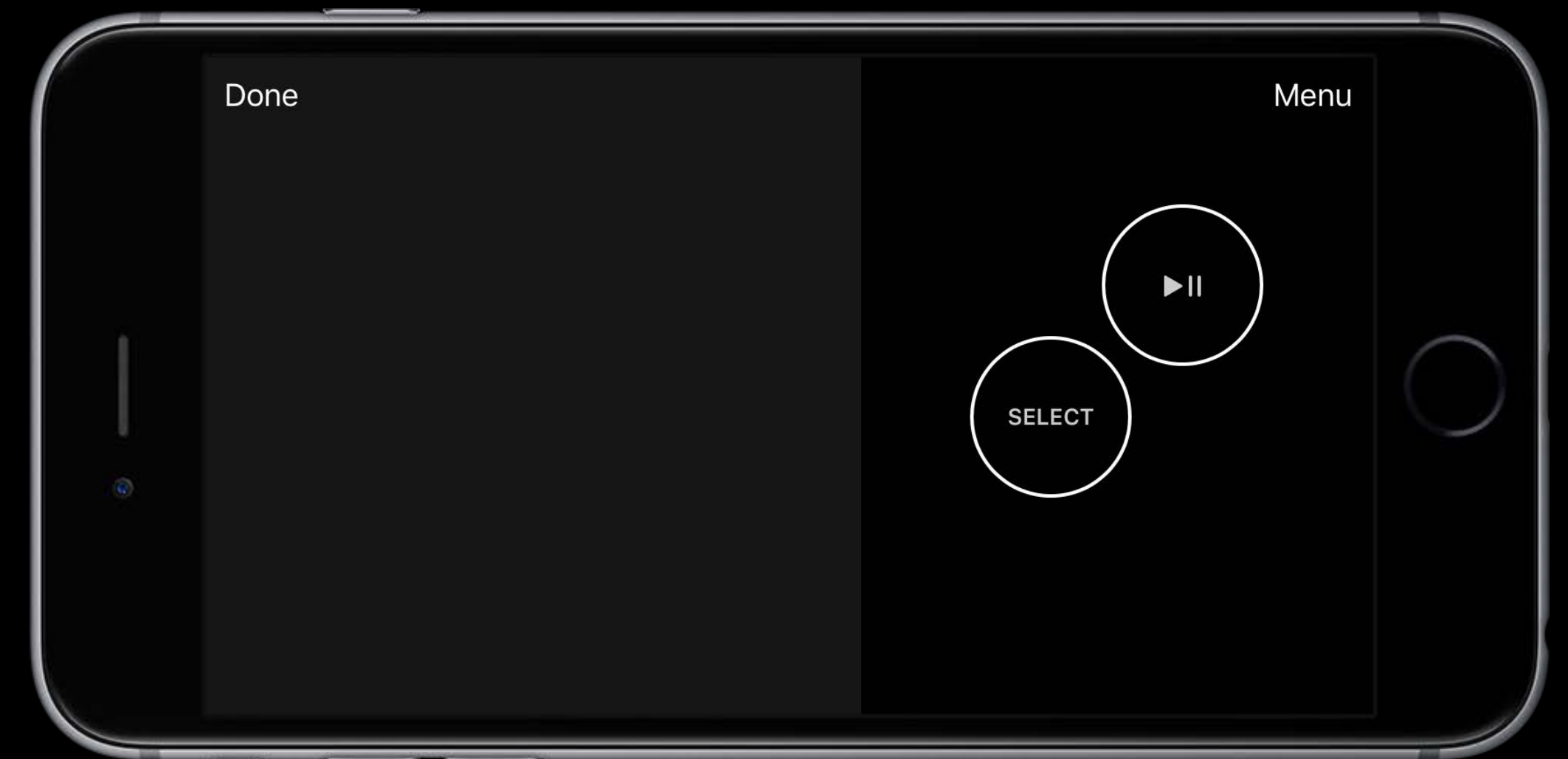
Apple TV Remote App

NEW

Design considerations

Game Controller mode is in landscape

Dpad values automatically rotated 90 degrees



Apple TV Remote App

NEW

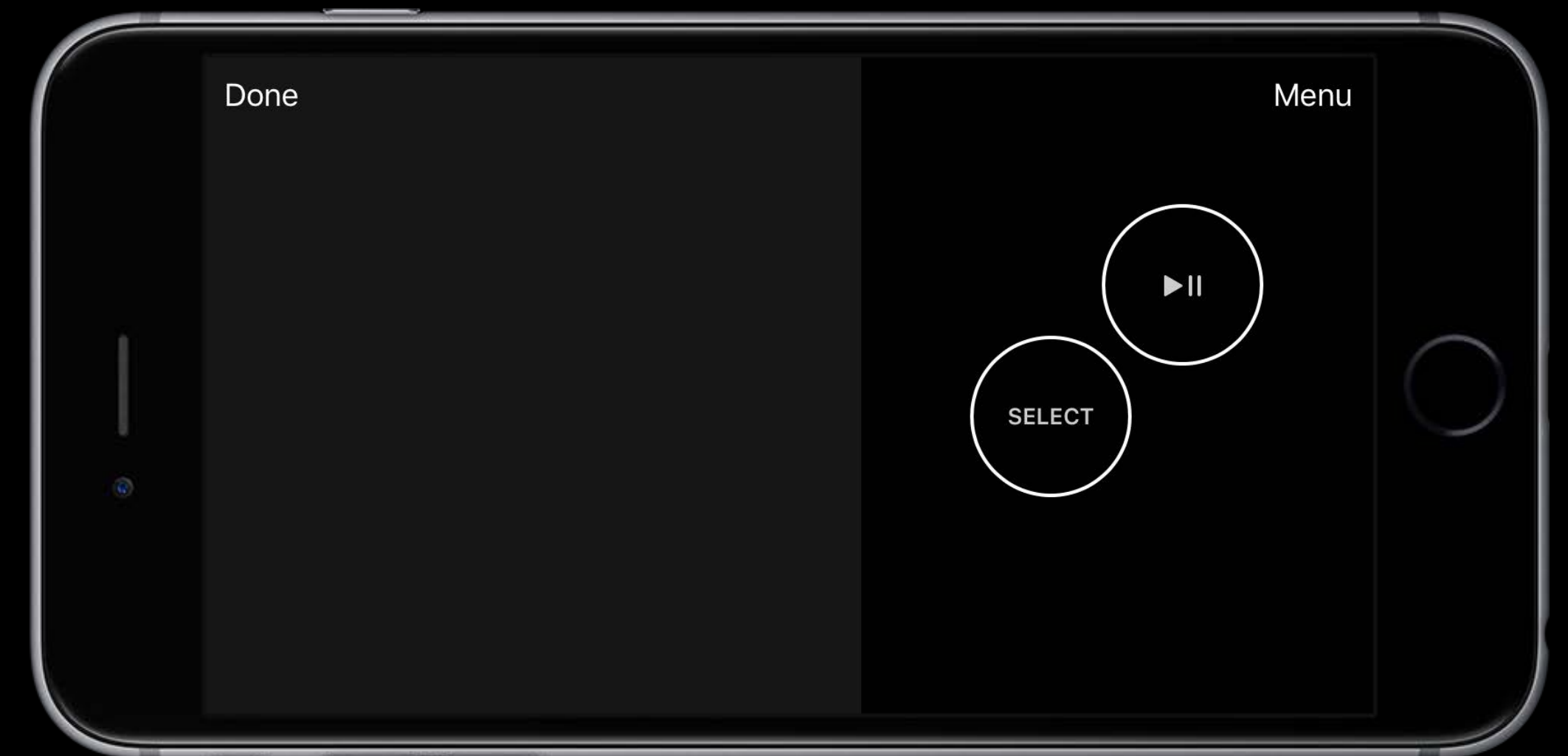
Design considerations

Game Controller mode is in landscape

Dpad values automatically rotated 90 degrees

Don't rotate dpad values in-game, instead set

`allowsRotation = true`

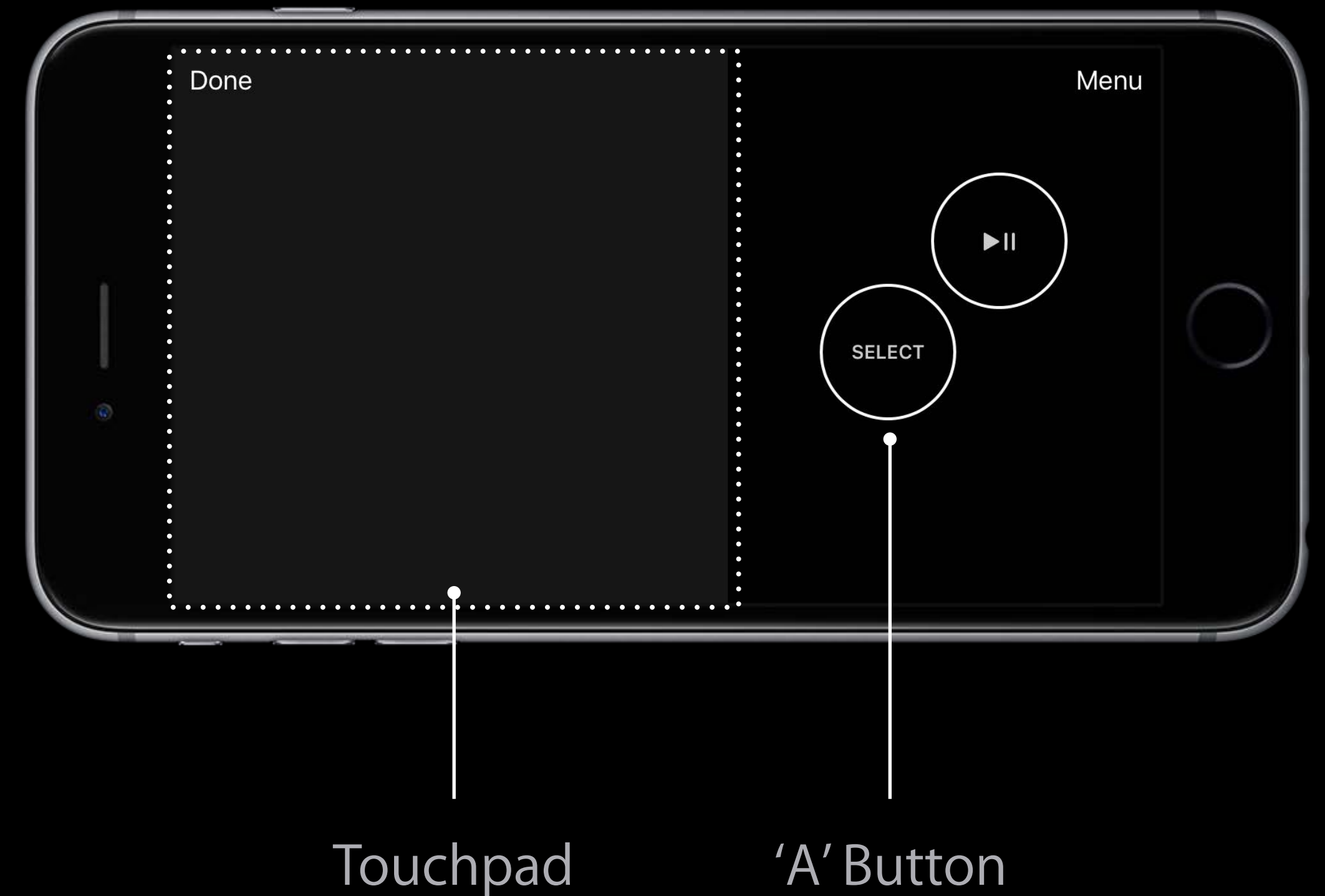


Apple TV Remote App

NEW

Design considerations

Game Controller mode separates 'A' Button from touchpad surface



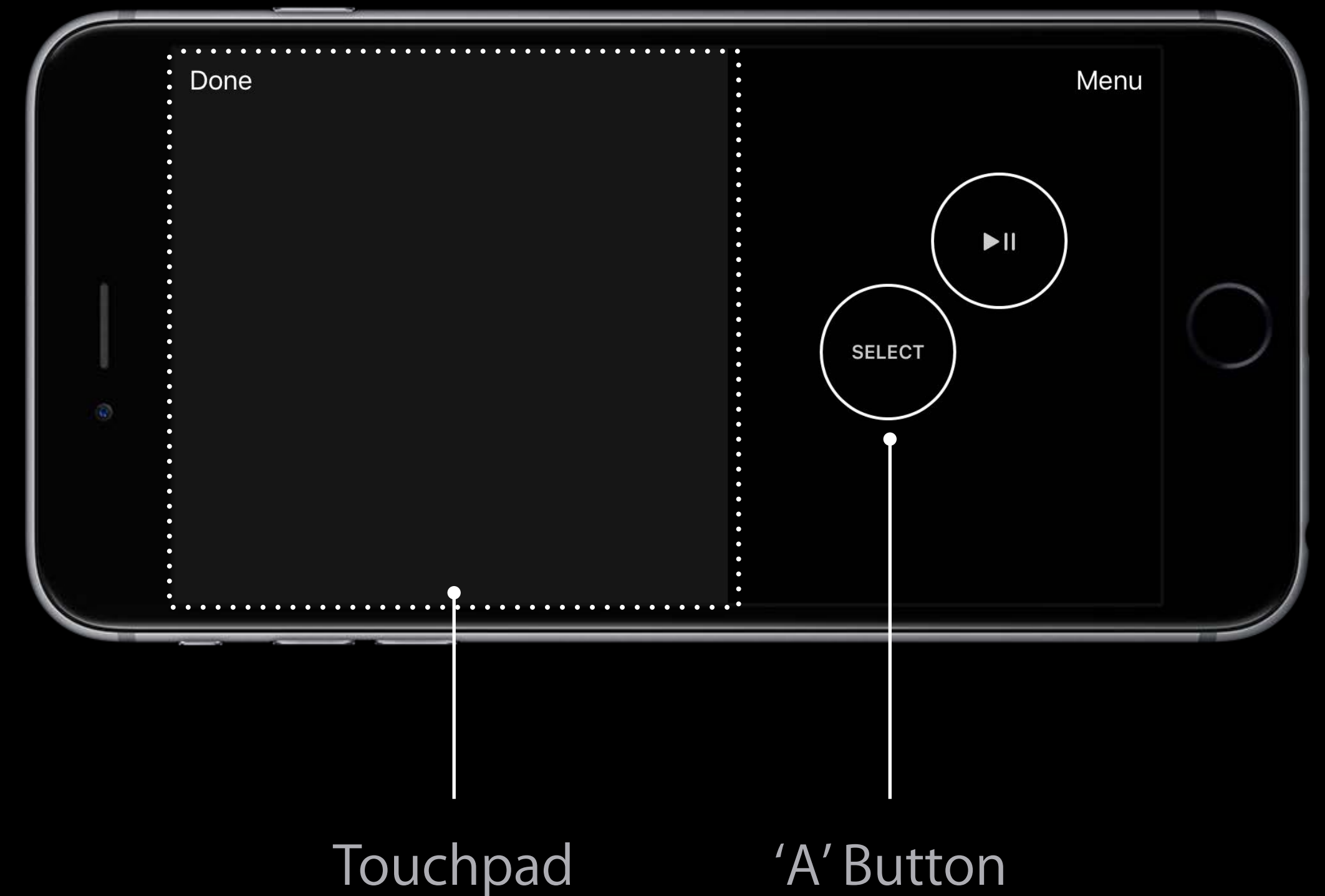
Apple TV Remote App

NEW

Design considerations

Game Controller mode separates 'A' Button from touchpad surface

Can still simultaneously use both



Apple TV Remote App

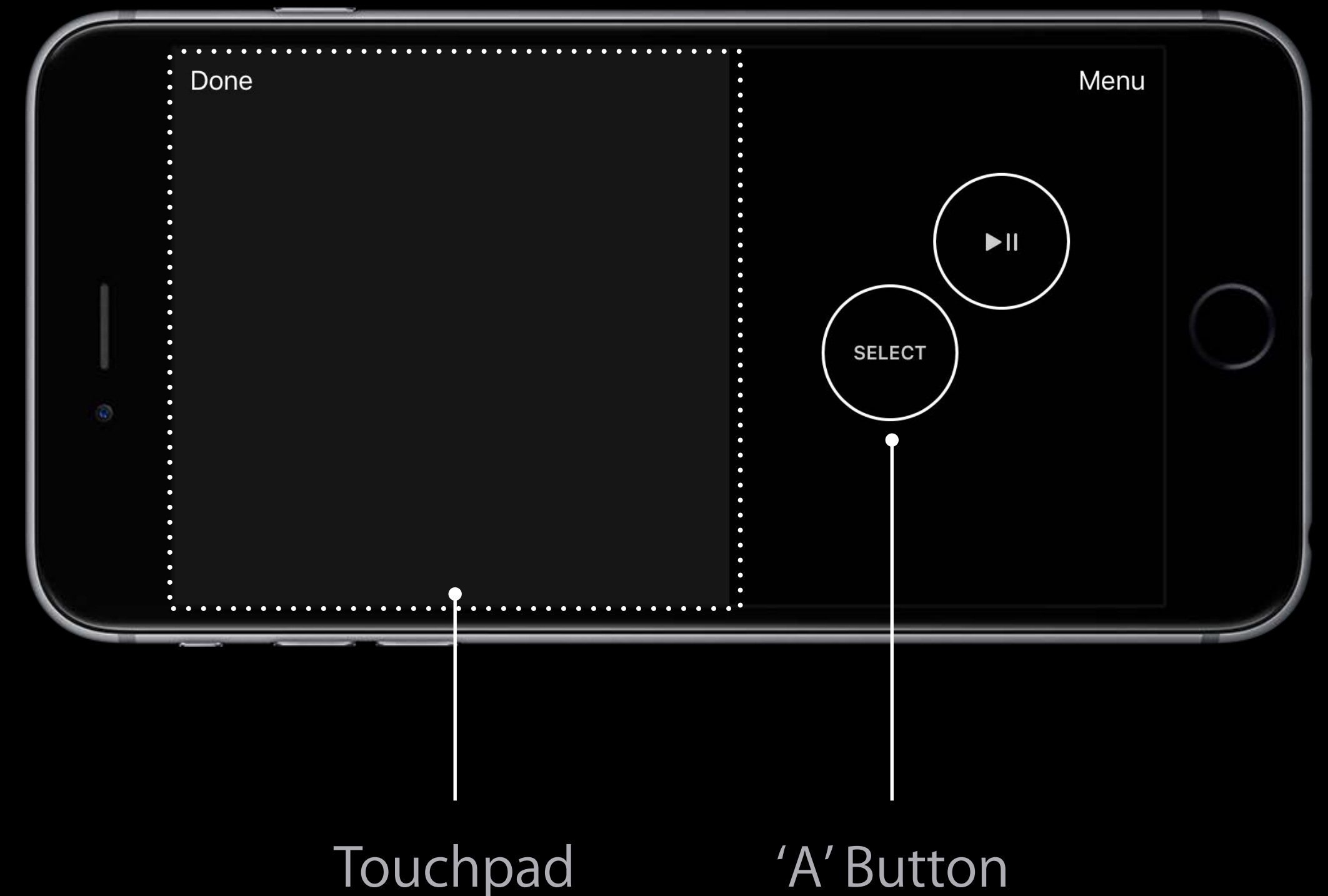
NEW

Design considerations

Game Controller mode separates 'A' Button from touchpad surface

Can still simultaneously use both

'A' Button presses don't implicitly provide touchpad DPAD values



Multiple Controllers

Multiple Controllers

NEW

One Siri Remote

Up to four MFi game controllers

Apple TV Remote app



Single-player game



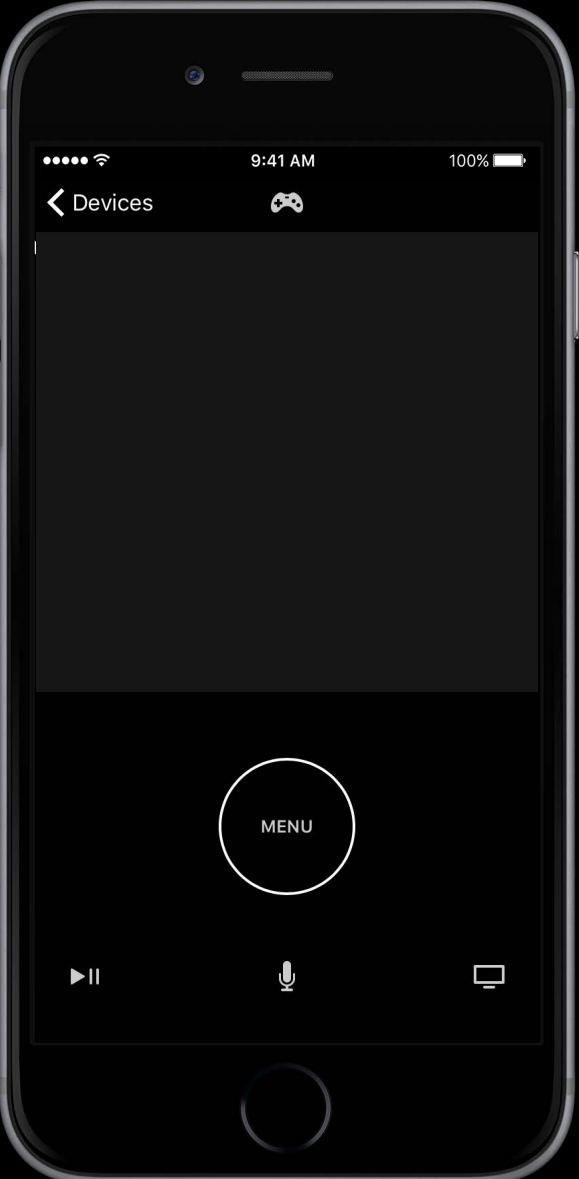
Single-player game



Single-player game



Single-player game



Multiple Controllers

Single-player best practices

Allow user to seamlessly switch to a different controller

Multiple Controllers

Single-player best practices

Allow user to seamlessly switch to a different controller

Treat intentional input (buttons, DPAD, thumbsticks, touch surface) as user intent

Multiple Controllers

Single-player best practices

Allow user to seamlessly switch to a different controller

Treat intentional input (buttons, DPAD, thumbsticks, touch surface) as user intent

Take motion from the last controller to register intentional input

Summary

Siri Remote

Menu button

MFi game controllers

Apple TV Remote app

Multiple controllers

More Information

<https://developer.apple.com/wwdc16/607>

Related Sessions

Mastering UIKit on tvOS

Presidio

Wednesday 10:00AM

Designing for tvOS

Presidio

Tuesday 4:00PM

Labs

Game Controllers Lab

Graphics, Games, and
Media Lab A

Thursday 9:00AM

tvOS Lab

Frameworks Lab D

Thursday 9:00AM



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