

# SPOTTER

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# SPOTTER

is a weight lifter's end-to-end workout companion. Our application utilizes the mobile and smart watch form factors for a seamless experience through all three stages of your workout. Users can create and manage their routines before hitting the gym, receive step-by-step guidance through a workout, and are able to look over detailed personal analytics afterwards to improve. The smart-watch integration allows users to receive granular feedback on their workouts like vibrations for each rep and velocity and power measurements using the accelerometer. Spotter manages your workouts so that you can put all of your effort into what matters most - getting big!

# BRAINSTORMING PROCESS

Our initial brainstorming revolved around the smart-watch form factor. Specifically, we tried to explore situations where people have their hands full and, therefore, cannot use a smart phone to improve their experience. For example, we brainstormed ways that a smart watch might improve the experience of someone who is washing windows of high rise buildings or operating a jackhammer at a construction site. After generating 50+ ideas ranging from an application that identifies secret handshakes to an air-drum video game, we settled on three ideas as our top options: DropNote (allows users to drop “notes” at any GPS coordinate that their friends can “pick up” when they are in that location), HandUp (creates queues

for students with questions in big lecture halls), and Spotter (a weight-training assistant app). After digging into the potential user bases and novelty of the ideas, we ended up choosing to work on Spotter for a few reasons. Our market that we could serve with Spotter - experienced weight lifters who work out regularly with a goal to improve - is big, well defined, and specific. Additionally, people within this market spend a lot of time and energy in the gym trying to improve, but are limited technologically by having their hands full most of the time. Our solution effortlessly integrates into a user’s daily workout, allowing them to put every bit of focus during their precious time in the gym on weight lifting.

To fully flesh out our idea, we went through 11 Task Analysis questions to get a high level view of our app:

1

## **WHO IS GOING TO USE THE SYSTEM?**

Anyone looking to improve the quality of their workouts will be interested in this system. Also, all people who are interested in fitness in general can make use of this application.

2

## **WHAT TASKS DO THEY NOW PERFORM?**

All of the interviewees performed typical exercises (i.e. curls, bench press, chest press), and they all had some sort of system in place where they targeted different muscle groups on different days.

3

## **WHAT TASKS ARE DESIRED?**

Most people are interested in improving the efficiency of their workout. For example, the second interviewee wanted to keep track of what exercise was next in his routine whenever he finished the preceding exercise. Our application will address this problem by notifying users of what follows upon completion of a set number of repetitions for a given exercise.

4

## **HOW ARE THE TASKS LEARNED?**

These tasks will be intuitive and will flow with the user's needs without abruptlying any aspect of their workout. The average user will fully understand the tasks because the watch guides you through the process and, essentially, accompanies you like a workout partner.

# 5

## WHERE ARE THE TASKS PERFORMED?

The tasks that will not necessarily be performed at the gym are the create, edit, and update workout tasks. Also, a user will likely share their workout results on their way back from the gym or once they reach home.

# 6

## WHAT'S THE RELATIONSHIP BETWEEN USER & DATA?

One of the app's biggest value propositions is that it will allow users to look over comprehensive analytics reports of the weightlifting progress. Understanding progress over time is a core component of progressing with weight lifting, and our app will allow users to visualize their lifting data in ways that they were unable to beforehand. Being able to access and view this data will tie the user to the product and will give them the incentive to use it even more.

# 7

## WHAT OTHER TOOLS DOES THE USER HAVE?

Right now, most users use a notes application like Evernote or the native iOS notes application to track their workouts. Users write down their workouts, record their weights, and update them as they progress. Most users don't take the time to manually plot graphs to view their progress, so they can't do much analysis. They also have to refer to their notes application every time they start a new exercise, which requires taking the phone out at each new step.

# 8

## HOW DO USERS COMMUNICATE WITH EACH OTHER?

For the minimal viable product, this app is not used for user-to-user communication. However, down the line, this app could support functionality to share workouts with friends, crowd-source spotters, and organize lifting partners.

9

## HOW OFTEN ARE THE TASKS PERFORMED?

Tasks will mainly be performed while at the gym, but while at the gym, they will be performed very often (after every exercise), as the watch will be an essential tool in the user getting through their workout. Outside of the gym, the user can create workouts at their leisure as well as look over their lifting analytics.

11

## WHAT HAPPENS WHEN THINGS GO WRONG?

When there is something that breaks the timing or the flow of the workout, the user always has the opportunity to pause it. For example, the user needs to stretch or get a drink of water, they can pause the timer. Additionally, there may be times when the next exercise a user is supposed to do is unavailable (for example, someone is using the bench press). The user will be able to “postpone” that workout and move onto the next one, making sure to come back to it later.

10

## WHAT ARE THE TIME CONSTRAINTS ON THE TASKS?

There are no real time constraints on the tasks because the main point of the app is to help the user step through their own workout at their own pace. While the breaks are timed, the user always has the option to pause them.

When our brainstorming process was complete, we had a clear idea about the needs Spotter was going to fill, the market that had these needs, and the value that it would deliver to fill those needs.

# PERSONAS

Once we had a clear idea of what we wanted to make, we thought of some personas that represent the people we are designing for.

**JONATHAN** is a 20-year-old college student trying to get fit and look good. He works out at the gym on his own three times a week when he's not in class, busy studying, or hanging out with friends. He's been working out for two years since he started going to college. Having an app that walks through his workouts helps with motivation and efficiency.

**MARK** is a 29-year-old body builder trying to get big. He spends most of his time working out, thinking about working out, and eating enough food to make gains. It is truly his passion in life. Analytics for his workouts are very important to him so he can keep track of how he is doing in the gym.

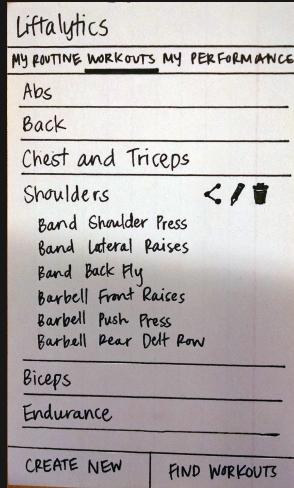
**SHELLY** is a 41-year-old mother of two trying to stay fit. She lives a busy lifestyle between working, driving her kids around, and trying to make time for herself. She is still determined to go to the gym at least twice a week to stay fit because eating a healthy diet isn't enough. Having a preset workout makes working out less stressful and time consuming for Shelly.

Using these personas, we came up with some preliminary designs to cater to this user base.

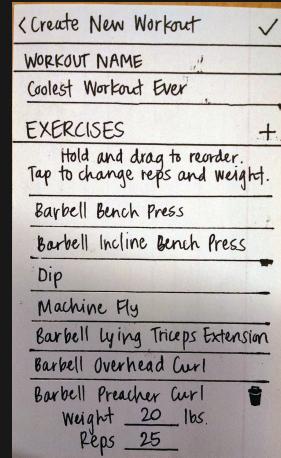
# DESIGN SKETCHES



Home screen  
showing weekly  
routine of workouts



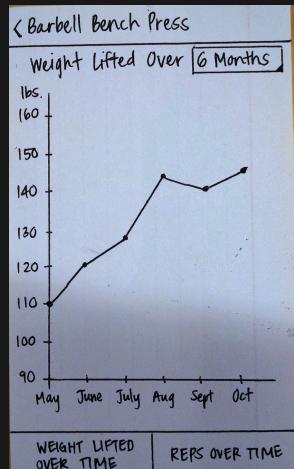
View and edit your  
workouts



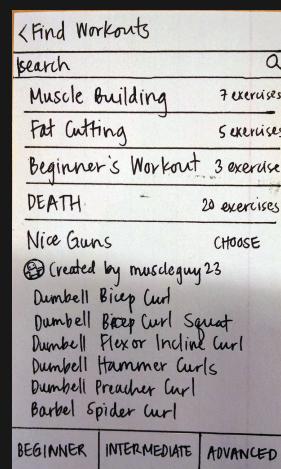
Create a custom  
workout, choose from  
exercises and customize  
weight and reps



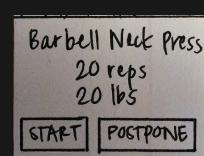
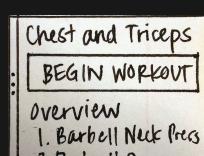
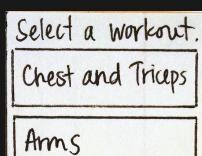
View your analytics  
for specific exercises



See how your  
progress looks over  
time



Search for pre-made  
workouts



Watch sketches -  
guide you through  
your workout

# COMPETITIVE ANALYSIS

In order to ensure that our app was unique enough that it would have a compelling selling point, we conducted a competitive analysis to gauge Spotter's value compared to similar apps. We found three main applications that served a similar purpose, but discovered that Spotter's unique combination

of pre, during, and post workout application combined with the use of the Toq Smartwatch delivered unique value that set it apart from its competitors. Below, we have given a summary of our competitor apps and how Spotter stands up against them.

# SIMPLE WORKOUT LOG

<https://play.google.com/store/apps/details?id=com.selahsoft.workoutlog>

**TARGET USER GROUP:** The target user group for this app is people who need to take notes about their workout routine, and need to keep comprehensive comments (maybe dancers or gymnasts); our user group differs from this because it will be specifically targeted at weight training, and not be as general as this app.

**USABILITY:** The challenges of this app are mainly the necessity of user-defining all the exercises. This is time consuming and error-prone, and our app will be more usable because it will enable users to quickly create and alter their workouts based on a set of predetermined weight training exercises.

**FUNCTIONALITY:** The scope of this application is more broad because it allows for user-defined exercise names and descriptions, along with user-defined categories of exercises and compilations of exercises called “routines”. Our app will offer better functionality because it will remove the complexity of having to define exercises, which we can do because our intended functionality is more focused than this app's.

# JEFIT

<http://www.jefit.com/>

**TARGET USER GROUP:** JeFit's user group is the closest to our intended app's, as it targets weight trainers who want to use an app to guide them during their workout as well as planning it before and viewing data afterwards.

**FUNCTIONALITY:** JeFit's functionality is comprehensive but also a bit complex. There is separate "create workout" and "edit workout" functionality that could probably be compressed into one pattern of interaction that allows the user to do both tasks without having to learn different things.

**USABILITY:** The app is hard to use because it tries to display lots of information mid-workout. The "start" and "stop" buttons are tiny compared to a large weight selection area, a log of the current workout, and a gif of the exercise. This information is best used only before or after the workout, so our app will focus on making the mid-workout interactions simple and offload the complexity to the phone, before or after the workout.

# FITNOTES

<https://play.google.com/store/apps/details?id=com.github.jamesgay.fitnotes>

**TARGET USER GROUP:** People who want to document their workouts. This app is not targeted at people who want to be guided through their workout, like ours will be.

**FUNCTIONALITY:** This app has very simple functionality. There are basic analytics options, but the main divergence between this app and ours will be that our app will provide functionality to guide a user through a workout rather than just report a user's past workouts.

**USABILITY:** The interface is very clean and user-friendly. You can swipe through your workout logs, or view them on a calendar. Our app will incorporate some elements of this app's design to showcase the data from a user's past workouts.

The aspects of our app that are already well-covered by the competition are the post-workout activity display and analytics aspects. There are many "Fitness Logs" that will show a log of past activities, and some of them will extract statistics from them (like FitNotes and JeFit). The uniqueness of our app's value will come from using the smartwatch to guide the user through a workout. There are relatively few apps like JeFit that guide someone through a workout, and those are clunky and hard to use. Using the watch will present the user with a superior experience because interactions can be kept simple and short, without the need to pull out a phone.

# SCENARIOS

There are three main scenarios or tasks that are associated with our app: creating a workout before going to the gym, working out at the gym, and analyzing a workout after leaving the gym.

The pre-workout scenario applies to a new user as well as users who want to change something in their workout routine. This scenario takes place at home or wherever is convenient for the user and can be completely separate from the gym experience. For this task the user can choose exercises from an organized list for each day of their workout routine. For example, back

and biceps on Monday, chest and triceps on Tuesday, legs on Wednesday, rest day on Thursday. In this scenario, the user can also pick the weight, number of reps, and number of sets for each exercise. Another option would be to choose preset workouts for less experienced users. Once the routine is set on the phone app, everything is set up for them to start working out at the gym according to their routine. Without this app, a user would have to inconveniently keep track of their routine on paper or in a notes app on their phone.

For the workout scenario in the gym the user is guided through their preset routine. The watch tells them exactly what exercises to do, how much weight to lift, and how many reps and sets to do. As the user is working out, the watch will be counting the reps using the accelerometer and notify the user when they finish a set. A rest timer will start and inform the user when to start the next exercise or set. In this scenario, it is possible for the user to need to postpone an exercise if a machine is occupied. The watch app allows the user to postpone an exercise and move on to another exercise. It is also possible that the user will want to get water or go to the bathroom; this is possible by waiting to press start on the next exercise. Without an app, the user would have to constantly look at their phone to check their routine and keep count of their own exercises as they go.

The post-workout scenario involves analyzing a gym workout. This task is also completely separate from the gym experience. Once the user gets home, at any time they can use their phone to check on their progress over time. Any user that has a goal to improve will

want to see some sort of visualization of their progress. They can see their progress in a specific exercise and compare it to their overall progress. It is very easy for the user to check in on their progress by choosing analytics from the home screen and choosing exercises to analyze. When done looking at their progress, the user can get pumped for their next workout. Without this app, most users will just try to remember weights they lifted and will not have a good idea of how they are progressing over time.

# USER STUDIES & FINDINGS

In order to get a deeper understanding of our users wants, needs, tastes, preferences, and work flows, we conducted interviews with three potential users at the gym. It was important for this to be a contextual inquiry, meaning that instead of interviewing users about the design, we followed them through their weight lifting workouts and observed them perform the tasks that they would perform with our application.

In general, our target users had a set schedule of when and what they will work out. They kept this information on their phone as a list of workouts in their general Notes app, which we identified as something we wanted to make more efficient with the app. It was common to separate out the areas of the body for different days and to go from one exercise to the next as they went through their workout process. Also, they usually took short breaks between workouts to drink water or to just rest their muscles. They also all had some sort

of warm up routine whether it be stretching or running around. They had different ideas of how to warm up but all set aside time in their workout to warm up. They also all had similar goals of pushing themselves and improving their physique and health.

The one target user who did not follow as strict of a schedule or keep track of their progress as much claimed that they like to keep their workouts simple. For this user, it was not simple enough for them to keep track of progress and a schedule. We made it a priority to make our app as simple as possible to cater to users like this who don't want to be bothered with complicated processes.

Another important unique event was when one of the interviewees had to adjust his workout routine because of the crowded nature of the gym. It is apparent that a flexible workout routine is necessary.

## TARGET USER 1

Mid-20's male who works at a banking firm in San Francisco. He works 60 hours a week and enjoys time off on the weekends. He likes to explore the Bay Area and hang out with his friends for fun. The interviewee is focusing on enjoying his new adult life in the city and securing a strong financial foundation for himself for the rest of his life.

The interviewee has been consistently working out for the past couple of years and has been steadily tracking his own progress. He lifts weights to stay in shape but also sets performance goals for himself to meet when he wants to bulk up with muscle or cut fat. The interviewee is up-to-date with the latest technology and would be likely to start using new technology/an app that helped him with his weight training.

## INTERVIEW 1 DESCRIPTION

(from the perspective of the interviewer)

I followed the interviewee around as he went through the process of going

to the gym to work out at his local gym. We started off at his house where he got dressed in his athletic gear. He made sure to grab his water bottle so that he could hydrate in the gym. He took a supplement before he worked out so that he would have maximum energy and be able to get the most out of his reps. He also made sure to have his gym ID card, cell phone, and headphones because he likes to listen to music when he works out.

At the gym, the interviewee first stretched and warmed up while listening to music. Once he was ready to lift, the interviewee looked at the notes on his phone to get his workout for the day. He does a different workout every day of the week: Monday = chest/triceps, Tuesday = back/biceps, Wednesday = legs, Thursday = Shoulders/abs, Friday = cardio (he takes the weekends off). Each workout consists of a long list of workouts as well as the reps/weight he did for each exercise in his last workout.

The interviewee would go down the list of exercises one by one to complete them in order (it was preferable

to go in order, but was not a deal breaker if he couldn't). For each exercise, he would go to the respective area of the gym where he could do the exercise, grab the weights needed, and do the first rep of the exercise. The interviewee had to check the reps/weight for each exercise he did because he usually did not remember what he had done the previous week. The interviewee would take breaks in between sets to rest and drink his water bottle. These weren't timed, but the interviewee tried to keep a set time (1:30-2 minutes) between sets. After each exercise was finished, the interviewee would record his reps/weight in his phone if anything changed.

After the workout, the user did a cool down stretch, filled up his water bottle for the road, and went home. He made a protein shake that he made sure to drink after his workout before he showered.

## TARGET USER 2

The interviewee is a 21-year-old Business major at U.C. Berkeley. He regularly goes to the gym (4-5 times a

••••• Verizon 9:20 PM 32%

[Back](#)

### Workout

Chest/tri:

- Flat Press - 75
- Incline Press - 60
- Middle Press - 40
- Flat fly - 60
- Decline Press - 50
- Tri Pulldown - 80
- Skull crushers - 90

- Overhead dumbbell dips -

- Incline Fly - 25
- Decline Fly - 25

Back/bi:

- Pull-ups - 2
- Low row - 120
- Lat pull down - 120
- Standing fly - 30
- Lower back extension - 35
- Side extension - 35
- Horizontal curls - 27.5

week) in order to maintain and improve his physique. His ultimate goal when working out is challenge himself by pushing his body to its limits since, to him, this is the only way to improve. He takes a Whey Protein shake as a post-workout routine, and he uses a simple notes application on his phone (S memo) in order to keep track of what exercises he should be doing on a

given day. He also uses this application to keep track of how many reps he performs and how much weight he uses for a particular exercise. He would like to be able to keep track of everything he does in the gym, along with his progress.

## INTERVIEW 2 DESCRIPTION

I went to the R.S.F. in Berkeley, CA for a workout, and I approached the interviewee in the weight room. After asking him for an interview, I completed an entire workout with him while simultaneously asking him a number of questions. Doing this allowed me to better understand the context of all of his answers. I observed that he carried a large water bottle and a small towel with him to stay hydrated and dry.

The first thing we did was free-weights because today was his Back and Biceps day. (He performs a different workout for every weekday. On weekends, he focuses on cardio and core exercises like planks and pushups). The first exercise was the bicep curl which we did for the 3 sets of 12 on both arms. Between every set,

the interviewee would look at his phone to see what to do next or to change the song that was playing through his headphones. (These headphones were not over-the-ear, so they fell out a number of times).

After bicep curls, we moved on to a number of other exercises, including the lat pull. This part of the routine was particularly bothersome for the interviewee since the machine was consistently occupied due to the number of people at the gym. For this reason, he had to check his phone even more times than he normally has to since he had to keep adjusting his workout routine. After completing the full routine, which lasted about an hour, the interviewee told me what exactly he would do when he got home, which included taking his protein shake and stretching after a hot shower.

## TARGET USER 3

A 21 year old male student. His main goals for working out are to feel good health wise and to look good. He thinks that anyone who claims it is not to look good is probably lying. He also just

enjoys working out as an activity. He tries to go to the gym two to three times a week and also works out a bit in his room (pull ups, push ups, sit ups). He also likes playing soccer and watching movies with his friends. He currently doesn't keep track of his workout progress except in his head.

In order to select target users we decided to go to the local gyms to observe and talk to people who work out. We followed each interviewee through their workout to get a good idea of what their routine is.

In general, our target users have a set schedule of when and what they will work out. They keep this information on their phone as a list of workouts. This is something we will try to mimic and make more efficient with the app. It is common to separate out the areas of the body for different days and to go from one exercise to the next as they go through their workout process. Also, they usually take short breaks between workouts to drink water or to just rest their muscles. They also all have some sort of warmup routine whether it be stretching or running

around. They have different ideas of how to warm up but all set aside time in their workout to warmup. They also all have similar goals of pushing themselves and improving their physique and health.

The one target user who did not follow as strict of a schedule or keep track of their progress as much claims that they like to keep their workouts simple. Currently it is not simple enough for them to keep track of progress and a schedule. We will make it a priority to make our app as simple as possible to cater to users like this who don't want to be bothered with complicated processes.

Another important unique event was when one of the interviewees had to adjust his workout routine because of the crowded nature of the gym. It is apparent that a flexible workout routine is necessary.

## INTERVIEW 3 DESCRIPTION

At the Fitness Center at Memorial Stadium I asked the interviewee questions while he worked out. He was

wearing gym shorts, a t shirt and running shoes. He started with sit ups but before that he said he ran around from his house to the gym. When he was too sore to continue doing sit ups he took a short break by sitting and drinking some water. He then moved on to bench pressing with free weight and other free weight exercises. After he was sore from this he took a short break to drink more water. He moved on to a machine that works out his triceps. Currently he just decides to finish when he can no longer do a set with the weights or he gets too sore; he also sometimes times his sets based on the environment such as the pace of a nearby treadmill. He said he likes to keep it sort of random but he claims that this is because he does not use

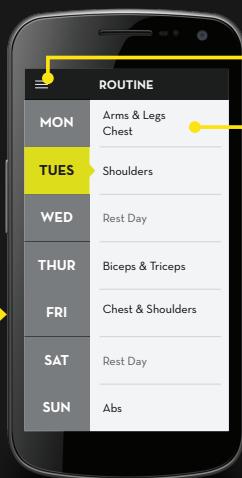
anything to keep track of his workouts. He also thinks it is important to listen to your body and not push yourself too far because you may injure yourself. He mentioned forgetting his progress from the last time he was at the gym. He was worried that he may not be making much progress because he does not keep track. He does not bring his phone with him to keep track of things because it is too heavy in his pocket when he runs to the gym.

In summary, our major takeaways were that users typically operated on a consistent weekly schedule with custom workouts that they would create for themselves. These workouts would become fairly standard, meaning that they would perform the same workouts each week in a routine. Users also took consistently timed rests between reps and sets. Additionally, it occasionally happened that a user wanted to use a specific machine that was in use (especially when the gym was full) and had to reorder their workout to accommodate this. We used these findings to inform our design and incorporated them into the user experience of Spotter to work around these flows.

# **FINAL DESIGNS & WIREFRAMES**

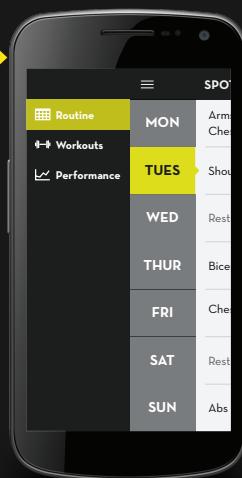
# PRE-WORKOUT

## EDITING/VIEWING ROUTINE



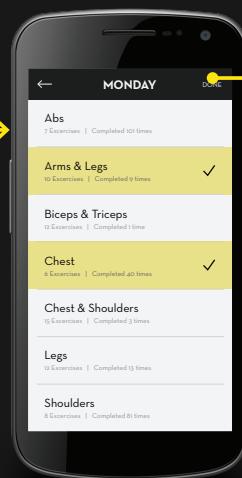
### HOME SCREEN

View of the user's weekly routine



### MENU

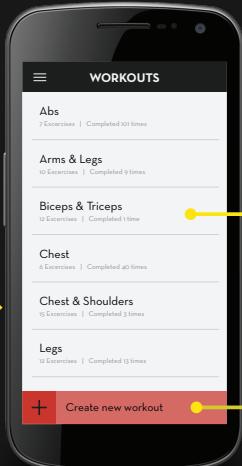
How user navigates through different phone tasks



### EDIT ROUTINE

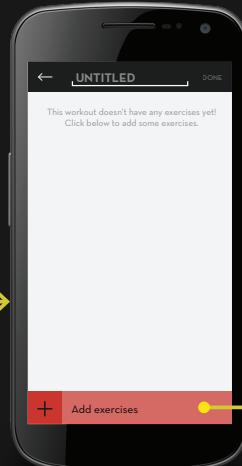
Users chooses which of his workouts to do on each day of the week

## CREATING/EDITING WORKOUTS



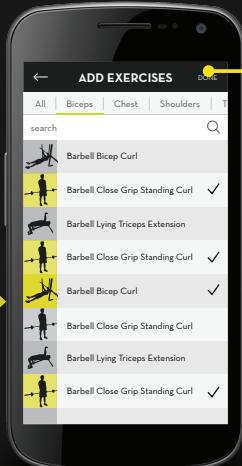
### WORKOUTS

List of user's workouts



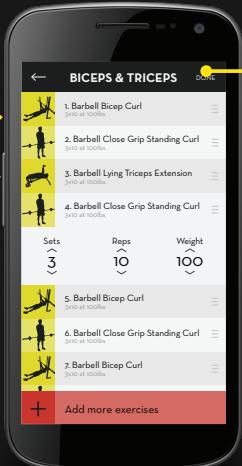
### NEW WORKOUT

View of new, empty workout



### ADD EXERCISES

User selects/deselects exercises



### EDIT WORKOUT

User sets reps, weight, and sets and reorders exercises

# AT THE GYM

## WORKOUT WALK-THROUGH



### WORKOUT SELECTION

User chooses from his workouts on the watch's main view

### FIRST EXERCISE

Watch displays first exercise, number of sets and reps to do, and how much weight to lift

### REP COUNT

Watch increments number of reps while user performs exercise



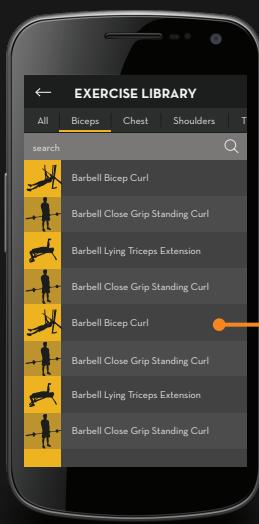
**REST (NEW EXERCISE)**  
Watch counts down time for rest and displays what exercise the user is going to do next. User can choose to postpone the exercise, moving it to the end of the workout

**REST (SAME EXERCISE)**  
Watch counts down time for rest and displays what set the user is going to do next

**NEW EXERCISE PROMPT**  
Watch displays information for next exercise and prompts user to start

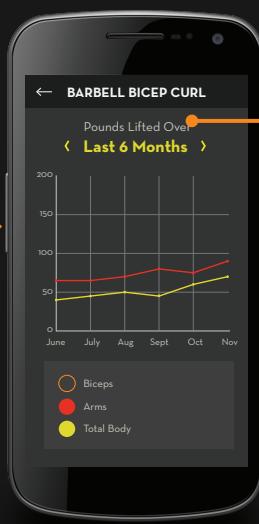
# POST-WORKOUT

## PERFORMANCE ANALYTICS



### CHOOSE EXERCISE

Choose exercise to view performance



### WEIGHT LIFTED OVER TIME

View performance as pounds lifted over time



### EFFICIENCY OVER TIME

View performance as percentage of reps completed over time

# TECHNICAL CHALLENGES

There were two main technical challenges when we were in the process of implementing and building this project: the accelerometer, and the card-based UI of the Toq watch.

Our application hinges on the data read by the accelerometer. It is this data that is ultimately analyzed, and it is this data that is driving the app to go to the next screen while a user is doing a workout at the gym. The accelerometer hardware is in the Toq watch, but the API to access it is unexposed to developers. Because this was such a key component of the application, much of our smartwatch demonstrations had to be hardcoded. For development with any other smartwatch type device, it will be necessary to develop specific and consistently reliable algorithms for interpreting data from the accelerometer, and classifying data streams into patterns that most likely represent reps of a certain type, versus patterns of data that are other kinds of motion.

The second technical challenge in building out this application was the Toq API structure. Under the current version of the API, there is no support for buttons on cards on the watch. Therefore, cards cannot be used to receive arbitrary input, nor can they be used to trigger context-dependent responses (versus static responses). Furthermore, in addition to the inability to put buttons (or other customizations, such as countdown timers) on cards, the Toq watch's Notification classes lack some of the functionality of their other Card classes. For example, a `NotificationTextCard` cannot contain an image like a normal card can, and this eliminated our ability to even do hardcoded demos that looked like the final product we had envisioned. Another, more minor, Toq-related challenge was the inability of the Toq to support displaying images of arbitrary ratios instead of the specific 250x288 pixels that it requires.

# **SUMMARY**

## **OF PROJECT AND RESULTING NOVELTY & VALUE FOR USERS**

Spotter's mission is to bring real technological innovation to the weight-lifting world by assisting our users at every step of their workout process without them having to worry about the hassle of technology. As

weight-lifters tend to be consistent and habitual with their weight training, it was extremely important for us to design the app to easily work into our user's pre-existing workout routine.

In the pre-workout phase, users can create a custom workout and add exercises from our extensive library of exercises. They can also edit their weekly schedule by adding and replacing workouts based on what body part they want to work on that week or what time of weight training they are interested in doing. This fits in nicely with a user's current workflow, as most of this information and interactions take place on user's native notes applications on their smart phones, which are a hassle to manage and update.

Once the users are in the gym, they can choose a workout and our smart-watch application will walk them through the entire routine. The watch will buzz every time a user completes a rep, ensuring that they exercise is being done correctly. At the end of a set, the watch will start a timer so that the user will take equally timed breaks in between set. This will allow the user to improve their stamina and progress properly. The user also maintains full control over their workout with the ability to skip over a workout if one of the machines is occupied or add time to breaks to go to the bathroom or drink some water.

After the workout, users can look at a range of performance graphs to track their progress over time. Weight lifters who go to the gym consistently tend to have a goal in mind and our powerful analytics platform helps our users achieve those milestones. Users can look at metrics like weight over time, rep efficiency, and power, all tracked with the accelerometer on the smart watch.

Spotter is a revolutionary tool that allows users to focus all of the precious mental strength on performing their levels at the highest possible level while the application handles all of the logistics. By addressing needs in the pre, during, and post phases of a workout, Spotter will make you a more efficient, higher performing, and overall better weight lifter.

