PROJECT 2: USER-INTERFACE DESIGN

Precor Elliptical EFX 833

INFO i300: HCI/Interaction Design
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Skyler Booth
Kenneth Berry
Patrick Bane
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Overview:

For project 2, our group chose to analyze an elliptical that is found at the HPER building on IU's campus. After deciding on the Precor Elliptical EFX 833, we then went on observing the machine and how it works as it is being engaged by subjects. We then tested out the exercise machine in a preset mode and in quick start mode. Bringing our experiment to an end we will conclude the positives and negatives of this machine and also some changes we recommend to ensure the effectiveness of this device.

Background:

The exercise equipment we did the study on is the EFX 833 Precision Series designed by Precor. Precor's mission is 'Fitness Made Personal' This company sells a variety of exercise equipment from treadmills to core strengthening equipment. The company "strives to bring a personal touch to the experience of every exerciser, relate to operators in our industry in a personal way, and cultivate a culture that believes in mutual respect and the overwhelming returns of sharing." This elliptical has many positive qualities including (but not limited to): motorized CrossRamp that can be adjusted up to a 40 degree angle, 20 different resistant levels, 6 personalized workouts, 7 different language modes, heart rate monitoring, customizable touch display, self-powered, and much more. The price of this

equipment is $6,495.00. The intentions of an elliptical, as opposed to running, it to provide a workout that has no impact conditioning, cross-training ability, and lower exertion effort. This product gives users the desired workout they want as well as the technological advances of the 21st century.

Case Study:

Method/ Process:

An iPhone's camera app was used to record and take pictures of the machine. We took pictures from the perspective of someone actually using the workout equipment. The machine has many affordances such as two different handlebar locations that allow for a comfortable and relaxed grip while using it. To change the incline or resistance of the pedals, there are two levers that the subject can either push down or up. The subject can hold on it while it changes to the desired level. The pedals have plenty of room for any sized feet and move in a smooth rotation. One affordance is the rotation of the pedals only goes a certain distance which eliminates the possibility of user error while exercising. Some metaphors on the machine are the red and green colors around the start and stop buttons, which are analogies for the colors on a traffic light. To begin the machine the subject must start peddling then the screen will prompt the user to answer a few questions before the actual workout begins.

To conduct this experiment, we went to the HPER gymnasium and had the user film his experience from the perspective of someone who is actually exercising on the machine. The group member began peddling and started the machine while he held the phone in one hand to document the process of starting this piece of equipment.

Background on the User Interface:

The User Interface:
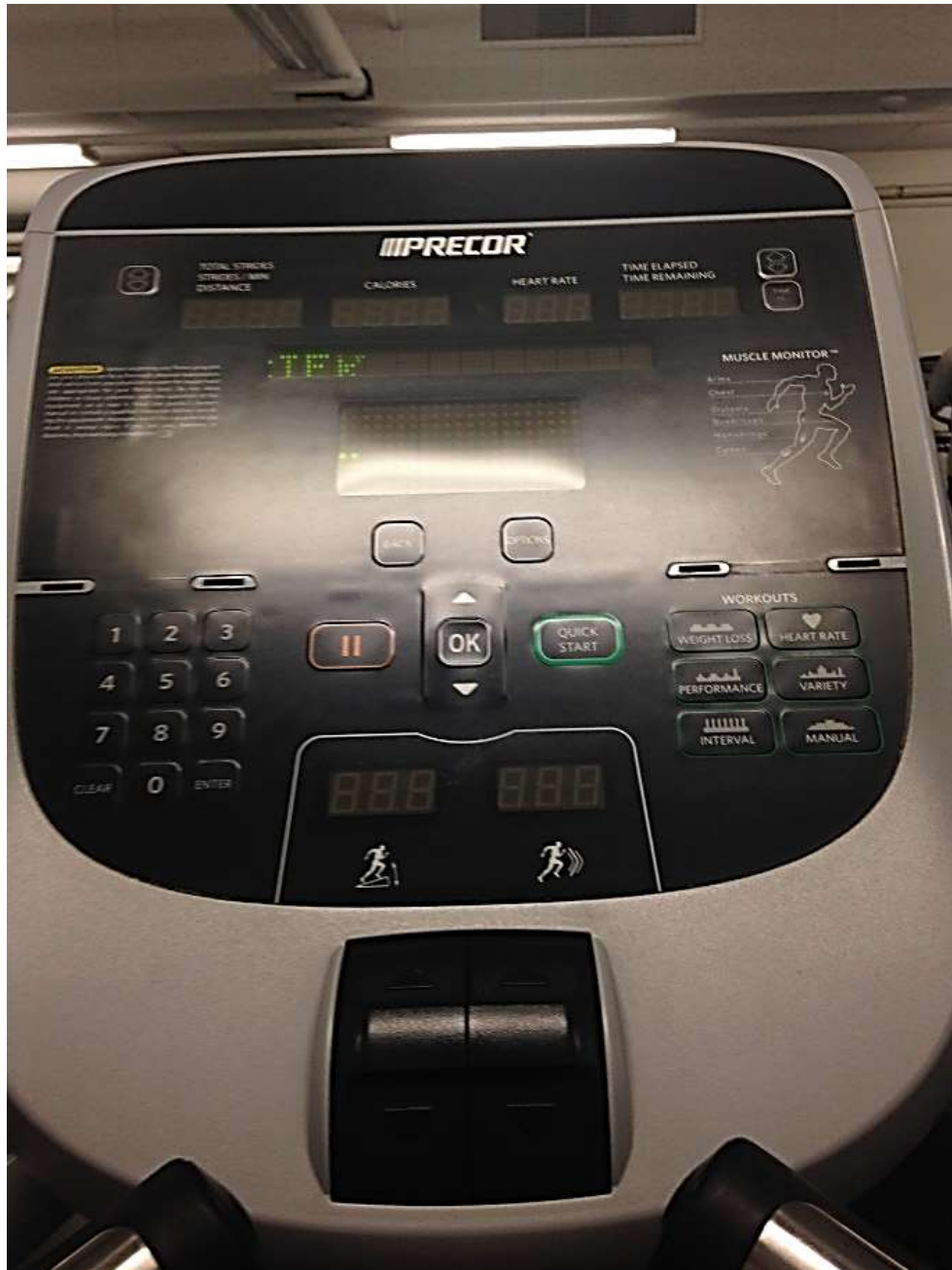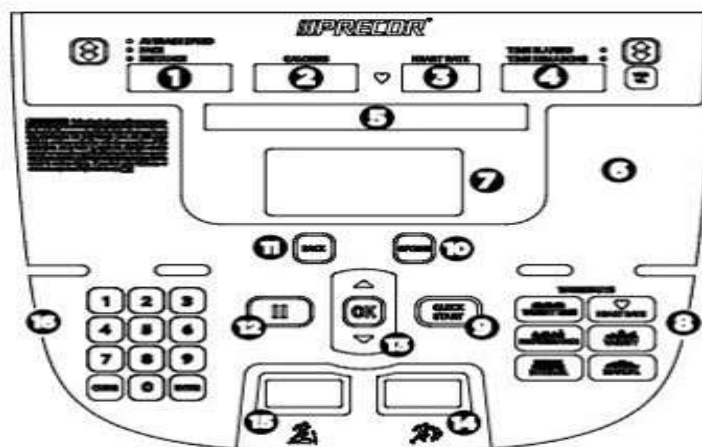

(Photo by: Kenneth Barry)

Interface Diagram

Figure 3: P30 console keys

Table 1. Parts of the console

Number	Part Name	Details
1	Average Speed Pace Distance	Use the ▲ or ▼ arrows to change which item you want to display
2	Calories	Displays the number of calories you have burned
3	Heart Rate	Displays your heart rate
4	Time Elapsed Time Remaining	Use the ▲ or ▼ arrows to change how the time is displayed
5	Upper Text Display	Scrolls information to guide the user
6	• Muscle Monitor - EFX • Stride Length - AMT • Rate per Minute - Climber • <blank> - Bike, Treadmill	• The Muscle Monitor displays the muscles used to perform that workout. • Stride Length describes the length of your steps during a workout. • Rate per Minute displays the number of meters, feet, or steps that a user has gained during a workout.
7	Lower Display	Displays graphical information about your workout progress
8	Workouts	• Manual: Available on all equipment • Heart Rate: Available on all equipment • Interval: Available on all equipment • Weight Loss: Available on all equipment except AMT • Variety: Available on all equipment except AMT • Performance: Available on all equipment except AMT • Fat Burner - AMT only

| ⑨	Quick Start	Press to begin exercising
⑩	Options - All equipment except AMT	• Press to enter Goals, Language, Weight, Age, and Target Heart Rate information, More Options • Press **More Metrics** to view additional metric information for all equipment except the AMT Metrics: • Percent Complete • Time in Zone • Segment Time Remaining • Average Speed • Pace - Treadmill only • Calories per Minute • Calories per Hour • WATTS • METS • Target HR • Average HR • Elevations - Treadmill and climber only • Stride Length - AMT only • Show All
⑩	Metrics key - AMT only	• Use to view Metric information on AMT
⑪	Back	Returns user to the previous screen
⑫	Pause	Use to momentarily stop machine during a workout
⑬	OK and Up/Down arrows	Used to navigate options and settings
⑭	Speed or Intensity Indicator	AMT, bike, treadmill, EFX (single), and EFX (dual)
⑮	Incline or Resistance Indicator	Treadmill, EFX (dual), and climber
⑯	Number pad	Use to enter numerical information such as age, weight, and passwords. Press **Clear** to delete the numbers entered. Press **Enter** after you have entered numbers on this number pad.

(Diagram provided by: Precor Incorporated)

As the diagram above shows, there are many different physical characteristics of this interface. These physical characteristics are:

- Buttons
    - Quick start
    - OK
    - Pause
    - Options
    - Back
    - Keypad
    - Time +/-
    - Arrows
        - Navigation up/down
        - Time control (time elapsed/time remaining)
        - Distance control (average speed/pace/distance)
- Preset Workouts
    - Weight loss
    - Heart rate
    - Performance
    - Variety
    - Interval
    - Manual
- Display screens
    - Average speed/pace/distance
    - Calories burned
    - Heart rate
    - Time elapsed/time remaining
    - Text readout
    - Graphical Workout

Analysis:

Quick Start Map
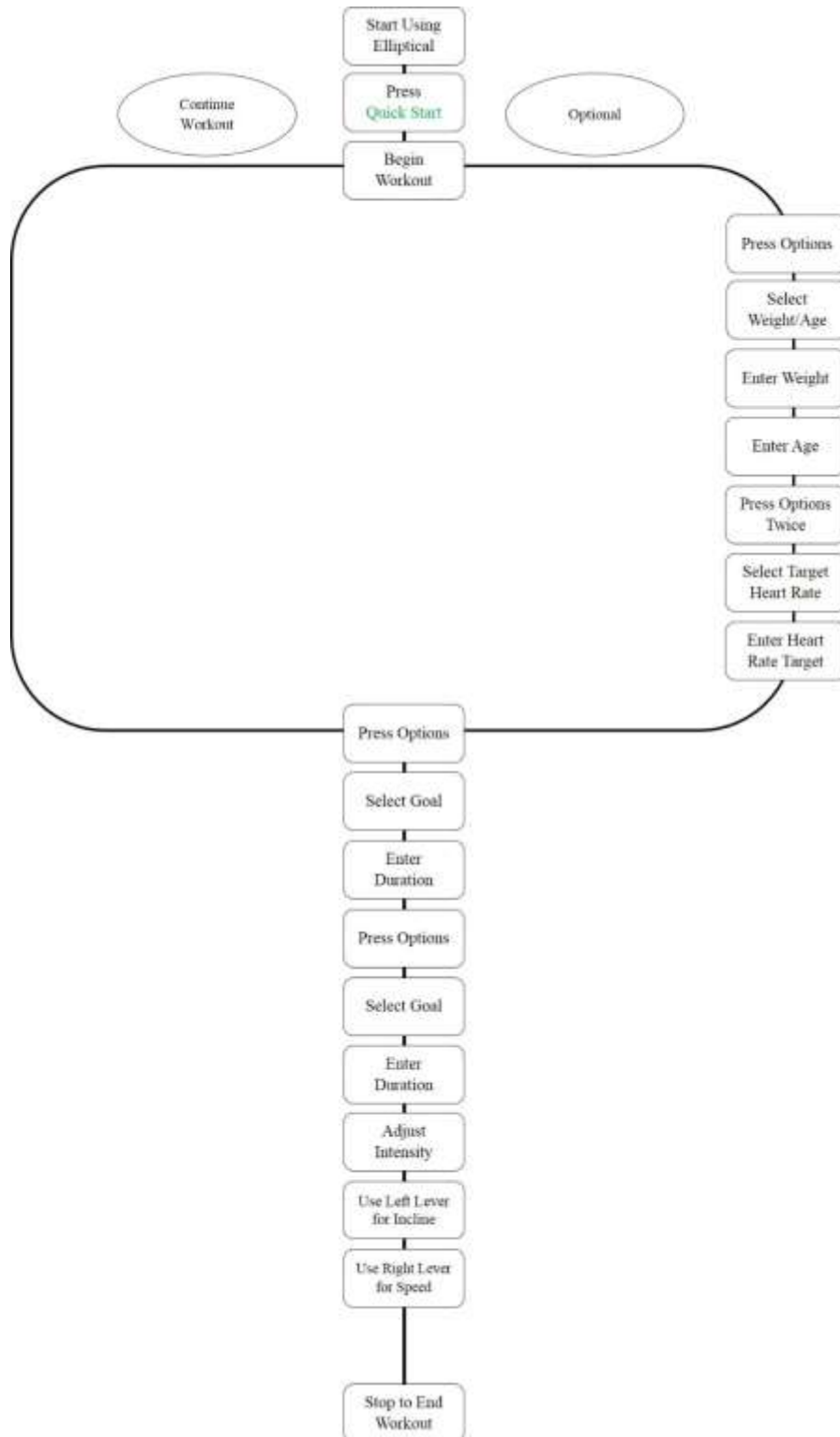
Quick Start Table

Step	Input Used	Feedback	Metaphor Used	Affordance Used
Power On	Peddles	Machine Power On	X	Peddles Go One Way
Start Quick Start	Quick Start Button	Audible Button Click and Display Lights Up	Green Color for Go	X
Begin the Workout	Peddles	Display "Start Workout"	X	Peddles Go One Way
Set Goal	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
End Workout	Peddles	Machine Power Off	X	X
X	X	X	X	X
Optional	X	X	X	X
Entering Weight/Age	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
Entering Heart Rate Target	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
Changing Time Display	Arrow Button in Upper Right Corner	Audible Button Click and Display Changes to Desired Output	X	X
Changing Distance Display	Arrow Button in Upper Left Corner	Audible Button Click and Display Changes to Desired Output	X	X
Increasing Speed	Right Lever	Display Shows Speed Increasing	X	Lever-Push/Pull
Increasing Resistance	Left Lever	Display Shows Resistance Increasing	X	Lever-Push/Pull
Measure Heart Rate	Metal Pulse Scanners	Interface Displays the User's Heart Rate	Heart Symbol while Measuring	X

The quick start has more user input compared to the preset modes. There aren't many mandatory steps to this machine. For the step by step analysis of using the elliptical, refer to the quick start table. This table goes down the list of steps to operate the elliptical in quick start mode. For a visual aid on how the process works, refer to the quick start map. To end the work out, the subject can either, stop peddling and get off or the subject reaches the preset time goal and gets off. The machine gives the subject instructions on how to operate as soon as the subject start peddling to power it up.

Preset Workout Map
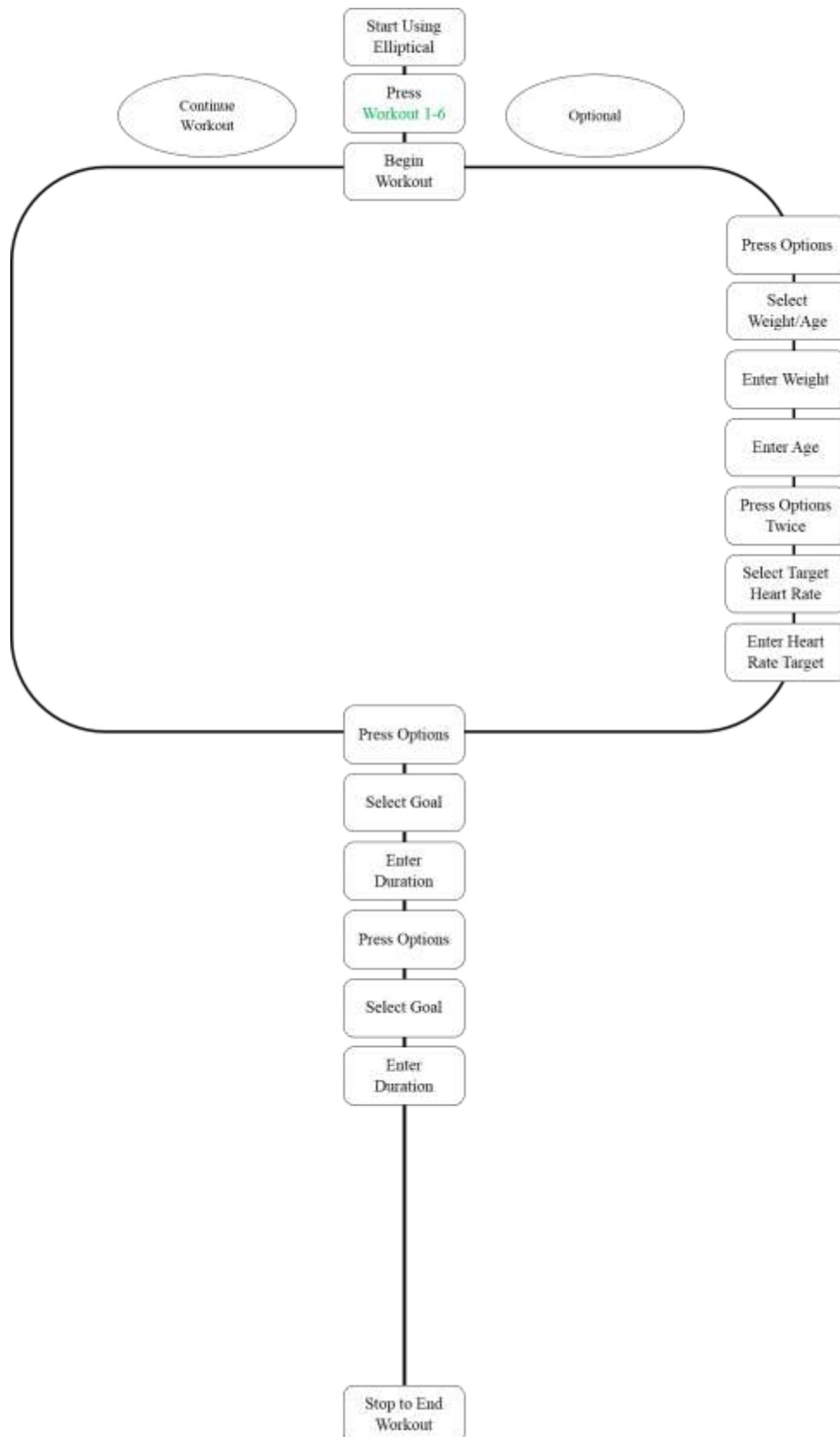
Preset Workout Table

Power On	Peddles	Machine Power On	X	Peddles Go One Way
Start Program	Program Button (Workouts 1-6)	Audible Button Click and Display Lights Up	Green Color for Go	X
Begin the Workout	Peddles	Display "Start Workout"	X	Peddles Go One Way
Set Goal	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
End Workout	Peddles	Machine Power Off	X	X
X	X	X	X	X
Optional	X	X	X	X
Entering Weight/Age	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
Entering Heart Rate Target	Options Button, OK Button, and Keypad	Audible Button Click and Display Shows Instructions/Feedback	X	X
Changing Time Display	Arrow Button in Upper Right Corner	Audible Button Click and Display Changes to Desired Output	X	X
Changing Distance Display	Arrow Button in Upper Left Corner	Audible Button Click and Display Changes to Desired Output	X	X
Measure Heart Rate	Metal Pulse Scanners	Interface Displays the User's Heart Rate	Heart Symbol	X

The preset workouts have fewer steps that are required by the user than the quick start. Once again, there aren't many mandatory steps for the preset programs. For the step by step analysis of using the elliptical in program mode, refer to the

preset workout table. This table goes down the list of steps to operate the elliptical in preset workout mode. For a visual aid on how the process works, refer to the preset workout map. To end the work out, the subject can either, stop peddling and get off or the subject reaches the preset time goal and gets off. The machine gives the subject instructions on how to operate as soon as the subject start peddling to power it up. All of these ending processes are the same as the quick start mode.

Findings:

As a result of doing both workouts and comparing them, there were a few things to take note of. The first being that both of the workouts are almost identical in terms of the steps needed to complete the workout. The preset workout was actually easier to complete than the quick start mode. The reason for this are simple; the preset workouts automatically change the speed and resistance is done for the user. The subject doesn't have to change them because the workouts are designed to adjust them according to the workout the subject chose. The preset workout also provided a more satisfying workout. This was because the preset workout would give intervals of challenging tasks followed by periods of rest. This was contrasted by the quick start mode which required the user to adjust back and forth while doing the workout.

Conclusion:

Summary:

`Our group began this project with the intent of analyzing the design of the interface of the elliptical exercise machine and making any suggestions where we thought necessary. This is a very nice and very high tech elliptical that is one of the best that are available on the market today. With its many different modes for the user to workout with it offers a wide variety of workout options. We took into account many usability factors for the user and determined that this elliptical, overall, has a pretty good design and that we would only make a few design changes to the interface and machine itself.

One thing our group noticed as a little bit odd, was that the quick start mode did not save much time, if any, compared to the pre-set workout mode. The pre-set workouts have fewer steps in them than the quick start workout modes. One would think that the quick start mode would be the fastest workout with the fewest steps but this was not the case with this elliptical. Overall, we enjoyed analyzing this machine and we learned a lot from its design and by thinking of ways to improve it. After much consideration and testing with this model and its interface we have come up with a few suggestions for the design.

Design Recommendations:

One difficulty that we encountered was the fact that there is no clear power button and no instructions on how to begin using the elliptical. In order to turn on the machine the user must begin pedaling, and there isn't a clear instruction or obvious signal for the user to do this. So our first recommendation would be to either create a start or power button, or to make a clear picture to inform the user that they must pedal to power on the machine. The better suggestion of the two would be the first because. Another problem is that if a user wants to enter their height and weight, they must do it while peddling. This is a little more difficult than it needs to be. A solution to this problem would be to have a built in scale to the machine to determine the user's weight, or to create a start button that allows the user to turn on the machine without having to pedal so they can then enter their height and weight before beginning to pedal. Another design recommendation would be a small built in fan on the interface that helps cool the user down with a nice breeze as they are exercising. Also the design could incorporate a small plastic cup holder that could easily attach to the interface or on the center of the bike in between the user's legs. Another recommendation to the design would be to create a USB port that allows the user to charge their phone while working out. This would enable the user to be able to listen to music as long as they would like while exercising without worrying about their phone dying.
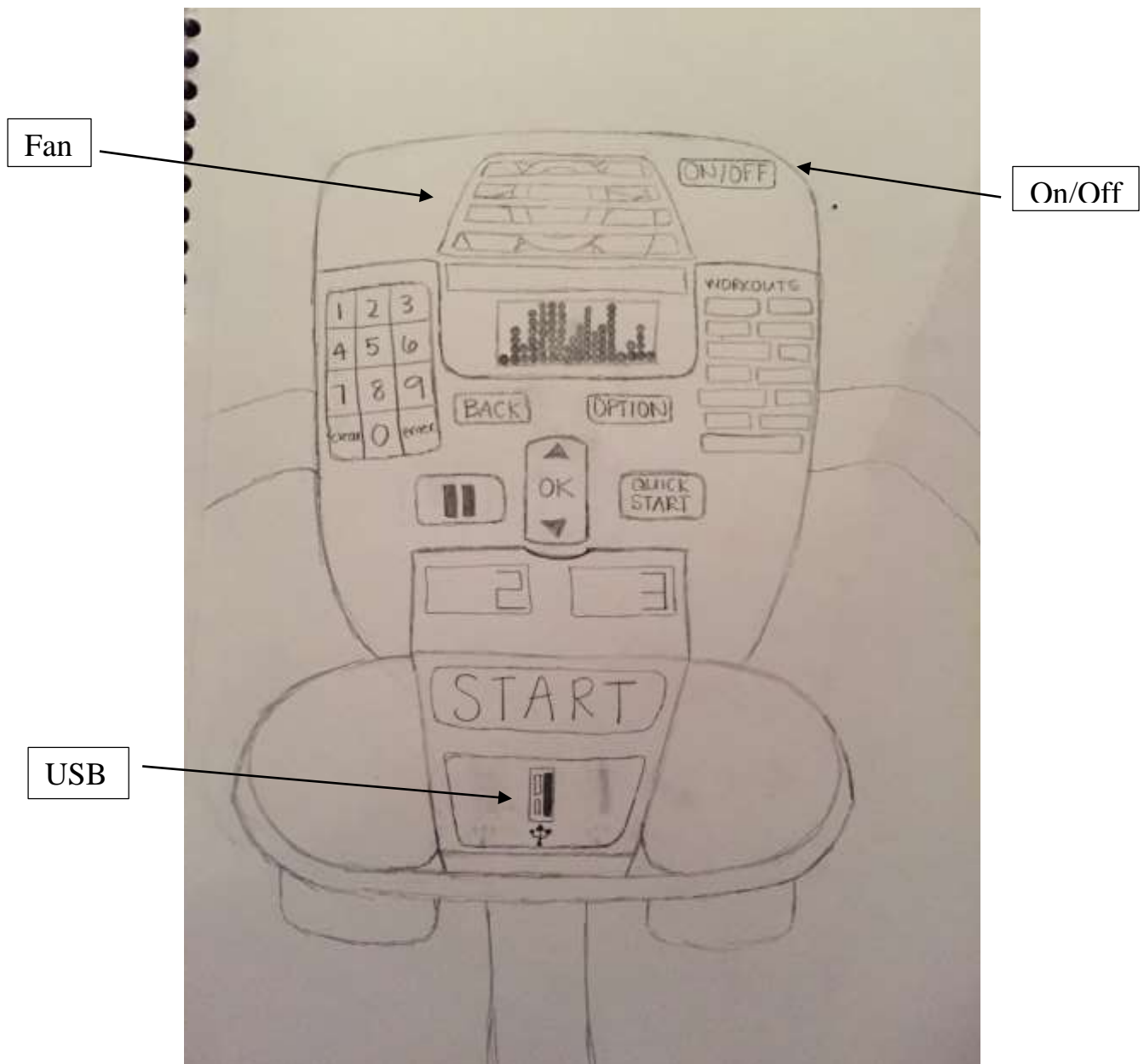
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