**Tell us about the features and technologies you used in your Swift playground.**

I have always been fascinated by navigating with GPS. Apps such as Maps provides turn-by-turn directions effortlessly. There are hundreds of thousands of roads and tens of thousands of cities, how does an app know what’s the fastest route to my destination? Recently, in my Algorithm and Data Structure class, I learned about graphs and Dijkstra’s algorithm, commonly used for path planning. I decided to construct a graph of 87K+ cities and towns in the United States, and create a path planner with Dijkstra’s algorithm. Of course, this is nowhere close to the sophisticated software behind Apple Maps. This project demonstrates the functionalities of graphs and Dijkstra’s algorithm with an interesting Swift Playground.

First, the Swift Playground will take you on a brief tour of graphs and Dijkstra’s algorithm. Your can try out a graph visualization demo, created using SpriteKit. You can add more nodes and edges and see them appear on the Playground live view. Each node has a key, which is an integer. Each edge has a weight, which is the length of the edge. By entering the start and end node, you can see the shortest path between the two nodes on the screen.

Next, I created an interactive app that allows you to find the shortest path between two cities or towns in the United States. The path is calculated based on the Euclidean distance between the two points (no fancy geometry here). First, click on the text field to enter your starting city and destination city. A search view controller will be presented, allowing you to find the city with ease. Once you have entered two cities, click the Make Route button. You will see a path being drawn on the screen. An alert view will also be presented, with information on the execution time of Dijkstra’s algorithm, and the number of cities your path crosses. In a table view below the map, you can find all of the cities and towns on your path. If you want to find another path, click the clear button. This demo was created using UIKit and SpriteKit. UIKit naturally handles all of the UI functions and elements. SpriteKit is a robust and convenient framework to visualize cities and paths.

**If you've shared or considered sharing your coding knowledge and enthusiasm for computer science with others, let us know.**

When I was thirteen, my parents gave me my first computer, a MacBook Pro. Ever since installing Xcode 5.0 on my computer, I have been in love with computer science, especially developing apps for iPhones, Apple Watches, and Macs. In the past five years, I have created a Run Tracker, an elegant task manager, computer vision and machine learning demos… My experience as an Apple Developer taught me many lessons about app development, computer science, but more importantly about collaboration and hard work.

In high school, I broadened my scope by taking several computer science classes. In my Data Structure and Algorithm class, I create iOS and macOS apps to visualize binary search trees and sorting algorithms. For my research project, I created a Swift neural network library and an app that can detect handwritten digits with a 95% accuracy.

Beyond app development, I am also a passionate machine learning research and electrical engineering. From building a quadcopter to making a 16-bit microprocessor, I love problem-solving and creating things with my own hands. For the past two years, my friend and I have been building a self-driving golf cart. Given the budget, material, and our limited knowledge, we had to find unique and simple solutions to complex issues. After iterations of designs and failures, we finally added electrical control to steering, throttle, and brakes. The hard work didn’t stop there. I needed to create a vision system that would allow the vehicle to follow the road. Months of research paid off. With a simple camera and complex software, now the vehicle can avoid obstacles, autonomously follow the road, and localize in complex environments.

I also love to share my passion and knowledge with others. I founded the App Development Club at my school. Our goal is to empower our community through coding. We created an iOS app for the school news and information website, currently available on the App Store. For more than a year now, the club has been hosting an Hour of Code every Sunday during the school year. We bring together local elementary school students and participate in coding activities. It’s deeply rewarding and gratifying to see our students fall in love with Swift Playground and LEGO Robots.

I had the honor to present a TEDx talk on my work in machine learning. I made an iOS app to demonstrate computer vision techniques during the talk. With technologies like the iPhone and iOS, the sky is not the limit. My TEDx talk has accumulated 220+K views on YouTube.

Looking back, my amazing experience with computer science and engineering started with an iOS app and Xcode. In 2016 and 2017, I had the incredible honor to attend WWDC as a scholarship recipient. I was blown away by the combination of the best technologies with the brightest minds. If I am so fortunate to attend WWDC this year, it would be another humbling experience. Thank you for your time and attention. I look forward to an amazing WWDC.

**If you have one or more apps on the App Store created entirely by you as an individual, tell us about them.**

Visionary is an image analyzer app powered by amazing computer vision technologies. The app allows you to convert a full page of text to the digital format with one click. You can scan the logo of a brand and the app will bring you to their Wikipedia page. Last but not least, the facial recognition feature can even detect facial expressions and emotions. Simply open the app and choose the task you would like to perform. Then, take or pick an image, the app will analyze the content of the image for you.

Track Your Run was originally inspired by my track and cross-country coach. He wanted a fitness app tailored to his needs. After years of development, Track Your Run has become a robust, all-in-one run keeper. The app logs your pace, distance, and location, and also record your heart rate, calories burned, and splits. The run analysis feature provides graphs of speed, stride rate and more. You can also see tips & suggestions based on your run data. The app watch app provides a seamless extension and syncs with the iPhone automatically.