

COMPUTER SCIENCE QR CODE APP(XCODE)

Activity into App Development for Apple Ecosystem

Overview:

It is no surprise that Apple is one of the largest companies in the United States and with that IOS holds a large market share in the mobile operating system market. With roughly about 61% of users running a version of IOS vs a roughly 39% of users running a version of Android OS. Because of this there is a growing market for XCode developers. In this lesson you will learn how to create an app that will prompt the user to insert a link/text of their choice and a QR code will be generated, which the user will be able to save in their camera roll. ^[11]

Learning Outcomes

- Understand the XCode environment and the basics of the Swift programming language.
- Understand the basics of a programming file and how to create one.
- Understand the syntax and built-in functions in Swift.
- Understand how variables effect the output and layout of the app's UI.

What is a QR Code?

QR Code stands for Quick Response Code, and it was first invented in 1994 by Denso Wave, a subsidiary from Toyota. Similar to its barcode cousin, which I'm sure most you have seen, it is a way to store data in a way that can be interpreted by a machine (for barcodes it's a laser and for QR codes it's a camera). However, unlike a barcode which is one dimensional, QR codes can store alphanumeric characters such as letter, symbols, and numbers in a two-dimensional way. Although bar codes have gotten more advance and are now able to store alphanumeric characters, QR codes still can hold larger amount of information. ^[10]

Program Functions:

1. ContentView.swift

This is the main view of the program; this is where the user will input their website and the user will have the option to save the QR Code generated by pressing a button. The user will also be redirected to the photos app to see their saved photo.

2. QRCodeView.swift

This is the QR viewer and the program in charge of generating the QR Code. This will be a structure that extends View. This program will have three sections; the body, the generateQRCode(url: String) function, and returnQR() function.

3. TextClearButton.swift(Bonus)

This is an optional program that will facilitate the user on removing all content from the website field. This will display a delete arrow on the right of the field where if pressed, the content of the field will be replaced with an empty String -> "".

Basic Syntax:

import – allows the user to implement modules within XCode to be able to use properties from the imported module. If you are familiar with c and c++, this resembles the syntax word – include.

struct – use to initialize and create a structure, where you, the programmer, can define properties and different functionality that can be used and referenced across the program.

let – creates a constant variable that will not change if reference anywhere else in the program.

var – creates a variable that can change throughout the program.

some – creates an opaque type, where the function returns an object without defining its type.

func – this is a function declaration, this allows you, the programmer, to make function that will perform different tasks.

if/else – a conditional statement where contents inside the if statement are executed if met a condition, if not then either program will exit the if statement or enter the else statement if one is present.

return – usually places at the end of a function with a return type, this is what the function will return if called by another function/method in the program.

example|property – the operator here is the period - . -; this is used to access the properties of a method/structure/class.

Breakdown of Each Program's content:

ContentView.swift

VStack – crates a stack where content will be placed vertically on the view. ^[5]

Text – (parameters: a string) adds text to the view.

.font – allows the change of font to a various type like tittle, caption, body, etc.

TextField – crates a text filed where the user can place text by typing or copy & paste.

.dissableAutocorrection – this disables the predictive and autocorrect feature on the keyboard.

.autocapitalization – this disables the autocapitalization of the first letter when a user types on to the text field.

.modifier – this allows to implement a modifier; in our case this will be the clear all button



Form – this created a plane where sections can be placed in a group. ^[6]

Section – this creates a section in the view where content can be placed in groups

Button – this creates a user button with an action function to perform a task.

.position – this allows the modification of the position of the button label.

UIImageWriteToSavedPhotoAlbum – this allows the program to save a photo from one application to the photo library; it is important that a Photo Library Addition Usage Description, under privacy, property list is created in the Info.plist file.

UIApplication.shared.open – this allows the application to open another app in the phone using URL schemes such as in our case – photos-redirect:// for the Photos App.

QRCodeView.swift

CIContext – this creates an evaluation context that allows the programmer to process images; this will allow us in this case to create a UIImage (more on this further down) ^[4] from the created filter. ^{[1][2]}

CIFilter.qrCodeGenerator – this is the built-in XCode QR filter that will be used to create a QR image from a URL. ^[3]

Body – this is the main of the program, where the function generateQRCodeImage will be called.

Image – this creates an image type; in our case we are passing the QR code image created by the function generateQRCodeImage with a given URL – this image is of a UIImage type.

.interpolation – this set the interpolation of our image (interpolation is a scaling process); we do not want interpolation IN THE VIEW for our case because it will cause the QR code to be blurry.

.resizable().frame – this will display our QR code image in the view at a given scale; in our case it is 150px by 150px – also the alignment was set to center.

generateQRCodeImage –

CGFloat – this is a float type for Core Graphic framework, which will be how we are going to implement the transformation. ^[7]

CGAffineTransform – this is a transform matrix used in 2D graphics; it is a 3 by 3 matrix composing of [a, b, 0; c, d, 0; tx, ty, 1], where the last row is always [0, 0, 1]. ^[8]

.outputImage?.samplingNearest().transform() – this will use the Affine transformation and nearest neighbor interpolation to scale the filter.

.createCGImage – this will create a bitmap image from the filter.

UIImage() – this will create a UIImage from the bitmap image generated; this is done because the Content View uses UIImage.

returnQR – this is a function that will return the QR image created by generateQRImage, this was created to shorten the reference in Context View.



TextClearButton.swift(Bonus)

HStack – similar to a VStack, however content is spaced in a horizontal way. ^[9]

Button – this is the button that will perform the delete action

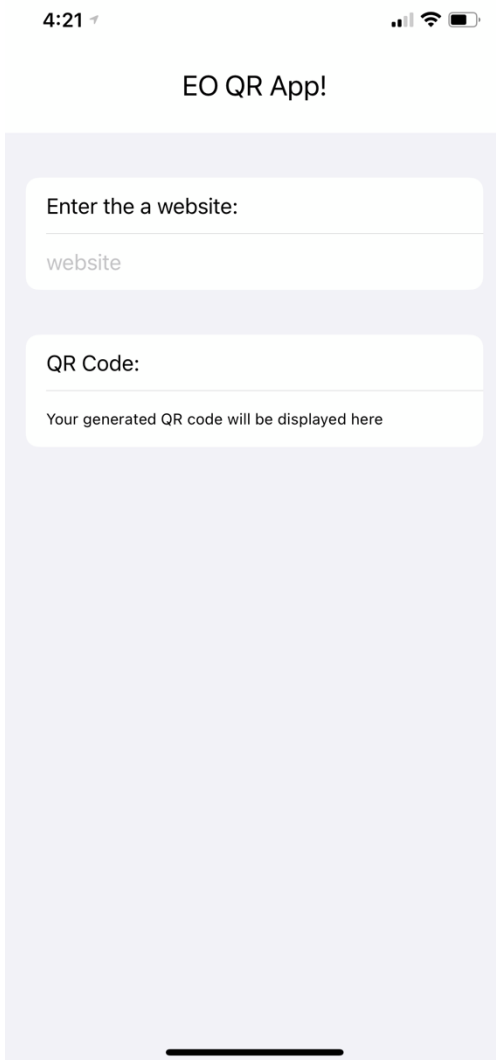
Label – this will create a label for the button

Image().foregroundColor(Color(UIColor.opaqueSeparator)) – this will set the label to a left delete arrow with an opaque/transparent color

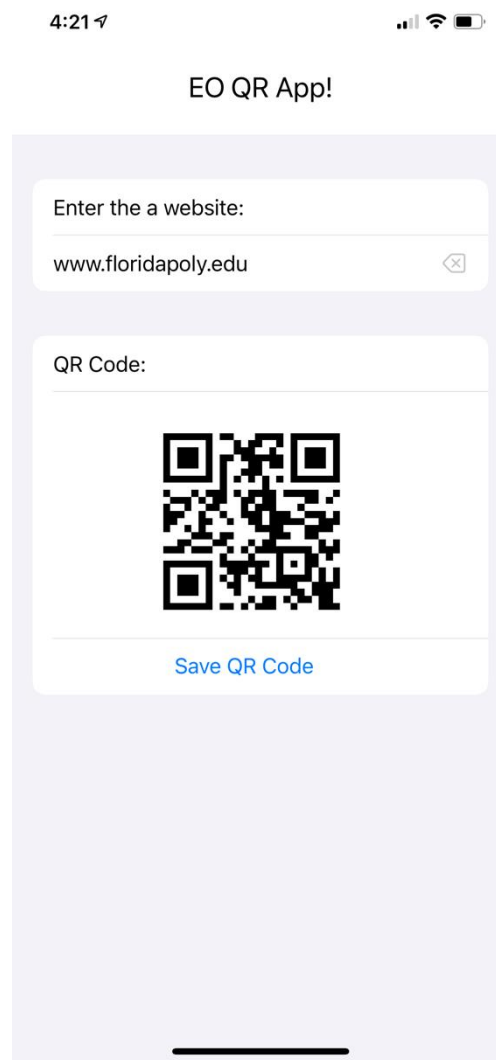
Photo Reference:

Text Field Dependent View:

If the text field is empty:



If the text field is not empty:

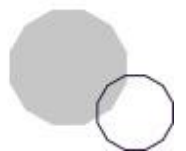


View Content:



Key:

A	VStack	E	Text
B	Form	F	TextField
C	Section	G	Button
D	QRView		



Review:

1. Describe what a QR code is and how it is used. Does QR code make it easier or more complicated to spread information?
2. What were the steps taken into creating an XCode project and each individual file with-in the project?
3. What swift file did you find the most interesting? Describe what the file does in three sentences.
4. Thinking outside the box: What do you think is the biggest flaw in using XCode to create mobile applications? Are you limited to one platform?

References:

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- [10] Kaspersky, “What is a QR Code and how do I scan one?,” *usa.kaspersky.com*, 10-Sep-2020. [Online]. Available: <https://usa.kaspersky.com/resource-center/definitions/what-is-a-qr-code-how-to-scan>. [Accessed: 12-Dec-2020].
- [11] “Mobile Operating System Market Share United States Of America,” *StatCounter Global Stats*. [Online]. Available: <https://gs.statcounter.com/os-market-share/mobile/united-states-of-america>. [Accessed: 12-Dec-2020].

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