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Chad Price - Paper Prototype, Digital Mockup
Jia Reese - Paper Prototype, Usability Testing
**Alex Vassallo** - Usability Testing, Writing

"All we have to decide is what to do with the time that is given to us. There are other forces at work in this world Frodo, besides the will of evil." -Gandalf, The Lord of the Rings

Deciding what to do with our time is hard, and we don't always make the right choices. This isn't because we are bad decision makers, but because we don't have all of the information we need to make an informed decision. We need to know what our goals are, what we already have planned, and what choices we can make. These things are always changing and difficult to remember. That's why we are designing Balance. It will remember your goals, show you how to reach them, and keep track of your progress. It will automate the most difficult and tedious tasks of personal time management and help you reach the time balance that you want.

Initial Paper Prototype

Our paper prototype is based on a smartwatch. Our first design has three main screens: Lock screen, Home screen and Menu screen. After unlocking the Lock screen, it goes to the Home screen. There is a menu bar at the bottom of the Home screen. It includes Home and Menu icons. In the Menu screen, there are four options: Schedule, Report, Ideal Balance and Notification.

Overview
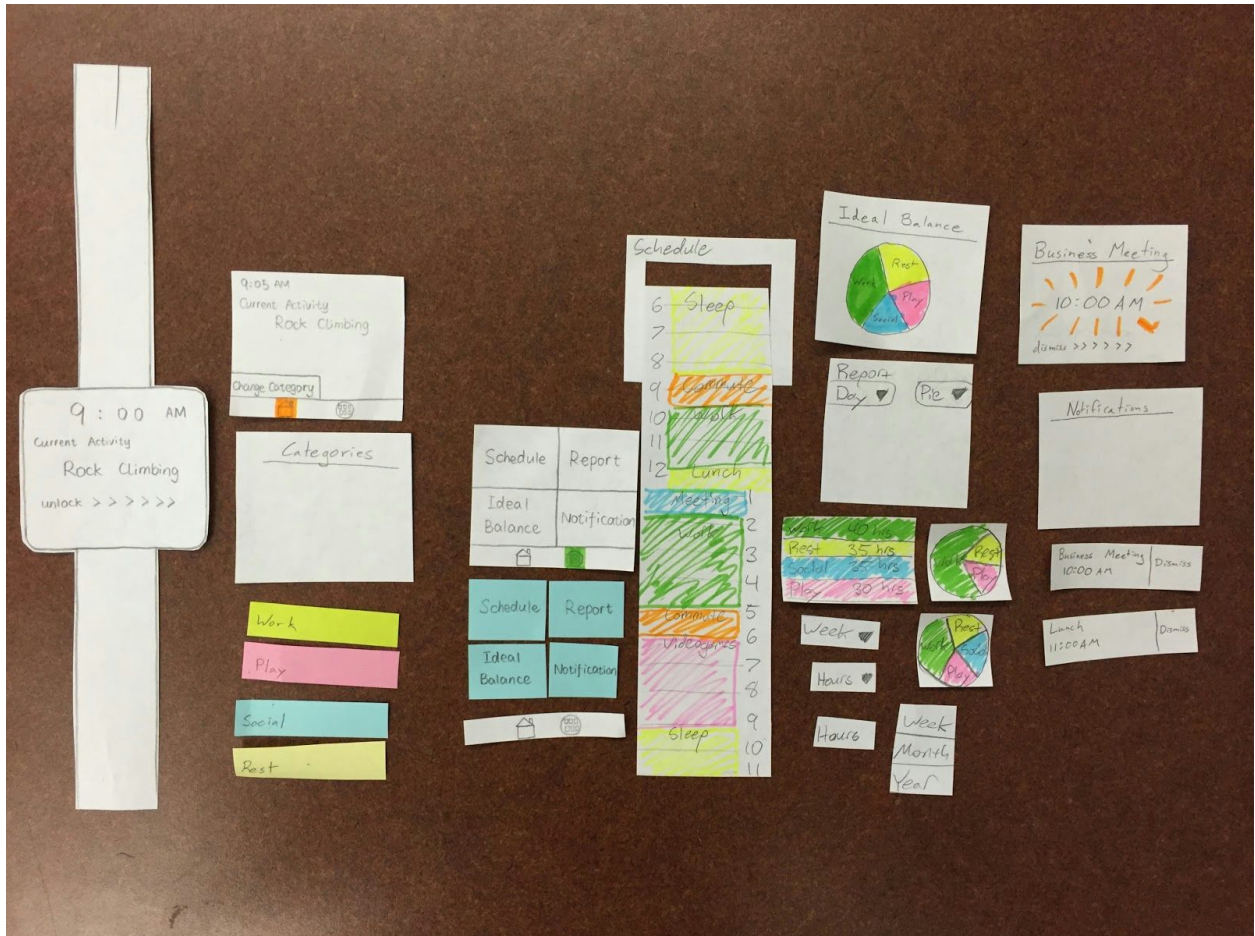
Activity #1: Categorize Current Activity

To interact with the smartwatch, you must first swipe right on the sleep screen to unlock it. When it unlocks, it displays the home screen where you can change the category of your current activity. To change the category from "Play" to "Social", press the "Change Category" button and select "Social".
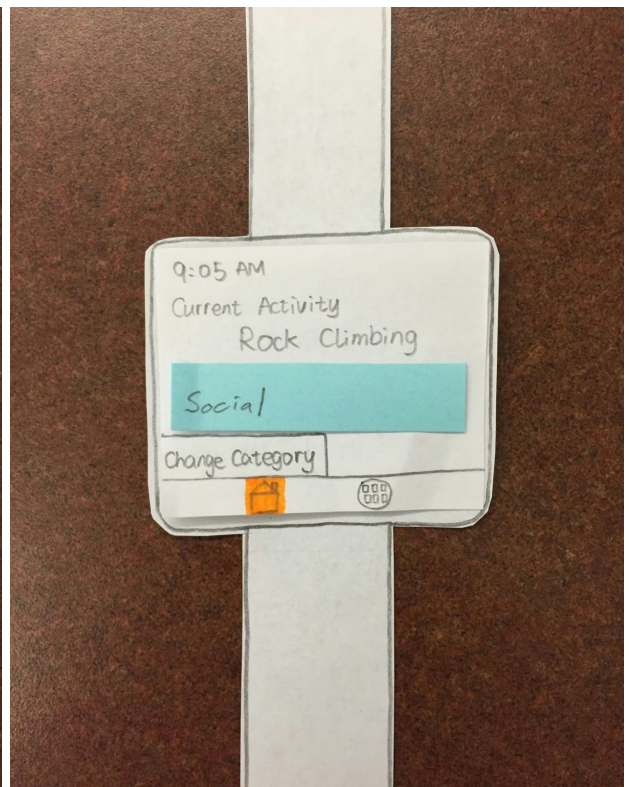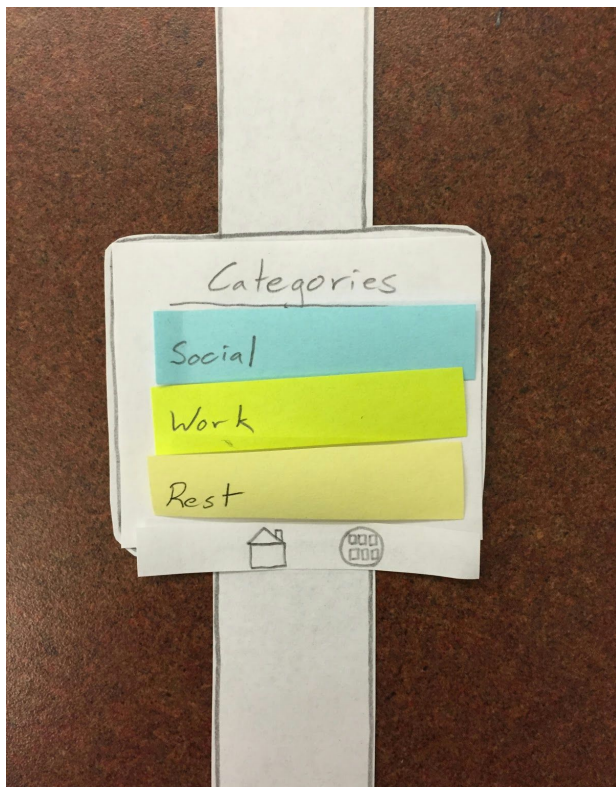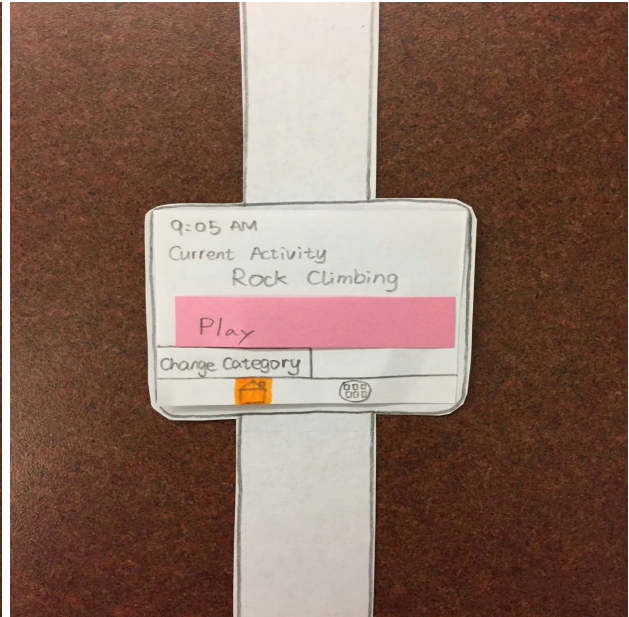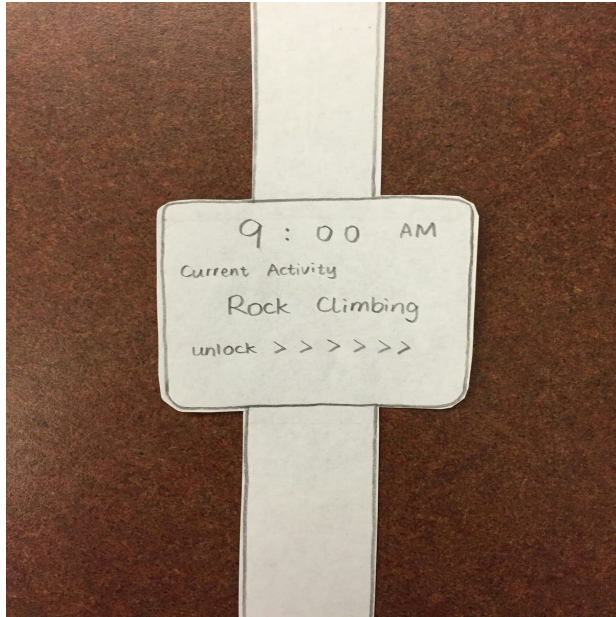
To see your current schedule, press the menu button at the bottom of the screen to bring up the main menu. From the main menu, press the "Schedule" button to go to the schedule screen. The schedule screen is an infinite scroll of your schedule for today. Each item on your schedule is color coded by its category.
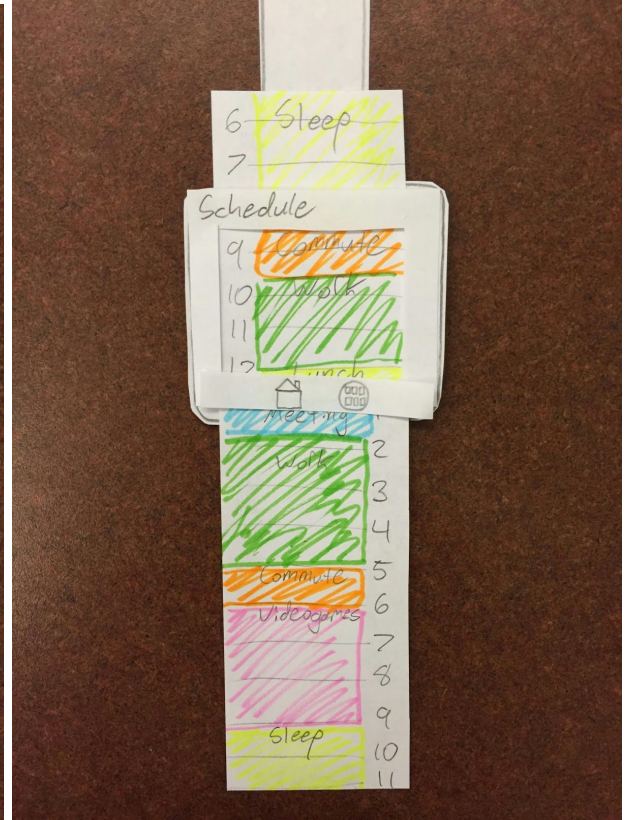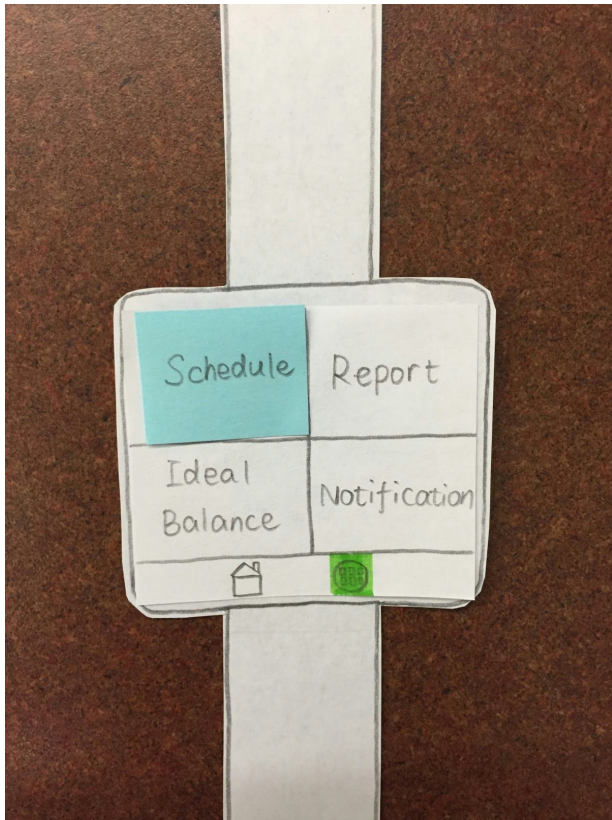
Activity #3: Check Report

To see the report, press the "Report" button from the main menu. The drop down menu on the left allows you to switch between a report of the past day, the past week, the past month, or the past year. The "Pie" report displays your time spent in each category as a pie chart. The drop down menu on the right allows you to switch to an "Hours" view that just lists the number of hours you have spent in each category.
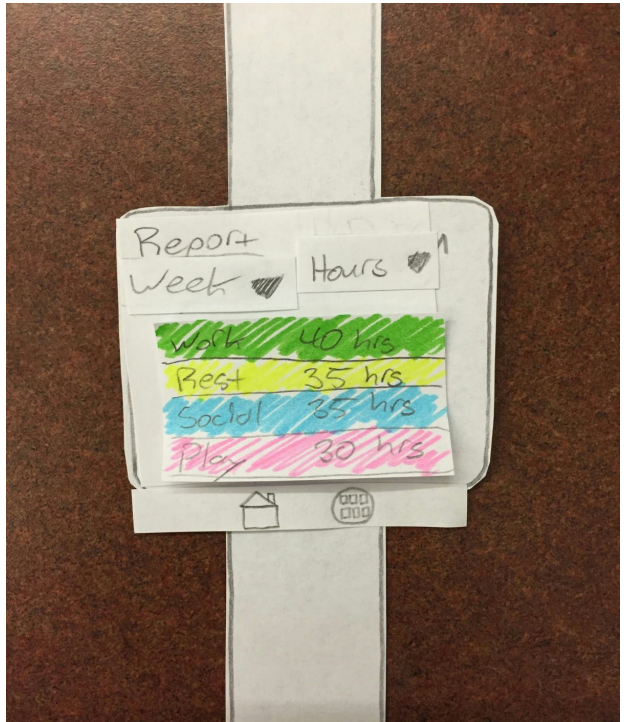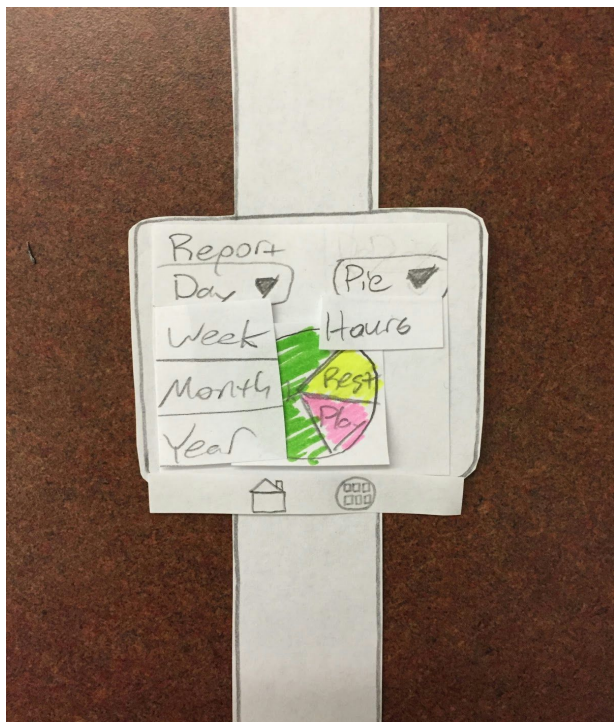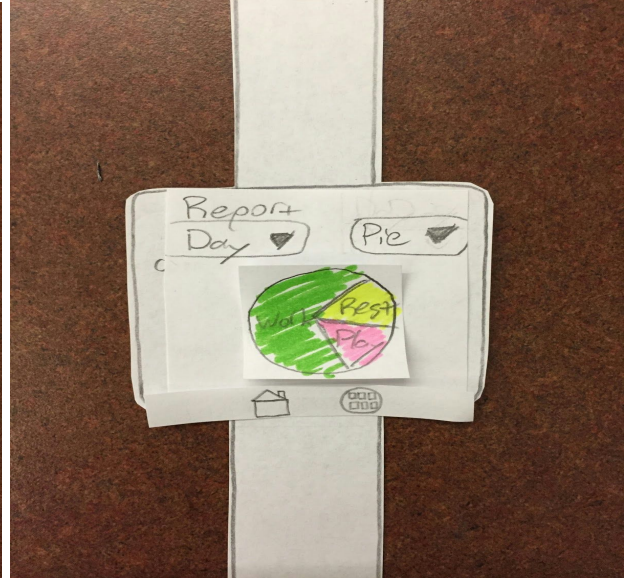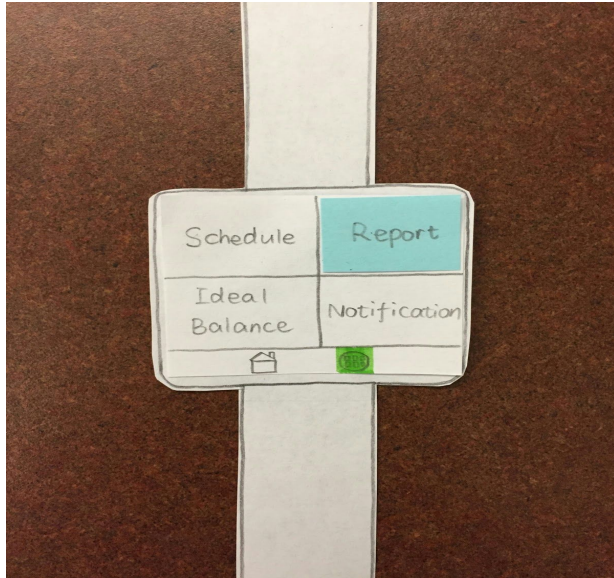
Activity #4: Receive and Dismiss Notifications

An alarm will go off for each notification that you do not dismiss. Alarms cause the smartwatch to vibrate as a non-intrusive reminder. The alarm screen requires you to swipe right to dismiss the alarm. To prevent a notification from setting off an alarm, you can dismiss it before the set time from the "Notifications" screen, also accessed from the menu.
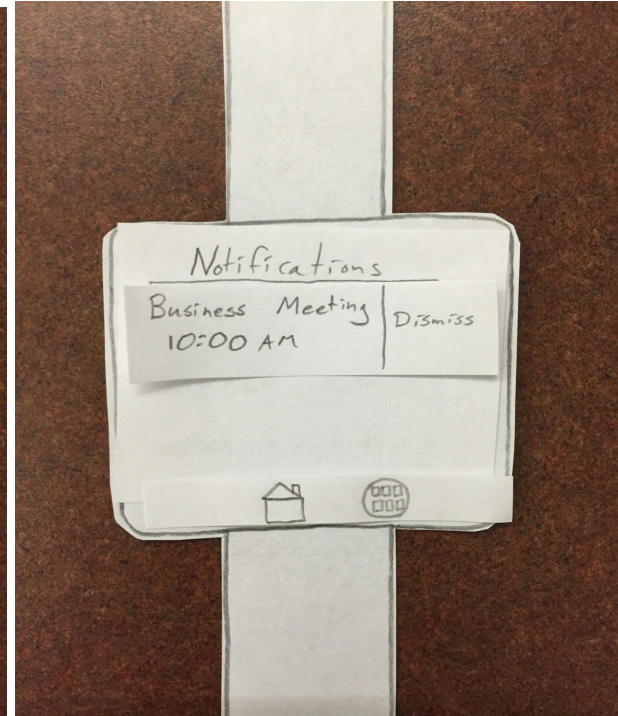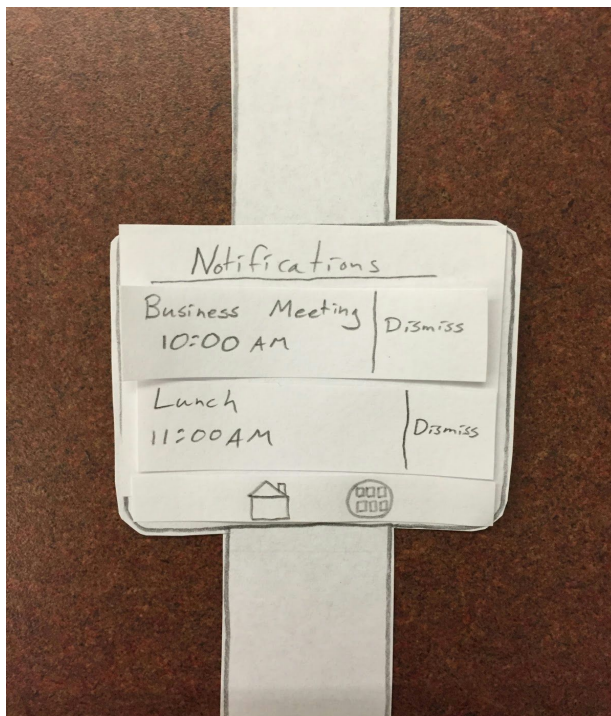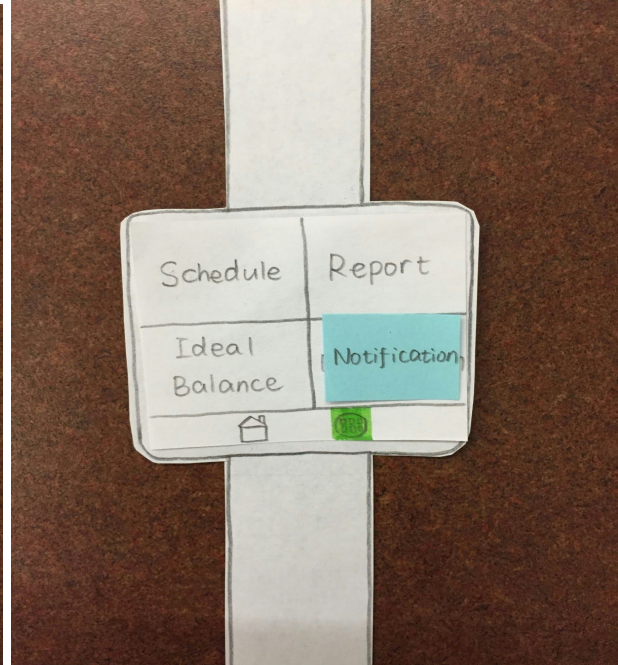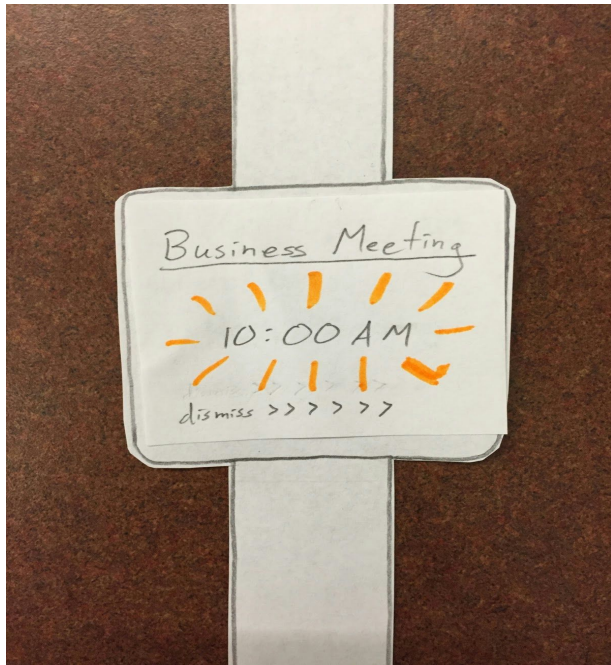
Activity #5: Check Ideal Balance

To see your ideal time balance, press the "Ideal Balance" button from the menu screen. The ideal balance screen allows you to see the goal that you have set for yourself.
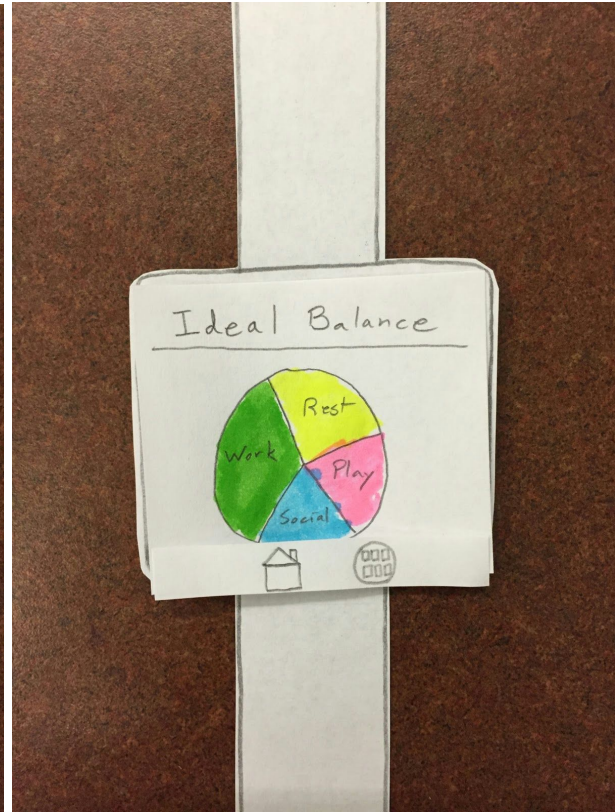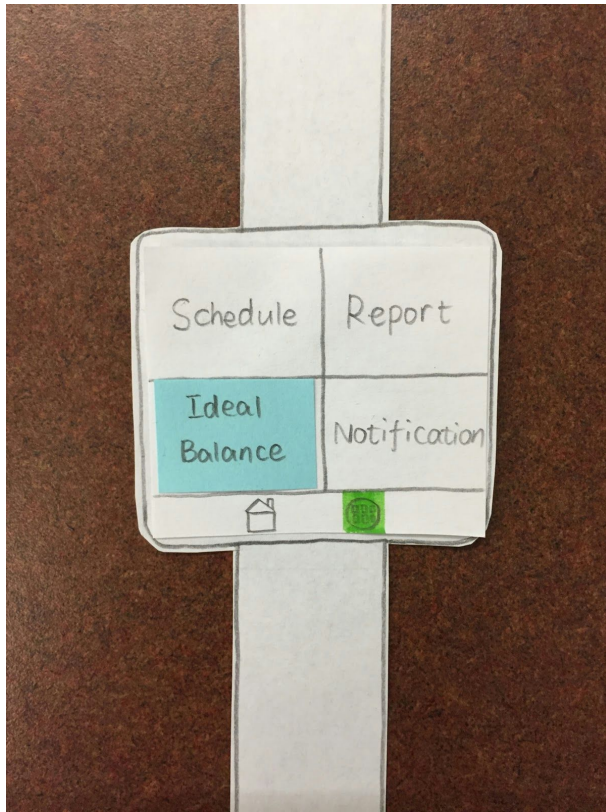
Testing Process

Usability Test #1
Our first usability testing participant, Mary, was an undergraduate student in Computer Science major in the University of Washington. We were under a time constraint and it was easier to find someone from our major. Mary has a busy schedule and we think she can represent our target users. The Usability Test was conducted in the HUB cafeteria because that can be a place where our target users would likely take a break and check their schedules. We first explained our design and how paper prototyping works, then we asked her to do the following tests:
1. Check the records of current balance of time for this week.
2. Cancel the notification of lunch at 11 am.

Usability Test #2
Our second usability testing participant was Ryan, a data visualization researcher at the University of Washington. As both a student and a researcher, Ryan manages many different responsibilities. We conducted our usability test at Ryan's home where he has the most control over his time management, with team member Chad as the computer and team member Ryan as the facilitator. Our participant Ryan has both classes and meetings with his research group that keep him on campus, but consistently waiting on people. We wanted to focus on how Ryan chose to use his free time, since good use of his free time seemed to be his biggest challenge. We conducted our testing by having Ryan fill in his free time with different activities to try and keep the balance.

Usability Test #3
Our third usability testing participant was Jerry. Jerry was chosen because he is not a college student, and because he is trying to balance his time with his family and himself. He also regularly has many unplanned events that interrupt his normal day. The usability test was conducted in his own home after work with team member Ryan as the computer, and Alex as the facilitator.

The tasks we mainly focused on during this test involved the schedule shifting. Since Jerry was constantly moving his schedule around to meet the needs of his family, we decided to focus our tests on how our prototype would handle it.

Retrospective Review
Looking back at our usability testing, our methods remained fairly static throughout. We gave a quick basic overview of the design and then asked participants to engage in particular tasks. What probably changed most were the tasks that we asked participants to do. We iteratively updated our paper prototype after each usability test and so asked participants to complete tasks that would cause them the test the new design. This gave us good feedback on whether the new design worked well and functioned as intended, solving the initial issues we came across.

Testing Results

The main findings that resulted from our usability tests and heuristic evaluations are as follows:

Critical Incident #1: No Interactivity in the Schedule Scroll
[Severity: Very High]

      Users expected a lot more functionality from our initial schedule screen, which was just a scroll that displayed the user's schedule for the current day. They tried to tap or hold specific schedule items to edit them. At first we were hesitant to allow users to edit their schedule in any way because of the difficulty of inputting text or choosing specific times using the smartwatch's small screen. Then we realized that we could actually add two useful features without any kind of text or time entry. The first was to allow users to change the category of scheduled activities in advance by tapping on them. We actually just reused the existing menu for changing the category of the current activity for future activities. This added a lot of flexibility while keeping the input method consistent. The second new feature was allowing users to add and remove notifications from the schedule by toggling an alarm icon next to each schedule item. These simple icons allowed users to put a notification on any item and to see their notifications in a more visual way.
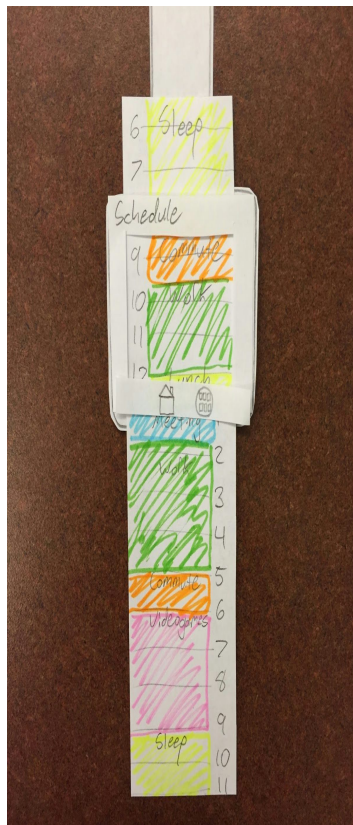

Old: New:
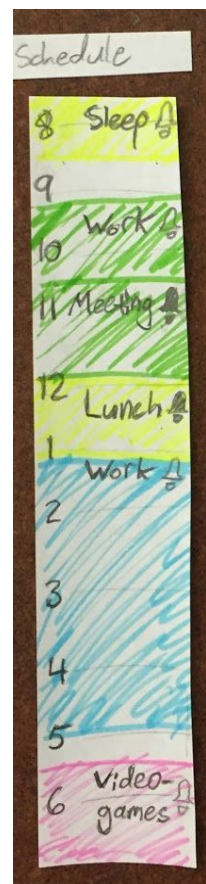
## Critical Incident #2: Drop Down Menu Targets

[Severity: High]

Users had no trouble using the drop down menus on the records page on the initial prototype because it was unnaturally large. However, when we made the prototype a more realistic size, it suddenly became difficult to use the drop down menus. We realized this was a problem when users said out loud which part of the drop down menu they had pressed instead of just pressing it. They were doing this because they didn't want to show that they actually couldn't use the tiny drop down menus even though it was something they had the right to vocally complain about. We decided to bypass this problem entirely by replacing the multitude of drop down menus with simple swipe gestures. Changing between records for the past day and week, which used to take two taps on very small targets, became one swipe anywhere on the screen.

Old:

New:
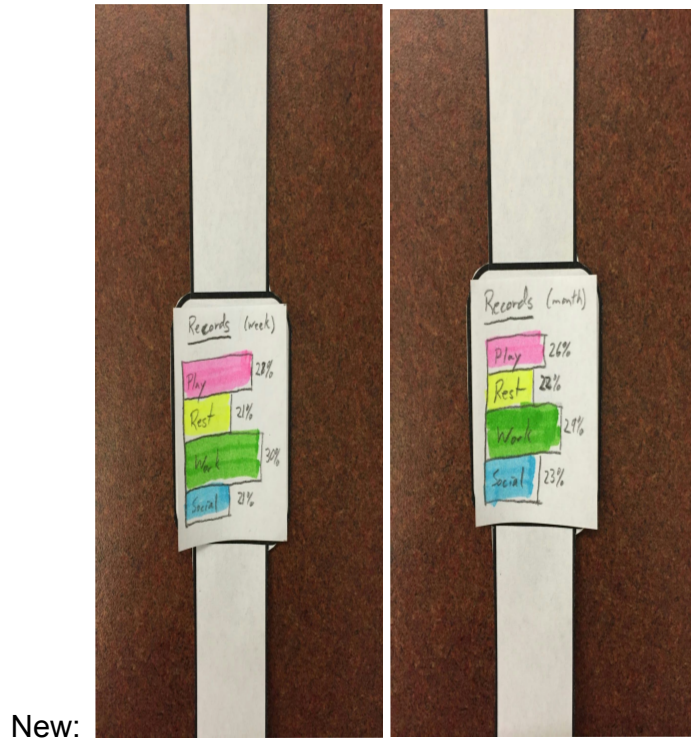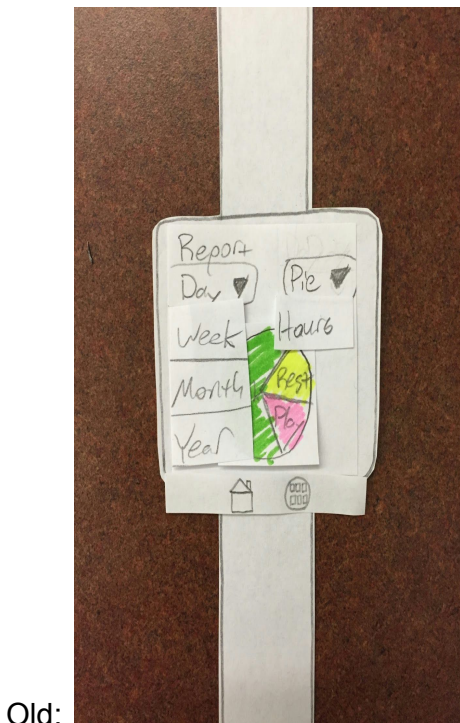
Critical Incident #3: Ease of Changing Category

[Severity: Low]

In the initial prototype, there was a small "Change Category" button that allowed users to change the category of the current activity. Besides this small button, there were two other problems that users pointed out. First, there was no way to cancel out of changing the category. Users had no choice but to select a different category once they had pressed the "change category" button. Second, there was no way for to see what the category already was. In the new paper prototype, we fixed both of these problems with a relatively simple addition. We added the current category to the category selection menu as a sort of back button and we put a small arrow on it to indicate that it is already selected.

Old:

New:
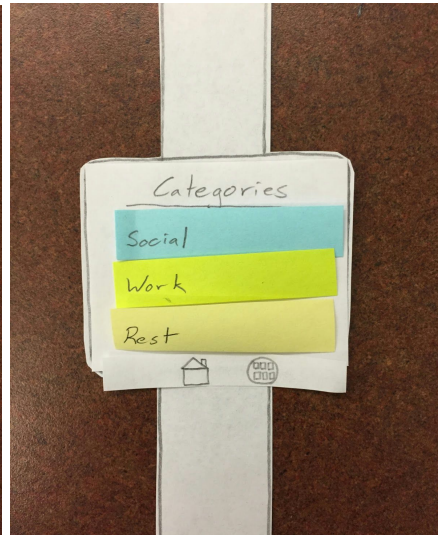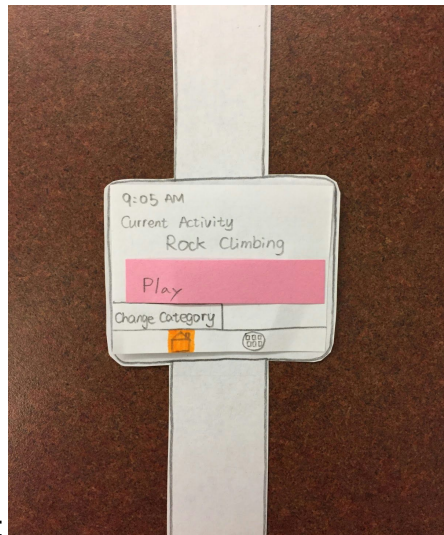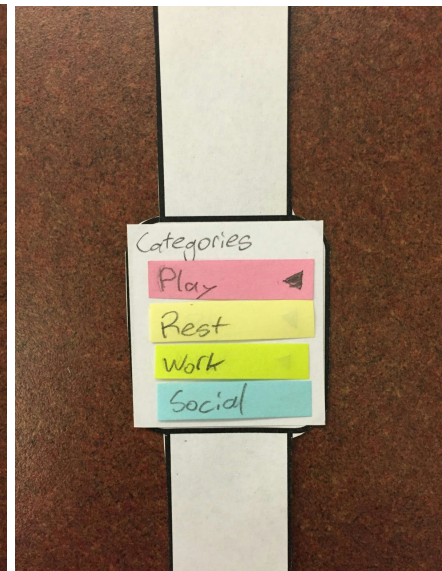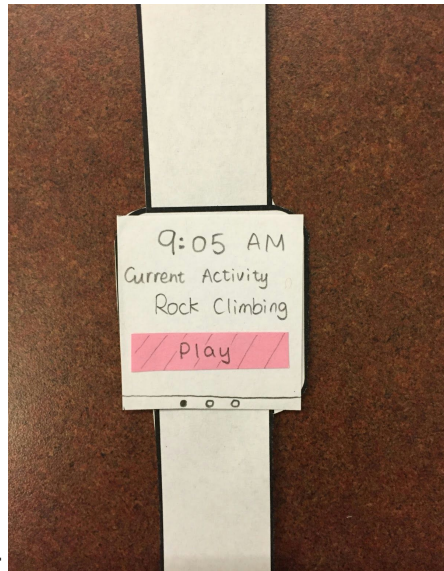
Critical Incident #4: Undo Button After Removing Notification
[Severity: Medium]

In our initial prototype, notifications could only be dismissed once before they were gone forever. There was no undo button or any way to add a new notification. This was a critical error because users could accidentally dismiss notifications and be unable to recover them. In the new prototype, new notifications can be added, but we also included a "undo" button for notifications. Instead of disappearing entirely, notification are grayed out and only removed once the activity they are associated with has passed. Any dismissed notification can be re-enabled from the notifications screen.
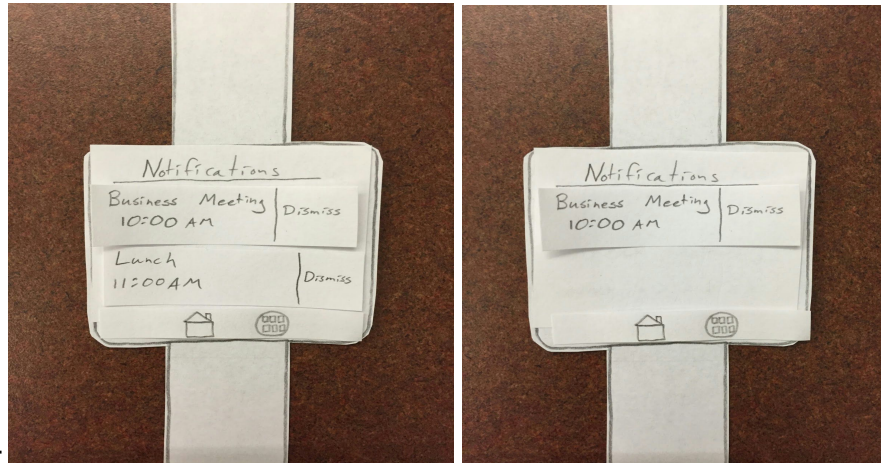
Old:

New:

Other Major Revisions

One of the main revisions that occurred over this entire process was changing how to navigate the design. Initially, we had buttons and dropdown boxes here and there. Because we are dealing with such a small devices, we found that these were often difficult to use. Therefore, when using buttons, we made them very large. Additionally, we decided to get rid of the dropdown menus. Instead, most of the navigation is now down through the use of swiping gestures.

Final Paper Prototype
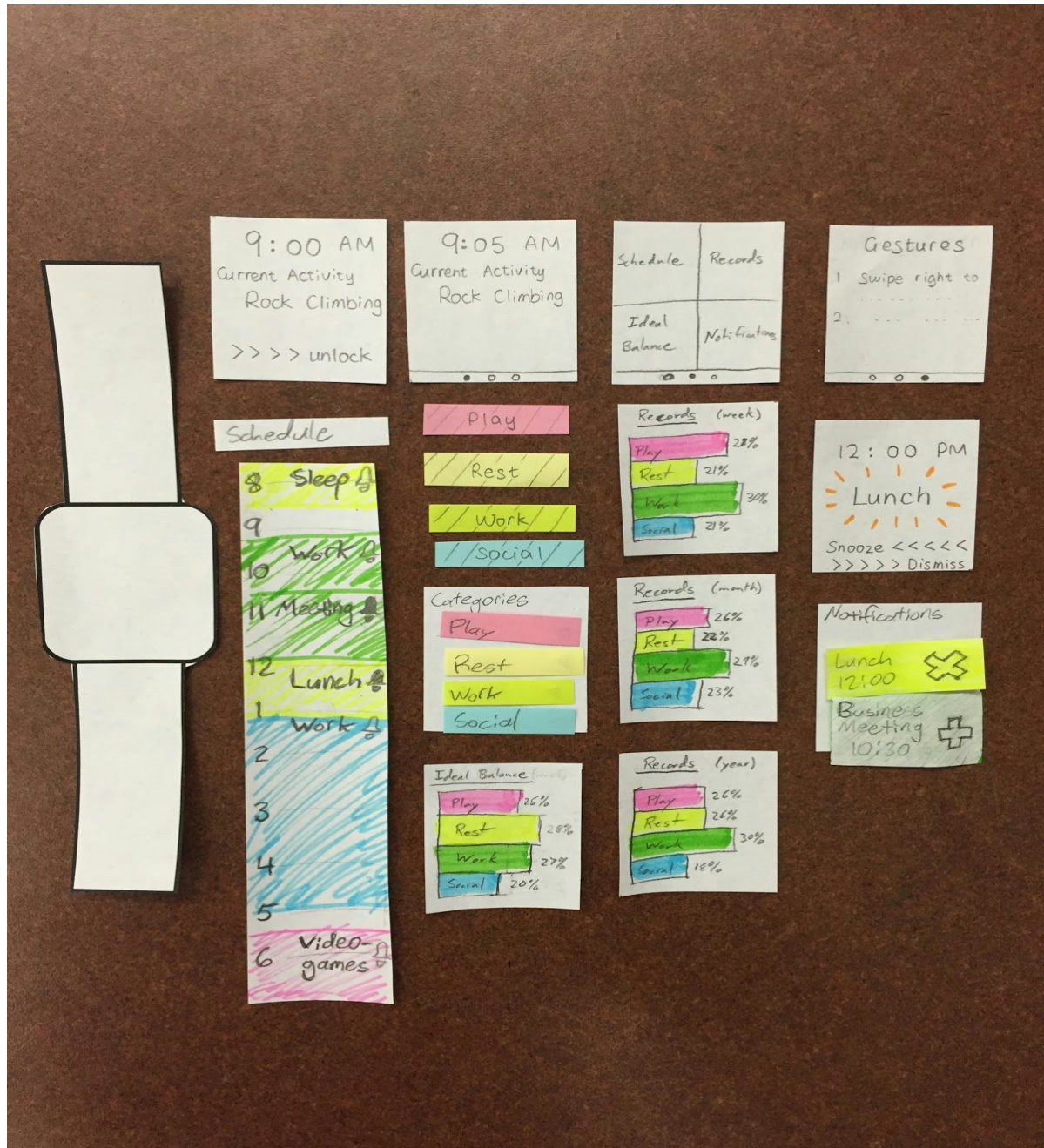
Revision #1: Replacing Buttons With Gestures

When we made our paper prototype smaller to more accurately illustrate a finished product, we realized that many of the buttons were difficult to hit and even to interpret because of their small size. We decided to fix the problem by removing a lot of the buttons altogether and replacing them with simple hand gestures. Swiping to the right replaced the menu button and allowed the user to "go back" from any screen. The home and menu screens also became one

continuous screen that the user could scroll left and right to explore. We also added a "Gestures" screen on the far right of the menu that lists and explains the various gestures because, unlike the buttons, these are not immediately visible. However, these gestures *become* visible whenever the user has a finger on the screen since dragging even slightly to the left, right, up, or down will move the screen, clearly indicating a possible gesture. This sort of tactile exploration is a lot more natural than pressing buttons because we, as humans, are more accustomed to moving objects around to learn about them.
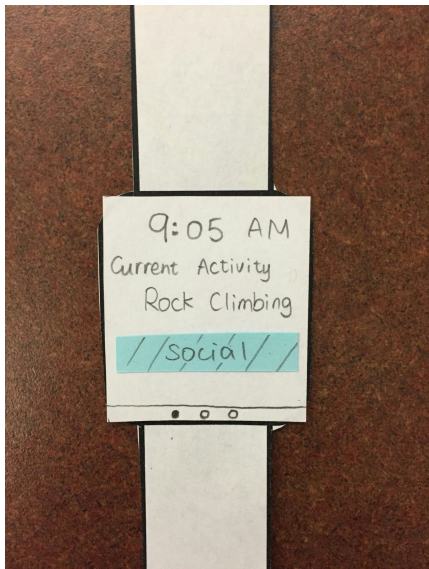
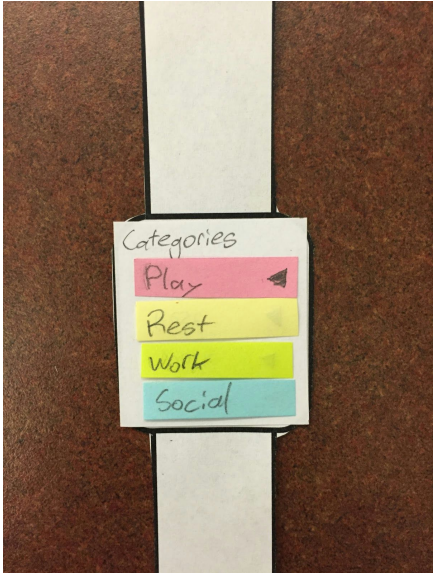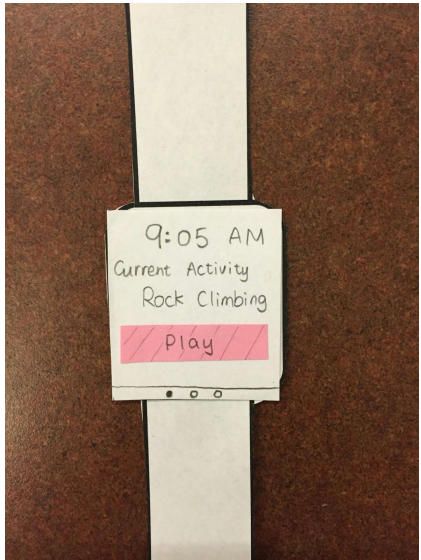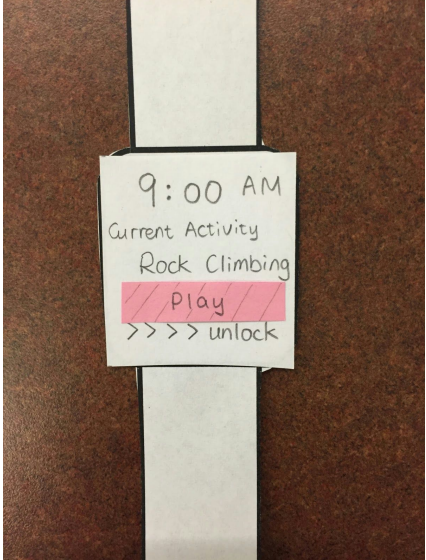### Revision #2: Record Presentation

The first thing we changed about the records screen was replacing pie charts with bar graphs. While we really liked the aesthetic presentation of pie charts as an indication of balance (an evenly cut pie has a natural symmetry), it became clear that pie charts were not very good at displaying an imbalanced schedule. When slices were small, it became difficult to identify and compare them. We also needed to put text on each slice or place the text around the pie and provide arrows to help identify different slices. Users couldn't tell the exact percentage or number of hours in each category. We chose to replace all of the pie charts in our design with bar graphs to eliminate these problems. After this change, displaying graphs was no longer an issue because each bar had plenty of room to write the name of its category. We could also show the actual percentage as a number next to each bar.
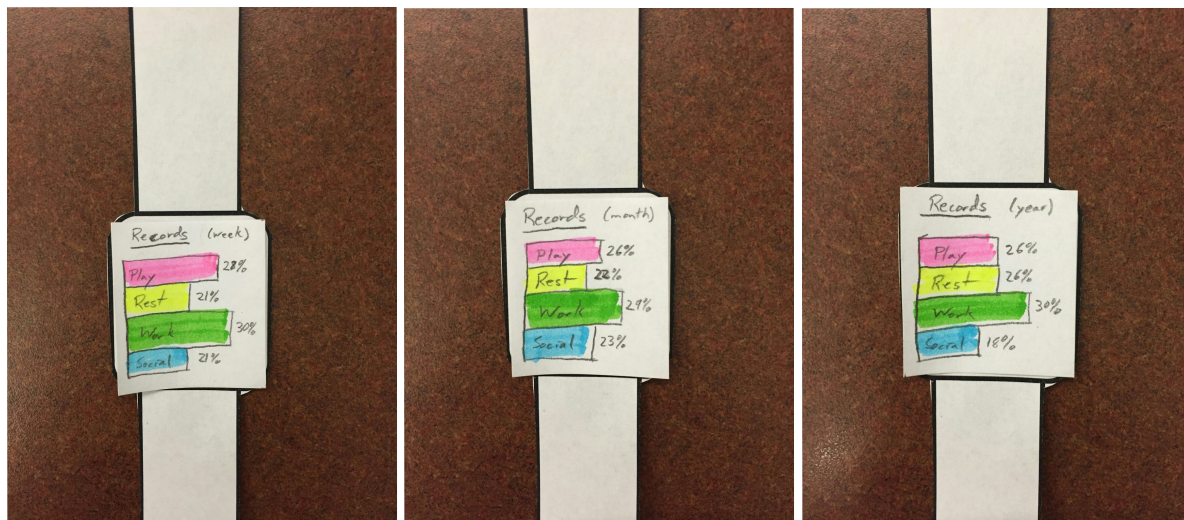
Another important change we made when revising the record presentation was to allow users to move directly between their ideal balance and their actual records. In our initial prototype, users had to go through three button presses and the menu screen to get from their ideal balance to their records. This made it difficult to see goals and performance side by side. In order to reduce the time between seeing the ideal balance and records, we made it possible to scroll between them from the ideal balance screen. This made the ideal balance screen much better for actively tracking goals.
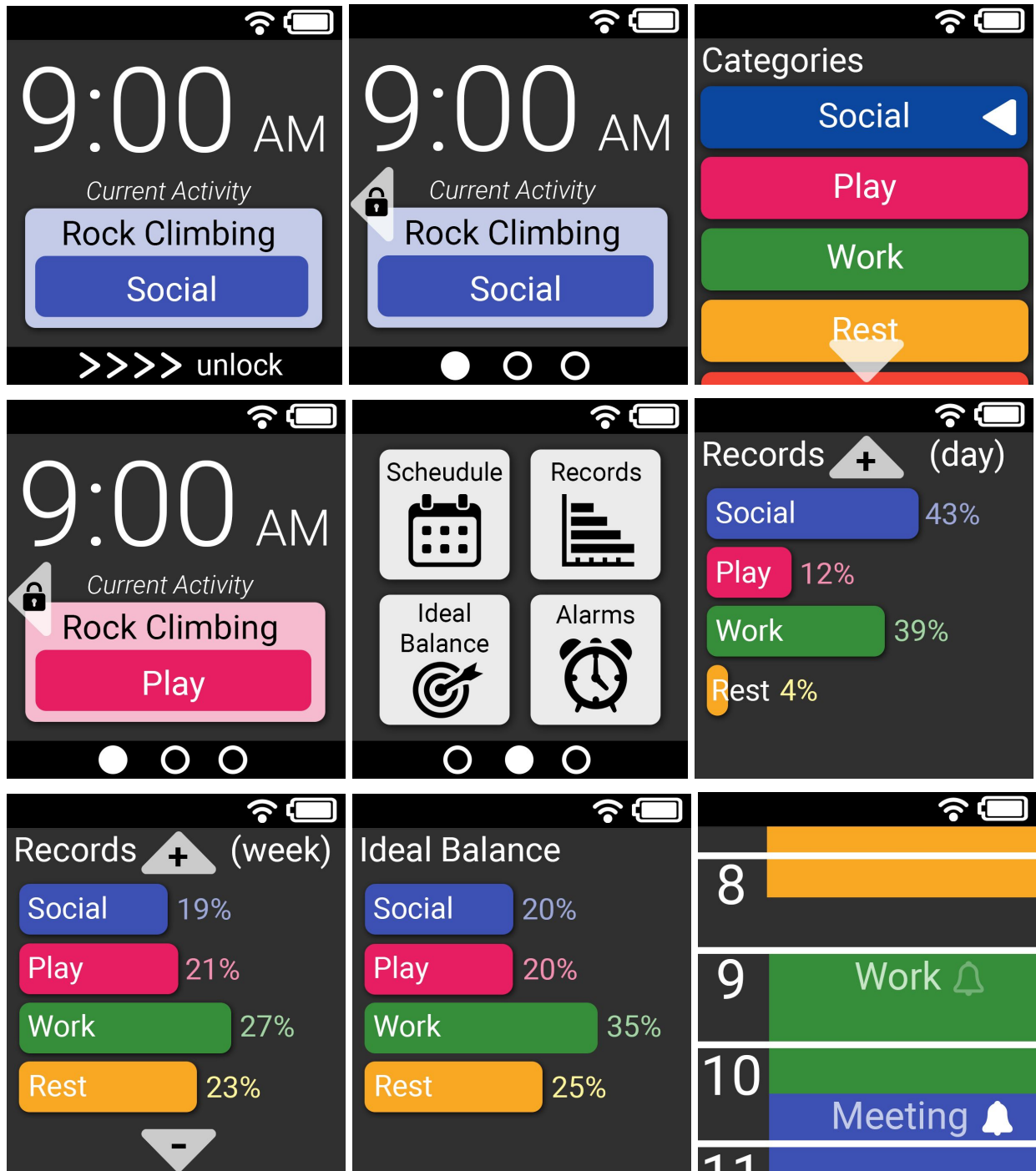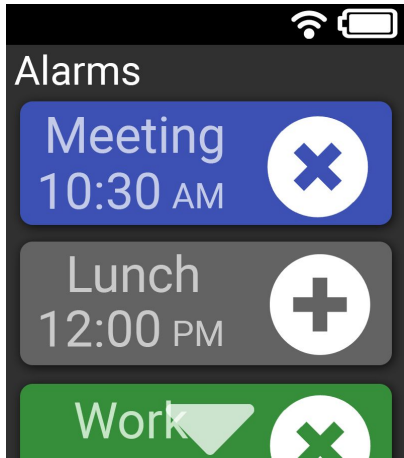
Revision #3: Changing Categories

We modified the current activity screen to be more interactive and allow the users to change the category of the current activity. This is done by touching on the category and selecting the new category from the menu. An arrow provides the user with the currently selected category. This proved to be a common enough task in our testing that it deserved it's own quick menu. Without this feature, users would have to exit back all the way into the schedule to make this simple change. It is important to have our design be as easy as possible to make quick changes.
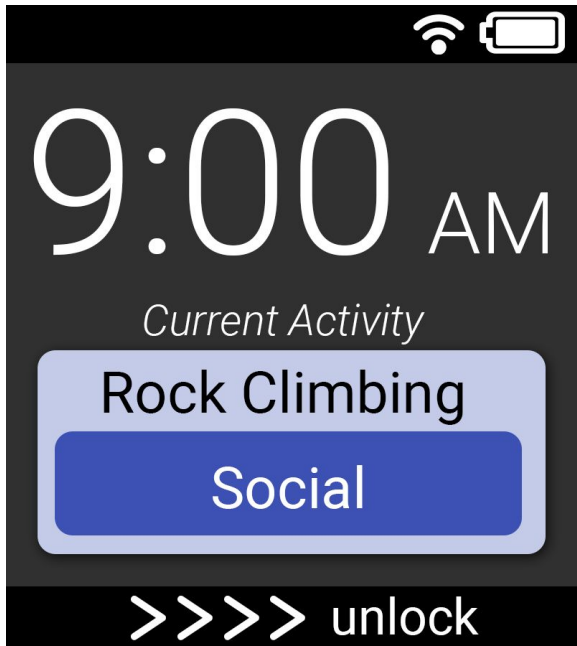
Digital Mockup

Overview

Screen 1
9:00 AM

Current Activity

Rock Climbing

Social

>>>> unlock

Screen 2
9:00 AM

Current Activity

Rock Climbing

Social

● ○ ○

Screen 3
Categories

Social ◀

Play

Work

Rest

Screen 4
9:00 AM

Current Activity

Rock Climbing

Play

● ○ ○

Screen 5
Scheudule | Records

Ideal Balance | Alarms

○ ● ○

Screen 6
Records + (day)

Social 43%

Play 12%

Work 39%

Rest 4%

Screen 7
Records + (week)

Social 19%

Play 21%

Work 27%

Rest 23%

−

Screen 8
Ideal Balance

Social 20%

Play 20%

Work 35%

Rest 25%

Screen 9
8

9 Work 🔔

10

Meeting 🔔

11

Alarms

Meeting
10:30 AM ✕

Lunch
12:00 PM ✚

Work ▼ ✕

Task 1: Change the Category of Current Activity

9:00 AM
Current Activity
Rock Climbing
Social
〉〉〉〉 unlock

Screen 1.1

9:00 AM
🔒
Current Activity
Rock Climbing
Social
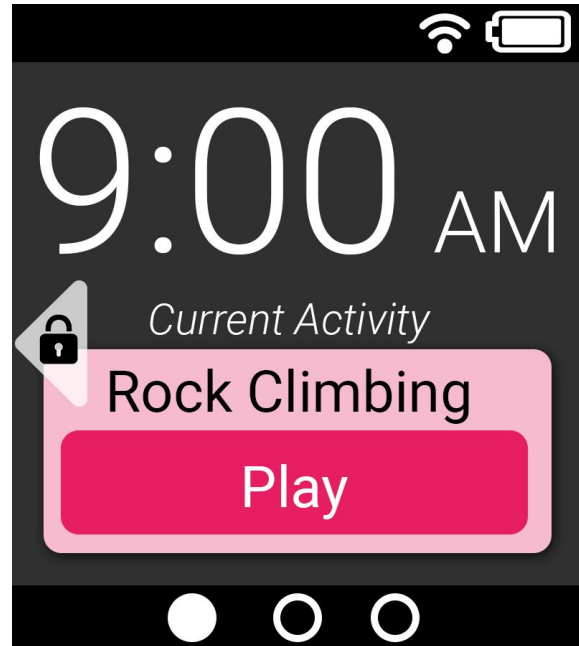● ○ ○

Screen 1.2

Screen 1.3   Screen 1.4

Screen 1.1: The Lock Screen is displaying current time and current activity. The category of current activity is automatically generated according to the history. Users can change the category of current activity manually. Swipe right on the screen to unlock.

Screen 1.2: After unlocking the Lock Screen, the user sees the Home Screen. The Home Screen is displaying current time and current activity. There is a triangle with a lock inside on the left side of the screen. It means swipe right to lock or go back to the Lock Screen. The three dots on the bottom of the screen indicates that the user is on the first of the three pages of screens. Tap on the category of current activity to go to the Category Screen.

Screen 1.3: The Category Screen is displaying a list of categories with different colors. The category of current activity is indicated with a triangle on the right side. There will be a triangle pointing down at the bottom of the screen if the list is longer than that the screen can display. Swipe up to see the rest of the list. Swipe right to go back to the Home Screen. Tap on a different category to change the category of current activity and it will go back to the Home Screen immediately after tapping.

Screen 1.4: Now the Home Screen is displaying the current activity with the updated category. The color of the category is changed as well.
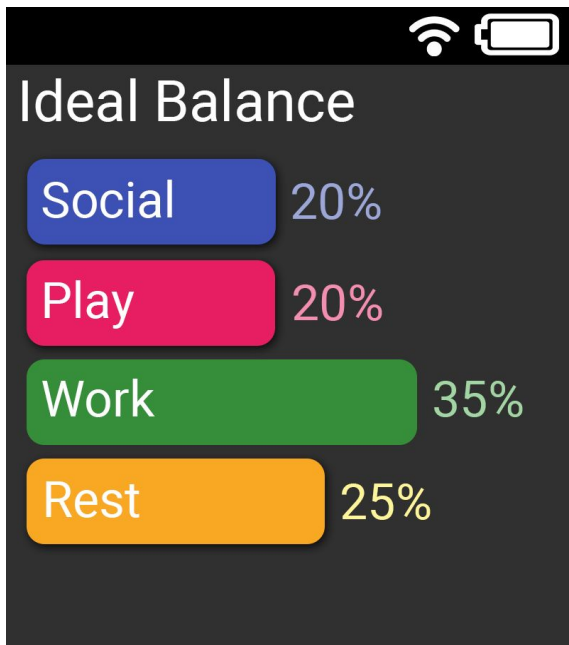
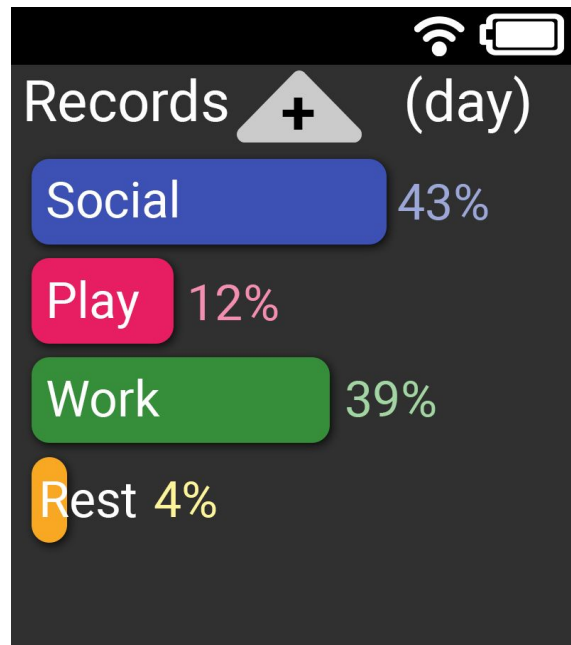**Task 2: See the Ideal Balance and Compare with Current Balance**
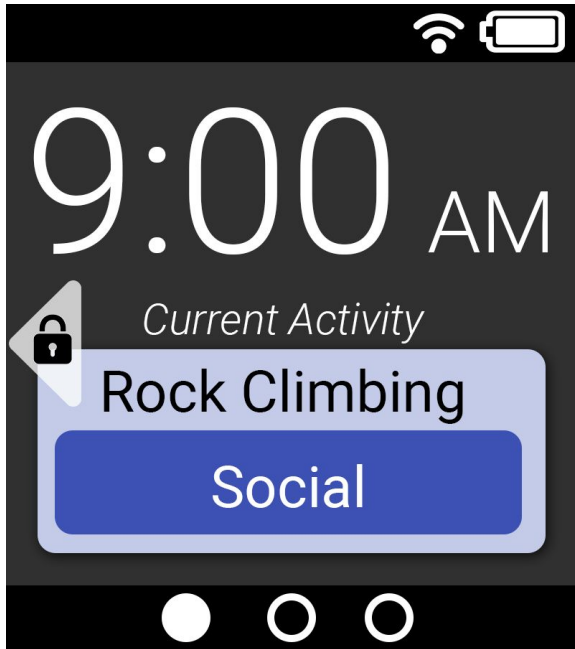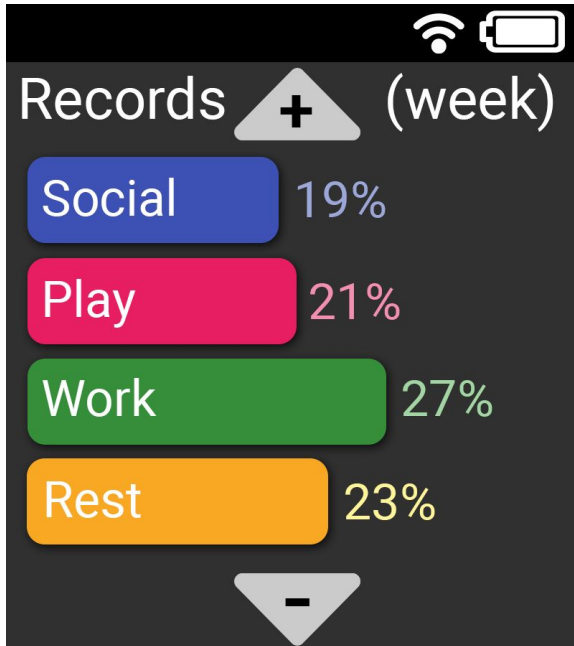

Screen 2.1
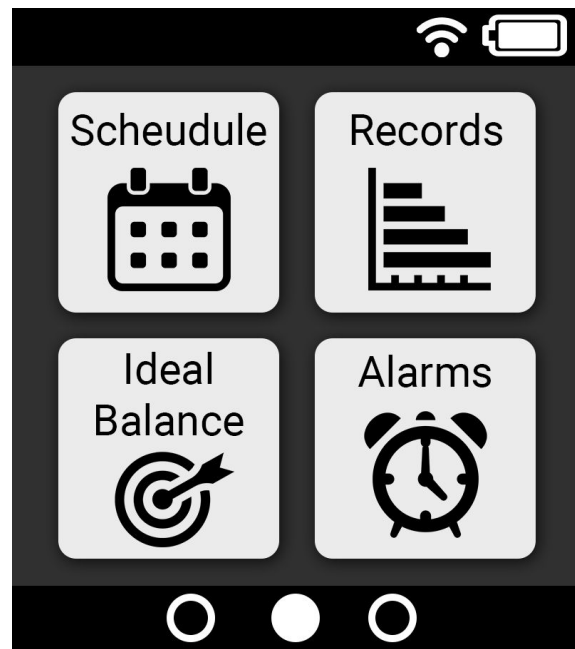
Screen 2.2

Screen 2.3

Screen 2.4

Screen 2.5

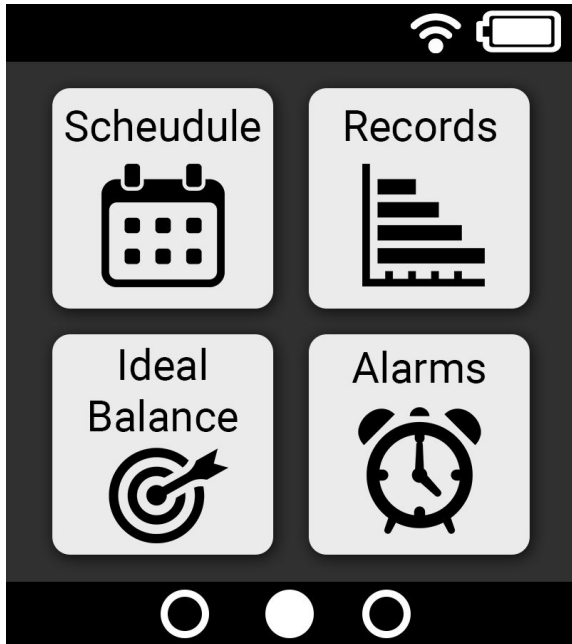Screen 2.1: When the user is on the Home Screen, swipe left once to go to the Menu Screen.

Screen 2.2: There are four tasks on the Menu Screen: Schedule, Records, Ideal Balance and Alarms. Tap on the Ideal Balance.

Screen 2.3: In the Ideal Balance Screen, it is displaying the user's preset ideal balance. Each category of activities is in a horizontal bar with different colors and different lengths. The length of the bar indicates the percentage of that category along with a percentage in number at the right end of the bar. The user can compare the ideal balance with current balance. Swipe left to see the records of current balance.

Screen 2.4: The Records Screen is displaying the balance of today as default. Same as the ideal balance, each category of activities is in a horizontal bar with different colors, different lengths and different percentages. Swipe down to see the record of current week.

Screen 2.5: The Records Screen is now displaying the balance of current week. There are "+" and "-" signs at the top and bottom of the screen. It means that the user can switch and see the records of day, week, month or year. Swipe down to see the record of current month and swipe up to see or go back to the record of today. The user can switch back to the ideal balance by swipe right on the screen.

Task 3: Dismiss and re-enable an alarm

Screen 3.1
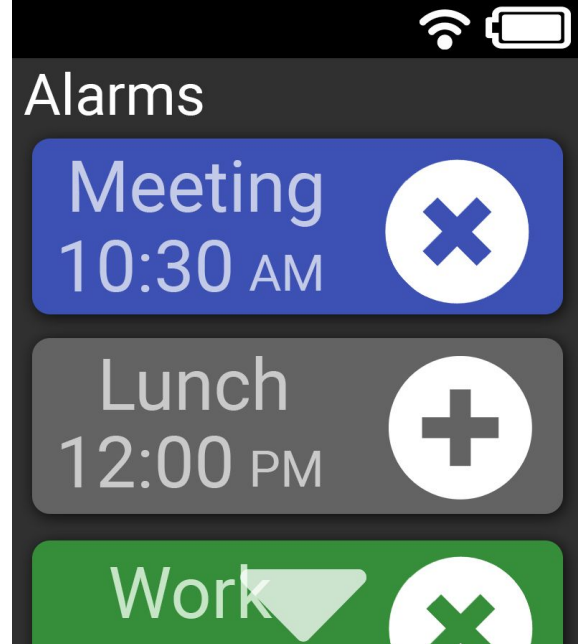
Screen 3.2

Screen 3.1: When the user is on the Menu Screen, tap on the Alarms.

Screen 3.2: The Alarms Screen is displaying a list of activities. There will be a triangle pointing down at the bottom of the screen if the list is longer than that the screen can display. Swipe up to see the rest of the list. On the right side of each activity, there is a symbol "x" or "+". "x" means the alarm of this activity is enabled. The user can tap on the symbol to dismiss the alarm. After dismissing the alarm, the symbol becomes "+". The user can re-enable the alarm by tapping on the symbol again. Then the "+" symbol becomes "x".
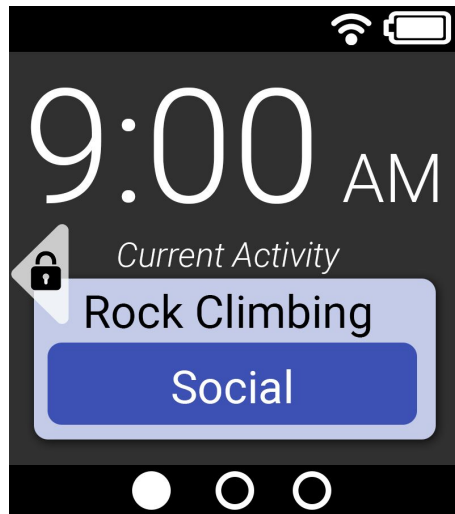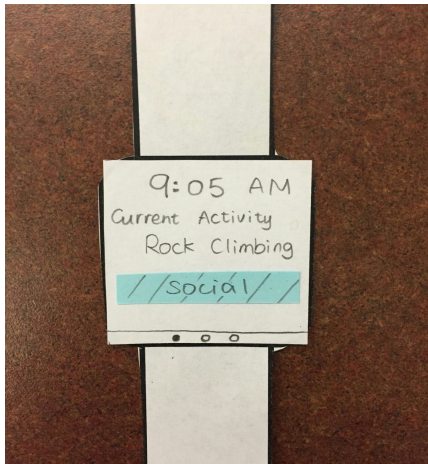
Decisions and Changes

We didn't make many changes from our final version of paper prototype. We only added some arrows to indicate that the user can swipe up or down, left or right to switch between screens. The changes are as the following:
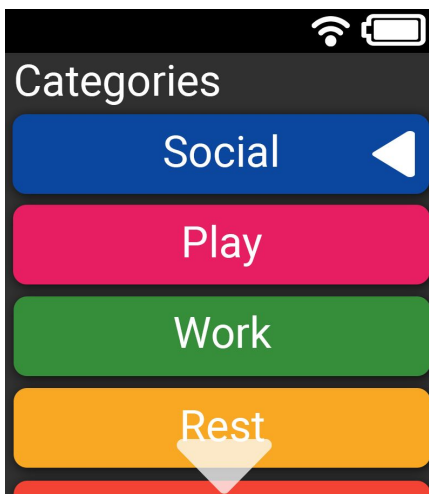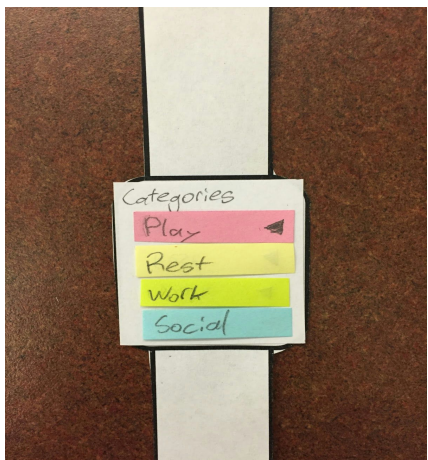
1. Added "+" and "-" signs.
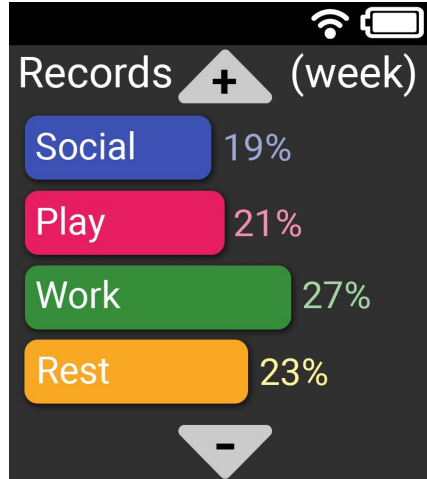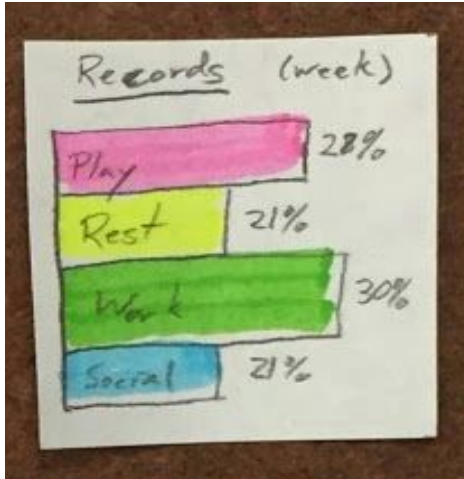
2. Added lock symbol.

3. Added down arrow.

Discussion

What did you learn from the process of iterative design?

We learned that the process of iterative design was helpful and effective. Even though we tried to make our design perfect the first time, it was not what the users wanted. We can't just design and be done with it. We updated our design each time after getting the feedbacks from usability tests and critiques. We developed the features that the users needed and eliminated the ones that are not, thus we improve our design iteratively.

How did the process shape your final design?

Our final design is very different from our initial design. Our initial design of the smartwatch was way too big. There were several features that were not possible to do on such a small screen, such as the drop-down menus. After the usability test, we made our smartwatch smaller and eliminated the drop-down menus. We also learned that the menu bar at the bottom of the Home screen was too small to tap on. Therefore, we developed swipe gestures to switch between menus. The users feedbacks shaped our design. Through the iterative process, our design became more and more practical for the users.

How have your tasks changed as a result of your usability tests?

Initially, the tasks we set for the usability tests gave away too much information. When the users did the tests, they already know what they were going to do. For example, in our first usability test, we asked the user to check the records of current balance of time for this week. The user knew that she could go to the record menu and find the current balance right there. This way, we couldn't test whether or not our system was easy to use. We could instead use a better task such as "find out how many hours you have spent on social activities this week". In this way, the user need to figure out that he should go to the record menu and find the current balance of time for this week, then get the number of hours spent on social activities. After the first usability test, we improved our tasks so that the users knew enough information but not too much to do the tasks.

Do you think you could have used more, or fewer, iterations upon your design?

We think that we could use more iterations for our design. We did three usability tests on our paper prototype. The user feedbacks were really useful for improving our design. If we have more time, we would want to do two more usability tests. For our digital mockup, we only got two feedbacks from critique in class. We think we need to do more iterations so we get more feedbacks.