Treadmill
Flexdeck Shock Absorption System

Life Fitness 95Ti

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ABSTRACT

The original treadmill interface, Treadmill Flexdeck Shock Absorption System Life Fitness 95Ti introduced solid design to the users. However, the target treadmill users we studied with still find the Fitness 95Ti has some concerns that make the running experience unpleased. There are rooms for improvement for the quick start functions that could be better displayed for the arrangement; and the advanced functions to be redesigned for being more user-friendly.

Our team designed two prototypes based from the two concerns as our goals from our targeted treadmill users. We were motivated by a few designs by other treadmill interfaces such as the Paramount Fitness Treadmill, which has a great layout and the Vision Fitness treadmill which contains clear speed and elevation adjustments. We were also inspired by the self-checkout machines which is a touch screen interface.

- **Prototype A** featured a pre-set quick start with the advanced functions implemented on the main screen.
- **Prototype B** featured a quick start dial with touch screen for advanced functions.

Both prototypes had mixed reviews, with prototype A being favoured for better quick start and speed adjustments, while prototype B being favoured for clarity of interface and advanced functions. But overall, an equal number of participants favoured both prototype A and B, each prototype has its own advantages to another.

If we could make a better prototype in the features, we will certainly incorporate the best aspects from both prototypes into it. This will include pre-set quick starts and advanced functions on touchscreen.

Overall, we were able to learn a lot about the process of design and user testing in this project which will certainly help us in the near future when we need to design a product.
<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>iii Abstract</td>
</tr>
<tr>
<td>1 Chapter 1 Identifying the Needs &amp; Establishing Requirements</td>
</tr>
<tr>
<td>2 Introduction</td>
</tr>
<tr>
<td>3 Purpose &amp; Objectives</td>
</tr>
<tr>
<td>3.1 Problem Statement &amp; User Goals</td>
</tr>
<tr>
<td>3.2 Redesign Objectives</td>
</tr>
<tr>
<td>4 Target Audience</td>
</tr>
<tr>
<td>5 Persona &amp; Context of Use</td>
</tr>
<tr>
<td>6 Heuristic Evaluation</td>
</tr>
<tr>
<td>7 User Study</td>
</tr>
<tr>
<td>7.1 Goals, Questions, and Hypotheses</td>
</tr>
<tr>
<td>7.2 Methods</td>
</tr>
<tr>
<td>7.3 Results</td>
</tr>
<tr>
<td>7.4 Discussion and Conclusions</td>
</tr>
<tr>
<td>10 Requirements Statements</td>
</tr>
<tr>
<td>11 Chapter 2 The Design</td>
</tr>
<tr>
<td>13 Inspirations &amp; Comparator Research</td>
</tr>
<tr>
<td>14 Conceptual Designs A</td>
</tr>
<tr>
<td>15 Conceptual Designs B</td>
</tr>
<tr>
<td>16 Comparisons of Design A &amp; B</td>
</tr>
<tr>
<td>17 Designing for Humans Reflection</td>
</tr>
<tr>
<td>18 Chapter 3 Prototyping</td>
</tr>
<tr>
<td>19 Task Pursued with Prototypes</td>
</tr>
<tr>
<td>19.1 Illustration of Prototype A</td>
</tr>
<tr>
<td>22 Illustration of Prototype B</td>
</tr>
<tr>
<td>24 Insights from the User Testing, Feedback &amp; Discussion</td>
</tr>
<tr>
<td>24 Insights from Prototyping</td>
</tr>
</tbody>
</table>
25 Chapter 4
Evaluation

26 Goals of this Evaluation Study

27 Motivation & Purpose
27 Participants
28 Materials
29 Instructions and Task Description
30 Observation Table for Prototype A
31 Observation Table for Prototype B
33 Experimental Design & Procedure

34 Results
34 Qualitative Data
34 Quantitative Data

36 Implications for the Future Design
CHAPTER 1

Identifying the Needs & Establishing Requirements
Fitness 95Ti is a treadmill machine that has two ways to start the running process, one by pressing the “Quick Start” button, and the other one by pressing the advanced-function buttons on the left, under the rectangular screen. For the “Quick start” button, users can adjust the settings of “speed”, “incline” and “time” using the arrow keys under the long screen. For the advanced-function buttons at left, users are required to enter information such as age, weight (using number keys at right) to start the process.

There is a “Pause” button for temporary stop the running process, and a “Cool Down” button for reducing the speed of the treadmill slowly. Users perceive feedbacks through the two screens on the interface. The long one on the top shows current user’s information about calories, distance, time, incline, speed, and heart rate. The rectangular screen on the left shows a graph about user’s workout profiles.

95Ti, Interface Analysis

- Included Buttons with Quick Start, Stop & Other Functions Features
- Adjustable Buttons with Speed, Incline, Time & Number Dials
- Displaying Calories, Distance & Heart Rate
Problem Statement & User Goals

The placement of the buttons on the current interface is not clear, making it confusing for first-time users. Although the advanced-function buttons are explained by text, the users tend to ignore them because they look cluttered and misleading. The lack of pre-set modes on this treadmill causes users to spend a longer time pressing buttons before they can start their running exercise.

The user's goals for our new interface are to be able to easily distinguish functions and to reorganize and redesign the advance function better for better understanding, and to quickly start a run process by using pre-set modes.

Redesign Objectives

Our objective is to shorten the overall learning curve of the interface by reducing a series of confusing button selections, as well as making safer adjustments for the users to have a great running experience.

We want to rearrange the placement of the buttons in order to let users have a basic understanding toward the functions of the buttons at their first glance.

Our secondary objective is to enhance the accessibility of the interface so that users can save time when setting up the treadmill. We also want to redesign more effective preset modes for the “Quick Start” and “Cool Down” button.
**TARGET AUDIENCE**

**Primary User Group**
Joggers, Age 20 – 40
Various Working Classes

**Goals**
Jogging is their life style, staying fit & be healthy. They are looking for a good sweat for cardio & stress release.

**Experience**
- Good knowledge of technology use.
- Used various type of treadmill models.
- Have a fixed schedule & owns a recreation pass.

**Facts**
- Highly health conscious
- Regular users of the gym and active outdoor exercisers
- Good knowledge of technology and computers (especially for treadmill)
- Experienced users of many types of treadmills
- Many of them maintain good shapes
- Some are improving their shapes or physical capability
- Working people or students

**Needs:**
- Fast and responsive buttons for quick acceleration of speed and incline
- Need advance options for more utility
- Preset customized modes to manage their workout routines
PERSONA & CONTEXT OF USE

“\textit{It Never gets Easier, You Just get Stronger!”}

- Mark loves to hang out with friends for chat, very sociable,
- He is tech-savvy, owns many tech gadgets.
- Active and Health living is his religion.
- He enjoys listening to music when working out with flow.

Treadmill Usage

Mark usually work out 5 times a week in a recreation facility. He usually performs a quick increase of speed and incline for the time up to 30 minutes every time he runs. He expects this routine would keep him fit throughout his years in business school. He expects the treadmill would be easy to use and accessible.

Goals

He hopes to maintain a healthy lifestyle by working out 5 times a week.

He is told as a yuppie, career driving, earning good pay, enjoying the cultural attractions of sophisticated urban life and thought,

Frustrations

Find time to work out and live balance live living.

Complicated interface layout.

How safe while operating the treadmill?

Context:

Mark realizes that he has not been exercising a lot after entering busiest weeks in the business school. After a couple of weeks, he can tell after a few chases for the bus and skytrain that he is going out of shape. After that, Mark decides to work out every time he has breaks during school days.

Scenario:

After one his classes, Mark has around an hour before his next class starts. He decides that this will be an optimal time for a 30 minutes run at the recreation center near his school. After getting changed, he enters a room and steps on a treadmill. Mark Sander wants to warm up for his body to prepare for the exercise; he then needs to adjust his speed and workout time.

Task:

Mark Sander needs to set up his desired incline and speed rate. He then has to set the time to 30 minutes in cardio mode. Finally, Mark can push the quick start button and set the speed and incline. Mark can then start on his workout.
HEURISTIC EVALUATION

HELP USERS RECOGNIZE
The users have no warning that the treadmill platform would start running.

Solution:
1. A countdown display at a screen.

FLEXIBILITY & EFFICIENCY OF USE
The users needed to press the speed dial for many times for adjusting the speed.

Solution:
1. Changes the adjustment buttons to wheel sliders.
2. Preset speed dials.

HIDDEN FEATURE
The number dials have no indication as quick dials for speed adjustment.

Solutions:
1. To identify the dials or take out the hidden function.

AFFORDANCE & HELP
Feature buttons are ambiguous for what they are supposed to do.

Solution:
1. Add Information / visual design.
2. Give suggestions when the function can be used.

HELP & DOCUMENTATION
The users are required to enter their data every single time for treadmill.

Solution:
1. Membership card for information storage.
**USER STUDY**

**Goals, Questions, and Hypotheses**

The user study goal is to determine which buttons are being used the most, and why they used. It is also important to find out what kinds of people are using the treadmill.

The first task is to using the quick start button. We are trying to determine how long it takes for runners to perform on this task, how many buttons are being pressed and how many times they are pressed?

The second task is to see what kinds of buttons users would press when they want to start running. We would like them to run for a couple of minutes and then ask them use the cool down button feature after the minutes of run.

The third task is to use the advanced function buttons to determine whether those functions are helpful for the users, and why or why not. To also determine how often they use them, we would ask their thoughts about it.

The final goal is to ask them a series of questions on what they think about the overall interface and how it can be further enhanced or improved.
USER STUDY

Methods

Participants

User 1 is an 18-25 years old female student who studies Education at Simon Fraser University. She is health conscious but does not like to eat vegetables very much. She goes to the gym about four times a week and uses the treadmill about three times a week. She is an advanced user of the treadmill. She normally jogs for cardio workout.

User 2 is a 14 year old female student who is very conscious about health. She works out at the gym seven days a week and uses the treadmill every time. She considers herself as a beginner treadmill user because she only uses the very basic functions mainly for running.

User 3 is an 18-25 years old male who recently graduated from University of British Columbia in Engineering. He works out three to four times a week on weekdays and likes to party on weekends. His reasons for going to the gym are to burn off the fat accumulated from his drinking habits and maintain a healthy body.

User 4 is a 46-55 years old male construction contractor who is very conscious about health. He goes to the gym four times a week and uses the treadmill about three to four times for cardio workout. He considers himself as an advanced user.

Materials

- Treadmill
- User Test questions sheets
- User Test forms
- Sound recorder
- Stopwatch

Procedures

Task 1: Run or walk by using the Quick Start feature. Record what buttons are pressed, how many times it was pressed, and duration to complete the task.

Task 2: Run for one minute then walk or cool down for one minute. Record what buttons are press, how many times it was pressed, and duration to complete the task?

Task 3: User is to explore other workout options on the machine, then choose any desired options. Record which buttons were pressed and how often?

A set of qualitative data questions on what buttons/features they would like to see or omit, and what features they found most useful and not useful.
Results

Task 1 - Quick Start function
Almost all the users didn’t find the Quick Start button to be useful at all due to the fact that the default speed is too slow. Only one user uses this button to operate the treadmill and then must the Speed dial to increase the speed. Other users just use the Speed dial to perform the Quick Start task.

Task 2 - Run then cool down
All users are heavily dependent on the Speed dial and Incline dial functions to perform task 2. No other buttons were used. Even though the Cool Down button is readily available for cooling down, only one user used this button. The other three users used the Speed dial to decrease the speed for cool down. Their reason for not using the Cool Down button was the speed drops too low.

Task 3 Advanced option exploration
With this task, we would like to see if users use the Advanced option functions and other buttons such as the number keypads. Only one user used the Manual button in the Advanced option, because “it sets the speed and incline” for her. The other users don’t use these functions at all due the fact that they are “confusing and don’t perform as expect”.

Discussion and Conclusions

Based on the data collected from the user study, all users mainly use the Speed, Time, and Incline buttons to perform most of the tasks on the treadmill. The Advanced option functions are rarely used because the buttons are not clearly defined and they don’t perform what the users expected. The index chart for the Advanced option is not very clear. Some users use the number keypads to specifying their weight and age information, and sometimes to specify the speed, incline, or time frame.

Other feedback we received from users are personal profile to track their workout progress and have the data to be available online, have customized speed and time for their peak run, and have customized speed and time for cool down. Other users prefer to have other ways to increase the speed while they are running or walking rather than pressing the speed dial. It would be beneficial if the speed dial was handheld.

Other Qualitative Data
When ask which features they would like to omit or add, many responded that it would be beneficial to have a way to track their workout progress and customized profile that sets their most used speed and time for them.
REQUIREMENTS STATEMENTS

Functional Requirements

Function 1

Requirement: The “quick start” button for the treadmill should allow users to begin running right away.

Justification: After pressing the “quick start” button, users must also adjust the speed and incline setting until they get their desired amount. This is because the default speed rate that comes with the quick start option is very low.

Metric: It is repetitive for users to press the speed and incline up multiple times after pressing the quick start. The systems should either have a better way to increase the speed or remember the user data so that users do not have to do it set the speed every time they use the treadmill.

Redesign: The interface should have pre-set speed rate for “quick start” button or a memory card to store user data. The arrow keys, which adjust the speed and incline, could be replaced by two rollers, in order to have faster speed and incline adjustments.

Function 2

Requirement: The advanced function buttons on the left side should be more user-friendly and visually pleasing.

Justification: The advanced function buttons are rarely used and make the interface look confusing. Users will find it troublesome to find their desired function to perform their task. Some users don’t even want to understand what some functions do.

Metric: Many users ignore the advanced functions meaning that it doesn’t meet the requirements for user needs. The pictograms on the left side don’t correlate with the advanced functions well.

Redesign: Combine the advanced functions in a small area or remove it completely. Then the interface will look cleaner and more focus will be on the main function which is what really matters.

Non-Functional Requirements

The interface should provide a safer alternative for adjusting the speed and incline rate. The user may not feel safe or comfortable to adjust the speed with the current buttons as they are running. There should be a stronger hierarchy with the interface. The number buttons at top, and the “quick start” should be the first thing the user sees. The quick start number should be bigger and have a brighter color than the rest of the buttons in the interface. The interface needs to show that the graphs on the left, the buttons on the left, and the left screen are all related to each other.

The emergency stop button looks very much like the safety clip on the left. The emergency button is also too far on the right and serve almost the same purpose as the pause function.
CHAPTER 2
The Design
## PRIORITIZATION WORKS

<table>
<thead>
<tr>
<th>Group/ Item</th>
<th>Business Importance</th>
<th>User Importance</th>
<th>Technical Feasibility</th>
<th>Resource Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Quick Start</strong></td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>This button should allow speed adjustments without requiring the user to press it multiple times.</td>
<td>Allow users to begin working out quickly could be a major selling point for casual runners.</td>
<td>Users want the interface to allow them to start running right away.</td>
<td>Easily Programmable and simple in function. Programmable and simple in function.</td>
<td>Although important, it should not take that long to make.</td>
</tr>
<tr>
<td><strong>2. Advanced Function Buttons</strong></td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Make it into one button or touch screen so that it would make the interface look less confusing. A profile card could be used for preset workouts and faster selections</td>
<td>This new form of advance features could be a major selling point for many gyms with profile cards.</td>
<td>Allows users to do their advance workout without having to input their desired settings every single time.</td>
<td>May be quite difficult since it has a lot of functions.</td>
<td>May take a while to program all the functions.</td>
</tr>
<tr>
<td><strong>3. Visual &amp; Layout</strong></td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Make a clear visual layout for the machine that will easily allow users to understand what each button does on the treadmill.</td>
<td>Having a good looking design could attract many customers for the treadmill machine.</td>
<td>User will like layouts that are engaging and easily understandable.</td>
<td>Having lights on buttons and screen will enhance user experience.</td>
<td>Should not take too long to make LEDs light up, but a lot of LEDs may be required.</td>
</tr>
<tr>
<td><strong>4. Speed</strong></td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Speed adjustments should be safe and easy to use while users are running.</td>
<td>Allowing users to easily adjust speed safely could be important for business.</td>
<td>Users will want to feel safe when running and adjusting their speed.</td>
<td>Should be simple adjust only speed up and down.</td>
<td>May need springs and sliders or just buttons depending on the design.</td>
</tr>
<tr>
<td><strong>5. Number Keypad</strong></td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Number keypad only needed to be shown when needed. Having it out may just take up a lot of space.</td>
<td>Having the number keypad out all the time may make the interface look unattractive and harder to sell.</td>
<td>Users will need it to enter their data.</td>
<td>Should correlate with the advanced functions and user profiles.</td>
<td>May take a while to implement since it is related to advanced functions.</td>
</tr>
</tbody>
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INSPIRATIONS & COMPARATOR RESEARCH

1. Paramount Fitness Treadmill

The Paramount Fitness Treadmill is well designed, organized, and has an attractive layout. It is clear what each area and buttons are used for. For example, the pause button is on the left side and the stop button if on the right so that there will be no confusion between the two. The paramount fitness treadmill inspired us in how we should group our buttons and use LCD lights to indicate our buttons. The user’s goals for the new interface are to be able to easily distinguish functions. The plan are, redesign the advance function betters, and to make quick start process by using pre-set speed modes.

2. Vision Fitness T9450 HRT Treadmill

The Vision T9450 HRT Treadmill includes very clear speed and elevation buttons. This allows users to quickly set up their desired workout. Also, users will not have to go through so much trouble to continuously press the same button again while running. The main focus on this interface is the quick start aspect and it greatly inspired and changed the way we designed our quick start function.

3. Self-checkout Machine

Our advanced functions interface for our treadmill machine was inspired by the self-checkout machines at grocery stores. The self-checkout machines were completely touch screen and it allowed users to choose their product, select the amount, and pay. Since it is completely touch screen, it makes the interface looks clean and tidy without sacrificing any of its features. Since our advance functions are quite complicated, if we use touch screen, we can also make it look tidy without having to take out any of its important features.
CONCEPTUAL DESIGNS A

Overview of Conceptual Design A

For concept design A, we focused on the simplicity of the layout and the quick start functionality. To make the design layout simpler, this design layout combines two screens into one. We replaced the arrow keys into sliders, right beneath the screen, for users to adjust the speed, incline, and time with better ease. We have relocated all advanced-function buttons to the left side of the screen. Once users press the “Advanced” button located at the bottom-left of the screen, the selections of advanced functions will be shown on the screen. Users need to press the buttons (four totals) on the left side of the screen to select the corresponding function. For the quick start functionality, which is located beneath the screen, has three pre-set buttons for quick starting: 2 mph, 4 mph and 6 mph. Each pre-set button will set the speed of the treadmill for the users and begin the workout right away. It also has light indicator to show whether the button has been selected. The major buttons, “Start”, “Stop”, “Pause”, and “Cool Down”, which directly control the treadmill, are placed on the left of the quick start area; while the number keypad which assists users to enter weight and age, is located at the lower right corner of the interface layout.

Design Hypotheses

If we group all the buttons that directly control the operation of the treadmill in proximity such as “Start”, Stop”, “Pause”, and “Cool Down”, users will know where to look at when they want to control the treadmill. If the users spend less time on finding the operational buttons, the interface learnability has been improved.

Interaction Paradigm & Interface Metaphors

The buttons, with triangle patterns pointing to the screen, at the left side of the screen refers to the corresponding function selections shown on the screen. Each triangle pattern functions as an arrow pointing to a specific option. The screen is not haptic; however, the users these buttons can help the users to select their options.

As a feedback for pressing a pre-set button, the three light indicators above the three pre-set buttons offer the users a sense of turning on/off the light. Once the users pressed a pre-set button, the light indicator above it will be on to provide the users a ON signal; vice versa, the other two light indicators remain an OFF signal to indicate that their corresponding buttons were not pressed.

The concept of slider controls adjusting the speed, incline, and time was taken from the concept of the slider controls for volume adjustment in computer programs. The up/down direction of a slider refers to the increment/decrement of a certain parameter. After the user lets go of the slider, the slider will automatically go back to its original position. Turning off the machine will automatically reset the speed, incline, and time back to zero.
Overview of Conceptual Design B

In our prototype, we transformed the Quick Start button to a dial with pre-set speed from 1 mph to 9 mph. The treadmill will gradually reach the desired speed that the user set after he/she presses the green start button on the dial. The major adjustment to the original interface is that we add a touch screen which enables the users to access their personal data and track their progress by swiping membership card. In the touch screen system, user will be able to edit their profile, progress and workout options. The Workout tab option contains advanced-function selections which include Cardio, Hill, Walk, and Warm up options. The modes for each workout option contain Time, Incline, and Speed. The modes can be customized if users press the pre-set number. When pressed, the number keypad pops up for the user to edit. We removed the physical number keypad and placed it into the touch screen system. It will only pop up when a number input is needed. We kept the Speed, Time, Incline buttons at their original locations. The Start, Pause, Cool Down, and Stop buttons have been moved to lower right corner of the interface. The Quick Start dial is next to the user profile touch screen for quick access to warm up if the users do not want to use the profile feature. At the top is a horizontal screen that shows Calories, Heart Rate, Distance, Speed, Time, and Incline information.

Design Hypotheses

If we have a speed dial to replace of a Quick Start button, users would not have to press the speed button repeatedly after the machine starts. They can turn the dial to a speed from 1 mph to 10 mph. There is wider range of selection speed for user to select at beginning than other pre-set quick start button. This convenient new feature helps users to easily focus on their running tasks which will more likely provide a more enjoyable running experience.

Interaction Paradigm & Interface Metaphors

The profile card used to access the user profile features on the treadmill is the same membership card given to all users by the recreational center.

The speed dial with scale may come from the dial used in many ovens in the kitchen. People turn the dial in a clockwise to increase the heat and anticlockwise to decrease it.

The profile card swiping system is used to store users’ information such as their age and weight and their custom settings they normally use for their workout. People scan it and then get the information of the card owners through the data that is stored in the chip or barcode. This feature eliminates the need to enter personal information such as age and weight, and workout settings every time.

The red light on the number key indicates that a button has been pressed. If the key is not pressed, then the key will not blink red, indicating that it is not pressed.
# COMPARISONS OF DESIGN A & B

<table>
<thead>
<tr>
<th>Aspect to Compare</th>
<th>Conceptual Design A</th>
<th>Conceptual Design B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quick Start Selection.</td>
<td>Have pre-set speeds of 2 mph, 4 mph, 6 mph buttons that users can press and being their work out right away. This allows users to quickly start without having to press the speed button repeatedly.</td>
<td>Have a dial button for the quick start, allowing users to easily adjust the speed. Users will have to turn the dial to select their desired speed.</td>
</tr>
<tr>
<td>2. Speed/ Incline Adjustments</td>
<td>To use a slider to replace the increase and decrease button for speed/incline adjustment.</td>
<td>Continue to use the standard increase/decrease arrow buttons since quick start problem is resolved.</td>
</tr>
<tr>
<td>3. Advance Function Digital Screen</td>
<td>To implement the advanced function buttons right next to the screen and combine both advance function screen with the main screen. It will make the interface less cluttered.</td>
<td>To implement touch screen for data input and function selection. Touch screen will allow users to pre-set their workout so they can begin by pressing just 2 buttons. This will make the interface appear less cluttered.</td>
</tr>
<tr>
<td>4. User Profiles</td>
<td>Not available</td>
<td>To have pre-saved functions for advanced users using a sensor card. Located on the advanced function digital screen located below the main screen on the left. Users can start on their desired workout options without having to re-enter their data every time.</td>
</tr>
<tr>
<td>5. Time Adjustment</td>
<td>A slider will be used to increase/decrease the time. Once the workout begins, the timer will count down. If the time adjustment is not used, it will count up instead.</td>
<td>To continue to use the arrows buttons to increase/decrease the time. Once the workout begins, the timer will count down. If the time adjustment is not used, it will count up instead.</td>
</tr>
</tbody>
</table>
DESIGNING FOR HUMANS REFLECTION

1. Visual Queries

Visual queries are the act of attention driving eye movements and tuning our pattern-finding circuits. It involves the process of visual thinking, which allocates the attention at its very essence. As our redesign objectives stated, we wanted to shorten the users’ learning curve toward the interface. We tried to improve the visual queries of the interface to improve the users’ learnability and discovery. Both conceptual designs applied the pop-out mechanism to draw the users’ initial attention to the quick start function. Also, during our discussion, we agreed that the “Stop” button was an emergency button and should be visually distinct to the users, when the users look for it. We therefore, on both designs, used a red-coloured button to indicate the “Stop” button in order to make it distinct from other buttons. Moreover, for design A, we combined the two screens in the original design into one. This could minimize the users’ sources of getting feedback and shorten the users’ time on exploring new features.

2. Pop-Out Effects

If a visual search target is distinct in one or more feature channels from the other objects surrounding it, the visual search target pops out. The proper use of pop-out effects can help users to quickly determine a visual search target. In our redesign, since we wanted our users to recognize the quick start function as quickly as at the first glance, we applied the pop-out visual mechanism to achieve this goal. For design A, by placing them in the center of the interface, we emphasized the three pre-set quick-start buttons by enlarging its physical size and coating the surface of the buttons with distinct color, yellow. We also added a light indicator feature as a signal to indicate the pressed button. For design B, the quick start dial was obvious because it was almost as three times larger than the other buttons. The use of dial in the quick start function also distinguishes itself from the use of buttons in the other functions.

3. Semantic Pattern Mappings

In interface design, designers often use patterns, or we call it graphical codes, to convey natural semantics. For example, designers use small shape defined by color, texture or closed contour to indicate an object, an idea or an entity, and use graphical objects in proximity to represent similar concepts or related information. (Ware, 2008) The graphical code is considered to be spatial metaphors because it aims to enhance human experience in the context of environmental interaction. We took this concept into account for both of our conceptual designs. For design A, we outlined the quick start area to distinguish it from other functions and grouped the “Pause”, “Cool Down” and “Stop” buttons in proximity. The purpose of this was to avoid confusion caused by the buttons arrangement, which existed in the original design. For design B, we used different shapes and sizes of buttons to indicate their actual functions. For the adjustment of time, incline, and speed, we kept the triangular buttons to refer to the increment or decrement of the parameters. We used a big round dial for the quick start function to call users’ attention as well as to make contrast with the smaller round buttons at its right side.
CHAPTER 3

Prototyping
**TASK PURSUED WITH PROTOTYPES**

Illustration of Prototype A

**Step 1:** For our conceptual design A, we mainly focused on the redesign for the “Quick Start” area and the layout for the interface. The user wants to have a warm up exercise at the beginning. He uses the “Quick Start” area and presses one of the “quick start” buttons: 2mph.

**Step 2:** Then the main screen will show “Walk to Start” in red which means the user can start by walking on the treadmill. The screen will count and show the distance, speed, incline and the time for the user.

**Step 3:** After a while, the user thinks that 2 mph is a little bit slow for him and wants to run a bit faster so he uses the slider which adjusts the speed of the treadmill. He slides it up to increase the speed to 5 mph. If he wants, he could also use the number pad to adjust the speed.

**Step 4:** After running at the speed of 5 mph, the user presses the cool down button for a short break.
Step 5: He also wants to try some of the advanced function on the treadmill. He then presses the advanced button located near the left corner of the screen. The screen allows him to choose 4 functions.

Step 6: He chooses the “Cardio” function. He presses the button beside the screen and the button then blinks red and blue to show that he has chosen the “Cardio” function.

Step 7: Then the screen shows the information required for the “Cardio” function and asks the user to enter the required information such as the weight and the age. The user can enter their information using the number pad.

Step 8: The user can now start the “Cardio” exercise by walking. The screen will also count the calories, speed, incline, and time for him.
Step 9: Finally, the user presses the “Stop” button to finish his exercise on the treadmill.
**TASK PURSUED WITH PROTOTYPES**

Illustration of Prototype B

**Step 1:** For our conceptual design B, we mainly focused on the advanced functions and the design for the user profile system. The user will have to use the membership card in order to access advanced function and the user profile.

**Step 2:** The user starts the advance functions by swiping his card on the right side of the touch screen. His profile then pops up and it shows his personal data including his name, age and weight.

**Step 3:** The user can easily change his/her data by pressing the numbers which pops up a number pad when press so that they could edit it.

**Step 4:** The user would like to start his exercise so he presses the “workout” button, four of the advanced function would pop up. The user presses the “Cardio” button which will instantly start his pre-set workout. He could also reset the speed time, and incline for his workout by pressing the numbers which will pop out a number pad that lets them edit it.
Task Pursued with Prototypes

Step 5: Finally, the user presses the “progress” button which shows them all the personal information for his/her training progress separated days, weeks, and months.
INSIGHTS & LESSONS REFLECTION

Insights from the User Testing, Feedback & Discussion

Through the user testing, we found that the quick start button on the original interface is not emphasized and that the time, speed, and incline buttons are used for different tasks. The confusing layout of the advanced-function buttons discourages users to use them at all. Several users suggested that we should add a feature of personal profile to track their workout progress and save their preset workout selections. We also observed that the interface’s lack of simplicity affects the learnability for the layout. We realized that having multiple pre-set modes or a dial for quick start would satisfy more user preferences. From user feedback, we also changed the physical advanced-function buttons on the interface’s touch screen in order to minimize the number of selection available to users at first glance. Furthermore, on one of our designs, we adopted the users’ suggestion of applying a user profile on the interface.

Insights from Prototyping

For our project, we made a couple of prototypes so that we can see what our treadmill interfaces could potentially look like. Making a prototype gives us a sense of how the user is able to use the interface and how they could press on the buttons. Also, by actually making the prototype, we could see that some of the designs did not work either because it was too messy or because it was too contained too many unnecessary white spaces. In the end, we picked the two best prototypes and further refined it so we can begin user testing. Overall, making the prototype allows us to further understand what our products look like and how it can be further improved.
CHAPTER 4

Evaluation
GOALS OF THIS EVALUATION STUDY

The users for the 95Ti Treadmill want to have their running routine to be easily set up without confusion. We think that the current quick start function and advanced functions are inefficient. The current advanced function is too confusing and requires a lot of steps which cause users to just use the quick start function, which can also be improved on.

Two Major Problem/ Goals

• Quick start button: The change of speed rate requires too many inputs. The goal is to have pre-set speed rates or a dial for users to quickly adjust it.

• Advanced functions: It is too confusing, takes too long to start, and many users don’t even know what most of the functions actually do. The goal is to delete useless functions while making it easier to use. We hope to speed up both processes for these functions in hopes to improve usability experience.

Questions

• For Prototype A, Are the buttons for advanced functions in prototype A easily recognized?

• For prototype B, is it obvious for users that in order for them to access the advanced functions, they have to swipe their recreational card?

1. Is the quick start function faster in prototype A, prototype B, or the original interface?

2. Are the advanced functions easier to access in prototype A, prototype B, or the original interface.

3. Is the pre-set quick start or the dial quick start easier to use?

4. Is having 2 start buttons (one for the original interface, one for the quick start) confusing for the users?

5. Do users know that they can also adjust the speed using the sliders/arrow keys after they use the quick start function?

Hypothesis

1. Having a pre-set quick start allows users to quickly select their desired speed without having to press increase/decrease speed repeatedly.

2. Allowing users to pre-set their advance function should quicken their workout. After pre-set, users need only to press 2 buttons to start their workout without having them to set their desired modes every single time.

3. The time it takes for users to pre-set the advance functions should take just as long as a user entering data for advanced functions on another treadmill interface.
# MOTIVATION & PURPOSE

## Participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Personal Details</th>
<th>Occupation</th>
<th>Self-identified Workout Type</th>
<th>Workout Frequency</th>
<th>Workout Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18-25, Male</td>
<td>Student</td>
<td>Intermediate</td>
<td>Rarely</td>
<td>30 mins</td>
</tr>
<tr>
<td>2</td>
<td>18-25, Female</td>
<td>Student</td>
<td>New</td>
<td>1/ month</td>
<td>1.5 hrs</td>
</tr>
<tr>
<td>3</td>
<td>18-25, Female</td>
<td>Student</td>
<td>New</td>
<td>1/month</td>
<td>1 hr</td>
</tr>
<tr>
<td>4</td>
<td>18-25, Male</td>
<td>Student</td>
<td>Intermediate</td>
<td>2-3/ week</td>
<td>1 hr</td>
</tr>
<tr>
<td>5</td>
<td>18-25, Male</td>
<td>Server</td>
<td>New</td>
<td>Rarely</td>
<td>5 mins</td>
</tr>
<tr>
<td>6</td>
<td>18-25, Female</td>
<td>Student</td>
<td>New</td>
<td>2-3/ year</td>
<td>45 mins</td>
</tr>
<tr>
<td>7</td>
<td>18-25, Female</td>
<td>Student</td>
<td>Intermediate</td>
<td>2-3/ week</td>
<td>1.5 hr</td>
</tr>
<tr>
<td>8</td>
<td>26-35, Male</td>
<td>Student</td>
<td>Intermediate</td>
<td>1-2/ week</td>
<td>1 hr</td>
</tr>
<tr>
<td>9</td>
<td>18-25, Male</td>
<td>Student/ Server</td>
<td>Advance</td>
<td>1-2/week</td>
<td>1 hr</td>
</tr>
<tr>
<td>10</td>
<td>26-35, Male</td>
<td>N/A</td>
<td>Intermediate</td>
<td>1-2/week</td>
<td>2 hr</td>
</tr>
</tbody>
</table>
MOTIVATION & PURPOSE

Materials

We used paper prototypes because it could be done quickly and could be easily changed if needed. We did use a high fidelity prototype because it would not really make sense to have a treadmill interface on a computer screen. We made a procedure guide so that users will know their task and objective during user study. The short survey/interview will be included so we have some basic background information of the user and their workout routines. The questionnaire guide is for users to evaluate the prototypes after the user testing is finished. The observation sheet is used during the user test in order to collect data of user actions when doing user study. Consent forms will be given in the beginning of the study to make sure we have permission to do the study. Also, the camera will be used to record the whole process of user study.

Paper Prototypes: To allow us to make quick and easy prototypes

Procedures Guide: Clear instructions for our purpose and also give our participant an overview of how the user testing will work Instruction and task guide: Basic instruction for prototype testing

Surveys/ Interview Guide: Lets us have basic background information of our users (Qualitative data). We will have a casual talk with our participant increase their interest towards our studies.

Questionnaires Guide: Lets users do an individual evaluation about our interface. It will use the scale feedback which will provide quantitative data for our prototypes as well as some additional background information about the user.

Observation Sheet: Basic guideline from what we have observed according to our hypothesis and questions that we address at very beginning of the user test workshop.

Consent Forms: So that we have their permission to do the study.

Camera: For detailed information of the participants process during the user study including buttons pressed and how they navigate throughout the interface during their task. It is also used for our own reference so that we can carefully observe what happened during the process and gain additional insight from it.
MOTIVATION & PURPOSE

Instructions and Task Description

Introduction

1. Introduction of the background and purpose of the user test

2. Inform participants that we are only testing for the prototypes not the users

3. Explain that the purpose is to redesign the treadmill interface and user testing

4. Description of procedures
   • Inform participants that there would be people taking note and the camera recording their actions
   • Inform participants that they will be required to fill out a questionnaire and do an interview after the end of the user test
   • Ask participants to think out aloud and describe their decision/course of action

5. Ask if there are any questions before signing the Consent Form

6. Ask participant to sign the Consent Form

7. Inform participants that they will not receive assistance unless necessary. However, any questions are welcome.

Short Interview Question

1. Start questions

2. Give out questionnaire (started when each prototype is finish)

Instructions & Task Description

1. Explain tasks for prototype 1 (Prototype A) & user test
   • Asks users to use set the speed of the treadmill to 2 mph by using the quick start function.
   • Asks the user to speed up by a bit.
   • Ask the user to slow down and stop.
   • Ask the user to go access the cardio function from the advance function section.
   • Once the user has done everything (enter weight, age, etc…) tell them to stop.

2. Explain tasks for prototype 2 (Prototype B) & user test
   • Asks users to set the speed of the treadmill to 4 mph by using the quick start dial.
   • Asks the user to increase the speed (could be the dial or the slider).
   • Ask the user to slow down and finally stop.
   • Ask the user to go access the cardio function from the advance function section.
   • Once the user has done everything (find the cardio button and press it) tell them to stop.
   • Ask the user to change the pre-set speed of the cardio function.

Exist Questionnaire & Interview

1. Interview questions at end

2. Thank the participant and give out motivation or monetary
## MOTIVATION & PURPOSE

### Observation Table for Prototype A

<table>
<thead>
<tr>
<th>Participants</th>
<th>Question/ Hypothesis/ Criterion</th>
<th>Question/ Hypothesis/ Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Can users recognize the Quick</td>
<td>Do users know how to access</td>
</tr>
<tr>
<td></td>
<td>Start pre-set buttons?</td>
<td>the advanced functions?</td>
</tr>
<tr>
<td>1</td>
<td>The user instantly pressed the</td>
<td>The user successfully pressed</td>
</tr>
<tr>
<td></td>
<td>speed and adjusted it</td>
<td>the advanced button to access</td>
</tr>
<tr>
<td></td>
<td>flawlessly</td>
<td>advanced function</td>
</tr>
<tr>
<td>2</td>
<td>The user pressed the desired</td>
<td>The user made a mistake and</td>
</tr>
<tr>
<td></td>
<td>speed</td>
<td>tried to press the screen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>instead of the buttons</td>
</tr>
<tr>
<td>3</td>
<td>The user pressed the preset</td>
<td>The user made a mistake and</td>
</tr>
<tr>
<td></td>
<td>buttons quickly without a</td>
<td>tried to press the screen</td>
</tr>
<tr>
<td></td>
<td>problem</td>
<td>instead of the buttons</td>
</tr>
<tr>
<td>4</td>
<td>The user instantly pressed the</td>
<td>The user tried to press the</td>
</tr>
<tr>
<td></td>
<td>desired speed without a</td>
<td>screen instead of the buttons</td>
</tr>
<tr>
<td></td>
<td>problem</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>After the quick start, the</td>
<td>The user had to redo a step</td>
</tr>
<tr>
<td></td>
<td>user tried to press both 4mph</td>
<td>because he pressed advanced</td>
</tr>
<tr>
<td></td>
<td>and 6mph button to adjust the</td>
<td>function twice. Used the</td>
</tr>
<tr>
<td></td>
<td>speed to 5mph</td>
<td>pre-set quick start button to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>slow down</td>
</tr>
<tr>
<td>6</td>
<td>The user just pressed the</td>
<td>The user used the advanced</td>
</tr>
<tr>
<td></td>
<td>desired speed and adjusted it</td>
<td>functions without a problem</td>
</tr>
<tr>
<td></td>
<td>with no problem</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>The user used the preset quick</td>
<td>The user used the advanced</td>
</tr>
<tr>
<td></td>
<td>start buttons without</td>
<td>functions without much problem</td>
</tr>
<tr>
<td></td>
<td>difficulty</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The user used the quick start</td>
<td>The user questioned where the</td>
</tr>
<tr>
<td></td>
<td>preset function without a</td>
<td>weight was in pounds or not</td>
</tr>
<tr>
<td></td>
<td>problem</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>The user used the quick start</td>
<td>The user tried to press the</td>
</tr>
<tr>
<td></td>
<td>preset with ease</td>
<td>screen instead of the button for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>advance functions</td>
</tr>
<tr>
<td>10</td>
<td>The user used the quick start</td>
<td>The user tried to press the</td>
</tr>
<tr>
<td></td>
<td>without much error. Heard the</td>
<td>screen and the quick start</td>
</tr>
<tr>
<td></td>
<td>tester wrong, though they</td>
<td>button before actually pressing</td>
</tr>
<tr>
<td></td>
<td>said start instead of stop</td>
<td>the cardio button during</td>
</tr>
<tr>
<td></td>
<td></td>
<td>advance function mode</td>
</tr>
</tbody>
</table>
## MOTIVATION & PURPOSE

### Observation Table for Prototype B

<table>
<thead>
<tr>
<th>Participants</th>
<th>Question/ Hypothesis/ Criterion</th>
<th>Do users know how to access the advanced functions?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The user successfully turned the dial to adjust the required speed</td>
<td>The user used the card to access the advanced functions with no problem. The user thought for a bit when exiting</td>
</tr>
<tr>
<td>2</td>
<td>The user used the dial flawlessly. But used the speed down button instead of the dial to slow down</td>
<td>The user thought for a long time before she started using it. Tried to change preset speed instead of preset time. Tried to start with quick start button</td>
</tr>
<tr>
<td>3</td>
<td>The user used the dial without a problem</td>
<td>The user pressed start on dial first before adjusting the speed. Slow but did most of the task correctly</td>
</tr>
<tr>
<td>4</td>
<td>The user did not use dial, but used the speed up/down button instead. Swiped the card in the beginning</td>
<td>The user tried to use arrows to change time instead of the touch screen interface</td>
</tr>
<tr>
<td>5</td>
<td>The user pressed “start” every time he readjusted speed with dial</td>
<td>The user used the dial and arrow buttons to adjust speed/incline instead of using the touch screen</td>
</tr>
<tr>
<td>6</td>
<td>The user swiped the card first. After that she used the speed up buttons instead of the dial</td>
<td>The user didn’t notice the instruction of entering weight on the screen</td>
</tr>
<tr>
<td>7</td>
<td>The user Used the dial without much problem</td>
<td>The user took a long time to swipe the card. The user was unable to find the cardio function. Task failed</td>
</tr>
<tr>
<td>8</td>
<td>The user thought the dial was inconvenient. He swiped the card first before doing quick start</td>
<td>The user actually used the advanced function to change the speed/time, but did it on the wrong section</td>
</tr>
<tr>
<td>9</td>
<td>The user used the dial without much of a problem, we pondered for a while</td>
<td>The user swiped the card first and then used the main functions to adjust advanced functions</td>
</tr>
<tr>
<td>10</td>
<td>The user swiped the card first before using the quick start dial. Used the arrow keys to increase the speed.</td>
<td>The user used the arrows keys to adjust incline and speed</td>
</tr>
</tbody>
</table>
The Questionnaire

Prototype 1
1. What was the first thing you noticed on the interface?
2. How did you feel when completing the Quick Start task?
   Very Hard 1 2 3 4 5 6 7 Very Easy
3. Please rate your ease of use for the Speed adjustment.
   Very Hard 1 2 3 4 5 6 7 Very Easy
4. Please rate your knowledge of the Advanced Functions.
   Totally lost 1 2 3 4 5 6 7 Know very well
5. Please rate the clarity of the interface.
   Not clear 1 2 3 4 5 6 7 Very clear

Prototype 2
1. What was the first thing you noticed on the interface?
2. How did you feel when completing the Quick Start task?
   Very Hard 1 2 3 4 5 6 7 Very Easy
3. Please rate your ease of use for the Speed adjustment.
   Very Hard 1 2 3 4 5 6 7 Very Easy
4. Please rate your knowledge on the Advanced Functions.
   Totally lost 1 2 3 4 5 6 7 Know very well
5. Please rate the clarity of the interface.
   Not clear 1 2 3 4 5 6 7 Very clear

Final Evaluation
1. Which Speed adjustment method do you prefer? (Check 1)
   □ Dial adjustment □ Up /down adjustment □ Preset in profile
2. Which interface do you prefer? (Check 1) and why?
   □ Prototype 1 □ Prototype 2 □ Prototype 3 Why: ____________________________
3. What is your favorite feature of the interface: ____________________________
4. What is your least favorite feature of the interface: ____________________________
   Gender: __________
   What is your age range? (Circle 1)
   Under 18 18-25 26-35 36-45 Over 45
   Job/Position: __________
## MOTIVATION & PURPOSE

### Experimental Design & Procedure

<table>
<thead>
<tr>
<th>Test Prototype A</th>
<th>Test Prototype B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Session 1</strong></td>
<td><strong>Test Session 2</strong></td>
</tr>
<tr>
<td>• Introduced the task</td>
<td>• Introduced the task</td>
</tr>
<tr>
<td>• Asked users to sign consent form</td>
<td>• Asked users to set speed to 2 mph with quick start and then adjust speed.</td>
</tr>
<tr>
<td>• Asked users to set speed to 2 mph with quick start and then adjust speed.</td>
<td>• Told users to stop when completed.</td>
</tr>
<tr>
<td>• Asked users to use the cardio function with the advance functions.</td>
<td>• Recorded observations.</td>
</tr>
<tr>
<td>• Once completed, told users to stop.</td>
<td>• Recorded observations.</td>
</tr>
<tr>
<td>• Recorded observations.</td>
<td>• Recorded observations.</td>
</tr>
<tr>
<td>• Introduced the task</td>
<td>• Introduced the task</td>
</tr>
<tr>
<td>• Asked users to set the speed to 4 mph with quick start dial. Then adjust the speed and stop the machine.</td>
<td>• Asked user to set speed to 2 mph with quick start and then adjust speed.</td>
</tr>
<tr>
<td>• Asked users to access the cardio function with advance functions.</td>
<td>• Asked user to use the cardio function with the advance functions.</td>
</tr>
<tr>
<td>• Told users to stop when completed.</td>
<td>• Once completed, told user to stop.</td>
</tr>
<tr>
<td>• Recorded observations</td>
<td>• Record observations</td>
</tr>
</tbody>
</table>
RESULTS

Qualitative Data

Prototype A

- Some users did not notice the “check” button on the number keypad which records their input
- The quick start pre-set buttons were very clear and always used.
- Sometime users stopped to think a bit when they were asked to change the speed that was not pre-set which indicates that we need to make the speed/incline/time text more obvious.

Prototype B

- Some participants have trouble in activating the advanced functions with the profile card.
- Users tend to continue using the speed dial feature to change speed instead of the increase/decrease speed buttons.
- Users are not aware that the pre-set workout buttons in Workout tab are changeable

Quantitative Data

Satisfaction for Quick Start

Ease of Use for Speed Adjustment
RESULTS

Knowledge of The Advanced Functions

Level of Understanding (Max: 7, Min: 0)

Number of Participants

Level of Clarity of The Interface

Satisfaction (Max: 7, Min: 0)

Number of Participants

Feature of Preference

Prototype A  Prototype B

Number of Participants

Quick Start  Advanced Functions

95Ti Treadmill Interface Redesign
IMPLICATIONS FOR THE FUTURE DESIGN

Prototype A

Some of the participants dislike the fact that they need to access for series of data entry button.

Prototype B

Some of the participants are found confusion to activates advance function on the prototype B interface because they don’t know how .some of the participants have trouble to use our prototype interface due to wording of the interface.

The data also indicates that the advanced function system in prototype B frustrates a user in some ways, but it is more helpful in general promoting users’ knowledge on advanced functions. In terms of clarity, more users give a higher rate of 7 to the prototype B, but it confuses users in some ways as well. The two interfaces are almost on the same level of clarity according to how users rated them.

Summary

The quantitative data indicates that the ‘quick start’ feature in prototype A is more effective than that in prototype B. ‘Quick start’ in Prototype A scored higher than B indicates that users intend to be more confident completing the task using a pre-set speed button. More users rate the speed adjustment feature of prototype A at a relative high score 7 and less users rate it at a lower score 4, from which we conclude that users prefer a slider to adjust speed.

5 out of 10 participants favour in prototype A because the quickness of the quick start button feature. 5 out of 10 participants favour in prototype B because of the profiled system for memorizing their exercise routine data. In general we have satisfaction on both of the prototype’s certain features.

Overall, a couple of things we learned are that people tend to stick with the buttons that they used before to adjust speed/incline/time. Even if there is a better adjustment in the advance function, they will tend to use the adjustment that they used first.

If we could change something in our prototypes, we would implement advanced functions with the main adjustments for speed/incline/time instead of making a whole new one. That way, there will be no repeated functions that may cause confusion.

Our novel prototypes certainly did better than the original, especially for the advanced functions. But as always, there were some confusion due to repeated functions that do the same thing which could be further improved. Our methods may have affected the results because the task we have them do in the beginning already teaches them what to do when adjusting speed/time/incline. After, when we wanted the users to adjust speed/time/incline, they use the ones that we introduced them to use in the beginning, instead of the ones that were available afterwards. If we could do the study again, we would remove repeated functions and have implement the best aspects of both prototype into one.