Executive Summary - Ground Reaction Forces Instructional App

Overview

The task given by the Golf Teaching and Research Center was to create a phone application aimed at teaching golf instructors on how to better their students golf swing. This application was made in a relatively new programming language called Kotlin in order to suit the Android OS. The project had to visually display ground reaction forces at seven key points in a golf swing, as well as allow the user to manipulate these forces as he or she saw fit.

Objectives

Our objectives for the capstone project were to create a mobile application for the purposes of teaching golfing instructors and students more about the physics of a golf swing, and specifically the ground reaction forces exerted by the golfer. The goal during this teaching is to enable the user to visually see how the change in these forces affect the frontal moment, and to allow the user to have full control over this functionality in the palm of their hand at home. Reaching the audience and creating this more personal and intimate connection through the app will hopefully help to better teach the principles of the course being taught by the Golf Teaching and Research Center here at Penn State.

Approach

The following steps outline the approach done by the team to accomplish the task of creating an Android application for instructional use:

● Meet with our sponsor and discuss what different components need to go into the design of the application and to better understand the customer needs
● Decide which IDE to use and whether or not we want to develop the application for IOS or Android or both
● Review existing products and patents on the market currently to ensure what we are doing is not violating anyone else’s intellectual property. This is covered in the Existing Products portion of the final report.
● Study documentation on the coding language Kotlin, and determine how to design the code in a format that will maximize efficiency while still remaining intuitive and understandable
● Design the look of the application by drawing it out on a virtual phone using an editor
● Derived equations for use in the code that correspond to the vectors shown in the app
● Tested throughout developing through Android Studios with the virtual devices in the IDE
● Validated our results against equations and working with our sponsor to ensure the values seemed correct and up to par with what was expected
● Results were in the form of an application with text data and visually represented data via lines that are draggable and responsive on the screen

Outcomes

This project resulted in a new and unique product for our sponsor’s use in teaching golf instructors and students via online courses offered by the Penn State Golf Teaching and Research Center. The product will hopefully bring in new customers and enhance the experiences of those taking the course, allowing them to more easily understand ground reaction forces in a golf swing.