**Get Fit Right**

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Our group has determined to create a fitness simulator for the duration of the project. Although we hope to open up the concept to many different forms of exercise, our initial focus was in the Gym. The use of improper form during many of the more complex exercises – Deadlift, Squat, Snatch – can lead to injury. The goal of our simulator is take a user through the exercise in a safe, comfortable environment where the risk of injury is as minimized as possible. It will start by utilizing motion capture technology through the use of a camera, and suit that the user can wear in order to analyze the movements of a user and then give them appropriate feedback. The purpose of this summary will be to delve into our ideas regarding hardware, constraints, and things to consider.

As stated, our premise was initially shaped around exercises within a gym; these exercises are to be focused on the user’s needs. If a user is looking to just get in shape, or improve performance on a particular fitness aspect, our simulator will be able to customize plans that work for the user. The most intimidating exercises in a Gym can be really anything involving a barbell. The barbell squat can be one of the most dangerous to do because it is usually the one in which people can load the most weight. Although pain may not be immediate, strenuous exercise coupled with poor form over a long period of time can lead to injury. A simulator would be beneficial due to its ability to provide feedback to a user who may not be experienced enough to pick out the faults in his/her own form.

In order to resolve the scenario we must consider what technologies would be most beneficial to incorporate. First, we plan on using some sort of hardware to keep track of the user’s movements. There are multiple factors to consider when determining what the appropriate hardware would be in this endeavor. Motion capture technology would be very useful, as it would allow us to capture the entire frame of the user as opposed to a sensor we could just place on the bar. In addition to that, we could possibly use a mobile phone camera for the motion capture. This would be helpful as smartphones are accessible to most everyone and would make use of the simulator far easier then possibly needing to have an external sensor or camera. For these reasons, we have determined that motion capture via smartphone will be the most readily available medium to use our application. The technology that is to be paired with our software must be practical for use. For this reason, we have chosen to not create any specialized barbell or expensive equipment. Our application will be created to be accessible to the masses.

In addition to our motion capture technology, we have also teamed up with Nike to provide an even more accurate method of collecting data. Our user will begin by entering their statistics; which can include their height, weight, and tests for flexibility. Our client, Nike, stands to gain by developing shirts and pants which can be used to track our users. The clothing has special embedded marker at strategically placed locations, and our motion capture technology uses those embedded sensors in order to better visualize how someone is moving. Nike is an established wellness company which will benefit from the creation of the next generation of training technology.

Our device does not only check for proper form and match it to an “ideal” image. Instead, it utilizes machine learning in order to learn more about the user. Everyone is built differently, therefore, not everyone should be given the same advice. Our application is one that get significantly more intelligent over time. Each user’s profile is entered into a database which the application can later reference for other similar users. It can check to see what was successful before and keep tweaking the advice to get maximal results. This way we can allow our users to feel truly taken care of and immersed in our program. This is opposed to being given a “cookie cutter” program which would not work for just anyone.

Lastly, it is important for us to be able to determine the root cause of the user’s inability to perform an exercise correctly. Although it may just be confusion, or lack of experience, it may also possibly be anatomical. Another aspect that our device should be able to determine is any issues that come from a lack of mobility. For example, if the user is having trouble to sit all the way down in a squat, one problem can definitely be ankle flexion. In this case our device could advise certain stretches to help, like in this case, possibly foam rolling their calves. Mobility is just as crucial for our user’s success as strength and agility. Not only is it important for our customer base to get results, but the protection of their joints and body in general is important for their health and long-term wellness. For this reason, we have chosen for our application to analyze the body for longevity and overall wellness. In conclusion, our device will be a simulator that will be able to monitor a user perform an exercise, and based on the data gathered, be able to advise them on how best to improve.