Abstract

The objective of our project is to design a device that will act as a user’s podiatric assistant for daily activities, such as running. The purpose of the device is to help the user perform better and help avoid injuries by improving their forms. The device would be attached to the user shoes, either below as a sole, or further integrated as an insole. The device tracks the user’s activity, such as their running form through the use of the sensors. It would record this data and even identify the foot type of the user, with this information being sent back to the user through an app.

The app would then analyze the stored data and, with this information, could show the user the type of walker or runner they are, show their current performance, give warning to improper form, and even offer suggestions on how to improve speed with certain techniques like foot line fire drills, or speed step-overs. This device differs from other fitness assistants in the case of running, the device could also show the user’s running stride such as toe striking or heel strike. Where most sensors to this point have only provided general pressure information, our insole design and subsequent app will look to serve users in both performance and general well-being, providing a more targeted and easy-to-understand user experience without the need for heavy parsing and understanding of the raw data.

Potential sensors that can be used here include products from Tekscan, such as the FlexiForce ESS301 Sensor and/or the FlexiForce A401 Sensor. These sensors would be placed either on top of or shallowly within an insole, in specific locations where the foot pressure is...
present the most. The sensors would measure pressure applied by varying an output voltage. The output voltage would be read by our Arduino Uno R3 Microcontroller, sent to a Bluetooth device and finally to the application. With the voltage output of the sensor, we will also be able to extrapolate if their form is correct and be able to notify the user if it is incorrect. This would be used to begin customizing the user experience from there.

With this insole sensor, we hope to create an Android fitness app using Android Studio that will be able to use the outputted data from the sensor, improving on the current design of fitness apps. With information of the user’s foot the app can curtail suggestions on how to improve their performance. Designing this device should be possible with the sensors, but getting the data from the shoe to the Android app will be challenging, but possible. However, the most challenging part would most likely be extracting the data and show it to the user as the right information, but making the app should not present itself with too many problems. With this device, we hope to help users not only in their performance for competition, but also in their quest in improving their fitness and general well-being.

References:

https://www.tekscan.com/products-solutions/force-sensors/ess301?tab=sensor-output-