

Alan D. Gerdov

Partner: Jonathan Liu; Faculty Advisor: Professor Len Middleton

Engineering Honors

Rachel Armstrong-Ceron, Stacie J. Edington,

Bonnie Mae Karsten, Jason P. McCormick, Ashli Wilson

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## PrimeTime - WN21 Capstone Final Report

### **Introduction**

We all know about the typical New Year's Resolutions to get in shape and stay that way. It is only human for it to be difficult to maintain the discipline to get to the gym or to start that run. Especially now, being limited by a global pandemic, it feels like all tasks have extra hurdles to jump through. Most of us mean well, but without a trainer, coach, or gym, we often fall short of our goals. Sometimes all it takes is someone telling us what we already know, what we need to hear, and that is we all have what it takes to improve our fitness as long as we just keep going.

My former gymnastics teammate, Jonathan Liu and I have been working on PrimeTime, a new workout interval timer application. With the guidance of my faculty advisor, Professor Len Middleton (especially in his Entrepreneurial Management, ES 395 course) and support of the engineering honors team, we have been tackling this endeavor since the beginning of the new year, 2021 and are planning to keep picking away at it into the summer. The functionality is operating, and we are making encouraging progress. We hope to run trials of our Version A at

our gymnastics practices by August, 2021 which will guide the finishing touches that we would want to consider before releasing the first version.

## Motivation

The specific motivation stems from the beginning of quarantine in March, 2020. With the cancellation of season and closing of businesses, us gymnasts (like many others) were forced to find creative means of staying in shape. Outside of running or doing general exercises/lifts with the limited equipment of our college house, I was hoping that there would be an application that would allow me to create time-based circuit workouts. Though similar interval timers already exist, current competitors do not have all the features that we aim to hit with our application, PrimeTime. In the meantime, I would do my own research, physically write my own workouts, and follow a competitor's timer as best as I could, but the whole time I was thinking, "I could do this better." I started writing notes, doing my own research and planning, and reaching out to colleagues that I would prefer to approach this project (turned capstone) with.

The New York Post released an article titled, "This is why most Americans don't exercise more" on January 13th, 2019. By my calculations, that gives about two weeks into people's valiantly failed New Years' Resolutions.

I don't have time	42%
I don't have the motivation	35%
I don't like exercising	25%

Work gets in the way	23%
I feel too old	23%
I don't see results	22%
Don't have equipment at home	21%
It's too expensive	20%
It's inconvenient	19%
Gym is too far away	18%

From “I don't have time” to the “Gym is too far away”, all ten of these excuses are completely mitigated by our time-effective, motivating, fun, free, convenient, and simple application, PrimeTime.

Not only does encouraging fitness help tackle the international obesity problem which America takes the cake (no pun intended), it has several other benefits as well. The CDC (Centers for Disease Control and Prevention) released an article about the “Benefits of Physical Activity” listing but not limited to improving your brain health through battling anxiety and depression while helping you sleep better, reducing health risks such as cardiovascular disease, Type 2 Diabetes, Metabolic Syndrome, and several forms of cancer, strengthening your bones and muscles, and improving your ability to do everyday activities with a heightened quality of life.

David Goggins famously says “if you have a room in your house, you have a gym.” I would like to add that if you have a room in your house and a smartphone or tablet, you not only have the gym, but now you can also have the results.

## **Focus / Concept**

Our focus is on user experience, and we wanted our first version to be simple and comprehensive yet thoughtful and satisfying to us and the consumer. Version A has three main features with their own respective subfeatures. Getting down to the brass tacks, the three features are the actual interval based workouts where you can create, edit, and store any workouts as presets for your convenience, the dynamic exercise catalog organized by target zone muscle groups, and lastly just a simple stopwatch and timer. PrimeTime gives you the freedom to navigate these target zones - Arms, Shoulders, Chest, Back, Abs, Legs, and Cardio - and use the exercises within them through an interval timer perfect for time-focused circuits. All of the selectable exercises include a name and description while there is also a dynamic ‘add exercise’ option where you can include any of your own exercises.

When creating the workouts, all you need to do is pick the time for each exercise, time dedicated for rest, how many and which exercises you want to do, and how many cycles you plan on running through. An easy example is called a full-body 20 seconds on, 10 seconds off Tabata workout. Let’s say you choose 6 exercises, and you want to run through it 5 times. You pick jump rope, push-ups, air squats, sit-ups, bicep curls, and jumping jacks. Your whole workout will be 15 minutes, where you will execute those 6 exercises for 20 seconds and rest 10

seconds in between each one. You would do that 5 times while your smart device visually and audibly updates you with periodic relevant warnings such as “half-way”, a three second countdown, or what the next exercise is.

### **Full-body Tabata (20 seconds on, 10 seconds off) Workout**

5x the following → 15 minutes:

1. *Jump Rope 20s, Rest 10s*
2. *Push-ups 20s, Rest 10s*
3. *Air Squats 20s, Rest 10s*
4. *Sit-ups 20s, Rest 10s*
5. *Bicep Curls 20s, Rest 10s*
6. *Jumping Jacks 20s, Rest 10s*

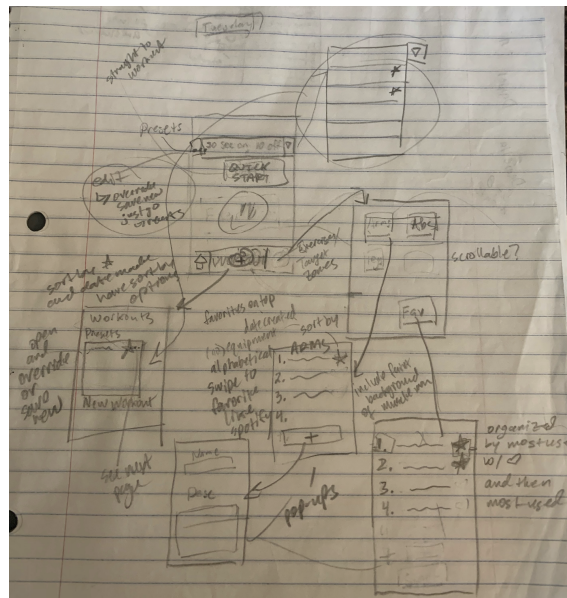
### **Process / Methods**

I am grateful to have a partner like Jonathan Liu. We were an effective duo regarding capitalizing on our strengths and recognizing creative solutions to our weaknesses. Jonathan and I are graduating with our B.S.E in Computer Science and Electrical Engineering respectively at the end of this April, 2021. Our technical EECS experience was especially relevant in creating an application from scratch without provided specifications. Our classwork and work experience in programming, especially Jonathan’s, allowed us to not be overwhelmed by the lack of direction. Our gymnastics experience and growing up involved with sports and fitness also gave us critical

understanding in the content of the application. We were essentially able to follow the guide of “What would we want in this app?” which made it a lot easier to plan our meetings.

As the creator of the idea, I initially explained at a very high level what I was picturing. Jonathan was immediately interested, and we eventually had to turn it from thoughts and word vomit into physical designs. We drew our individual ideas and even had our entire first two three-hour meetings discussing application design and storyboard layouts. It is only natural, especially if you have limited experience, to have to go back on your work, scrap it, and start over. In effort to mitigate this, we wanted to plan out our vision on paper as much as possible, so we can make any appropriate changes to the plan as we get there rather than just going rogue for each step.

Below is an example of the application web design that we initially used to direct our work. Though it does not appear super comprehensive, the act of discussing this and making it, allowed us to be a lot more effective and organized.



We started out using the application XCode and its features under the language Swift, but after a couple sessions of us trying to navigate that, we found it was easier to use the software called Unity under the language C#. Unity is a cross-platform game engine used by many games that are currently on the App Store and Google Play Store. Jonathan has a lot of experience in Unity from several class projects. Though it pales in comparison, I have a reasonable amount of coding experience myself, and most of it was in C++ or C which is much closer to that of C# than Swift. This change in software, though wasted work of a few sessions, ended up being more productive due to our experience. Jonathan was able to familiarize me with the software and how to use it while we were making gains on the project. He would work quickly on the code behind the functionality, and I would help out with the logical pseudocode. With less experience with syntax, I would be more responsible with structuring each storyboard along with the more basic scripts.

We aimed to meet once or twice a week for three hours every week until the end of the semester. Though the gymnastics travel schedule and both of our surgeries (discussed later) tried throwing a wrench in our plans, we adapted as well as we could. I was responsible for finding a person to help us design our logo and other basic graphics. Unfortunately, she lost her work on her broken computer and is trying to retrieve it at the moment. I also photographed my teammates to model the exercises and target zones. We tried to create everything in-house to avoid any potential legal issues for when we eventually submit this to the App Store and Google Play Store. I also created our initial list of exercises, their descriptions, whether they require equipment, and their respective target zone assignments. We will add to this to have a more extensive list, but we first wanted to make sure it worked as intended with the initial set of

exercises. An example from three target zones is below. Note that some exercises belong to multiple target zones. This will certainly be accounted for in the application at the completion of Version A.

<b>Arms</b>	<b>Shoulders</b>	<b>Chest</b>
Pull-ups	Shoulder Press	Push-ups
Chin-ups	Handstand Push-ups	Bench Press
Push-ups	Front Weight Raise	Chest Fly
Hammer Curls	Reverse Fly	Dips
Dips	Lateral Weight Raise	Wide Arm Push-ups

## **Discussion**

We learned a lot throughout this project, from fitness to application development to operating Unity to entrepreneurship to handling adversity. In the process, we were also able to decide what to prioritize in our Version A. We have a lot of high hopes, but in terms of meeting our deadlines and creating a product that we can use as a baseline, we needed to choose which features make the final cut. We ultimately aim to put these features back in. It was hard to let some of them go for the time being, but learning how to effectively prioritize is one of our largest takeaways.



All things considered, I am grateful for being in Engineering Honors which was the catalyst in me finally pulling the trigger on working on one of my few application ideas. As a business and engineering honors student-athlete, my schedule is busy to begin with, but this semester turned out to be one of the most difficult yet. Nevertheless, I am happy to have been *forced* (for lack of a better word) to start this project. We faced several obstacles along the way such as conflicting schedules, a fluctuating competition and travel gymnastics schedule, and surgeries. Jonathan and I both had unexpected surgeries, his in his shoulder and mine in my knee. This made our schedules a lot more variable and complicated due to recovery, therapy, and general health limiting our meeting and coding opportunities. Despite it all, we were able to remain positive and optimistic and coded most of the functionality with relative success. With classes and season ending, we aim to delegate a lot more immediate attention to this project because capstone or not, we really believe that this could help the fitness goals of many, including ourselves.

I look forward to keeping you updated. I cannot wait to see where this goes and how the application develops. We are only working on Version A at the moment and already have plans for the future. Some of our cool future ideas for user experience is to incorporate repetitions into our workouts. Specifically, instead of everything being done by an automatic timer, you can add rep-based exercises in your workout, and you will only be able to move on from that exercise when you notify your smart device that you finished the amount of repetitions. This goes in hand with having inconsistent timing between exercises. We want the user to have as much freedom in creating their workouts as possible. This plans to consider having both time- and repetition-based exercises in the same workout along with having a different amount of time in between exercises

(ie. Exercise 1 - 20 seconds, Rest - 10 seconds, Exercise 2 - 30 seconds, Rest - 30 seconds, etc.).

We want more organization and connection between the exercises and target zones, and eventually a “Favorites” target zone and sort features that allow quicker navigation. Many other ideas relate to user experience in minor ways, and we hope that all of these grains of sand eventually add up to a heap, and people appreciate our thoughtfulness behind providing them full discretion over their workout experience. We hope to connect people through the love of fitness and health and eventually be able to connect users through sharing workouts and exercises. Our thought is that the more options there are for working out and the more it gets thrown in people’s faces, the more likely they are to take their health into their own hands.

These plans are subject to change after seeing reviews and results from our practice trials, which would guide any next steps more concretely. I cannot express again how thankful I am for the push it took to actually budget time for this capstone, no matter how difficult it was to do so. Regardless of where our careers take us, I have confidence that Jonathan and I will be able to handle working on this considering our relative success working on it during the busiest times of our lives. We also have some other fitness application ideas to consider, but you will have to stay tuned for those. Keep an eye out for us... I promise you will see something cool. Go Blue!