Thesis Design Dossier:

Improving Adult Golf Learning

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Abstract

Golfing can be an enjoyable, relaxing, and fun sport. However, according to Bob Bauchemin, Professor/Director of Player Development at Humber College Golf Lab, adults who are new to the sport tend to be stuck in certain behaviours and movements that make learning frustrating, and stall their improvement dramatically. As opposed to children, adults tend to be very self-conscious during their swing; this can make training a delicate and complicated process. Product benchmarking has revealed that current training solutions are feedback based, and can increase an adult learner's self-consciousness as a result. Additionally, the current solutions focus on specific areas of skill, meaning a variety of products need to be purchased to provide comprehensive training; this negatively impacts sustainability in the learning process. Based on these findings, there is a need for a training solution that covers a range of skills, and eases psychological burdens, thus allowing enough improvement to start the game confidently. A comprehensive solution would make training more sustainable, and cover a range of basic skills. Evaluation and analysis will be based upon methods including interviews, user observation, and collaboration with the Humber Golf Lab. Additionally, psychological and kinesiological research will assist in a better understanding of the project. A full-scale, one-to-one model study will aid in evaluating its success in human interactivity, ergonomics, and psychological factors. Sustainability and social responsibility will be evaluated using a Life Cycle Assessment (LCA). The desired solution will be a comprehensive golf training program that eases adults' self-consciousness, increases their confidence, and focuses on areas which are typically difficult to improve.

Table of Contents

Chapter 3

3.1 Analysis – Needs

- 3.1.1 Needs/Benefits Not Met by Current Products
- 3.1.2 Latent Needs
- 3.1.3 Categorization of Needs

3.2 Analysis – Usability

- 3.2.1 Journey Mapping
- 3.2.2 User Experience

3.3 Analysis – Human Factors

- 3.3.1 Product Schematic – Configuration Diagram
- 3.3.2 Ergonomic – 1:1 Human Scale Study

3.4 Aesthetics & Semantic Profile

3.5 Sustainability – Safety, Health and Environment

3.6 Innovation Opportunity

- 3.6.1 Needs Analysis Diagram
- 3.6.2 Desirability, Feasibility & Viability

3.7 Summary of Chapter 3 – Defining the Design Brief

Appendices

References

Chapter 1 Introduction

The purpose of this chapter is to provide a definition of the problem being addressed, as well as a justification of its significance, and lastly provide the background historical and social context of the problem.

1.1 Problem Definition

Golfing can be a very enjoyable, relaxing, and fun sport. However, when learning, constantly slicing and hooking the ball, taking too much soil, and putting with too much or not enough power can be frustrating. According to Bob Bauchemin, the mechanics of a proper golf swing feels very unnatural to adults who have never golfed before, and it is very difficult to feel when one is doing it properly. These factors often turn people away from the sport altogether. The current approach to training relies heavily on auditory and visual feedback. In addition to this, Bauchemin explains that self-consciousness can have a significant negative impact on learning for adults as compared to children. There is a need for a greater focus on tactile feedback that may enable trainees to gain proper sensation and muscle memory where visual and auditory approaches fall short, and provide a pathway to learning that does not have the negative psychological aspects which typically hinder the learning experience.

1.2 Rationale & Significance

Preliminary research on Golf training reveals a surprising amount of in-depth research literature on the subject, especially regarding psychology and kinesiology, which could be used in informing a solution with a higher level of human interaction. Additionally, there is access to the Humber College Golf Lab, which is run by professional trainers who can provide valuable

research opportunities.

The investigative approach taken will include literature reviews, semi-structured interviews, ergonomics research, user observation, as well as research into existing products. The intention is to answer the following questions:

- What do first time golfers enjoy about golfing in general? What do they dislike the most?
- Which parts of a golf course tend to be the most difficult for first-time learners? The easiest?
- Is learning to golf for the first time as a mature adult different from doing so as a youth/young adult? In what ways?
- Is there any general advice that trainers tend to give adults when they start golfing for the first time? Any general principles that speed up the learning process?
- What are their most common errors? Which of these is the most difficult to correct?
- Do left-handed golfers have issues that right-handed golfers do not?
- Is there a series of steps trainers go through with a first-time golfer?
- In the 21st century, what training solutions for first-time adult golfers have been the most impactful to the learning experience?

- Are there any areas of the learning/training experience for first-time adults that tend to cause frustration, or that remain in need of a solution?

1.3 Background / History / Social Context

Bauchemin states that people are attracted to the game of Golf for its low-impact nature, the social aspect of the game, as well as enjoying the time spent in nature and the cultivated course. In the corporate world, Golf is a go-to activity for networking and outing; for this reason, young adults in business often will start learning the game. It is seen as an upper-class activity. Bauchemin also states that the vast majority of the aspects of golf training have seen some technical solution, and that the only area where no decent solution has been developed is in teaching a proper golf-grip.

Chapter 2 Research

2.1 User Research

2.1.1 User Profile – Persona

The primary users are adult trainees, aged 20+. This includes business people, casual golfers, sport players, and non-sport players. Secondary users are golf trainers and shop owners. Tertiary users are club owners and media professionals (see Appendix for Triangulation).

Persona: Todd

Age: 35

Education: Business Administration

Salary: 80K

Profession: Project Management

Married: Y

(You Betcha, 2020)

Profile: Todd is 35 years old, has a degree in Business Administration, and has worked his way up to being a Project Manager. He is married with 2 kids. He has never played golf before, but works with a number of people who do, and there is pressure to be able to play during business outings. He also would like to take it up as a social activity.

2.1.2 User Observation – Current Practice

According to Bauchemin, a typical training session begins with a brief explanation of the physics of a golf swing and how the club should contact the ball. He says that one of the most common errors is that learners tend to think they have to help the ball up into the air, when it is really a downward swing motion that produces this effect. They are then shown proper grip, alignment, and posture. Beyond this, a trainer tends to observe their natural tendencies and attempts to guide them in the right direction.

By looking at video of a training session, it was observed that the user tends to end the session with more confusion and frustration than when the session begins.

2.1.3 User Observation – Activity Mapping

Activity Mapping

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
User Goals	Hitting the ball (no instruction)	Proper Grip	Proper Posture	Maintain Balance	Establish Swing Path	Hitting the ball freely
User Actions	User hits ball off to side	Keeps both hands on grip	Continues "scooping" motion	Spreads feet & bends knees successfully	Trainer moves club manually, user roughly copies	Continues "scooping habit, retreats into poor grip
User Thoughts	First swing feels exciting	I am going to forget how to grip it again if I let go	I don't understand what he is talking about	This is easy to do	This feels awkward, I don't know if I am doing it right	I don't remember anything, this feels awkward
Storyboard						
User Experience						
+	o					
				o		
Neutral		o			o	
			o			
-						o
Challenges	User must guess how to proceed	Difficult to replicate hand positions	Hard to visualize self	Harder to use full body with proper stance	User cannot "feel" if they are doing it right	Proper technique doesn't feel "right" to the novice
Insights/ Takeaways	Reveals users natural tendencies	Proper grip can be very complicated	Can be unaware of certain motions without tactile correction	Proper stance brings out "unnatural" characteristics of golf	Users cannot visualize what the club is doing on the back swing	It takes time for proper to technique to become natural

Figure 1. Activity Mapping

Empathy Mapping

Name: Todd
Age: 35
Education: Business Administration
Salary: 80K
Profession: Project Management
Married: Y
(You Betcha, 2020)

Pains	Gains
• Cannot feel what he is doing differently on a good stroke • Stroke feels very unnatural • Keep forgetting how to grip properly • Not enough physical interaction with trainer • Anxious about what he looks like	• Better mental understanding of golfing mechanics. • More consistent

Thoughts and Feelings

- Using more consistent tactile training may help user to sense what a good swing is like
- Physically correcting a swing may be better than simply explaining it or visually showing it

Figure 2. Empathy Mapping

2.1.4 User Observation – Human Factors of Existing Products

(See 2.2.2) Many training products such as an Impact Mat, or a putting tutor, are dimensioned in a way that easily fits in an office. Beyond this, as Golf is an outdoor activity, there is virtually no maximum size requirement for training products. Some products, such as the FlightScope Mevo, or Arccos Caddie Sensors, are dimensioned to be portable so they may fit in a pocket or a golf bag.

2.1.5 User Observation – Safety & Health of Existing Products

(See 2.2) The primary safety concern of Golf training products revolves around the swinging motion itself. Any device that is swung should be strong enough not to come apart during use. Additionally, any product that takes the impact of a golf club should be able to withstand it without fracturing and resulting in dangerous or sharp projectiles.

2.2 Product Research

According to Bauchemin, the vast majority of aspects of golf training have already been provided some sort of technical solution. This section intends to benchmark some of these current products to determine any trends or important benefits and features, as well as identify any gaps in the market that may still exist.

2.2.1 Benchmarking – Benefits & Features

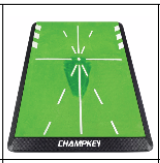
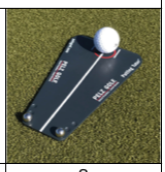
Benchmarking Products							
							
1	2	3	4	5	6	7	8
FlightScope Mevo Launch Monitor	Tour Striker Ball	SKLZ Smash Bag	CHAMPKEY Tracker-PRO Impact Golf Hitting Mat	Orange Whip Trainer	Arccos Caddie Sensors	Eyeline Golf Groove+ Putting Laser	Pelz Golf DP4007 Putting Tutor
Benefits							
- Versatility -Lightweight -Accuracy and Precision	- Versatility -Ease of Use -Lightweight -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Enhances Consistency -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Enhances Consistency	- Versatility -Lightweight -Accuracy and Precision	- Quality and Durability - Versatility -Ease of Use -Accuracy and Precision	- Versatility -Ease of Use -Lightweight -Enhances Consistency -Accuracy and Precision

Figure 3. Table of Benefits of Benchmarked Products

Preliminary	From Coding
Minimizes Self-Consciousness	Quality and Durability
Comprehensive Training	Versatility
Focus on Basic Skills	Ease of Use
Inexpensive	Lightweight
	Enhances Consistency
	Instant Feedback
	Accuracy and Precision

Figure 4. Preliminary (anticipated) benefits, and Benefits derived from coding

Figure 1 is derived from promotional material that was coded to find key words which fit into the categories on the right. If a category was mentioned, it was recorded on the table

2.2.2 Benchmarking – Functionality

Benchmarking - Feature/Function Comparison Table

Products	 1	 2	 3	 4	 5	 6	 7	 8
	FlightScope Mevo Launch Monitor	Tour Striker Ball	SKLZ Smash Bag	CHAMPKEY Tracker-PRO Impact Golf Hitting Mat	Orange Whip Trainer	Arccos Caddie Sensors	Eyeline Golf Groove+ Putting Laser	Pelz Golf DP4007 Putting Tutor
Price	$499 USD	$59.99 CAD	$32.99CAD	$34.99 CAD	$139.95 CAD	$200.46 CAD	$124.95 USD	$63.68 CAD
Dimensions	8.89 x 3.81 x 6.1 cm	3.8 x 21.8 x 16.2 cm	76.2 x 61 x 61 cm	13" x 17"	47"	~ 3 x 3 x 2 cm ea.	14.06 x 8.43 x 4.8"	24 x 3 x 15.01 cm
Weight	0.5 Lbs	30g	1.5 Lbs	3.7Lbs	1.85 Lbs	24.29g ea.	1.18 Lbs	1.17 Lbs
Construction	-White plastic housing -Rubber trim	-Stretchable Fabric with Rubber Bladder	-Sealed Canvans -Anchor Loop	-Rubber Bottom -Foam Middle -Pile-directional fabric	-Composite shaft -Rubber Grip -Weighted Plastic Ball	-Green Plastic Housing -Aluminum Top	-Steel Housing -Polycarbonate Shaft -Glass Lens	- Black Plastic - Stainless Steel Marbles
Misc	- 3D Tracking Doppler Radar - Phone App Connection	- Inflatable / Adjustable	- Fixed to ground with stakes - Must be filled with rags - Tactile Feedback	- Visual Feedback - Weather resistant	- Adjustable	-Automatic shot tracking -hands-free shot capture -Smart Distance Club Averages -A.I. GPS Rangefinder, adjusts in real-time for wind, slope, temperature, humidity and altitude giving you the Arccos Caddie Number	- Cross-Hair Laser locks to putter orientation	N/A

Figure 5. Table of Features and Functions of Benchmarked Products

2.2.3 Benchmarking – Aesthetics & Semantic Profile

A common colour theme throughout the benchmarked products is dark greys or blacks, and grass-greens; in keeping with colours commonly seen on the golf course. White lines tend to be used as guides or targets. All edges tend to be broken or lofted.

2.2.4 Benchmarking – Materials & Manufacturing

Anything that does not receive direct impact from a golf club tends to be constructed from a hard, injection molded pastic. Products that do take direct impact or withstand higher amounts of stress can be made from any material that is resistant to shattering or breaking; this includes vinyl, foams, rubbers, or fabrics. New fibre composites are used to withstand tensile forces.

2.2.5 Benchmarking – Sustainability

There is little-to-no account for sustainability in these benchmarked products. None of the materials are biodegradable, although most of the materials are recyclable.

2.3 Summary

User profiles were given for the primary, secondary, and tertiary users. The persona was established as the ideal primary user. Journey mapping and Empathy mapping were then provided as an analysis of a typical training session. Benefits and features were then provided for a set of benchmarked products. It was determined that there are virtually no size restrictions, which may provide opportunity for a full-bodied solution.

Chapter 3 Analysis

3.1 Analysis – Needs

Based on the research from chapter 3, further analysis reveals that tactile training is an area that may be explored in more detail. Products that focus in this area tend to be very limited in their scope.

3.1.1 Needs/Benefits Not Met by Current Product

Consistent tactile learning is a need that has not been fully met by current products. The products that do have a tactile aspect tend only to account for one aspect of the training process. This may provide oportunity for greater exploration to expand the scope of tactile learning in a single product.

3.1.2 Latent Needs

(See 3.1.2) In relation to the benefits in Figure 3., the latent needs of the user revolve mainly around accessibility as taken from the emphasis on portability and lightweight. There is also an emphasis on social interaction, as these products are intended to improve one's ability to play with others to an appropriate skill level.

3.1.3 Categorization of Needs

Immediate Needs	Latent Needs	Wants & Wishes
• Consistent Tactile learning • Comprehensive • Multiple skill levels • Durability • Low cost • Easy to use • Convenience	• Easily accessible • Social interaction: enables games with other people • Social belonging: Skills determine who you can play with	• Fear of the enemy: be able to compete with other players • Self Actualization: Experiential- extrinsic: experience outdoors, seeing golf course

Figure 6. Table of Categorization of Needs

3.2 Analysis – Usability

3.2.1 Journey Mapping

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
User Goals	Hitting the ball (no instruction)	Proper Grip	Proper Posture	Maintain Balance	Establish Swing Path	Hitting the ball freely
User Actions	User hits ball off to side	Keeps both hands on grip	Continues "scooping" motion	Spreads feet & bends knees successfully	Trainer moves club manually, user roughly copies	Continues "scooping habit, retreats into poor grip
User Thoughts	First swing feels exciting	I am going to forget how to grip it again if I let go	I don't understand what he is talking about	This is easy to do	This feels awkward, I don't know if I am doing it right	I don't remember anything, this feels awkward
Storyboard						

Figure7. Table of Journey Mapping

3.2.2 User Experience

User Experience						
+	o					
				o		
Neutral		o			o	
			o			
-						o
Challenges	User must guess how to proceed	Difficult to replicate hand positions	Hard to visualize self	Harder to use full body with proper stance	User cannot "feel" if they are doing it right	Proper technique doesn't feel "right" to the novice
Insights/ Takeaways	Reveals users natural tendencies	Proper grip can be very complicated	Can be unaware of certain motions without tactile correction	Proper stance brings out "unnatural" characteristics of golf	Users cannot visualize what the club is doing on the back swing	It takes time for proper to technique to become natural

Figure 8. Table of User Experience

3.3 Analysis – Human Factors

The following section will include configurations of the proposed concept, as well as a 1:1 scale ergonomic study. For the Training Station, important ergonomic measurements of the 99th percentile man and 1st percentile woman were retrieved from The Measure of Man and Woman (Tilley & Dreyfuss, 2002) and overlaid to fit the posture of a golfer. This provided ergonomic measurements that are unique to the sport like squatted shoulder height and squatted buttock height. Since golf grips are already standardized, detailed ergonomic analysis for the Smart Grip was not necessary, so dimensions were simply fitted to the longest grip size (9.25") to accommodate the full percentile range; these dimensions were retrieved from Choosing the Perfect Golf Grip (Lamkin Grips).

3.3.1 Product Schematic – Configuration Diagram

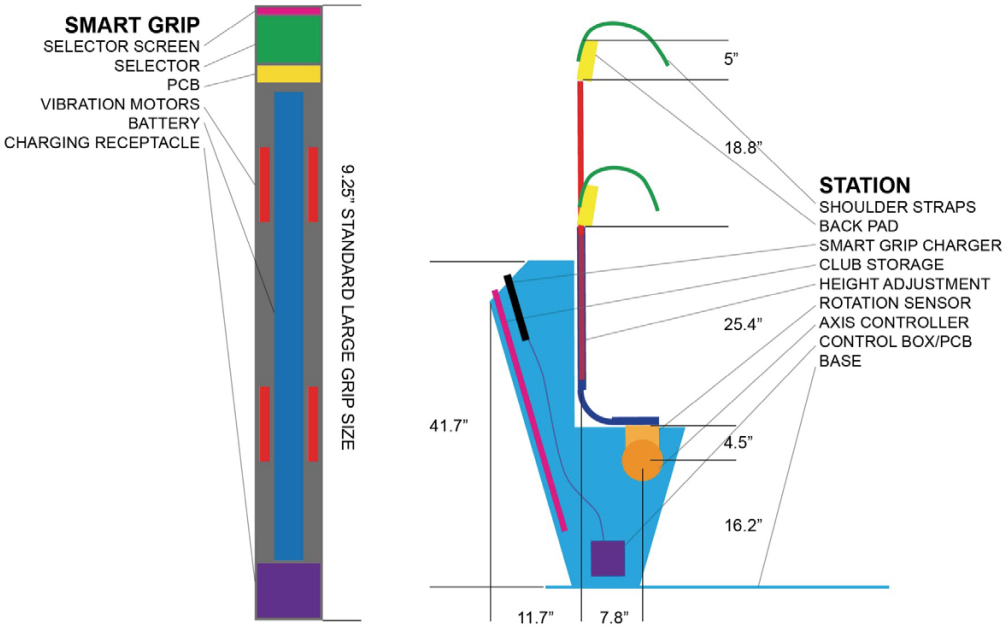


Figure 9. Configuration Diagrams for Smart Grip (left) and Training Station (right) with dimensions derived from percentile data.

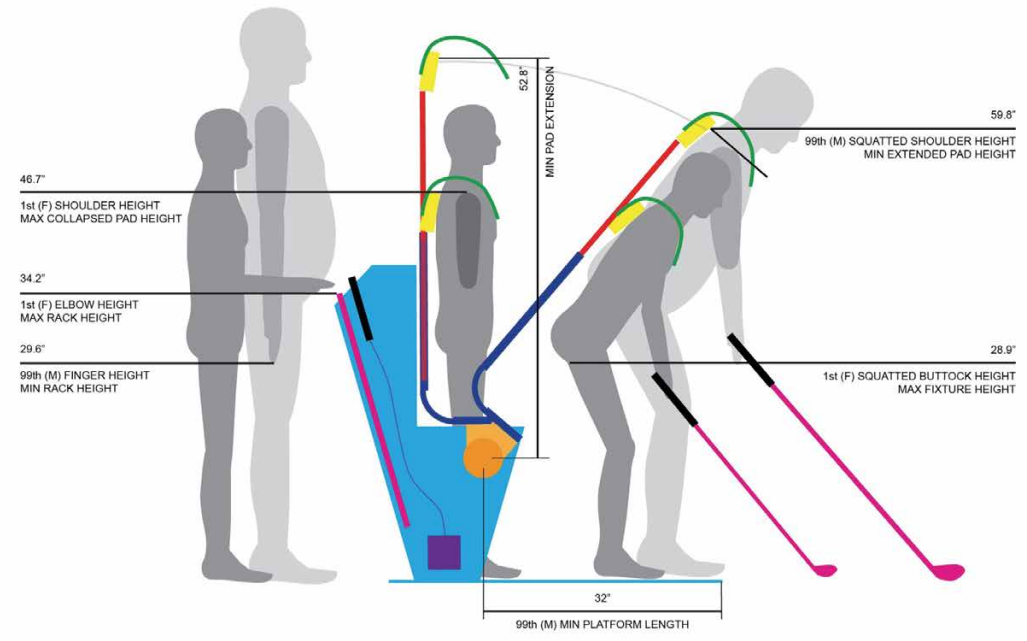


Figure 10. Side view of Training Station with percentile figure data

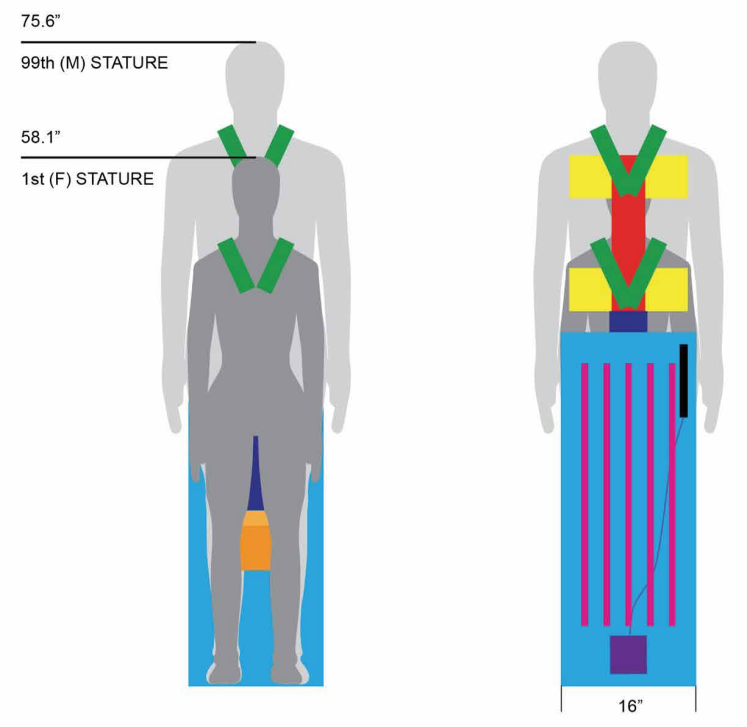


Figure 11. Front and Rear views of Training Station with percentile data.

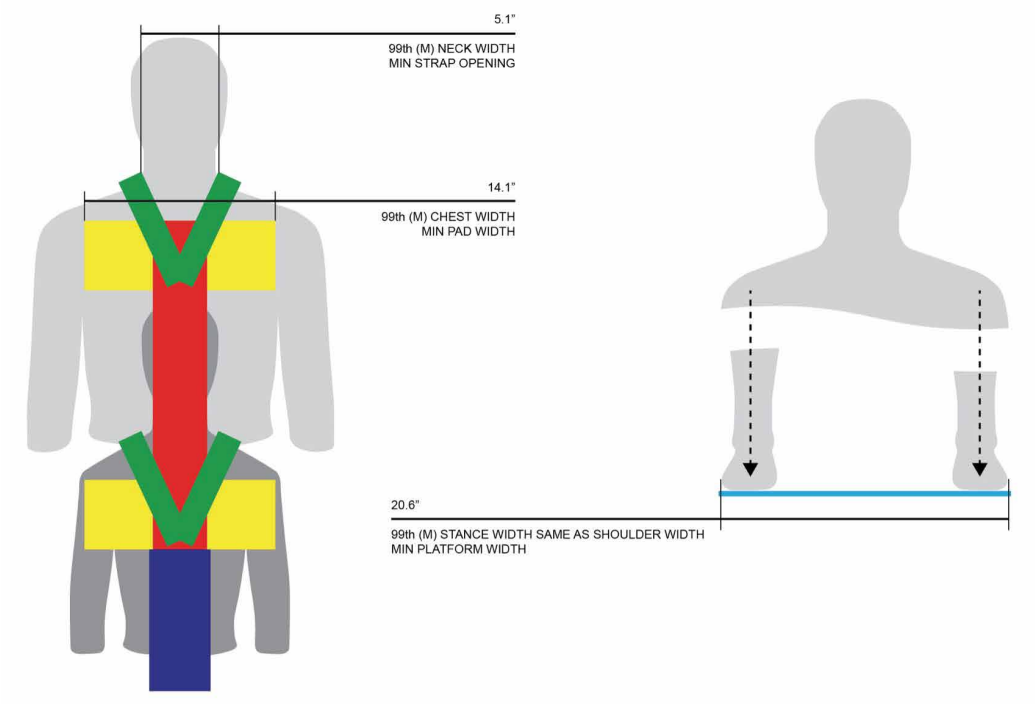


Figure 12. Detail views with percentile data of Training Station fixture and platform.

3.3.2 Ergonomic – 1:1 Human Scale Study

Figure 13. Training Station Ergonomic Buck.

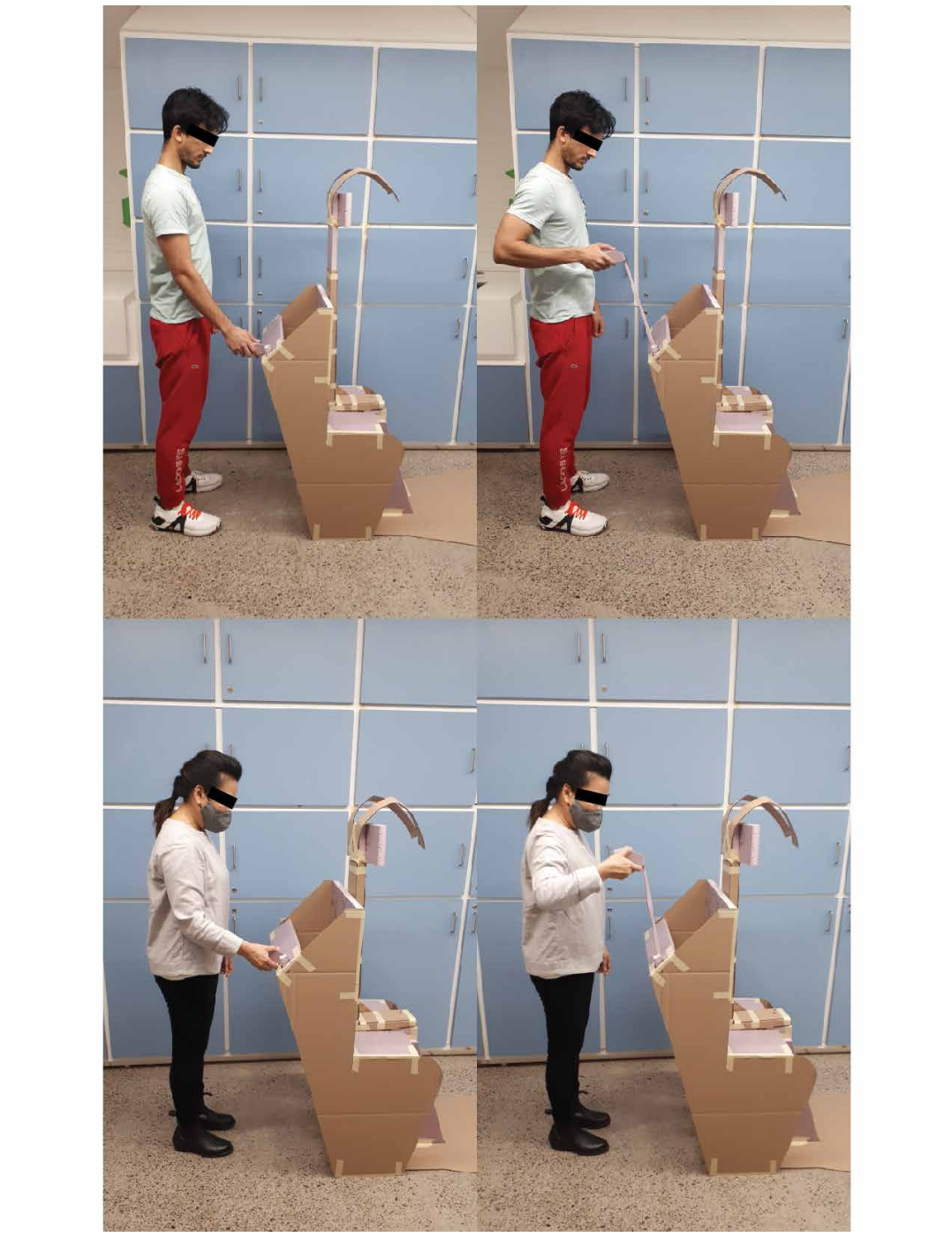


Figure 14: 99th percentile male (top) and 50th percentile female (bottom) testing ergonomic dimensions of the club rack height. Subjects are shown grabbing a club at the rack (left) and lifting it out (right).

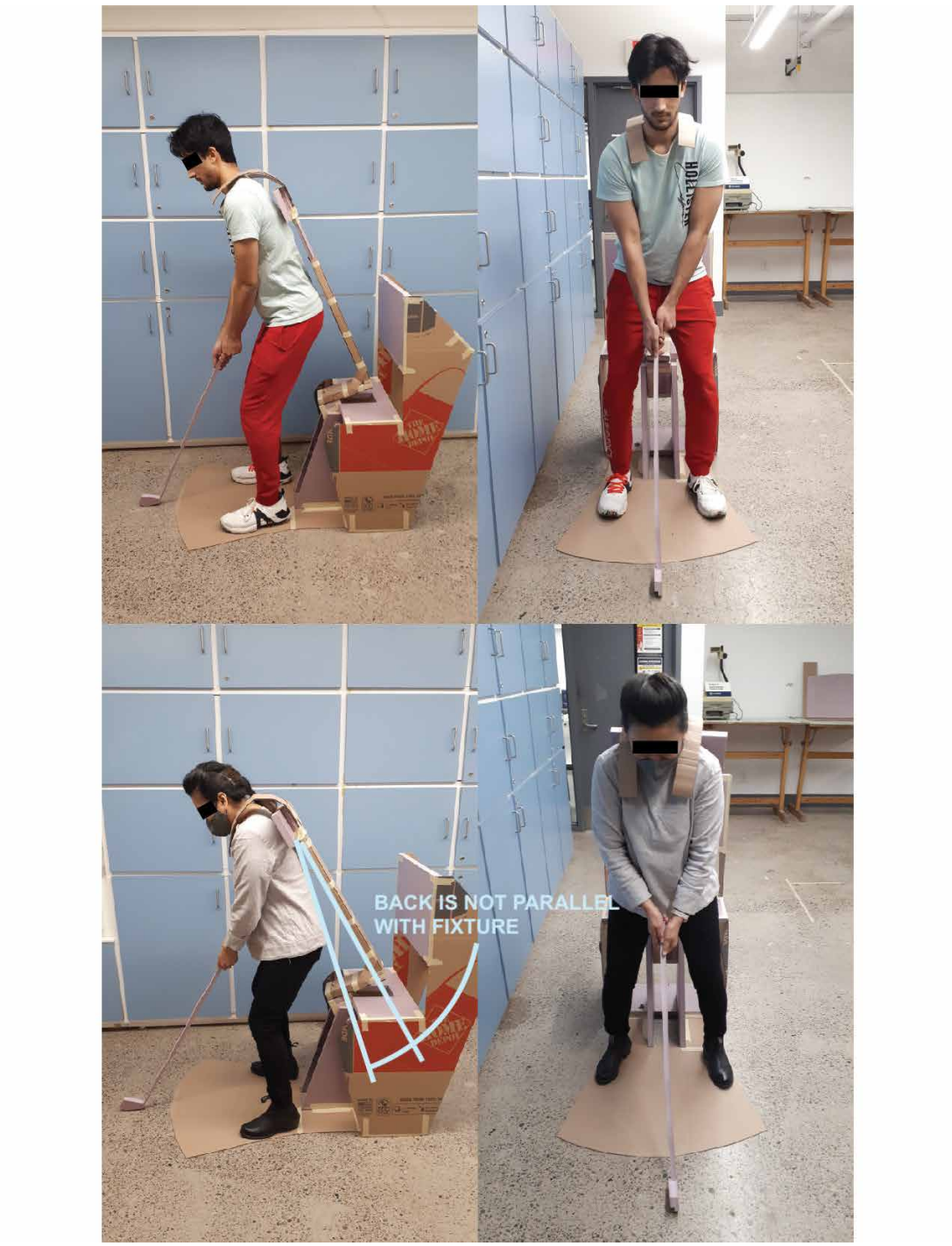


Figure 15: 99th percentile male (top) and 50th percentile female (bottom) testing ergonomic dimensions and adjustability of the rotating fixture (left), and the platform and shoulder straps (right).

Figure 16: Training Station showing club rack and 50th percentile female in fixture.

The results of the 1:1 scale ergonomic buck in Figure 14. revealed the effectiveness of the dimensions taken from the schematic of the club rack (Figure 10). Both 99th percentile male (99M) and 50th percentile female (50F) test subjects were able to grab and remove the club without straining or changing their posture.

Figure 15. reveals the effectiveness of the ergonomic dimensions of the rotating fixture for the 99M with their back shown parallel with the fixture without strain. In testing the lower end of the fixture's adjustability, it appears unable to collapse far enough to maintain parallelism with the 50F's back, which is problematic, especially given the schematic dimensions were acquired for an even smaller subject (1st percentile female). The issue may be in an oversight of the difference in posture between taller and shorter golfers, in that the shorter subject appears to remain more upright. The schematic dimensions will need to be adjusted to enable 1st percentile female users to maintain their more upright posture. The range of height adjustability for the back pad must be increased on the lower end to allow the fixture to be parallel with the user's back, while maintaining a proper fit at the shoulders. To do so with precision, the 1st percentile female figure will be fitted to the posture of a shorter golfer, and the fixture dimensions will be adjusted likewise.

Figure 15. also shows the effectiveness of the width of the platform for the 99M and 50F in accommodating a shoulder-width stance. The length of the platform may be able to decrease, as it appears both subjects are relatively far away from the edge. This dimension is not detrimental, however, as long as the platform does not reach into the path of the club head during a swing, which does not appear to be an issue anyways given the position of the club head on the ground for both subjects (Figure 15).

Figure 15. also reveals the effectiveness of the adjustability for both the shoulder strap and the back pad. The width that these components are fitted to accommodates the 99M, but they appear to be just as effective for smaller subjects.

Figure 16. focuses on the width of the club rack. Although there is no maximum width limitation, the buck revealed that the oversized width was unnecessary, and can fit a full set of clubs in a row while being much smaller. The schematic (Figure 11) was adjusted to show a more sustainable width of 16”, which is slightly wider than the back pad of the fixture (Figure 12).

3.4 Aesthetics & Semantic Profile

As the target user group is young adults in business, the semanitc profile is could be described as “elite” based on the culture of the corporate world. The aesthetics, therefore, should ideally be inspired by entry level luxury products. The main influence for the design language will be taken from Lexus Automotive, as they have very organic forms which match those in nature and on the golf course.

3.5 Sustainability – Safety, Health and Environment

Most training solutions focus on only one aspect of the training process, which requires multiple products to provide comprehensive training. Not only is this expensive, but also results in a greater environmental impact from the cumulative life cycles of these products, in manufacturing, shipping, maintenance, and disposal.

By providing a single solution for a range of training needs, one is able to significantly reduce the environmental impact of golf training.

3.6 Innovation Opportunity

3.6.1 Needs Analysis Diagram

Immediate Needs	Latent Needs	Wants & Wishes
• Consistent Tactile learning • Comprehensive • Multiple skill levels • Durability • Low cost • Easy to use • Convenience	• Easily accessible • Social interaction: enables games with other people • Social belonging: Skills determine who you can play with	• Fear of the enemy: be able to compete with other players • Self Actualization: Experiential- extrinsic: experience outdoors, seeing golf course

Figure 17. Table of Categorization of Needs

3.6.2 Desirability, Feasibility & Viability

This piece of equipment is largely static, the main body is not load bearing, and so standard materials may be used for them. This also means that the mass of the material of the body is not necessarily an issue. The only area where there may need to be advanced materials is on the rotating fixture to save weight while maximizing structural rigidity and functionality.

The Platform will be made out of a similar material to what is used at driving ranges for turf pads to simulate grass. To frame this portion, there will be a dense rubber with a steel core for rigidity and weight to anchor the machine in place. This steel core will be connected to the

rotating fixture to reduce any flexing. The main body will be made out of a plastic that is impact resistant, injection moldable, cost effective and that does not break down in sunlight. PVC may be ideal for this portion. The organizer at the top of the club case will be made out of a rigid material with a green turf-like finish to mimic that of the platform.

The mechanical fixture itself will be made out of cast aluminum to house the actuating motion of the core that extends to adjust for height. The rest of this fixture will be an extruded aluminum for strength, rigidity, and lightness to reduce the rotational mass.

The sustainability of the product will mainly be based on the durability and longevity of the product. Even though much of the product will be plastic, the device is almost entirely recyclable. With these things in mind, a greater focus on cost-effectiveness in material selection is warranted. As the design is largely static, there is virtually no need for advanced composite materials, which cannot be recycled. This enables the use of standard materials, which may be recycled and improves the overall sustainability of the product throughout its lifetime.

3.7 Summary of Chapter 3 – Defining the Design Brief

Overall, the 1:1 scale buck showed the effectiveness of the dimensions determined in the schematic diagrams (Figures 1-4). The only significant issue was an oversight of the more upright posture of shorter users, revealing a need for greater lower-end adjustability for the fixture. The rest of the issues have no impact on ergonomic effectiveness, but are simply opportunities to reduce material usage and improve overall sustainability. The static nature of the design, and the absence of a need for portability allows for a comprehensive approach to

the solution. The success of the design will therefore be largely measured by its ability to replace the need for multiple other training products with one system.

Chapter 4 Design Development

4.1 Initial Idea Generation

4.1.1 Aesthetics Approach and Semantic Profile

As the target user group is young adults in business, the semanitc profile is could be described as “elite” based on the culture of the corporate world. The aesthetics, therefore, should ideally be inspired by entry level luxury products. The main influence for the design language will be taken from Lexus Automotive, as they have very organic forms which match those in nature and on the golf course.

4.1.2 Mind Mapping

4.1.3 Ideation Sketches

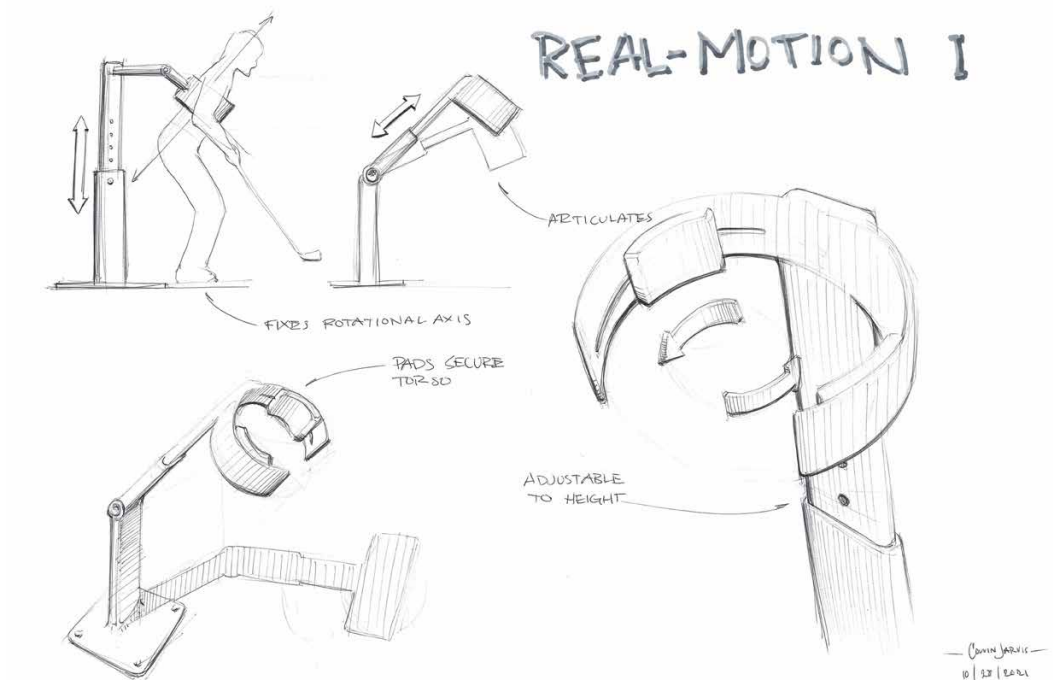


Figure 18. Real-Motion I Ideation Sketch

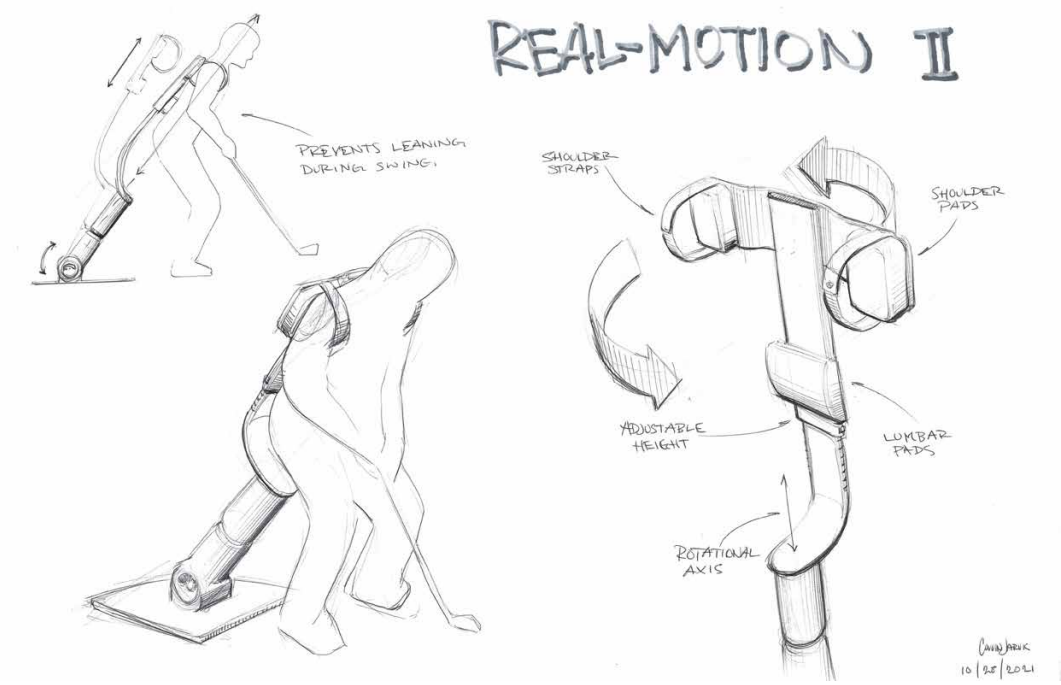


Figure 19. Real-Motion II Ideation Sketch

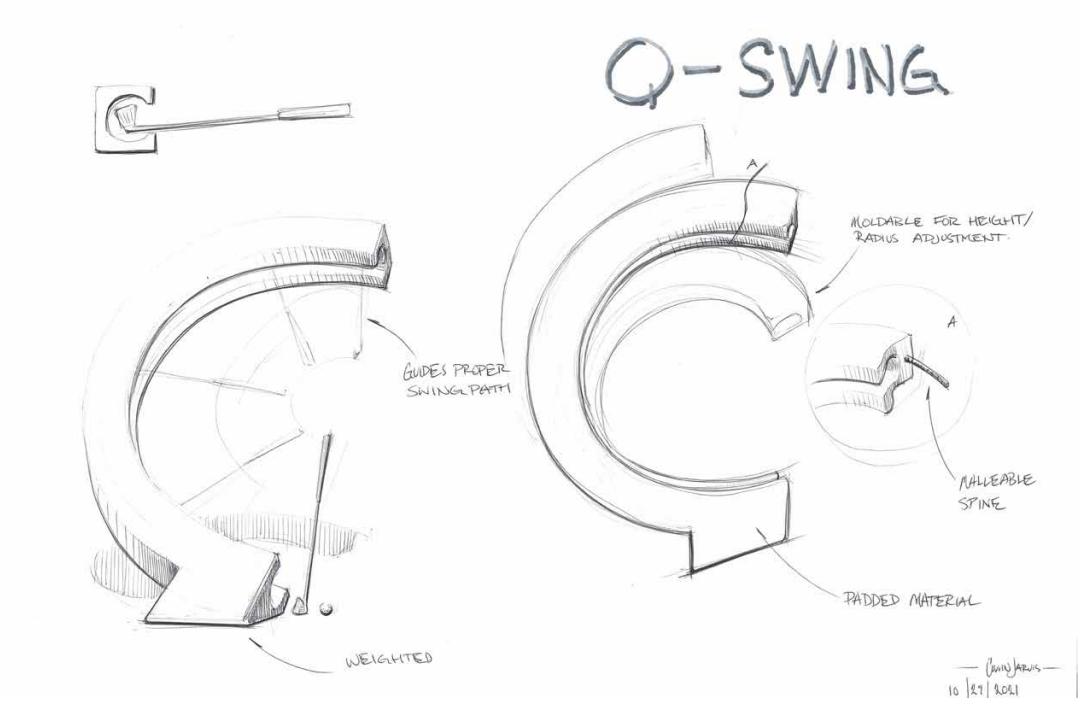


Figure 20. Q-Swing Ideation Sketch

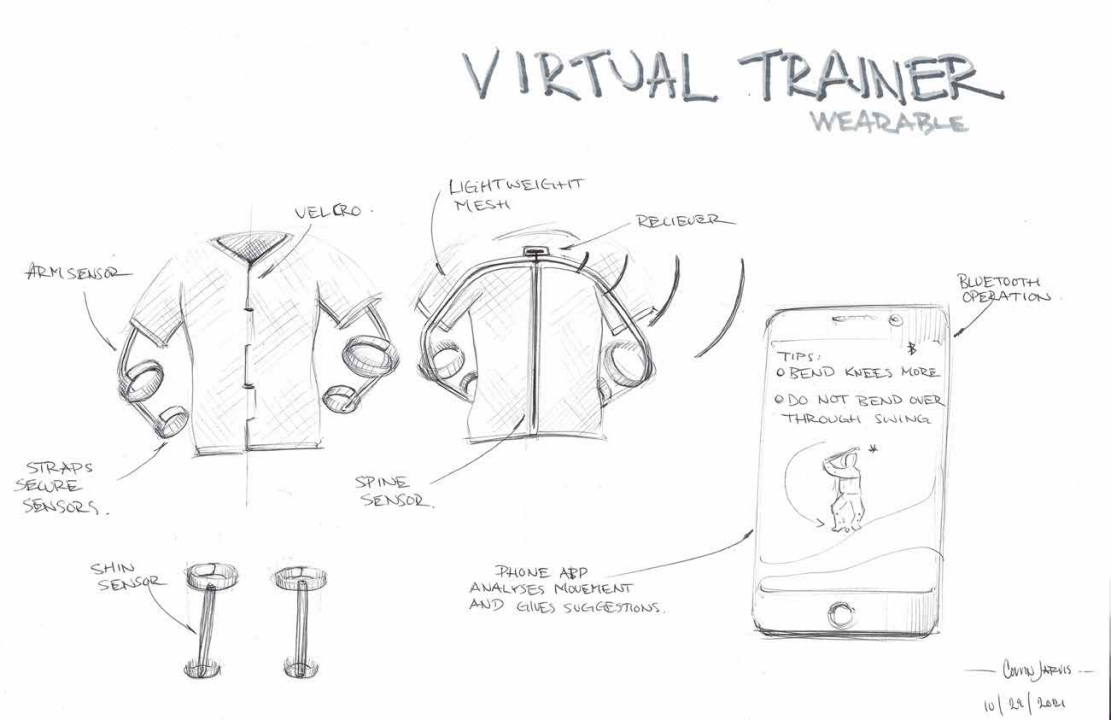


Figure 21. Virtual Trainer Ideation Sketch

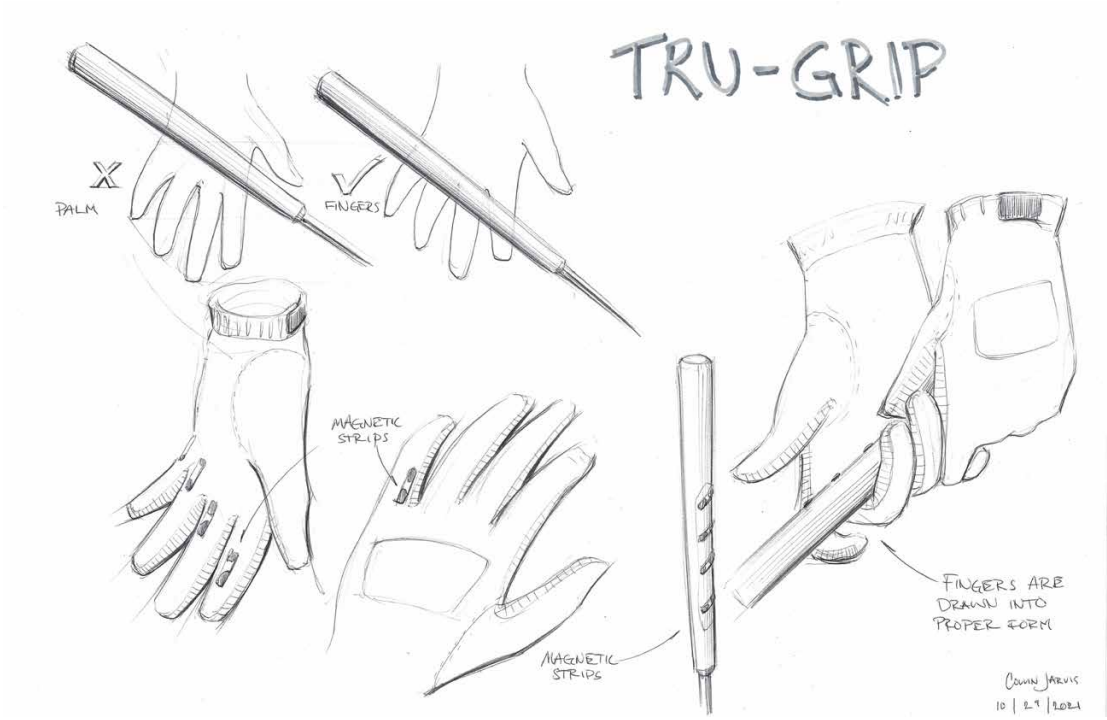


Figure 22. Tru-Grip Ideation Sketch

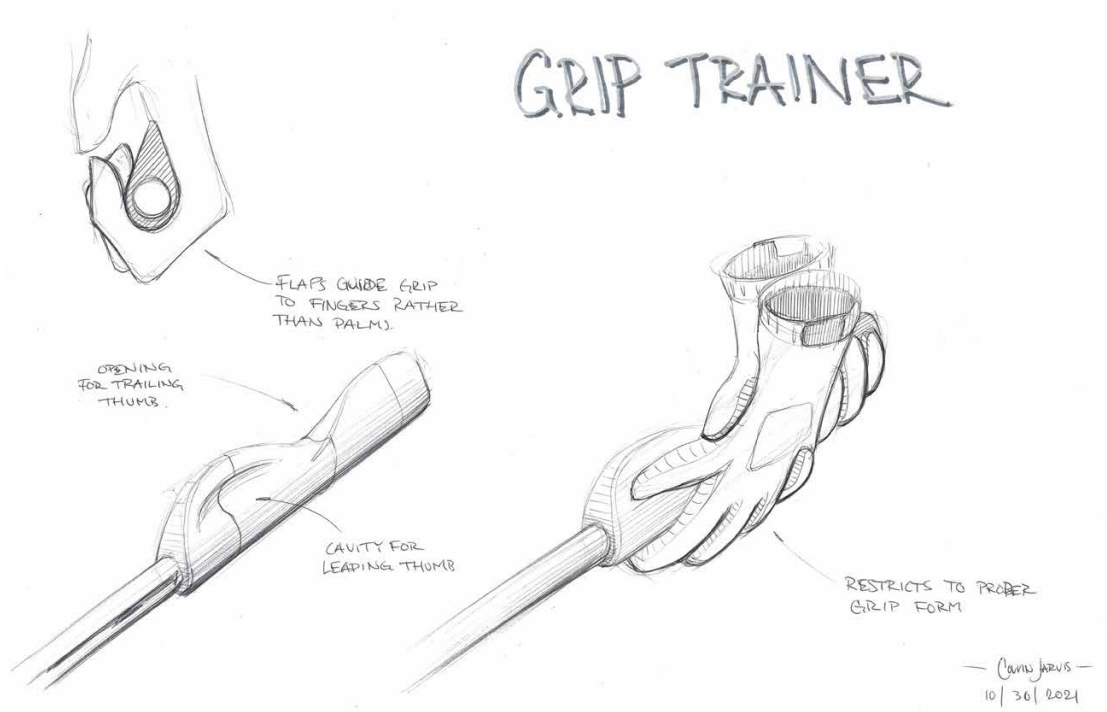


Figure 23. Grip Trainer Ideation Sketch

4.2 Concepts Exploration

4.2.1 Concept One

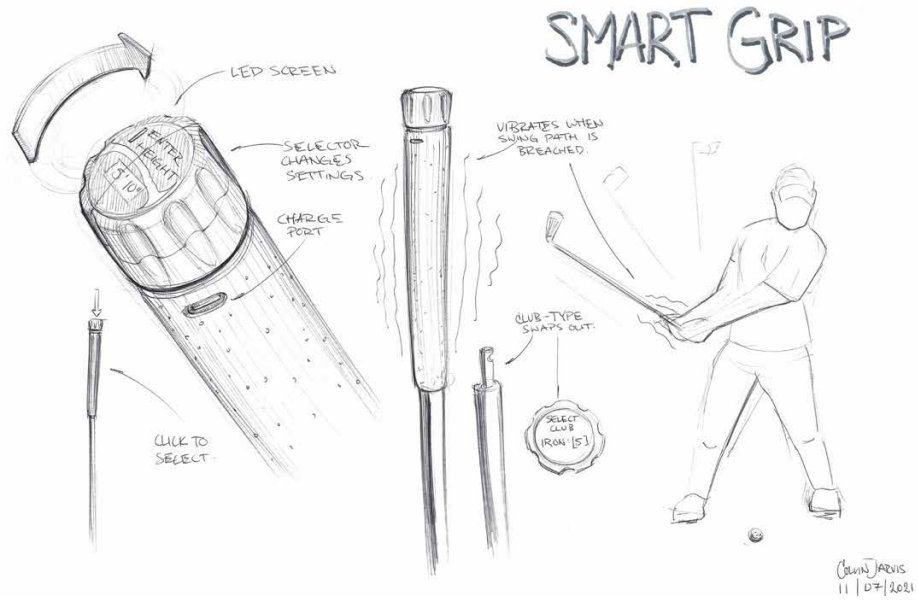


Figure 24. Smart Grip Concept Sketch

4.2.2 Concept Two

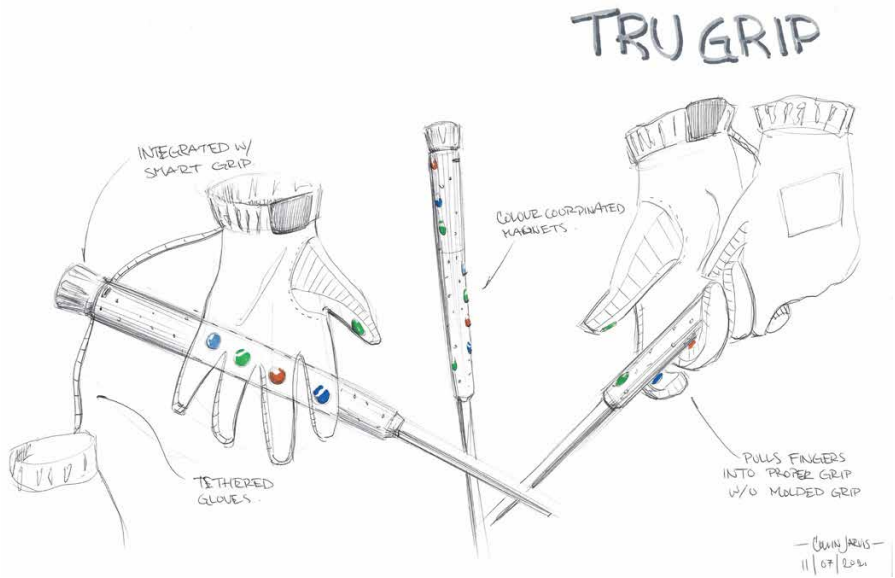


Figure 25. Tru Grip Concept Sketch

4.2.3 Concept Three

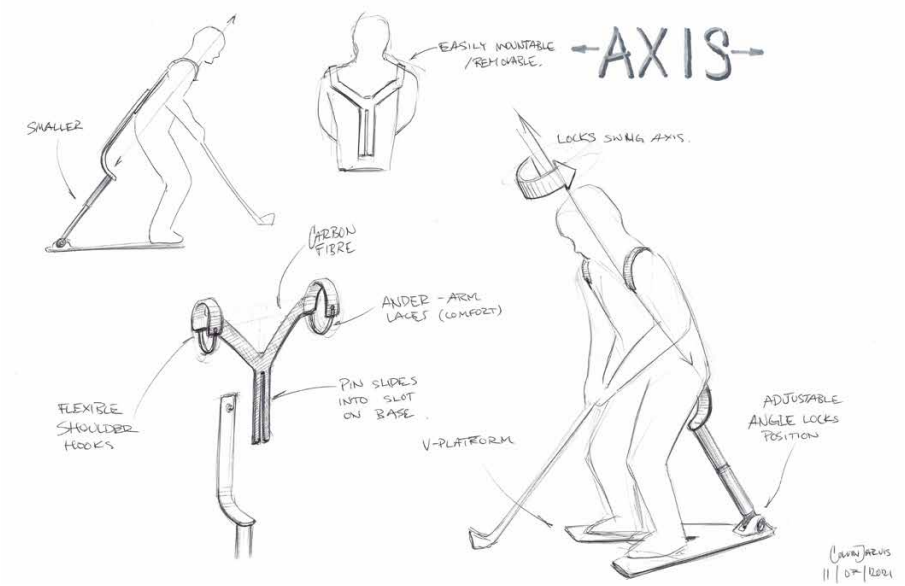


Figure 26. Axis Concept Sketch

4.3 Concept Strategy

4.3.1 Concept Direction & Product Schematic One

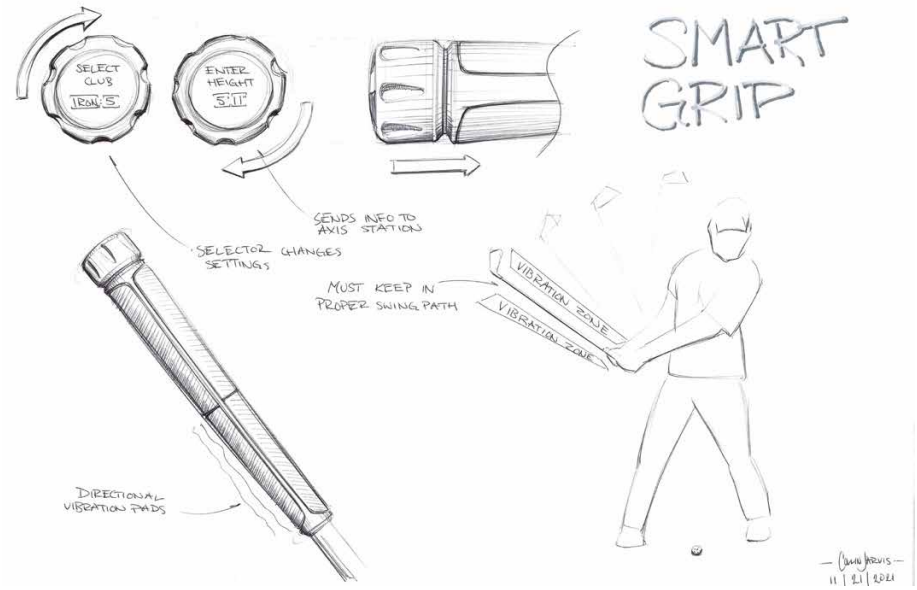


Figure 27. Smart Grip Concept Development Sketch

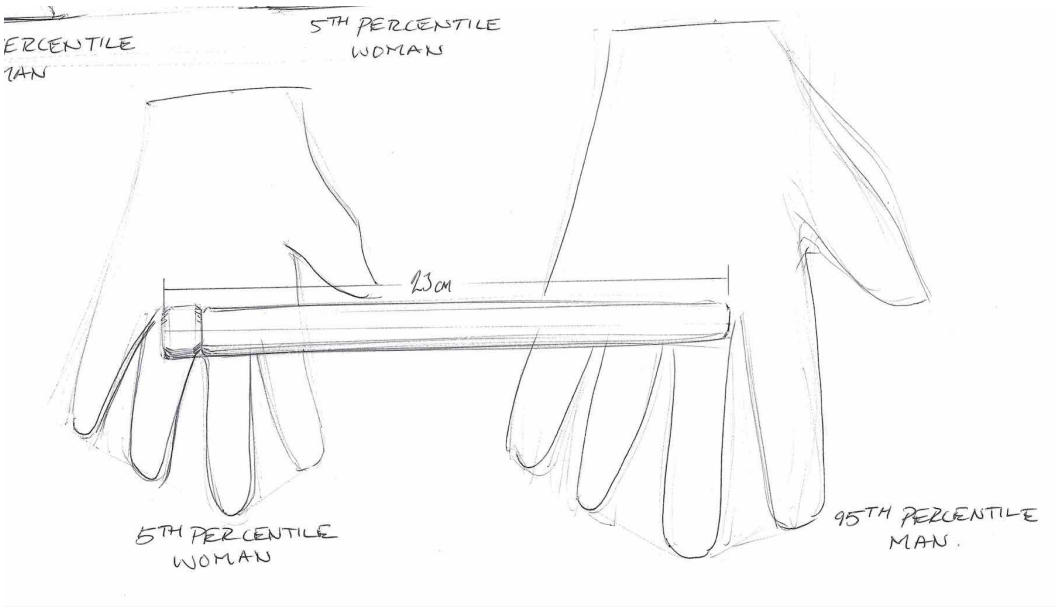


Figure 28. Smart Grip Schematic Sketch

4.3.2 Concept Direction & Product Schematic Two

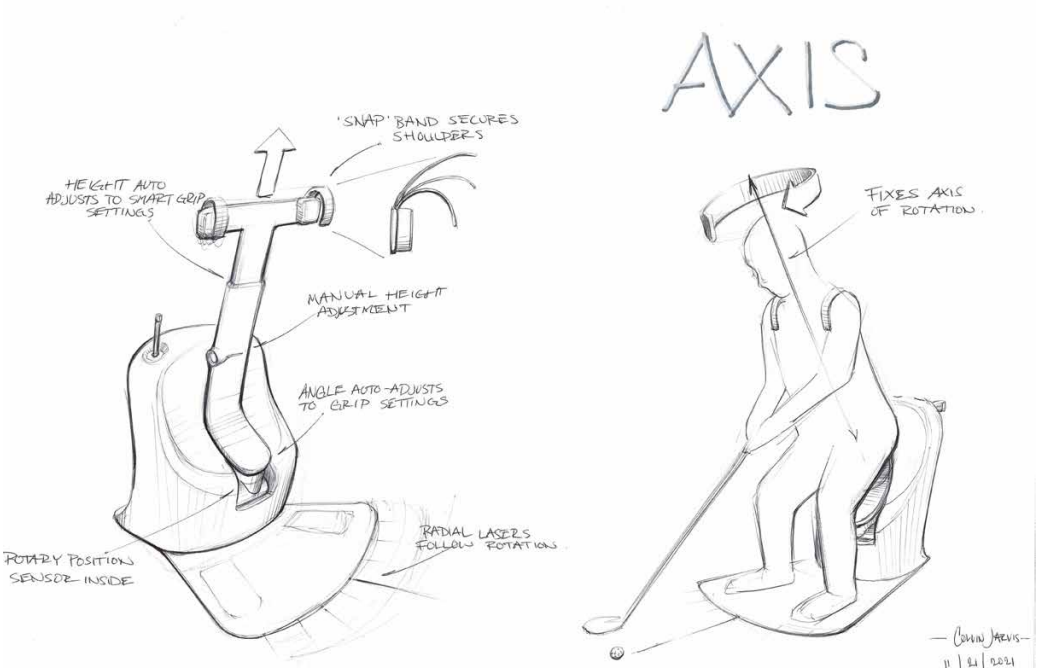


Figure 29. Axis Concept Development Sketch

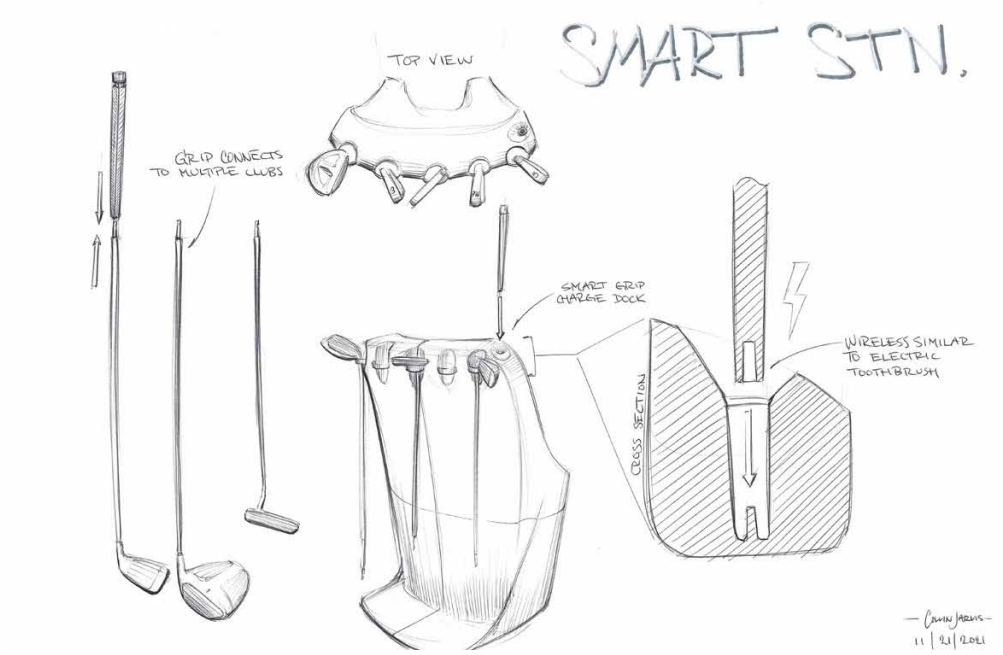


Figure 30. Smart Station Concept Development Sketch

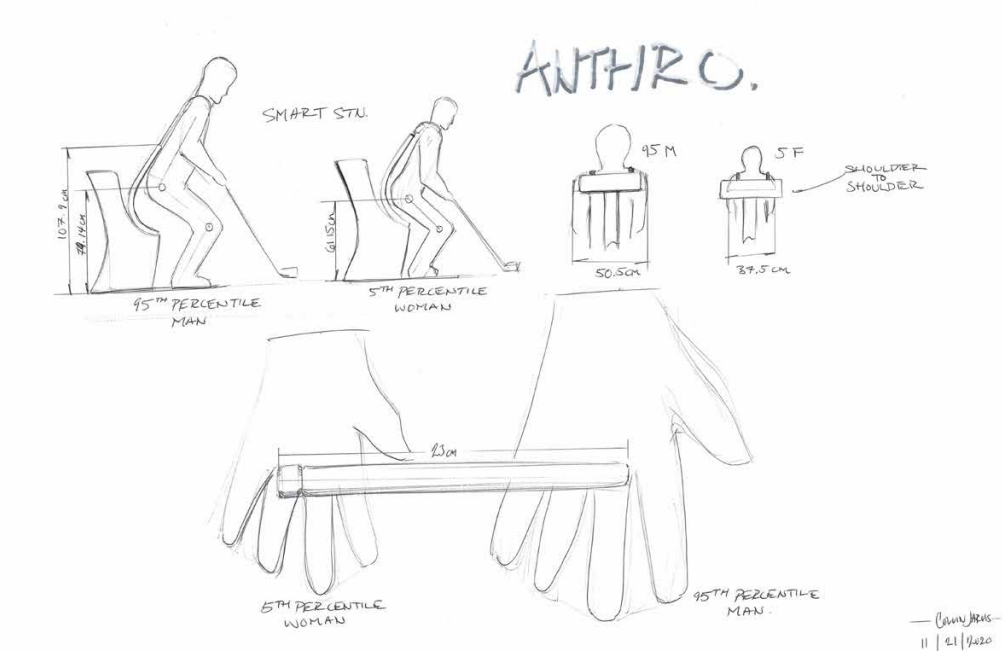


Figure 31. Axis Schematic Sketch

4.4 Concept Refinement & Validation

4.4.1 Design Refinement

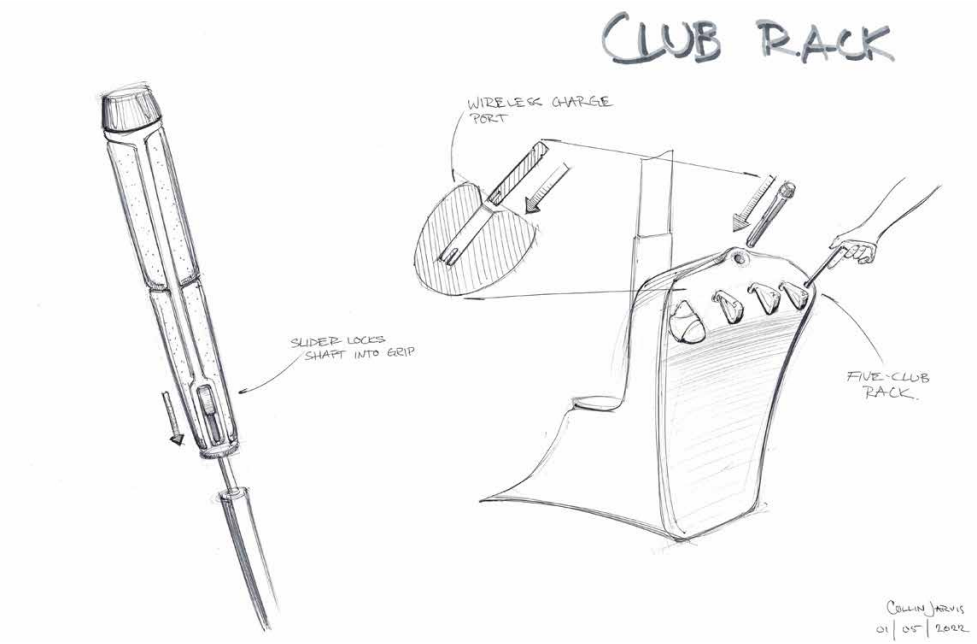


Figure 32. Grip and Rack Design Refinement Sketch

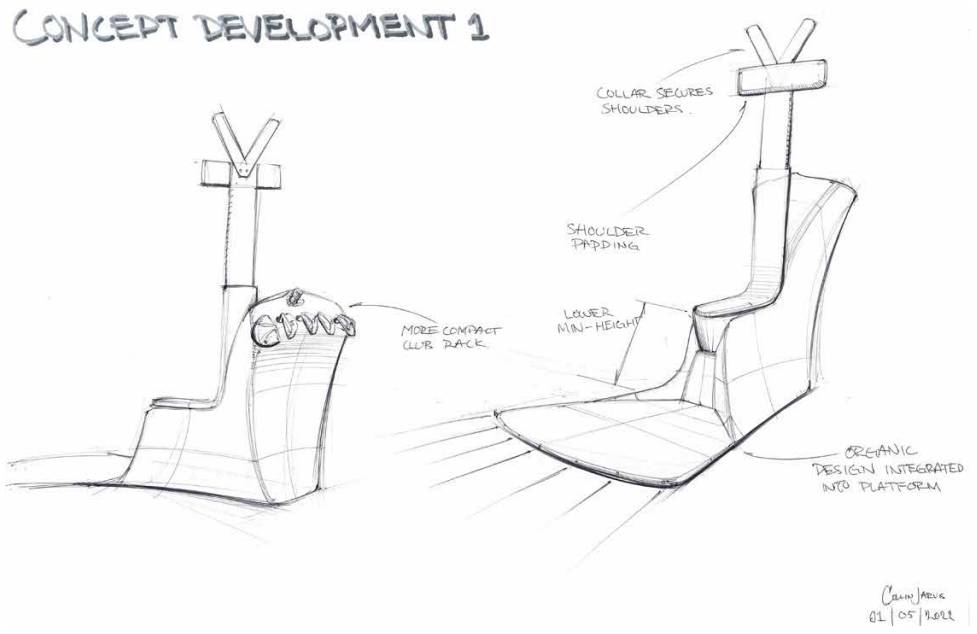


Figure 33. Axis Design Refinement Sketch

4.4.2 Detail Development

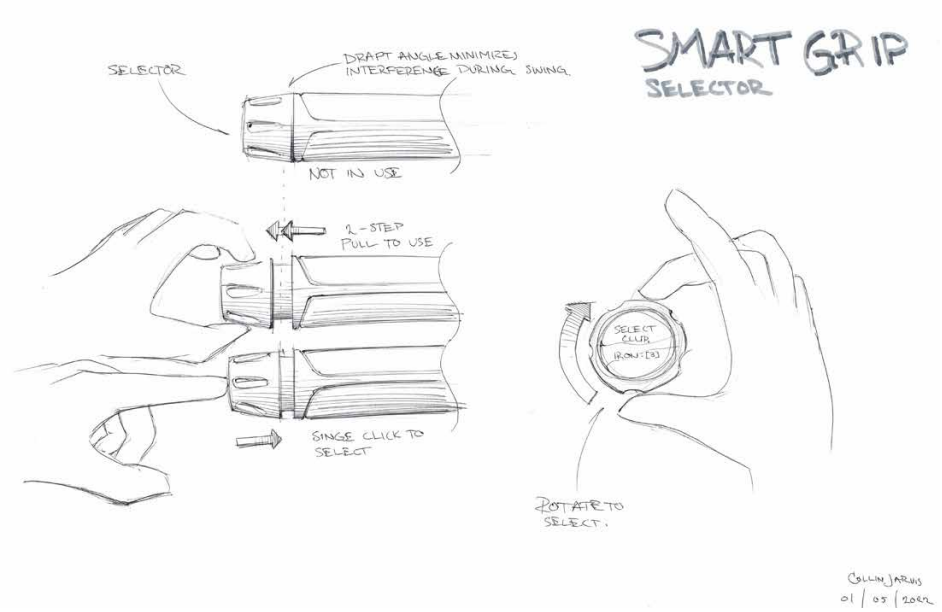


Figure 34. Smart Grip Detail Development Sketch

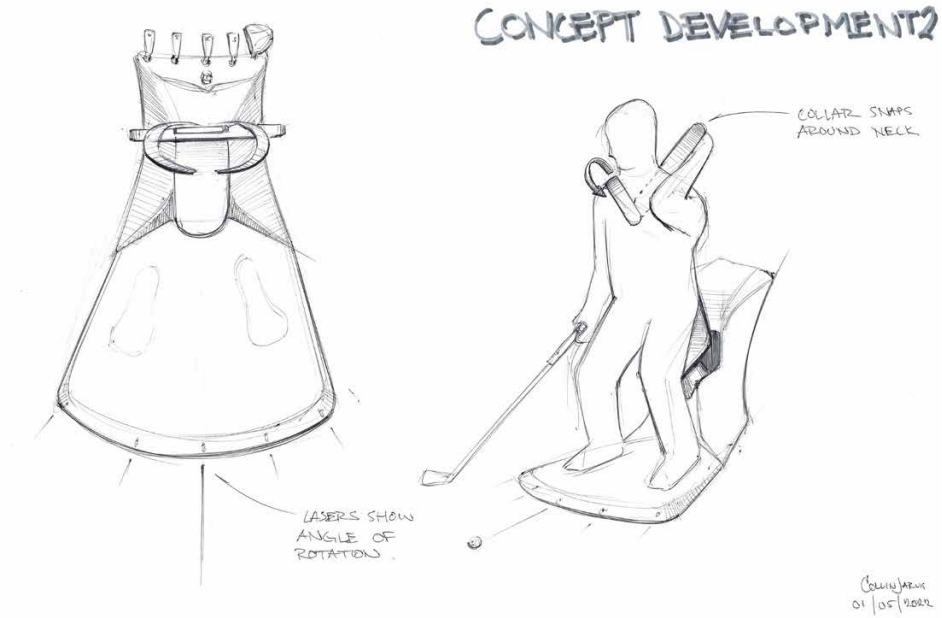


Figure 35. Axis Collar Detail Development Sketch

4.4.3 Refined Product Schematic & Key Ergonomic

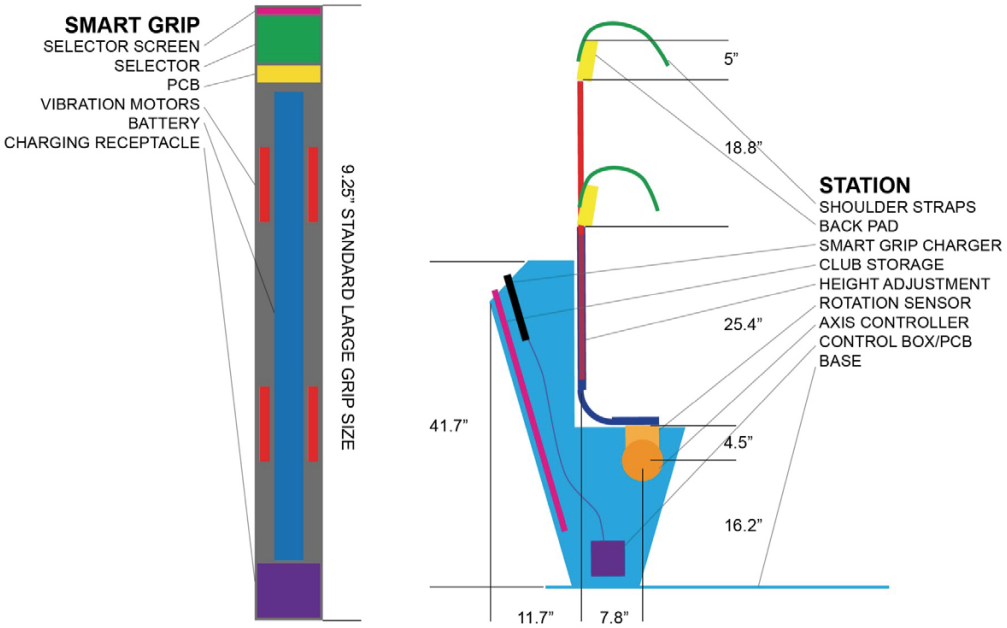


Figure 36. Configuration Diagrams for Smart Grip (left) and Training Station (right) with dimensions derived from percentile data.

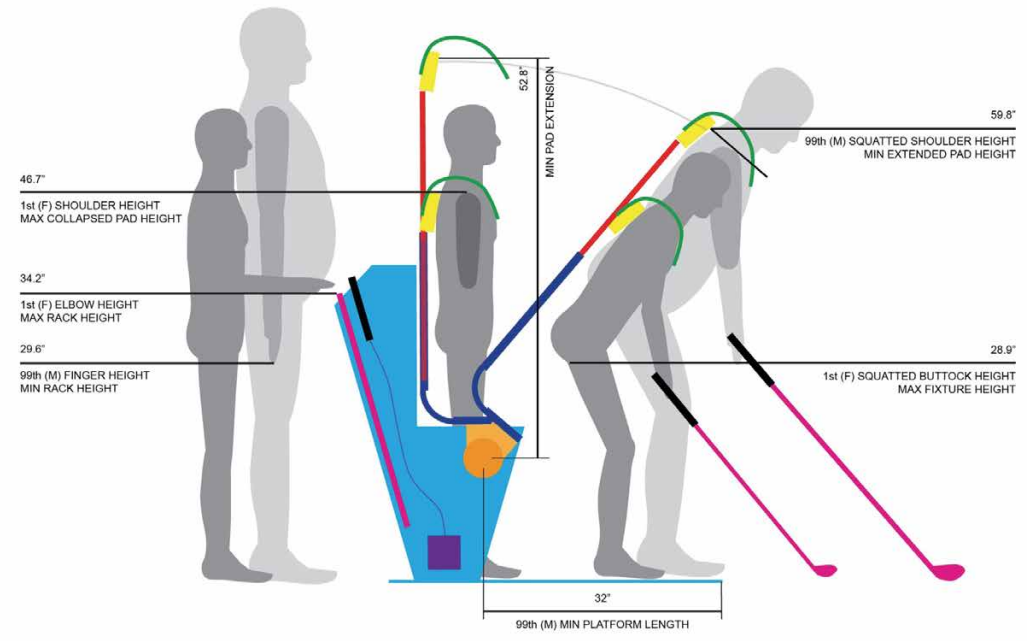


Figure 38. Side view Schematic with percentile figure data

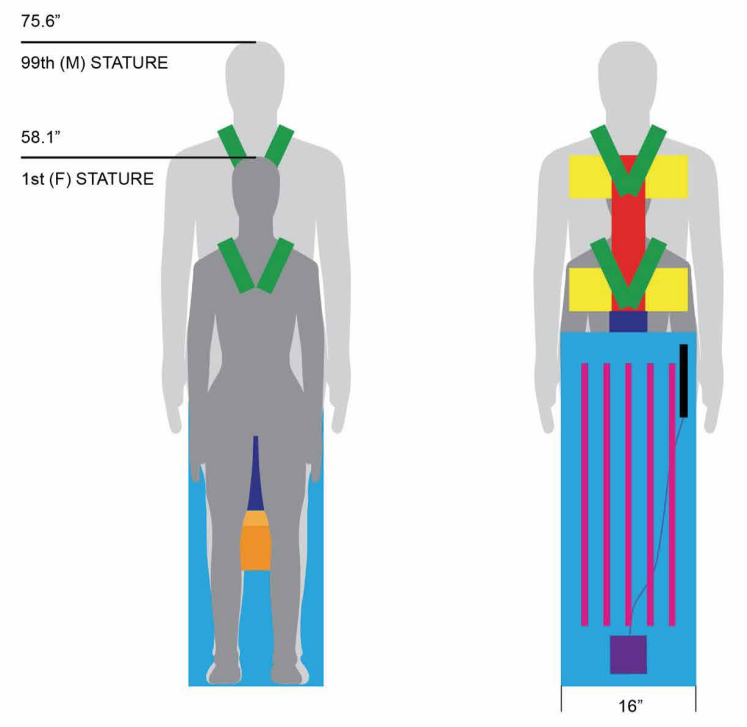


Figure 37. Front and Rear Schematic views with percentile data.

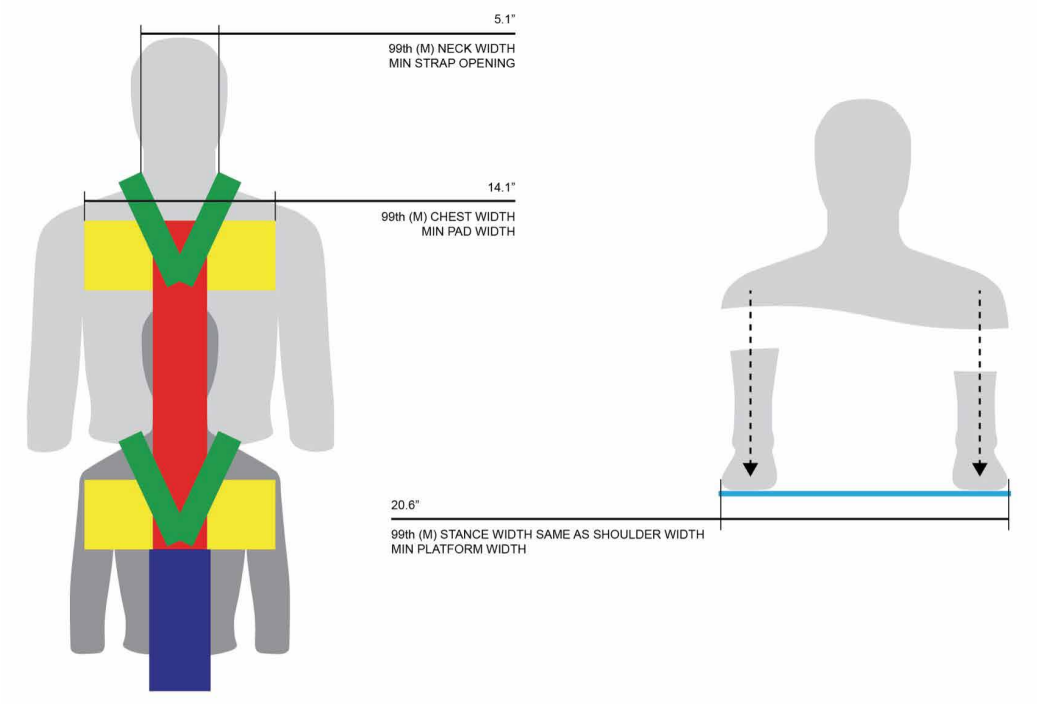


Figure 39. Detail Schematic views with percentile data of Training Station fixture and platform.

4.5 Concept Realization

The basic concept leading into the design finalization stage remains largely the same. The main changes have to do with improving the aesthetic appeal and any user interaction points. There will be a larger focus on obtaining a style similar to that of Lexus Automotive, indicating a luxurious design which is appropriate for the game of Golf.

4.5.1 Design Finalization

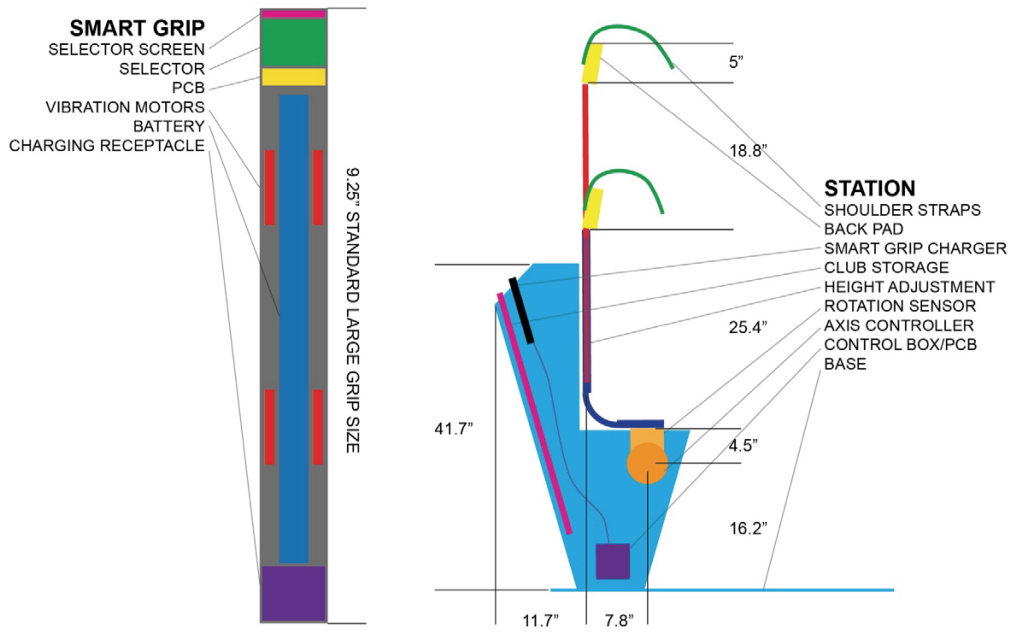


Figure 40. Configuration Diagrams for Smart Grip (left) and Training Station (right) with dimensions derived from percentile data.

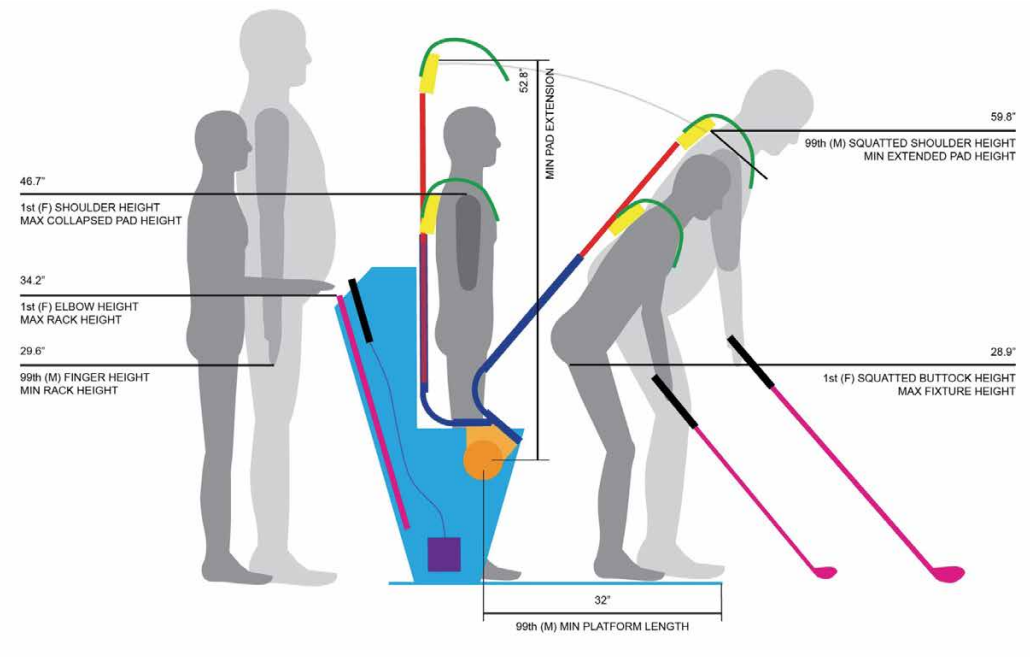


Figure 41. Side view Schematic with percentile figure data

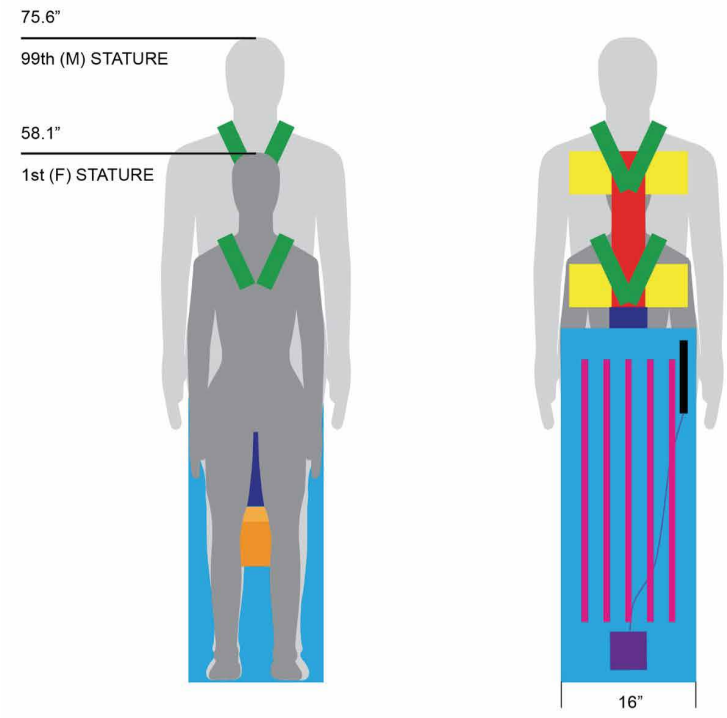


Figure 42. Front and Rear Schematic views with percentile data.

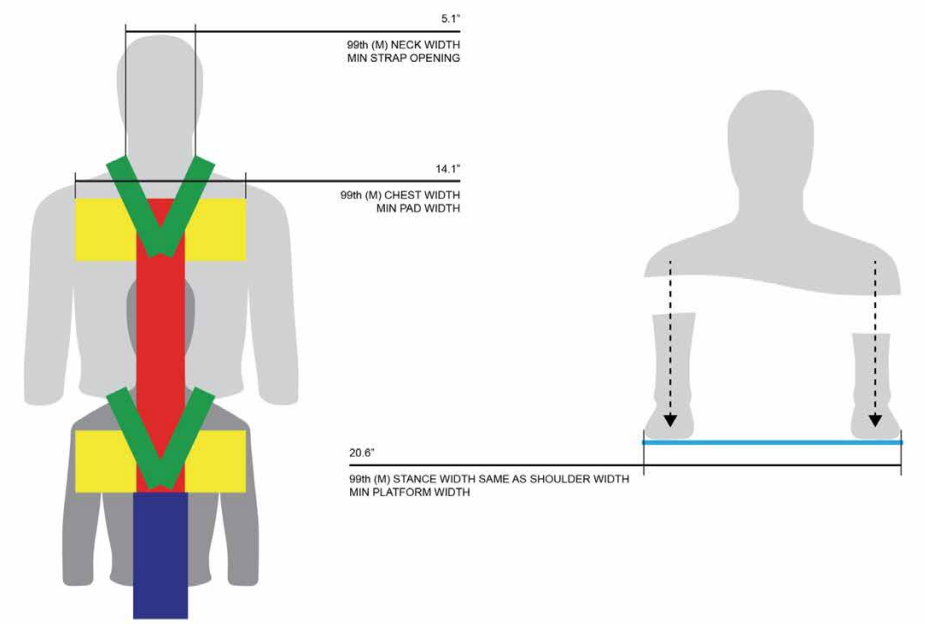


Figure 43. Detail Schematic views with percentile data of Training Station fixture and platform.

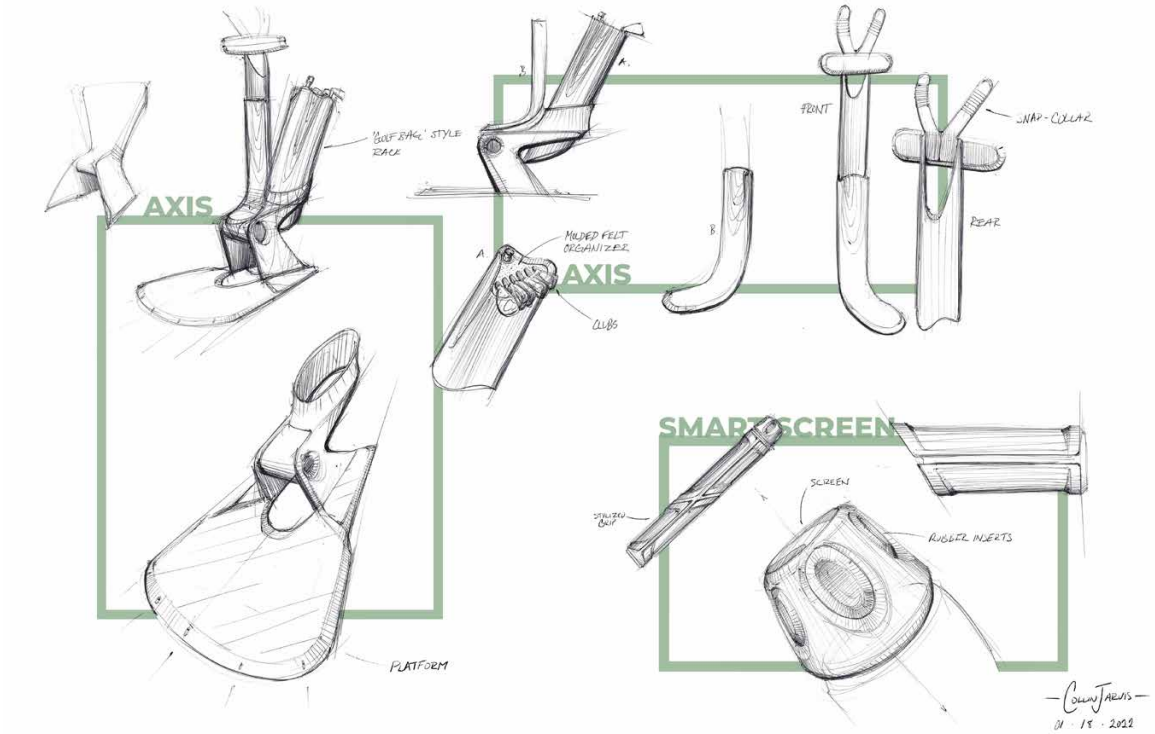


Figure 44. Refined Design Sketches

4.5.2 Physical Study Models

Figure 45. Front ¾ View of Sketch Model

Figure 46. Rear ¾ View of Sketch Model

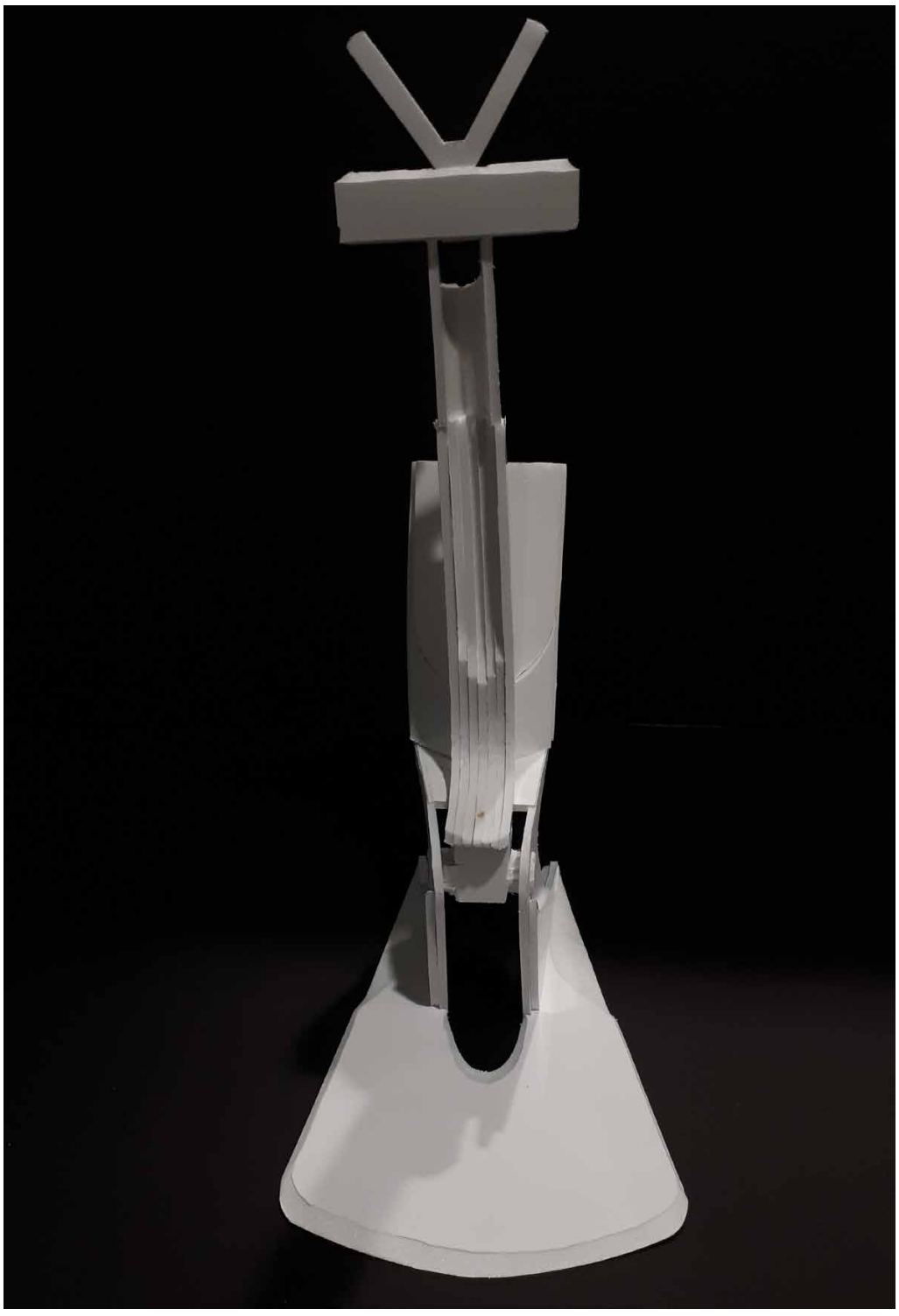


Figure 47. Front View of Sketch Model

Figure 48. Side View of Sketch Model

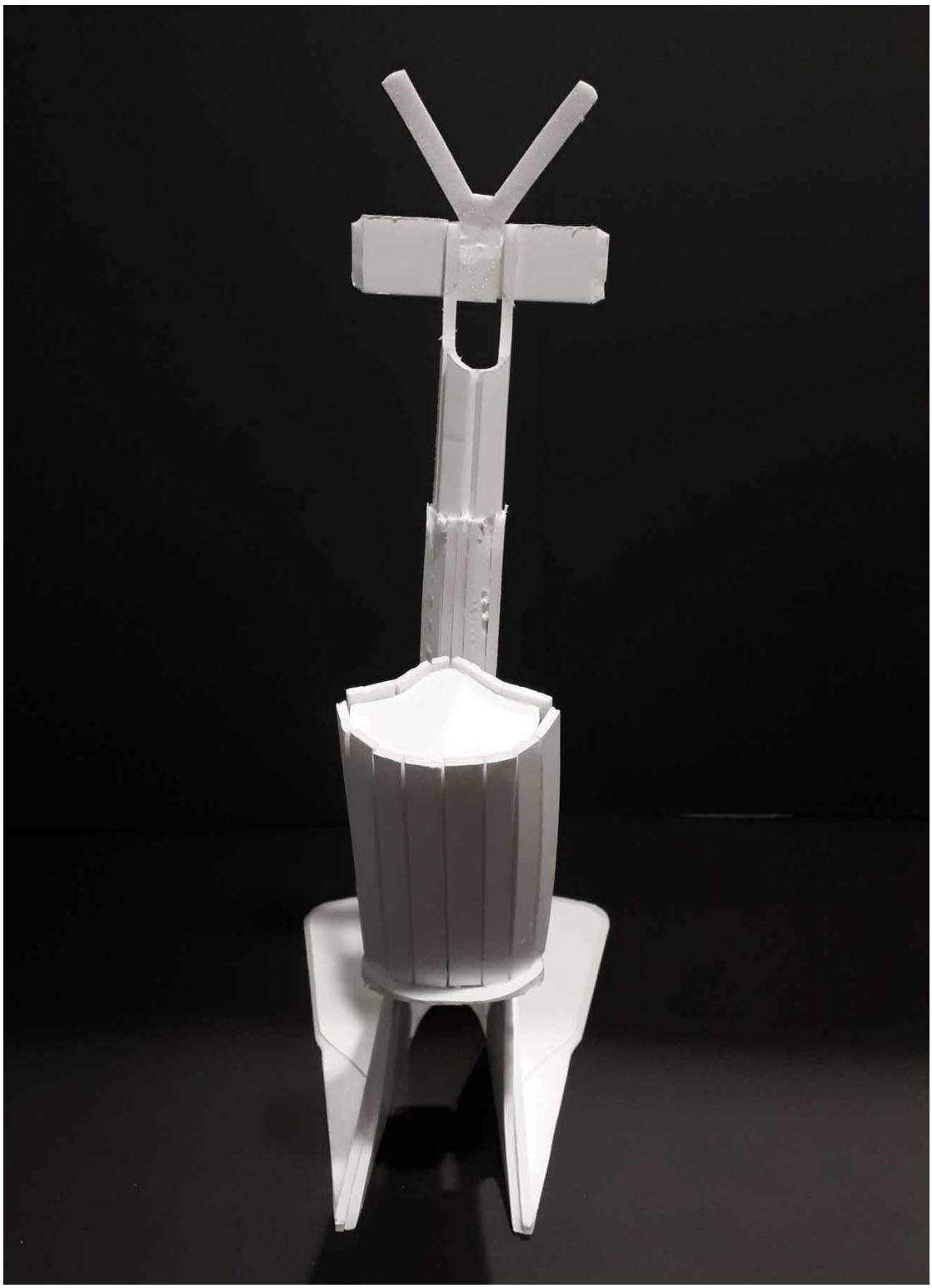


Figure 49. Rear View of Sketch Model

Figure 50. Detail View of Club Storage of Sketch Model

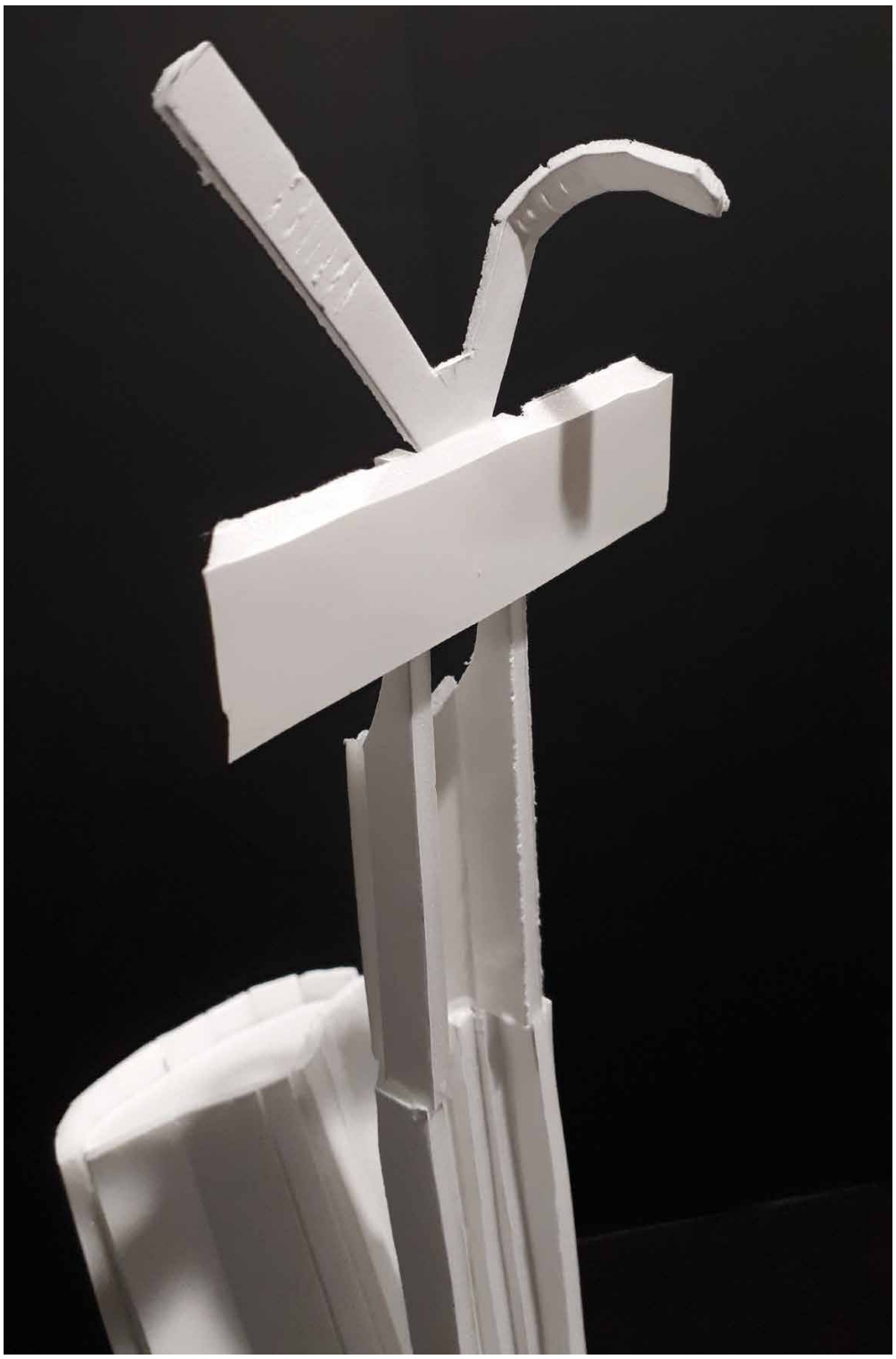


Figure 51. Detail View of Collar of Sketch Model

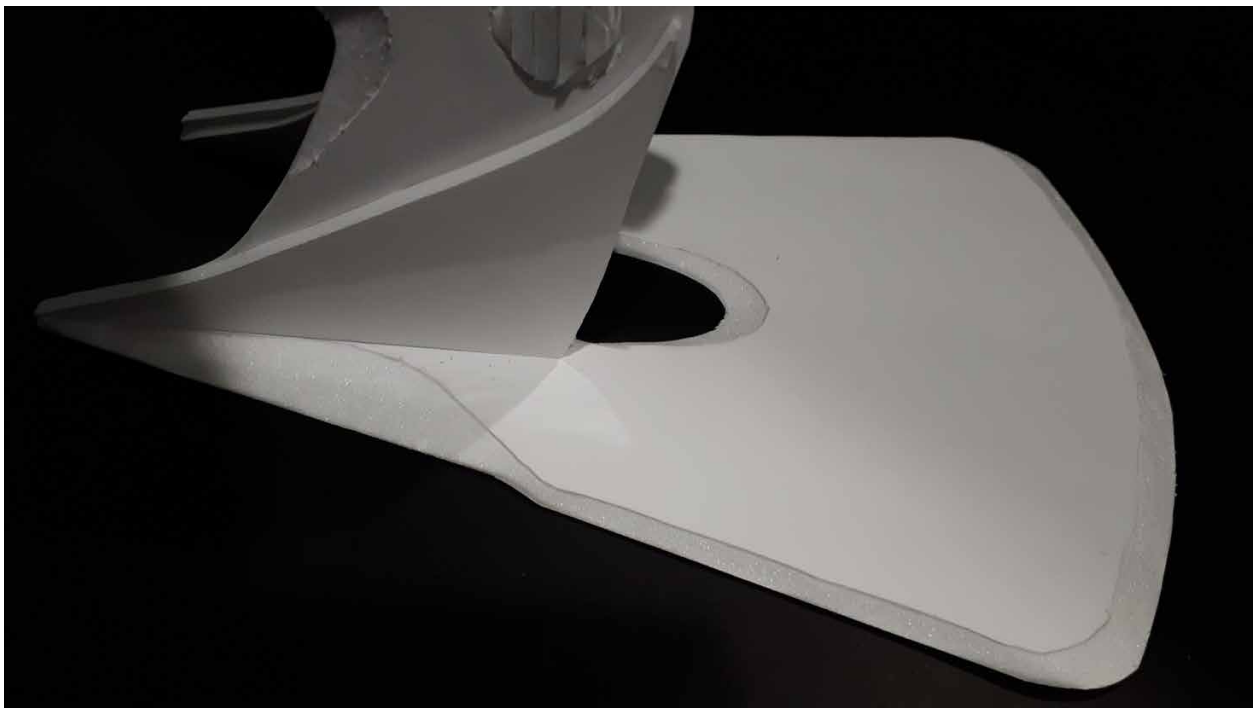


Figure 52. Detail View of Platform of Sketch Model

4.6 Design Resolution

The final design relies heavily on swooping organic lines in keeping with the "Lexus Automotive" design language. The Smart Grip was heavily revised to appear more organic, with the haptic vibration pads rotated 90 degrees from top to bottom to create diagonal lines. The smart screen was also made much smaller as not to obstruct the user's hands, and the selector was changed to an outside shroud that rotates around the static screen, which is designed to appear as a suspended "jewel". The user will be able to select their height from the screen, after which the rear fixture will automatically adjust to their proper posture for the club they have attached to the grip. To simulate a golf course, artifical turf will be used for the platform, and the rest of the body will be made from injection molded plastic.

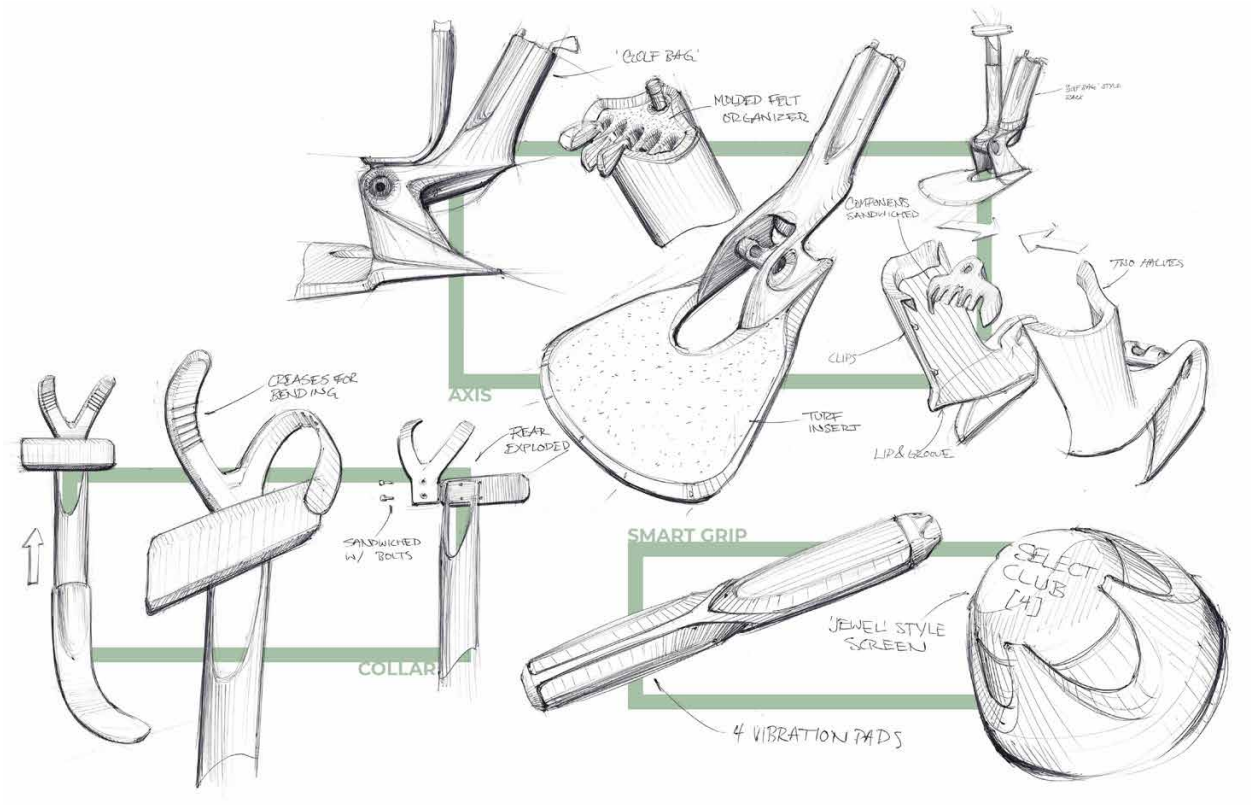


Figure 53. Finalized Refined Design Sketches

4.6 CAD Development

The CAD process was very drawn out and was restarted twice. After beginning with solid modeling, it was recommended that surface modeling would be a better direction to begin with. After 2 months of attempting to figure out how surfaces meet, it was discovered that solid modelling was already an adequate, and much faster route. After restarting the model for a second time, the rest of the model took 3 weeks to complete. The process began with an extrusion at the base, and then lofting the intricate shapes off of it, meeting the bulge at the botton with a variable radius. The club storage was lofted into the base and met with a variable radius. The moving fixture and platform were both lofted separately.

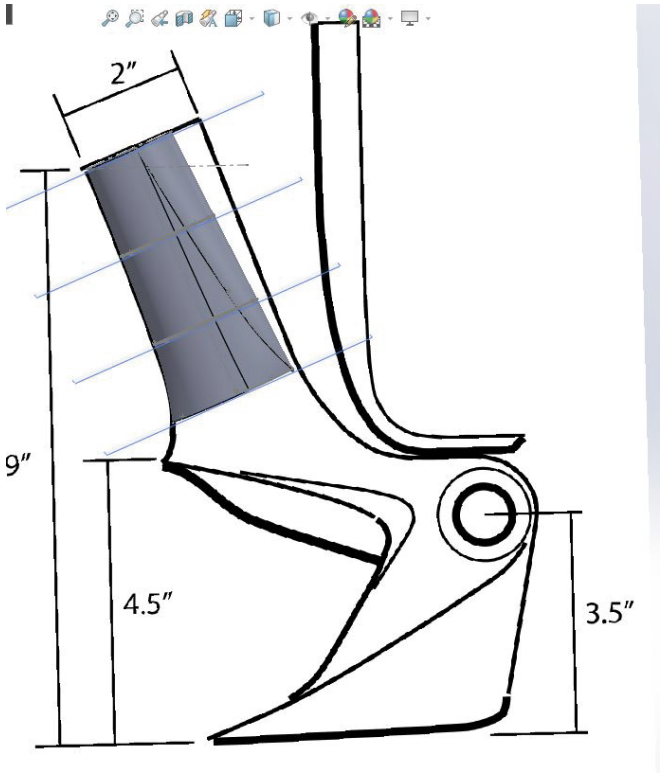


Figure 54. First Attempt at CAD Model using solids

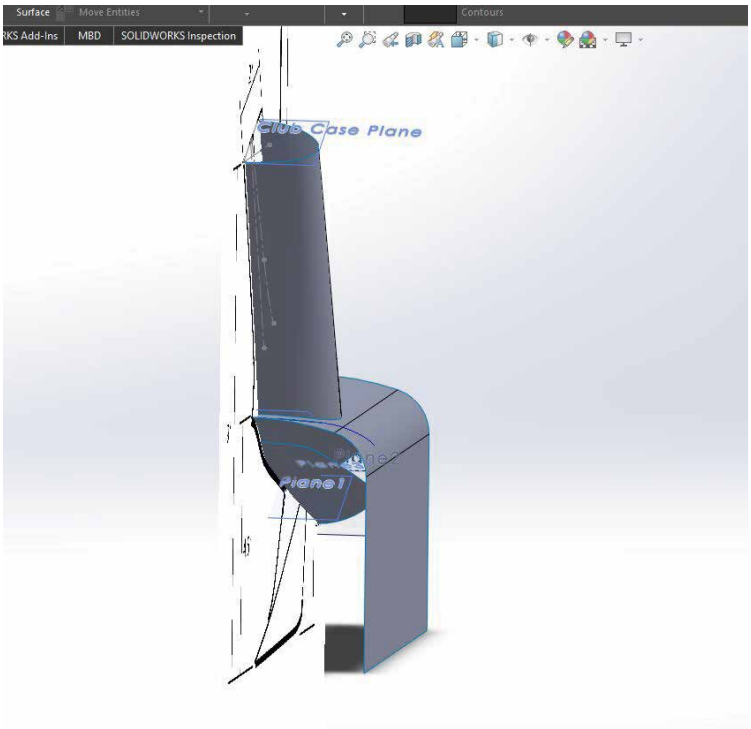


Figure 55. Second attempt at CAD Model using surfaces

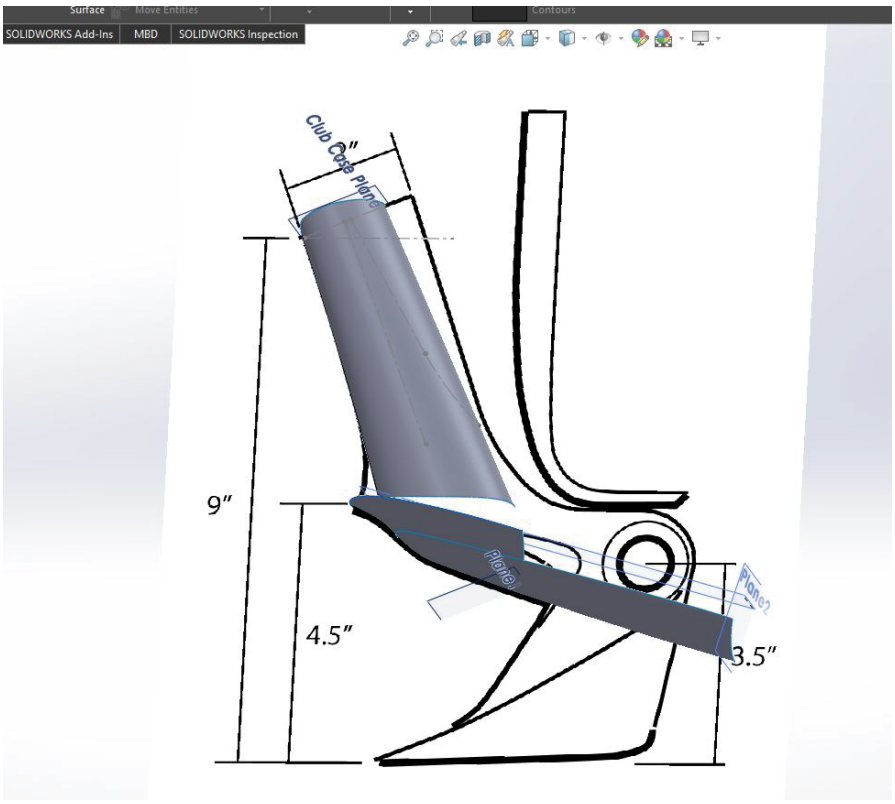


Figure 56. Attempting to use surfaces on the under side

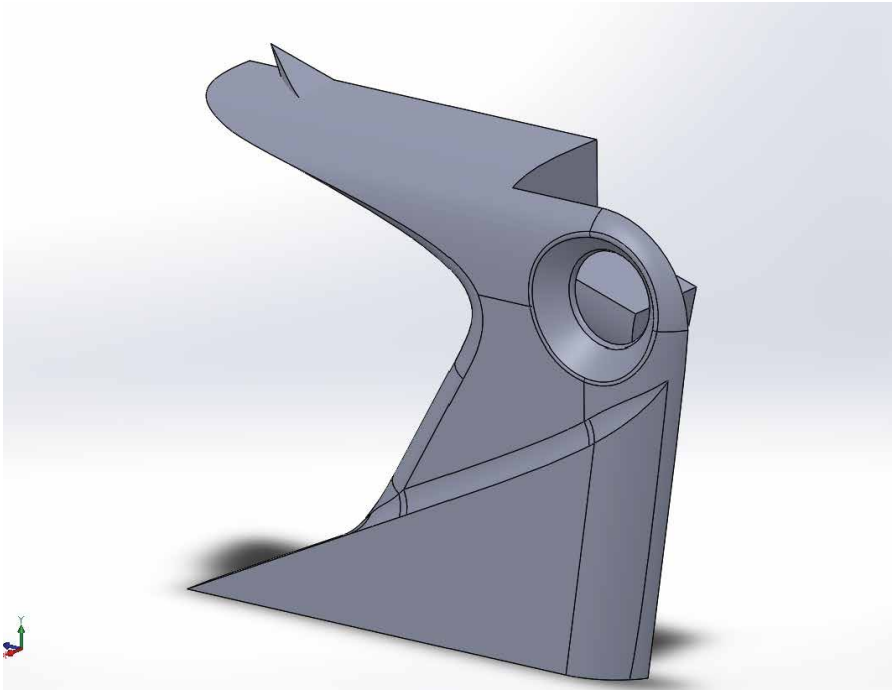


Figure 57. Reverting back to solid modeling and making more progress

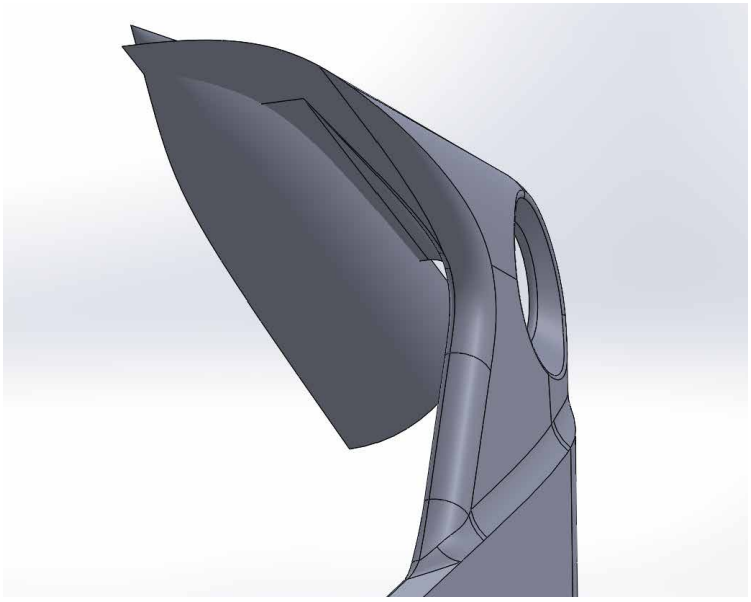


Figure 58. Figuring out rounded surfaces underneath

Figure 59. Connecting club storage to the base

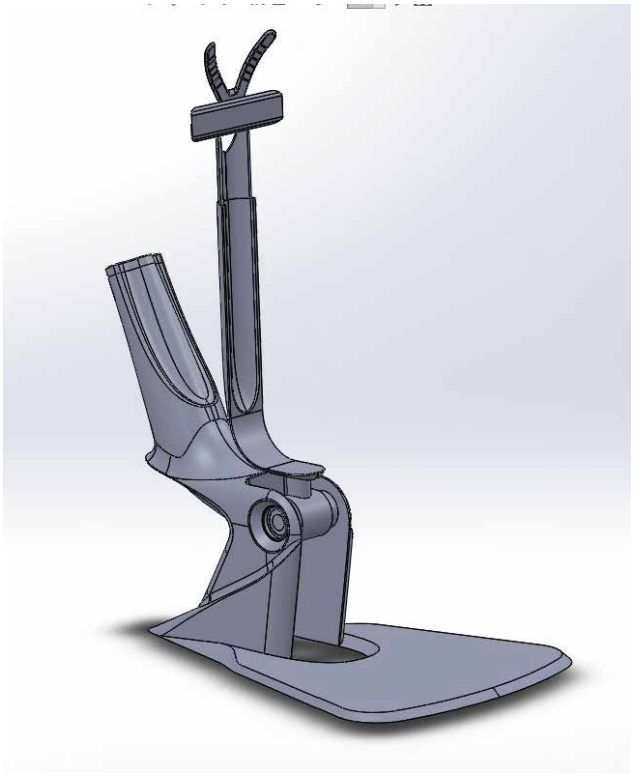


Figure 60. ¾ View of Completed CAD Model

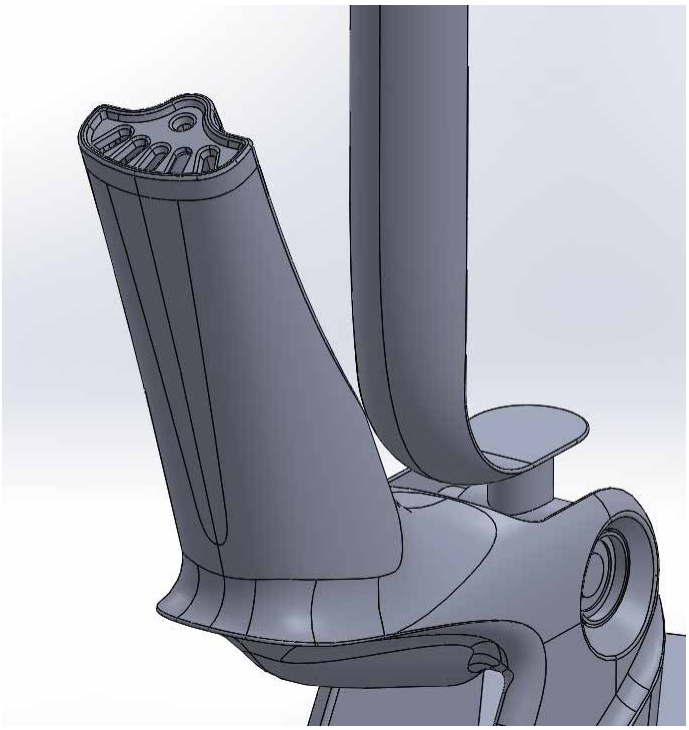


Figure 61. Detail View of Club Storage of Completed CAD Model

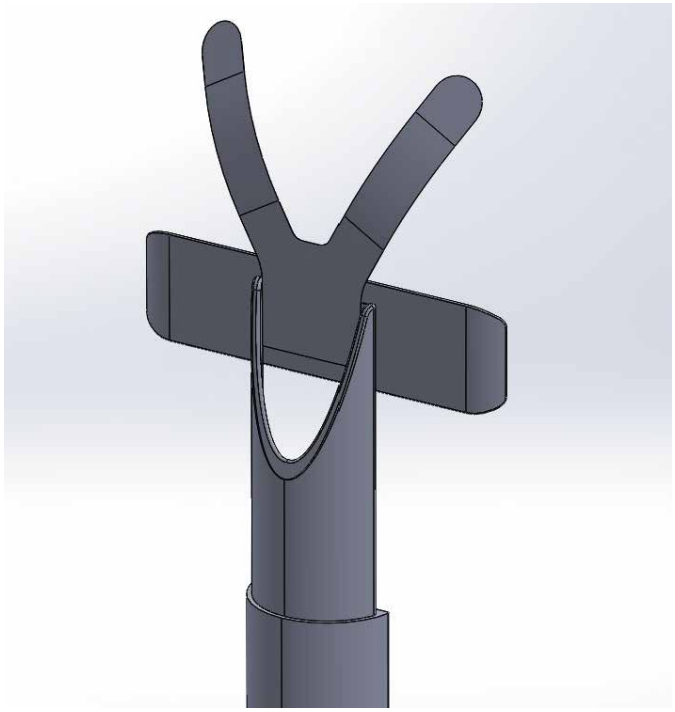


Figure 62. Detail View of Collar of Completed CAD Model

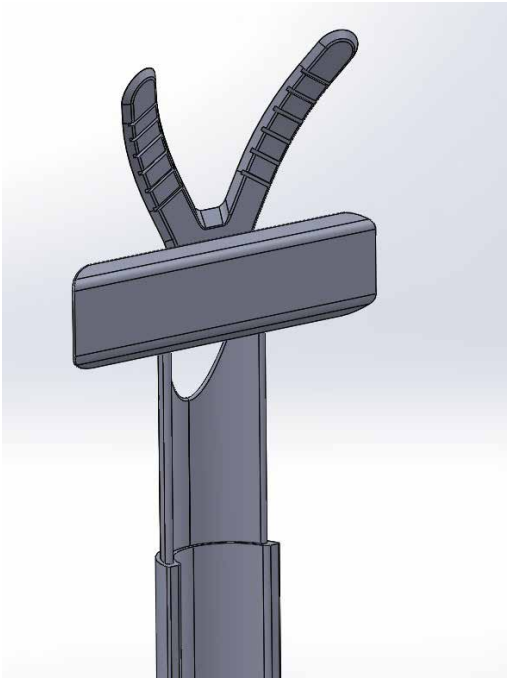


Figure 63. Detail View of Collar of Completed CAD Model

4.8 Physical Model Fabrication

Incomplete

Chapter 5 Final Design

5.1 Summary

The proposed solution fixes a user's posture to a proper swing axis, preventing undesired [unconscious] motions such as leaning forward throughout the swing, while allowing them to rotate about their spine. The Smart-Grip provides haptic feedback to indicate when the user is in the proper swing path in real time.

The central part of the design is the shoulder fixture, which adjusts to the users posture, and secures their shoulders with a snap-collar. This fixture automatically adjusts when the user selects a club on the Smart-Grip interface, and inputs their height. A set of interchangeable training clubs is stored at the rear of the body, along with a charging dock for the grip. During practice, a sensor in the base records the speed of their swing and automatically adjusts resistance to encourage the user to swing slower or faster.

The comprehensive focus on tactile training theoretically will enable the user to learn how a proper swing feels without the need for confusing auditory and visual instructions.

5.2 Design Criteria Met

5.2.1 Full Bodied Interaction Design

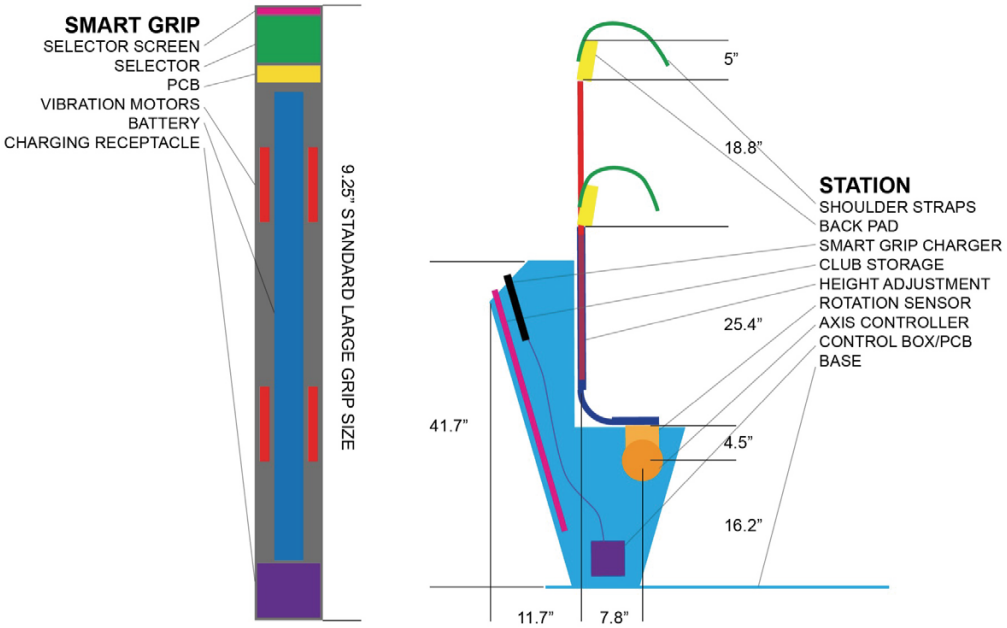


Figure 64. Final Configuration Diagrams for Smart Grip (left) and Training Station (right) with dimensions derived from percentile data.

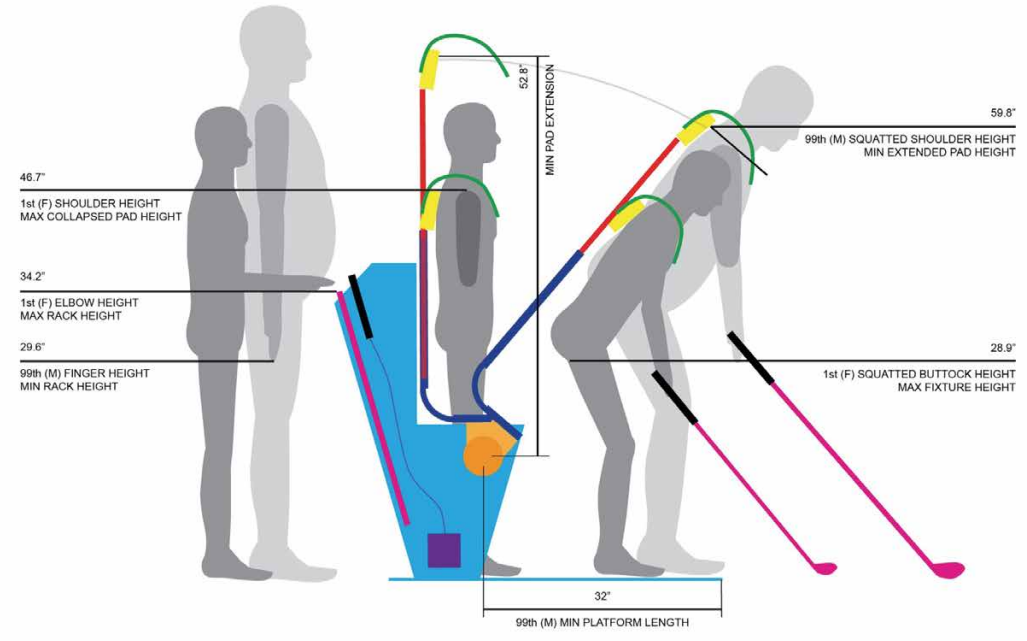


Figure 65. Final Side view Schematic with percentile figure data

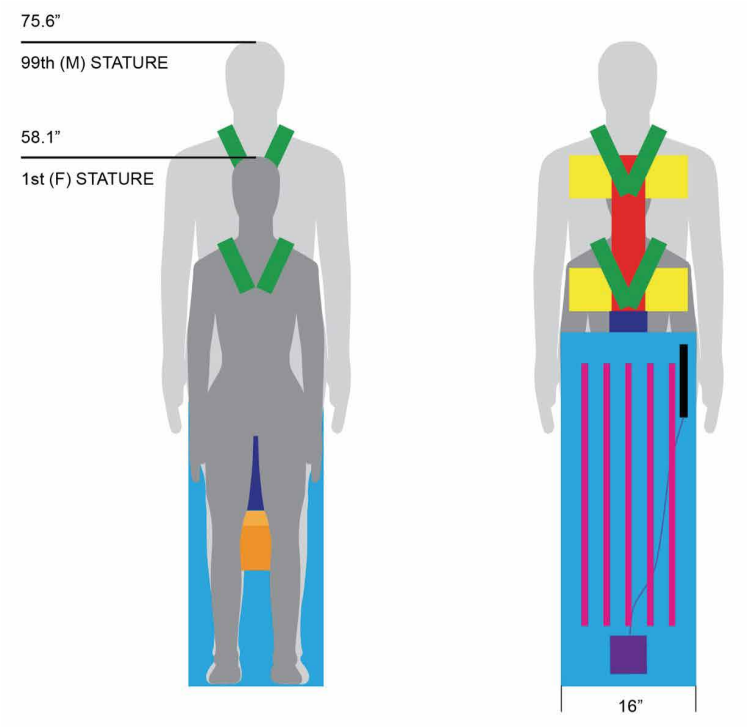


Figure 67. Final Front and Rear Schematic views with percentile data.

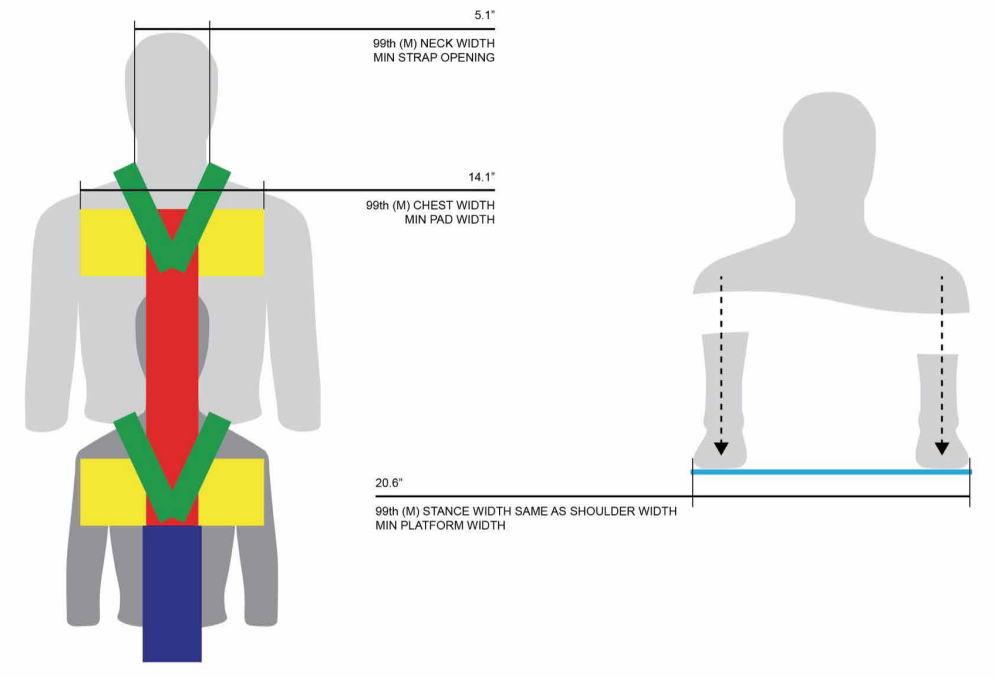


Figure 66. Final Detail Schematic views with percentile data of Training Station fixture and platform.

5.2.2 Materials, Process and Technology

As this piece of equipment is largely static, the main body is not load bearing, and so standard materials may be used for them. This also means that the mass of the material of the body is not necessarily an issue. The only area where there may need to be advanced materials is on the rotating fixture to save weight while maximizing structural rigidity and functionality.

The Platform will be made out of a similar material to what is used at driving ranges for turf pads to simulate grass. To frame this portion, there will be a dense rubber with a steel core for rigidity and weight to anchor the machine in place. This steel core will be connected to the rotating fixture to reduce any flexing. The main body will be made out of a plastic that is impact resistant, injection moldable, cost effective and that does not break down in sunlight. PVC may be ideal for this portion. The organizer at the top of the club case will be made out of a rigid material with a green turf-like finish to mimic that of the platform.

The mechanical fixture itself will be made out of cast aluminum to house the actuating motion of the core that extends to adjust for height. The rest of this fixture will be an extruded aluminum for strength, rigidity, and lightness to reduce the rotational mass.

5.2.3 Design Implementation

5.3 Final CAD Rendering

Figure 68. Front ¾ View CAD Render

Figure 69. Rear ¾ View CAD Render

Figure 70. Side View CAD Render

Figure 71. Side View CAD Render In-Situ demonstrating fixture function

Figure 72. Detail View of Collar CAD Render

Figure 73. Detail View of Collar Collapsed CAD Render

Figure 74. Detail View of Club Storage CAD Render (Winther, 2012)

Figure 75. In-Situ of Usage CAD Render

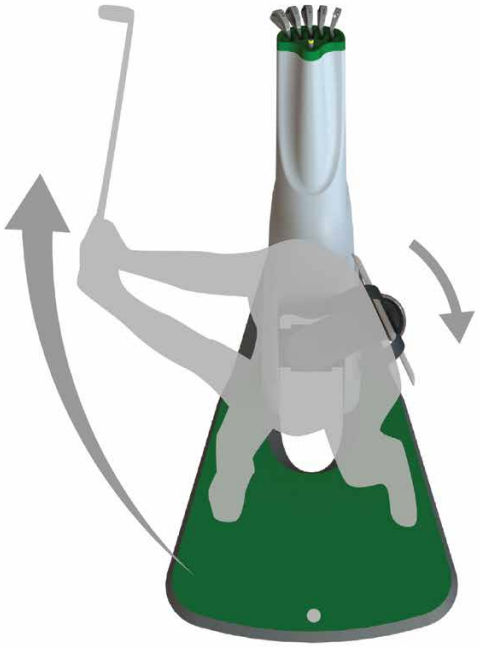


Figure 76. In-Situ of Usage CAD Render

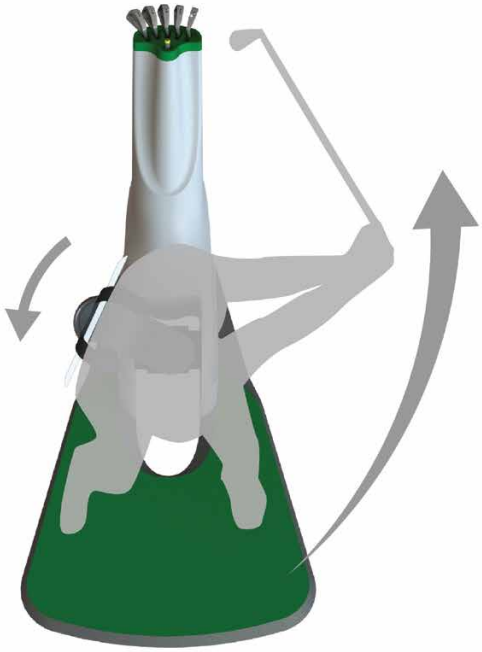


Figure 77. In-Situ of Usage CAD Render

5.4 Physical Model

5.5 Technical Drawings

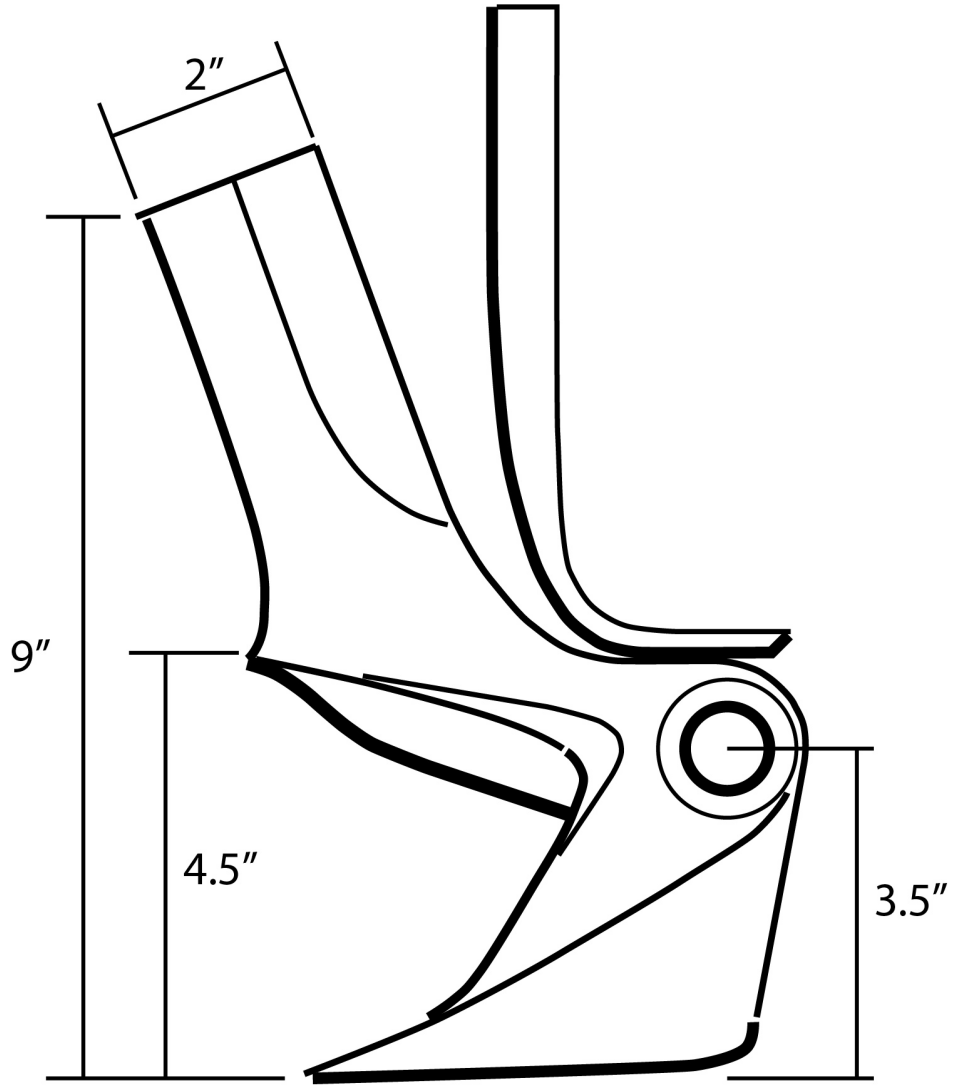


Figure 78. Technical Drawing of Side View With 1/8 Scale Dimensions

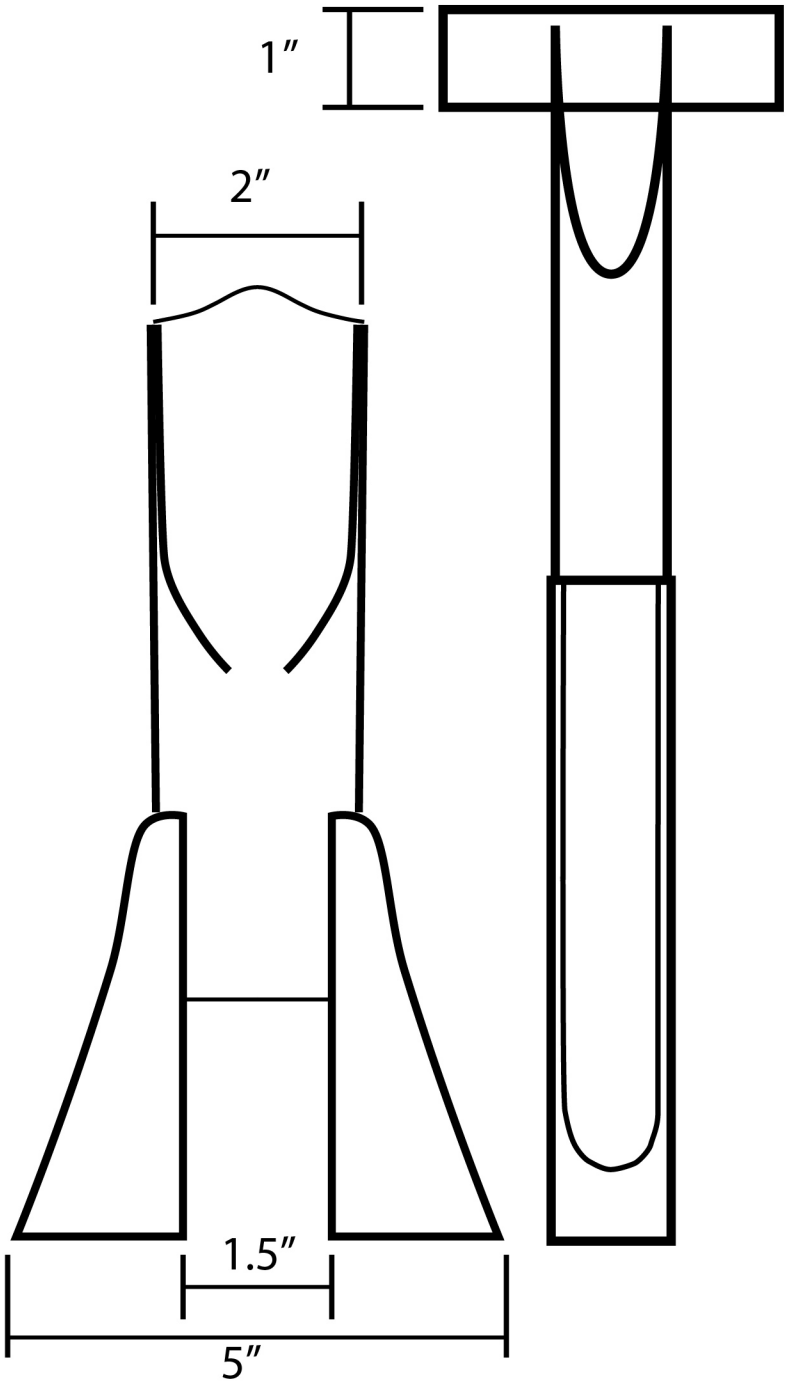


Figure 79. Technical Drawing of Front View With 1/8 Scale Dimensions

5.6 Sustainability

The sustainability of the product will mainly be based on the durability and longevity of the product. Even though much of the product will be plastic, the device is almost entirely recyclable. With these things in mind, a greater focus on cost-effectiveness in material selection is warranted. As the design is largely static, there is virtually no need for advanced composite materials, which cannot be recycled. This enables the use of standard materials, which may be recycled and improves the overall sustainability of the product throughout its lifetime.

Chapter 6 Conclusion

Golfing can be an enjoyable, relaxing, and fun sport. However, However, when learning, constantly slicing and hooking the ball, taking too much soil, and putting with too much or not enough power can be frustrating. According to Bob Bauchemin, Professor/Director of Player Development at Humber College Golf Lab, adults who are new to the sport tend to be stuck in certain behaviours and movements that make learning frustrating, and stall their improvement dramatically. As opposed to children, adults tend to be very self-conscious during their swing; this can make training a delicate and complicated process. Product benchmarking has revealed that current training solutions are feedback based, and can increase an adult learner's self-consciousness as a result. Additionally, the current solutions focus on specific areas of skill, meaning a variety of products need to be purchased to provide comprehensive training; this negatively impacts sustainability in the learning process. Based on these findings, there is a need for a training solution that covers a range of skills, and eases

psychological burdens, thus allowing enough improvement to start the game confidently. Additionally, it was found that The current approach to training relies heavily on auditory and visual feedback. The solution proposed fulfills a greater focus on tactile feedback that may enable trainees to gain proper sensation and muscle memory where visual and auditory approaches fall short, and provide a pathway to learning that does not have the negative psychological aspects which typically hinder the learning experience.

A full-scale, one-to-one model study aided in evaluating its success in human interactivity, ergonomics, and psychological factors. Sustainability and social responsibility was evaluated on the basis of its ability to replace the need for multiple other training products, as well as its longevity.

References

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You Betcha. (2020). Guys Golfing [Video]. YouTube https://www.youtube.com/watch?v=QSFEeEqRrPE

Winther, S (2012). Titleist 7-Iron Golf Club. Retrieved from https://grabcad.com/library/titleist-7-iron-golf-club-1

Appendix

A Discovery

Collin Jarvis 5:46

Yeah. Okay, so next question is, is learning to golf for the first time as a mature adult different from doing so as a young or? Or youth or young adult? And in what ways?

Bob Beauchemin 6:01

Oh, absolutely. It's totally different. children tend to picked up quicker and not have as many fears about what they looked like. And and they just adapt to it much quicker. And they're far more honest about their abilities too. I find with adults, they're used to controlling their environment. And, and, or at least attempting to, and, and trying to learn golf, you have to give up a little control to swing the club properly. So I'd say and their muscles are formed. And their ability to to learn new functions is it takes a lot more time and effort, whereas kids are in total learning mode all the time, you know, so for them to learn a new skill is not that that tricky for them?

Collin Jarvis 7:02

That's a great answer. Okay. Next question is, is there any general advice that you tend to give adults when they are starting golf for the first time? Or any general principles that speed up the process?

Bob Beauchemin 7:19

That's a great question. Well, I tried to give them some basic knowledge of physics, like what makes the golf ball go up in the air, what makes it go to the right or to the left? a, you know, how does the club and the ball interact? And most people respond to that, well, so long as you keep it really simple and short, but good, because most people want to know why things are happening. But generally, trying not to overwhelm people with a whole bunch of information, the first few lessons, just, you know, see what they do naturally, and then just kind of gently guide them in the right direction. And maybe give them you know, certain things like, like the grip, for instance, you have to show show them because that's so important to to any contact with the club. So that has to be explained and and shown, the student shown how to do it properly, was a lot of the

Exerpt from interview with Bob Bauchemin

Analysis Insights

- People can enjoy golf for a variety of different reasons (low-impact, social, competitive, nature), but dislike it primarily due to unnatural, complex motions which are very difficult to learn
- A significant amount of the game and training comes down to psychology and habit
- Initial training involves only a brief explanation of physics, and then a focus on a few foundational skills
- Allowing user to evolve their swing is necessary for training adults
- There are technical solutions for virtually every area of training except for learning a proper grip

B Contextual Research (User)

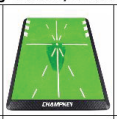
Journey Mapping Anticipated

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7
User Goals	Hitting the ball (no instruction)	Proper Grip	Proper Posture	Maintain Balance	Establish Swing Path	Hitting the ball freely	
User Actions	User hits ball off to side	Keeps both hands on grip	Continues "scooping" motion	Spreads feet & bends knees successfully	Trainer moves club manually, user roughly copies	Continues "scooping habit, retreats into poor grip	
User Thoughts	First swing feels exciting	I am going to forget how to grip it again if I let go	I don't understand what he is talking about	This is easy to do	This feels awkward, I don't know if I am doing it right	I don't remember anything, this feels awkward	
Storyboard							
User Experience							
+							
Neutral							
-							
Challenges	User must guess how to proceed	Difficult to replicate hand positions	Hard to visualize self	Harder to use full body with proper stance	User cannot "feel" if they are doing it right	Proper technique doesn't feel "right" to the novice	
Insights/ Takeaways	Reveals users natural tendencies	Proper grip can be very complicated	Can be unaware of certain motions without tactile correction	Proper stance brings out "unnatural" characteristics of golf	Users cannot visualize what the club is doing on the back swing	It takes time for proper to technique to become natural	

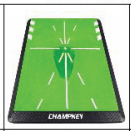
B Contextual Research (Product)

Benchmarking Features

Benchmarking - Feature/Function Comparison Table

Products								
	1	2	3	4	5	6	7	8
	FlightScope Mevo Launch Monitor	Tour Striker Ball	SKLZ Smash Bag	CHAMPKEY Tracker-PRO Impact Golf Hitting Mat	Orange Whip Trainer	Arccos Caddie Sensors	Eyeline Golf Groove+ Putting Laser	Pelz Golf DP4007 Putting Tutor
Price	$499 USD	$59.99 CAD	$32.99CAD	$34.99 CAD	$139.95 CAD	$200.46 CAD	$124.95 USD	$63.68 CAD
Dimensions	8.89 x 3.81 x 6.1 cm	3.8 x 21.8 x 16.2 cm	76.2 x 61 x 61 cm	13" x 17"	47"	~ 3 x 3 x 2 cm ea.	14.06 x 8.43 x 4.8"	24 x 3 x 15.01 cm
Weight	0.5 Lbs	30g	1.5 Lbs	3.7Lbs	1.85 Lbs	24.29g ea.	1.18 Lbs	1.17 Lbs
Construction	-White plastic housing -Rubber trim	-Stretchable Fabric with Rubber Bladder	-Sealed Canvans -Anchor Loop	-Rubber Bottom -Foam Middle -Pile-directional fabric	-Composite shaft -Rubber Grip -Weighted Plastic Ball	-Green Plastic Housing -Aluminum Top	-Steel Housing -Polycarbonate Shaft -Glass Lens	- Black Plastic - Stainless Steel Marbles
Misc	- 3D Tracking Doppler Radar - Phone App Connection	- Inflatable / Adjustable	- Fixed to ground with stakes - Must be filled with rags - Tactile Feedback	- Visual Feedback - Weather resistant	- Adjustable	-Automatic shot tracking -hands-free shot capture -Smart Distance Club Averages -A.I. GPS Rangefinder, adjusts in real-time for wind, slope, temperature, humidity and altitude giving you the Arccos Caddie Number	- Cross-Hair Laser locks to putter orientation	N/A

Benchmarking Benefits

Benchmarking Products							
							
1	2	3	4	5	6	7	8
FlightScope Mevo Launch Monitor	Tour Striker Ball	SKLZ Smash Bag	CHAMPKEY Tracker-PRO Impact Golf Hitting Mat	Orange Whip Trainer	Arccos Caddie Sensors	Eyeline Golf Groove+ Putting Laser	Pelz Golf DP4007 Putting Tutor
Benefits							
- Versatility -Lightweight -Accuracy and Precision	- Versatility -Ease of Use -Lightweight -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Enhances Consistency -Instant Feedback	- Quality and Durability - Versatility -Ease of Use -Enhances Consistency	- Versatility -Lightweight -Accuracy and Precision	- Quality and Durability - Versatility -Ease of Use -Accuracy and Precision	- Versatility -Ease of Use -Lightweight -Enhances Consistency -Accuracy and Precision

C Results Analysis

Root Cause Analysis

Problem — Trainees are making a scooping motion in their swing

- **Why?** — They are not keeping their rotational axis fixed
  - **Why?** — They do not know how to correct subtle details
    - **Why?** — They cannot feel if they are moving properly
      - **Why?** — They are not receiving sufficient tactile feedback

J Approval Forms and Plans

IDSN 4002
SENIOR LEVEL THESIS ONE

Humber ITAL / Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / FALL 2021
Catherine Chong / Sandro Zaccolo

THESIS TOPIC APPROVAL:

Student Name:	Collin Jarvis
Topic Title:	How may we improve the experience for adults learning to golf?

TOPIC DESCRIPTIVE SUMMARY (Preliminary Abstract)

Golfing can be an enjoyable, relaxing, and fun sport. However, according to Bob Bauchemin, Professor/Director of Player Development at Humber College Golf Lab, adults who are new to the sport tend to be stuck in certain behaviours and movements that make learning frustrating, and stall their improvement dramatically. As opposed to children, adults tend to be very self-conscious during their swing; this can make training a delicate and complicated process. Product benchmarking has revealed that current training solutions are feedback based, and can increase an adult learner's self-consciousness as a result. Additionally, the current solutions focus on specific areas of skill, meaning a variety of products need to be purchased to provide comprehensive training; this negatively impacts sustainability in the learning process. Based on these findings, there is a need for a training solution that covers a range of skills, and eases psychological burdens, thus allowing enough improvement to start the game confidently. A comprehensive solution would making training more sustainable, and cover a range of basic skills. Evaluation and analysis will be based upon methods including interviews, user observation, and collaboration with the Humber Golf Lab. Additionally, psychological and kinesiological research will assist in a better understanding of the project. A full-scale, one-to-one model study will aid in evaluating its success in human interactivity, ergonomics, and psychological factors. Sustainability and social responsibility will be evaluated using a Life Cycle Assessment (LCA). The desired solution will be a comprehensive golf training program that eases adults' self-consciousness, increases their confidence, and focuses on areas which are typically difficult to improve.

Student Signature(s):		**Instructor Signature(s):**	
Date:	10/13/2021	**Date:**	14 October 2021

IDSN 4502
SENIOR LEVEL THESIS TWO

Humber ITAL / Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / WINTER 2022
Catherine Chong / Sandro Zaccolo

CRITICAL MILESTONES: APPROVAL FOR CAD DEVELOPMENT & MODEL FABRICATION

Student Name:	Collin Jarvis
Topic / Thesis Title:	**IMPROVING ADULT GOLF LEARNING**

THESIS PROJECT – DESIGN APPROVAL FORM

Design is reviewed and approved to proceed for the following:	X	**CAD Design and Development Phase**

Comment:
- Initial CAD started reasonably as of week #7/February 22nd, continue with detailing and refinement.
- No review in week #8, unsure about development progress - as of week #8/March 8th.
- Advised completion latest by week #9 (March 17th).
- CAD completion in week #13.

Design is reviewed and approved to proceed for the following:	X	**Model Fabrication Including Rapid Prototyping / 3D Printing and Model Building Phase**

Comment:
- Cannot approve of model fabrication until CAD development at 90% completion of all components > advised completion latest by week #9 (March 17th).
- Once CAD is completed, can move forward to model fabrication from week #10 onward.
- No model fabrication.

Instructor Signature(s):

Date:	12th April, 2022

PANEL ON
RESEARCH ETHICS
Navigating the ethics of human research

TCPS 2: CORE

Certificate of Completion

This document certifies that

Collin Jarvis

has completed the Tri-Council Policy Statement:
Ethical Conduct for Research Involving Humans
Course on Research Ethics (TCPS 2: CORE)

N01292671

Date of Issue: **28 September, 2021**

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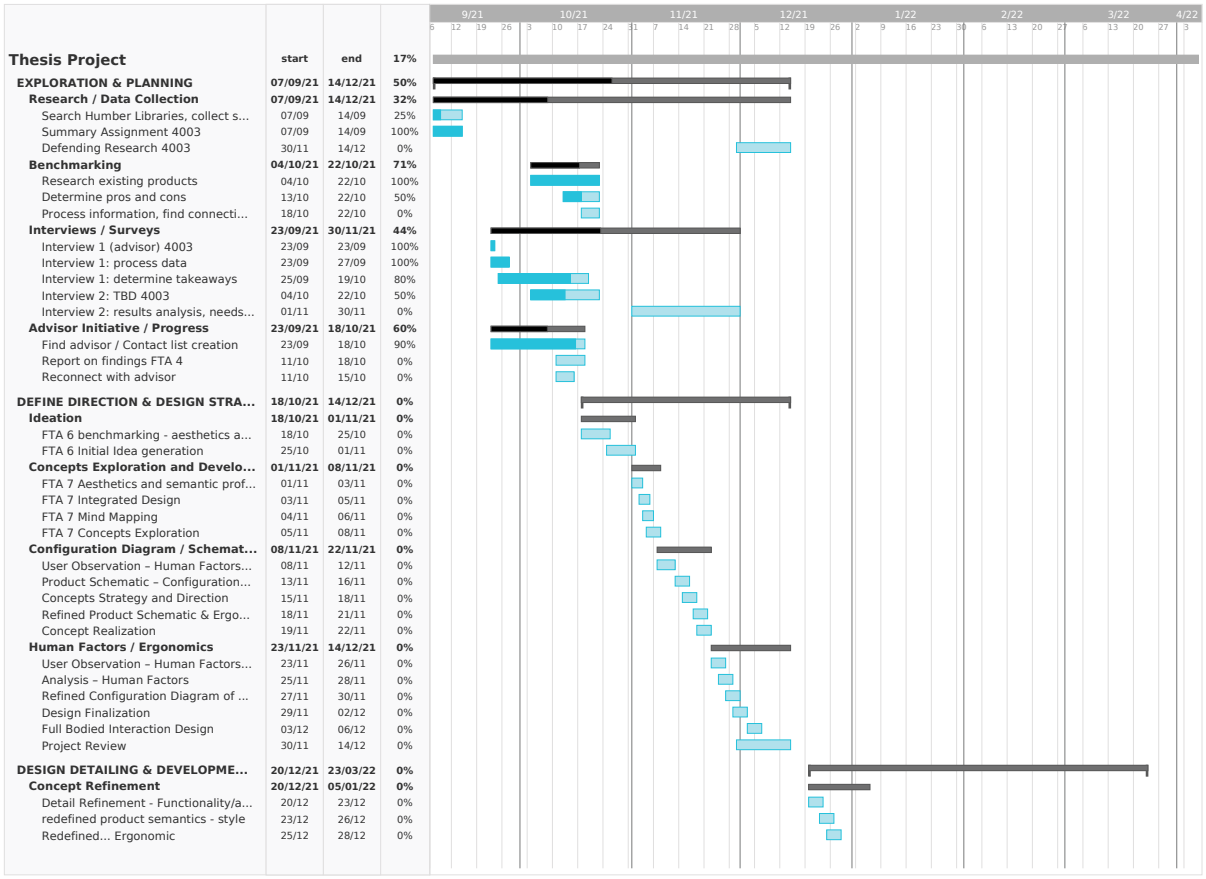

Thesis Project	start	end	17%
EXPLORATION & PLANNING	**07/09/21**	**14/12/21**	**50%**
Research / Data Collection	**07/09/21**	**14/12/21**	**32%**
Search Humber Libraries, collect s...	07/09	14/09	25%
Summary Assignment 4003	07/09	14/09	100%
Defending Research 4003	30/11	14/12	0%
Benchmarking	**04/10/21**	**22/10/21**	**71%**
Research existing products	04/10	22/10	100%
Determine pros and cons	13/10	22/10	50%
Process information, find connecti...	18/10	22/10	0%
Interviews / Surveys	**23/09/21**	**30/11/21**	**44%**
Interview 1 (advisor) 4003	23/09	23/09	100%
Interview 1: process data	23/09	27/09	100%
Interview 1: determine takeaways	25/09	19/10	80%
Interview 2: TBD 4003	04/10	22/10	50%
Interview 2: results analysis, needs...	01/11	30/11	0%
Advisor Initiative / Progress	**23/09/21**	**18/10/21**	**60%**
Find advisor / Contact list creation	23/09	18/10	90%
Report on findings FTA 4	11/10	18/10	0%
Reconnect with advisor	11/10	15/10	0%
DEFINE DIRECTION & DESIGN STRA...	**18/10/21**	**14/12/21**	**0%**
Ideation	**18/10/21**	**01/11/21**	**0%**
FTA 6 benchmarking - aesthetics a...	18/10	25/10	0%
FTA 6 Initial Idea generation	25/10	01/11	0%
Concepts Exploration and Develo...	**01/11/21**	**08/11/21**	**0%**
FTA 7 Aesthetics and semantic prof...	01/11	03/11	0%
FTA 7 Integrated Design	03/11	05/11	0%
FTA 7 Mind Mapping	04/11	06/11	0%
FTA 7 Concepts Exploration	05/11	08/11	0%
Configuration Diagram / Schemat...	**08/11/21**	**22/11/21**	**0%**
User Observation – Human Factors...	08/11	12/11	0%
Product Schematic – Configuration...	13/11	16/11	0%
Concepts Strategy and Direction	15/11	18/11	0%
Refined Product Schematic & Ergo...	18/11	21/11	0%
Concept Realization	19/11	22/11	0%
Human Factors / Ergonomics	**23/11/21**	**14/12/21**	**0%**
User Observation – Human Factors...	23/11	26/11	0%
Analysis – Human Factors	25/11	28/11	0%
Refined Configuration Diagram of ...	27/11	30/11	0%
Design Finalization	29/11	02/12	0%
Full Bodied Interaction Design	03/12	06/12	0%
Project Review	30/11	14/12	0%
DESIGN DETAILING & DEVELOPME...	**20/12/21**	**23/03/22**	**0%**
Concept Refinement	**20/12/21**	**05/01/22**	**0%**
Detail Refinement - Functionality/a...	20/12	23/12	0%
redefined product semantics - style	23/12	26/12	0%
Redefined... Ergonomic	25/12	28/12	0%

Project Timeline Page 1

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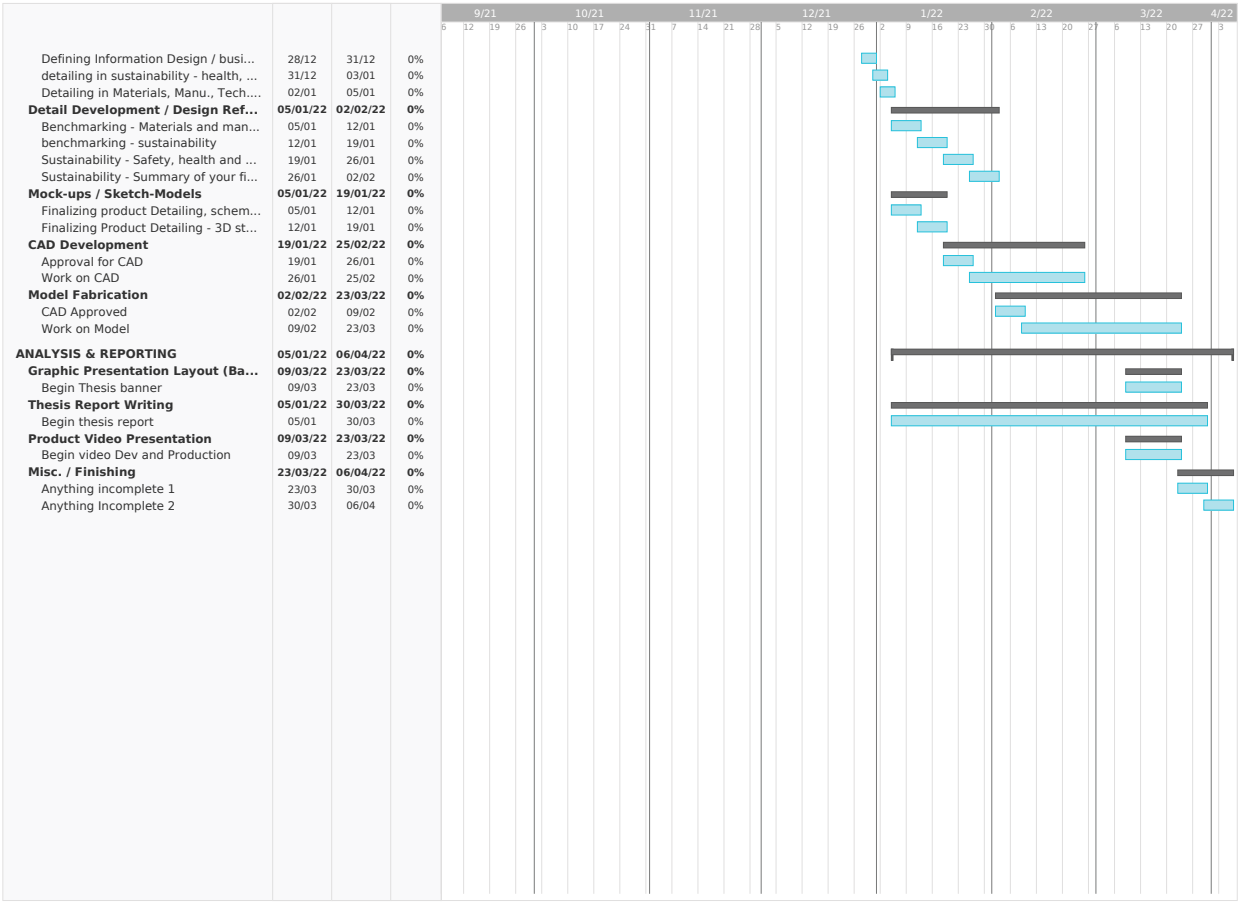

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detailing in sustainability - health, ...	31/12	03/01	0%
Detailing in Materials, Manu., Tech....	02/01	05/01	0%
Detail Development / Design Ref...	**05/01/22**	**02/02/22**	**0%**
Benchmarking - Materials and man...	05/01	12/01	0%
benchmarking - sustainability	12/01	19/01	0%
Sustainability - Safety, health and ...	19/01	26/01	0%
Sustainability - Summary of your fi...	26/01	02/02	0%
Mock-ups / Sketch-Models	**05/01/22**	**19/01/22**	**0%**
Finalizing product Detailing, schem...	05/01	12/01	0%
Finalizing Product Detailing - 3D st...	12/01	19/01	0%
CAD Development	**19/01/22**	**25/02/22**	**0%**
Approval for CAD	19/01	26/01	0%
Work on CAD	26/01	25/02	0%
Model Fabrication	**02/02/22**	**23/03/22**	**0%**
CAD Approved	02/02	09/02	0%
Work on Model	09/02	23/03	0%
ANALYSIS & REPORTING	**05/01/22**	**06/04/22**	**0%**
Graphic Presentation Layout (Ba...	**09/03/22**	**23/03/22**	**0%**
Begin Thesis banner	09/03	23/03	0%
Thesis Report Writing	**05/01/22**	**30/03/22**	**0%**
Begin thesis report	05/01	30/03	0%
Product Video Presentation	**09/03/22**	**23/03/22**	**0%**
Begin video Dev and Production	09/03	23/03	0%
Misc. / Finishing	**23/03/22**	**06/04/22**	**0%**
Anything incomplete 1	23/03	30/03	0%
Anything Incomplete 2	30/03	06/04	0%

Project Timeline Page 2

K Advisor Meetings & Agreement Forms

IDSN 4002 /4502
SENIOR LEVEL THESIS ONE & THESIS TWO

HUMBER
Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

INFORMATION LETTER

Research Study Topic: Improving the experience for adults learning to golf.

Investigator: Collin Jarvis / 905 376 2474 / c-jarvis2@hotmail.ca

Sponsor: Humber ITAL, Faculty of Applied Sciences & Technology (IDSN 4002 & IDSN 4502)

Introduction

My name is Collin Jarvis, I am an industrial design student at Humber ITAL, and I am inviting your participation in a research study on various problems that adults are confronted with when learning to golf. These problems include psychological obstacles like self-consciousness and embarrassment, as well as unnatural characteristics of an effective golf swing. The results will be contributed to my Senior Level Thesis project.

Purpose of the Study

This study is being conducted as an aid in designing a training solution that addresses a range of golfing skills focued on in the training process, as well as minimizing psychological factors that inhibit improvement. With your help, I plan to address problems that adults and trainers typically face, and target areas that have not yet been addressed. This study is primarily based on understanding ergonomics, human interaction design activities, and user experience aspects of the research area.

Procedures

If you volunteer to participate in this study as a trainee, your activities in interacting with golf clubs and training equipment may be observed and documented. Your activities may be documented by means of a digital camera / video camera while using the equipment and receiving training from a professional. You may also be asked questions pertaining to the training experience and interaction with the equipment. If you volunteer to participate in this study as a trainer, your activities in interacting with a trainee and training equipment may be observed and documented by means of notes and/or digital camera / video camera. Semi-structured interviews or questionnaires will also be included in this process.

Confidentiality

Every effort will be made to ensure confidentiality of any identifying information that is obtained during the study. In the case of being recorded visually, your face will be masked /blurred or hidden. The information and documentations (photographs) gathered are all subject to being used in the final presentation of the study.

Participation and Withdrawal

Your participation in this study is completely voluntary and you may interrupt or end the study and the session at any time without giving a reason or fear of being penalized.

If at any point during the session, you feel uncomfortable and wish to end your participation, please let the moderator know and they will end your participation immediately.

Humber Research Ethics Board

This research project /course has been approved by the Humber Research Ethics Board. If you have any questions about your rights as a research participant, please contact Dr. Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, **Lydia.Boyko@humber.ca**

INFORMATION LETTER

Conditions of Participation

- ✔ I understand that I am free to withdraw from the study at any time without any consequences.
- ✔ I understand that my participation in this study is confidential. (i.e. the researcher will know but will not disclose my identity)
- ✔ My identity will be masked.
- ✔ I understand that the data from this study may be published.

☒ **I have read the information presented above and I understand this agreement. I voluntarily agree to take part in this study.**

Bob Beauchemin	Bob Beauchemin	December 1, 2021
Participant's Name	Participant's Signature	Date

Project Information

Thank you very much for your time and help in making this study possible. If you have any queries or wish to know more about this Senior Level Thesis project, please contact me at the following:

Phone: 905 376 2474

Email: c-jarvis2@hotmail.ca

My supervisors are:

Prof. Catherine Chong, **catherine.chong@humber.ca**

Prof. Sandro Zaccolo, **sandro.zaccolo@humber.ca**

PARTICIPANT INFORMED CONSENT FORM

Research Study Topic: Improving the Experience for Adults Learning to Golf.

Investigator: Collin Jarvis / 905 376 2474 / c-jarvis2@hotmail.ca

Courses: IDSN 4002 & IDSN 4502 Senior Level Thesis One & Two

I, Bob Beauchemin *(First Name/Last Name)*, have carefully read the Information Letter for the project, *Improving the Experience for Adults Learning to Golf*, led by Collin Jarvis. A member of the research team has explained the project to me and has answered all of my questions about it. I understand that if I have additional questions about the project, I can contact Collin at any time during the project.

I understand that my participation is voluntary and give my consent freely in voice recording, photography and/or videotaping; with the proviso that my identity will be blurred in reports and publications.

Consent for Publication: Add a mark in one of the columns for each activity

ACTIVITY		YES	NO
Publication	I give consent for publication in the Humber Library Digital Repository which is an open access portal available to the public	X	☐
Review	I give consent for review by the Professor	☒	☐

Privacy

All data gathered is stored anonymously and kept confidential. Only the principle investigator/researcher, Collin Jarvis, and Prof. Catherine Chong or Prof. Sandro Zaccolo may access and analyze the data. All published data will be coded, so that visual data is not identifiable. Pseudonyms will be used to quote a participant (subject) and data will be aggregated. All raw footage/data will be erased or destroyed at the end of the project.

I also understand that I may decline or withdraw from participation at any time, without negative consequences.

I understand that I can verify the ethical approval of this study, or raise any concerns I may have by contacting the Humber Research Ethics Board, Dr. Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, **Lydia.Boyko@humber.ca** or Collin Jarvis / 905 376 2474 / c-jarvis2@hotmail.ca.

Verification of having read the Informed Consent Form:

☒ I have read the Informed Consent Form.

My signature below verifies that I have read this document and give consent to the use of the data from questionnaires and interviews in research reports, publications (if any) and presentations with the proviso that my identity will not be disclosed. I have received a copy of the Information Letter, and I agree to participate in the research project as it has been described in the Information Letter.

Bob Beauchemin	Bob Beauchemin	December 1, 2021
Participant's Name	Participant's Signature	Date

Collin Jarvis 5:46

Yeah. Okay, so next question is, is learning to golf for the first time as a mature adult different from doing so as a young or? Or youth or young adult? And in what ways?

Bob Beauchemin 6:01

Oh, absolutely. It's totally different. children tend to picked up quicker and not have as many fears about what they looked like. And and they just adapt to it much quicker. And they're far more honest about their abilities too. I find with adults, they're used to controlling their environment. And, and, or at least attempting to, and, and trying to learn golf, you have to give up a little control to swing the club properly. So I'd say and their muscles are formed. And their ability to to learn new functions is it takes a lot more time and effort, whereas kids are in total learning mode all the time, you know, so for them to learn a new skill is not that that tricky for them?

Collin Jarvis 7:02

That's a great answer. Okay. Next question is, is there any general advice that you tend to give adults when they are starting golf for the first time? Or any general principles that speed up the process?

Bob Beauchemin 7:19

That's a great question. Well, I tried to give them some basic knowledge of physics, like what makes the golf ball go up in the air, what makes it go to the right or to the left? a, you know, how does the club and the ball interact? And most people respond to that, well, so long as you keep it really simple and short, but good, because most people want to know why things are happening. But generally, trying not to overwhelm people with a whole bunch of information, the first few lessons, just, you know, see what they do naturally, and then just kind of gently guide them in the right direction. And maybe give them you know, certain things like, like the grip, for instance, you have to show show them because that's so important to to any contact with the club. So that has to be explained and and shown, the student shown how to do it properly, was a lot of the

Excerpt from interview with Bob Bauchemin