Final Report

Golf2Go

Tutorial 05_Group 13

As a future member of the engineering profession, we, Golf2Go, are responsible for performing the required work in an honest manner, without plagiarism and cheating. Submitting this work with our names and signatures is a statement and understanding that this work is my own and adheres to the Academic Integrity Policy of McMaster University and the Code of Conduct of the Professional Engineers of Ontario.

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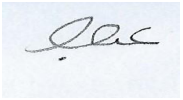
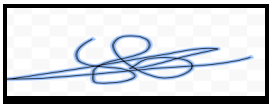
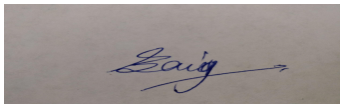
Abd Elelah Arafah (arafaha)	
Stephen Gobrial (gobrials)	
Ahmed Baig (baiga18)	
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0.0 Summary

Our company, Golf2Go, was presented with the challenge to help our client, Tim's, improve his putting in golf. Tim suffers from a medical condition that causes blotches/ spots in his vision and gradual loss of eyesight. Due to this, he describes putting as the hardest part of his game as it is difficult for him to judge the distance, direction, and slope to the hole. Our company decided to focus on making short range putting easier for Tim through a device that would convey important information to increase his shot accuracy. The Accuracy Enhancer is a device that improves a player's short range putting accuracy by providing the distance and direction to the hole. As the device is targeted to help improve the accuracy of people with similar condition as Tim, the device is designed so it is easy to carry and use while also being cost-effective relative to other golf products. Our product has many benefits for the player as well their coach. The first benefit of our product is that it is specifically targeted towards people with condition similar to Tim's; this allowed us to the Accuracy Enhancer with the challenges they face. There are no other products on the market that are specifically help improve the accuracy of people with vision impairment. Another benefit of using our device that it reduces the workload of the coach. As the coach needs tell the player distance to the hole, they need to walk to hole repeatedly. Since the Accuracy Enhancer can measure the distance between the hole and player, the workload of the coach would be reduced. Once the device is set-up, the coach would be able to measure the distance standing beside the player. Overall, Golf2Go has created a device that would make putting easier and more enjoyable for Tim and people with similar conditions.

1.0 Introduction

1.1 Background Information

Tim is a client who suffers from Type 1 diabetes and unfortunately lost majority of his eyesight by the age of 21. Diabetes is a serious disease that affects the human body, either by not producing insulin or by not using the insulin it produces properly. Type 1 diabetes occurs when the immune system attacks and kills the beta cells in the pancreas that produce insulin. Despite this, Tim took this in a positive manner and still did the things he loves to do. His love for golf is clearly evident as he plays the sport despite being slightly visually impaired along with founding the Ontario Vision Impaired Golf Association. He faces a struggle when it comes to short range putting and says that this is the hardest part of the game for him which is why we decided to take on this issue.

1.2 Refined Problem Statement

Design a system that helps golf players with visual disabilities in the accuracy of their short range putting. The system will be easy to use and carry, cost-effective, and follows the guidelines of the sport.

1.3 Objectives, Constraints and Metrics

There are three main objectives for the project design: portable, affordable and functional. Firsty, we tried to make our product more portable, this will help our client to have a better experience in many different golf courses. To achieve this objective, we decided to reduce the weight and size of the design. The design had to fit inside a golf bag preferably that is relatively full and it had to be easily lifted by Tim and/or the Coach for convenient

transportation. As a result, we used a plastic collapsible bucket and a very light tripod as a base.Another objective is making the device functional, this means that it had to be durable in different weather conditions, functional in different golf courses, works for short distance putting, and the flashlight can be easily distinguishable between sunlight and other lights. To achieve this objective, we decided to use waterproof materials such as plastic, this will protect it from rain and snow. Also, we decided to use a laser measure that covers a short range radius as well as limited mid-range distances. Moreover, we decided to use red colored tuck tape to cover the flashlight with so it can be distinguishable.The last objective is that the devices needed to be affordable. To achieve this objective, we decided to create a very simple device that is made of cheap and durable materials. Therefore, we used plastic and aluminum as our main materials. The total cost of our product was 121.35 dollars which is relatively cheaper than all the golf products in the market.By achieving these objectives and constraints in our design, we prioritize our user's golf experience over anything else. This will help the user to have a better experience in different aspects of golf such as, lining up the shot and estimating the distance of the shot for putting.

1.4 Prior Art (Appendix B)

1.4.1 Existing Products

There are very limited/no products to aid the visually impaired people that play golf. This is due to the Golf Association, which has altered/changed the rules for visually impaired players compared to other players [1]. Although there aren't many products specifically targeted towards visually impaired golfers, products designed for other users can also be used to help them play. One of the product from this category is "The Aiming". This product is designed to help golf players improve their aim. There are two settings for this product: one with sound and the other

uses vibrations[2]. It helps the user better align themselves towards the hole, and once the player is in position, The Aiming makes a sound to let the player know that they are perfectly aligned. The product is easy to use and carry, however, it is very expensive.

The second product that may be useful for people with poor vision is the "Golf Buddy Voice 2." The Voice 2 is an audio device that tells the distance between the golfer (who is with the device) and the hole [3]. Due to its size and weight, the Voice 2 is also very portable. It can also be used to play in various weather conditions as its also water resistant. However, The Voice 2 is only limited to use on some golf courses that have been already loaded on the device.

1.4.2 Patents

Many people around the world consider playing golf as a form of recreational entertainment. Whether be with friends or family, it is widely considered a calm yet competitive sport that helps you pass time with those around you. There are different existing patents that can help Tim's accuracy for his short range putting for instance, George E Barnhart inventition. He invented a club that yields when the ball is struck in order to absorb the contact force to a certain extent when the 2 objects collide[4]. This cushioning impact by the face of the club, prevents shock to the user's hands and, proportionally converts this "cushioning" to an increase in driving force[5]. This system allows Tim to primarily focus on setting himself up to strike the ball since the actual hitting part is taken care of by this design club [6]. It could be that in some cases he feels some shock in his hands which limits his interpretation of impact force.

2.0 Conceptual Design

2.1 Brainstorming

When our team started brainstorming, we firstly used metrics tables (Appendix B, Table 01) and an objective table (Appendix B, Figure 01) to generate and picture our initial alternative designs. Using the information provided by these design brainstorming methods, it was obvious for us that the most important functions we were aiming for were providing the direction and the distance of the shot through the objectives and constraints we needed.

During the designing period we were able to use different significant brainstorming methods from Tutorial 5 to Tutorial 8, that are all a part of the design process, most significant and effective methods being: morphological chart(Appendix B, Table 02), metrics tables (Appendix B, Table 01) and 4-3-5 method.

Of course just like any design project that involves a team based competition, there were many ideas that were brought up that were outrageous and were almost impossible for us to accomplish. For example in tutorial 5, when we used method 6-3-5 and a morphological chart(Appendix B, Table 02) to come up with different designs, a sensor contact device was one of the devices that we thought is possible for us to use. However, we soon found out it is impossible for us to build and program, nor buy in stores, given the expertise and time we had.

2.2 Process

When the design alternatives generation stage of the design process was reached, our group used different brainstorming methods such as the 6-3-5 method and a morphological chart (Appendix B, Table 02) in Tutorial 5. When we attempted to use the 6-3-5 method, our main goal

was to find the best possible ideas we were able to find in order to resolve Tim's issue in playing golf.

During the execution of the 6-3-5 method, each member was able to come up with ideas for each problem and these ideas were passed around among the group and were discussed if they were approved or not. For the completion of the morphological chart(Appendix B, Table 02), all team members came up with unique and creative ideas to generate a table and discussed all the functions and means that could be implemented into our final design.

One design that we came up with in Tutorial 5(Appendix B, Figure 02), is a design in which included a 2 piece device where one device is clipped to the player's clothes and the other device is placed at the hole. The first device that gets clipped to the player is equipped with speakers, and an antenna to emit and receive signals about the distance to the hole and communicate it to the user. While the other device that is placed at the hole also has a small antenna that also emits signals to and from the other device.

Another design that our team came up with in Tutorial 5(Appendix B, Figure 03) is a design that is equipped with 2 devices, which are similar to the previous design in their function as they provide the user with the distance to the hole, however, in this design the 2 piece devices uses laser/light technology. One of the 2 piece devices was placed at the hole and the other was attached to the golf club. In addition, an important metrics/material we used was measuring tape, where its laid down from where the user is putting to the whole itself, and its main function is to provide the user with the direction to the hole. So, the device as a whole is able to provide the user with both direction and distance to the hole (More details on both designs are under the "Explanation of design alternatives" section in Appendix B).

2.3 Outcomes

Using the decision matrix in tutorial 6(Appendix B, Table 03), we were able to explore possible constraints and prioritize different objectives, that were important for us to be executed in our final alternatives. The objectives that we found out to be most important for us are: comfortable to use, durable and lightweight. This is because we prioritize the user's experience over anything else, so we needed our device to be as comfortable as possible as well as durable so that it is able to survive a long period of usage. More on the evaluation of the decision matrix is under Appendix B, "Evaluation of the decision matrix and final decision" section.

For the final alternative, we used method 5-3-4 in tutorial 8 to generate one more design than the two designs that were generated in tutorial 5. The design involved a tripod, a target box attached to the tripod, a strong magnet that has a magnetic field that could reach 8 feet also attached to the tripod, and a compass embedded in a glove. The tripod with the magnet and the target are placed on top of the hole, and the glove is worn by the user to be provided the direction due to the magnetic field emitted by the magnet, the prototype as well as visual representations/sketches of the design are found in Appendix B, Figure 04, Figure 05, Figure 06.

However, after much research we found out that one of the most important components of the design, the magnet (with a strong enough magnetic field to affect the compass from a far distance), was almost nowhere to be found. Even after the first design review, we were told that finding the magnet is the most important mission we had to do, as at the time we told the upper-year biology students that we weren't able to find the magnet not in stores nor online. So we had to think of other ways to provide the user with the direction to the hole. By the time the second Design review has arrived, we came up with an idea of attaching a flashlight (Appendix B, Figure 07) on the tripod that shines a unique differentiable color of light to the user for him to

look at and clearly identify where the hole is. This idea was a good alternative for the the initial final design and the reviewers at the design reviews were impressed and didn't have much feedback to give us in terms of adjustments but they were mostly focused on how the design would to be used.

3.0 Final Design

3.1 Description

The Accuracy Enhancer is a device to help players like our client Tim, those with visual disability, improve their short range putting accuracy. The device provides the players with direction to the hole as well as the distance between the player and hole to aid them into hitting a more accurate shot. The Accuracy Enhancer consists of two parts; one part is with the coach while the other is near the hole. The first part of the device consists of a tripod, bucket, flashlight, velcro, and tuck tape. The tripod allows the device to be easily portability due to its ability to fold. The velcro is used to secure the flashlight in the bucket. The tuck tape changes the color of the light from the flashlight into red, to make it easier for the players to spot the device. The tripod, bucket, and flashlight all provide the device the durability and strength it needs to survive in different weather conditions. The second part of the device consists of a laser distance measurer, which will be used by the coach. An industrial grade laser measurer is chosen due to its durability in different weather conditions. The materials chosen to build the device were specifically chosen for optimal durability and portability. To see a labeled image of the device, please refer to Figure 2 in Appendix A.

3.2 User

The Accuracy Enhancer is constructed using foldable parts; this allows the device to be

carried in a golf bag. The legs of the tripod can be folded inwards, reducing its size as well the size of the entire device. The bucket on the tripod can be rotated in any direction allowing it to be easily adjustable when packing. The bucket is kept as a storage area for the flashlight and the laser measurer to avoid losing the small parts of the device. The device is very portable as it can be carried in a golf bag due to its foldable parts.

The Accuracy Enhancer is set-up for use by the player's coach. Since the device is targeted to improve the accuracy of players with a visual disability, the coach would most likely set up the device. The base of the device is a tripod; the legs of the tripod open outwards which allows the device to be set-up over the hole. Make sure the bottom of the middle shaft of the tripod is at least 8 cm above the hole to prevent the ball from making contact with the device. As the flashlight is attached to the bucket using velcro, it can be reattached to the bucket. To set-up the direction of the device properly, the coach would rotate the bucket on the tripod until the player sees a white light from the flashlight. If the player sees a white light, it would allow the player to aim their shot towards the hole. The tuck-tape in front of the flashlight changes the color of the light that is distinguishable from the surroundings. Once the flashlight is turned on, the coach walks back the position of the player. The distance between the player and hole is measured by the coach using the second part of the device, the laser distance measurer, as shown in Figure 1 Appendix A. Along with giving the distance between the firing point and the hole, the device also reduces the workload of the coach. They could use the laser measurer from the position of the player to determine the distance to the hole without walking back and forth between the player and the hole repeatedly. Once the player knows the distance, it allows them to estimate the power required to hit the golf ball. Once the player knows the distance and direction, they can hit the shot accurately.

3.3 Construction

The construction of Accuracy Enhancer was done by incorporating multiple different products in the market into one design. These materials were chosen by assessing their portability, durability, and ease of setup. Details for these materials can be found in the "Bill of Materials" regarding price and where the purchases were made. The stand of the device, which is to be placed around the hole, is a tripod used for cameras. The height of this tripod is adjustable for the convenience of the user. This is useful since other components of the device require the height to be at eye level to the user. The head of the tripod has a ball mechanism that allows for complete 360-degree rotation. Because of this, the user can rotate the head of the tripod in virtually any orientation. This is advantageous when using the next device which is the collapsible bucket. The bucket will be velcroed onto the head of the tripod using industrial grade velcro purchased from Rona. Because this bucket is simply velcroed onto the the tripod, it can be removed after use and collapsed if the user pleases. We decided to use the collapsible bucket precisely for convenience in case the user considers it a hassle to carry around the full-size bucket while traveling. However, he can use this bucket to carry the other materials, first of which is the flashlight which would be velcroed inside the bucket as well. This flashlight is used to help with the direction part of the user's game. The head of this flashlight is covered by a red colored tuck tape. Tuck tape is essentially red colored transparent tape and the purpose behind using this tape is so that it changes the color of light that is being outputted by the flashlight to allow the user to differentiate between this light and any other daylight/sunlight. Once velcroed, it will be pointing directly towards the user. The reason the flashlight has to be directed straight at the user is that as the user looks at the flashlight straight on, he would see a white light. The tuck tape changes the color in a way such that as the flashlight is viewed at an angle, it would seem red, but as you view it straight-on it seems white. This way, the user knows that he is

looking right at the hole since he sees white as opposed to red. This is where the ball located at the head of the tripod is essential. By allowing a full range of movement, the bucket can be rotated by the coach when Tim is lining up for his shot so he has an idea as to where has to aim. Tim would just need to tell the coach to stop as soon as he sees a white light and came aim in that direction to increase his chances of getting it in the hole. The last device needed to complete our product is the Mastercraft Laser Measurer. This device will be used to assist the user for distance. It fires a laser and measures the distance between the firing point and any surface it makes contact with. A strip of velcro is used to attach this device to the inside of the collapsible bucket so that it does not get lost during transportation. By doing so, it keeps all the materials necessary for the prototype to function properly, in a confined space so nothing gets lost and also to reduce the workload of the coach since he wouldn't have to carry these products everywhere whenever the device needs to be used.

3.4 Safety

To ensure the safety of the users, it is critical to consider all the risks associated with the use of the device. One of the aspects we focused on when creating the device was to use lightweight material. As the coach needs to carry the device to the hole, making it lightweight is critical to avoid injury. Repeatedly lifting heavy objects could cause the users injury, therefore, the device was made using lightweight materials.

3.5 Final Design Decision Explanation

The Accuracy Enhancer went through many iterations before the final product. Initially, in the first prototype (Figure 04 Appendix B), a magnet would be used to help the player with the direction to the hole. A compass would detect the magnetic field of the magnetic and point towards the magnetic. It would be attached to the player's glove. The means of conveying the

direction of the needed to be changed as we were unable to find a lightweight magnet strong enough to cover the desired range. The device was modified in which a flashlight is used to help the player with the direction. Even though the flashlight would be functional in conveying the direction, tuck tape was added to the flashlight to also help with the player's alignment. If the player is looking from the front at the flashlight, the light would be very close to white; as the person moves away from directly facing the flashlight, the light seen is more red. When the player sees the white light from the bucket, they will be aligned to the hole. Originally, the target was to be a plastic bin due to its durability in different weather conditions and it was to be mounted on a small table-like structure. The plastic bin, as in prototype 1 and 2, was changed to a bucket. The bucket used was lighter, smaller, less expensive, and foldable. This allowed the device to become more portable without the loss of durability. A tripod was also used to mount the target instead of four-legged structure. As more legs would have a higher chance of being hit by the ball, a tripod, with three legs, was used. The tripod was also easily adjustable, portable, and lightweight. The height and the positioning of the target could be easily changed based on preference. It was also durable as it was made using materials to allow for outside use. Velcro was used to attach different part of the device to allow for easier maintenance. The batteries of the flashlight could be easily replaced as velcro is detachable. If the bucket is somehow damaged, it would be easier to remove from the device. The velcro was also used to attach the laser measurer in the bucket when not in use. This was used to avoid the laser measurer from being misplace.

3.6 Discussion of Feedback from Design Reviews

For the first design review, the first prototype of the Accuracy Enhancer, as shown in Figure 04 Appendix B, was review by upper year science students. They design reviewers

suggested making a bag for the device to allow for easier carry as well to keep all the components of the device together. This caused us to make changes to our device to allow players to carry the device in their golf bag. A tripod would be as the base and the target would be mounted on the tripod. They would provide stability when the device is in use and could easily be folded to fit into a golf bag. A velcro was added inside to bucket as a storage area for the laser measurer. Both these changes completed the function of the bag as well as making the device more portable. The second prototype of the Accuracy Enhancer, as shown in Figure 07 Appendix B, was reviewed by upper year biology and engineering student for the second design review. The feedback we received was targeted more towards the specification of the design, i.e. the use of the laser measurer, how the device would be set up, and materials for the final prototype.

4.0 Conclusions

Accuracy Enhancer is a device that is fully functional and assists people with visual disabilities with their golf experience. Our device is easy-to-use, portable, durable, and relatively cheap compared to other products. The device reduces the work required by the coach and also helps the user as well, providing ease to both parties. Since we were restricted to things such as the cost and the level of expertise we had accessible to us, we could not implement a product that involves software or some other method of virtual interaction. Our main objectives were to better the experience for Tim while making it portable, and long lasting. There are many methods of completing these objectives however not all these methods were available to us. For future projects, having a fund granted to us as a budget to work with would produce better results since a larger budget would allow for more possibilities to be explored. In addition, assigning an upper

year student who adds to our skill set will definitely improve outcomes and consequently improve the quality of work that is outputted by teams during this Engineering project. These “mentors” could be assigned based on the teams choice as to how they would like to solve their task. For example, if a group wanted to implement a product that requires circuits and or programming to be fully functional, a Computer Engineering student should be assigned to them with their task. For a group that would like to have a robust product that was built by scratch, a Civil/Mechanical Engineering student should be assigned since they can help with the design of that product and/or manufacturing of the product. These are just methods the projects can be improved so that the level of professionalism also rises and as a result, is more beneficial to our clients who took their time to speak to us regarding their difficulties. All in all, a problem was presented, the solution to which is our product Accuracy Enhancer. It most certainly assists users with their golf experience itself and moreover does not act as a burden upon anyone in any aspect of the game.

5.0 References

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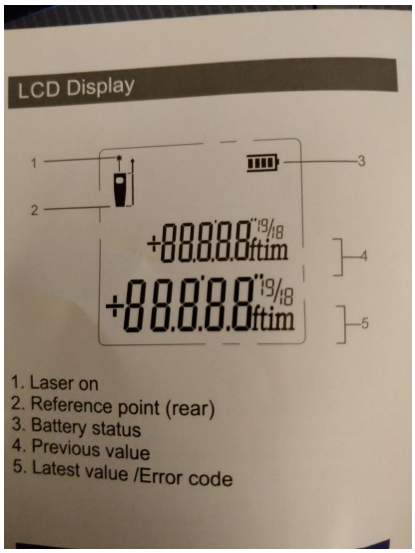
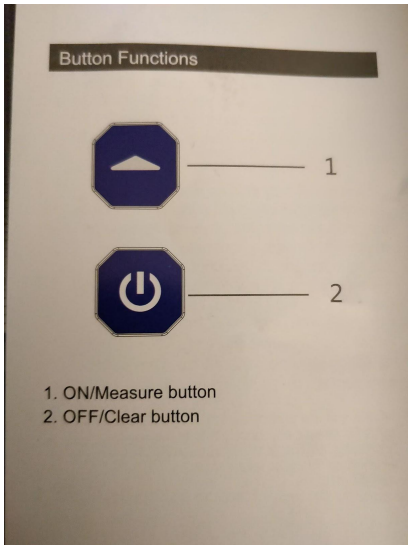
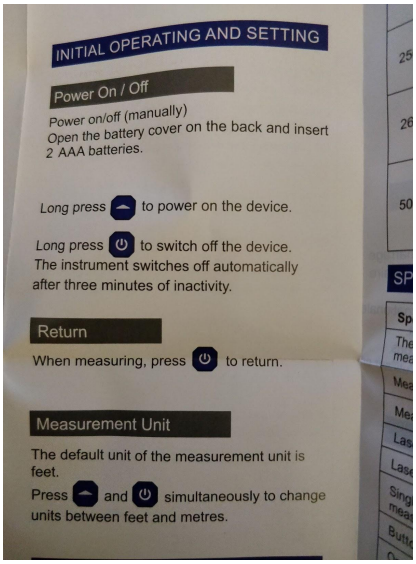
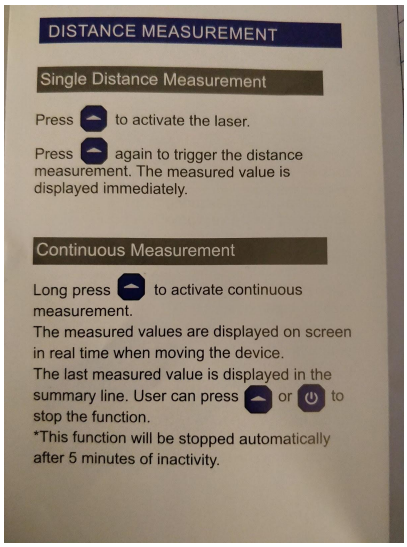
Appendix A - Device User Guide

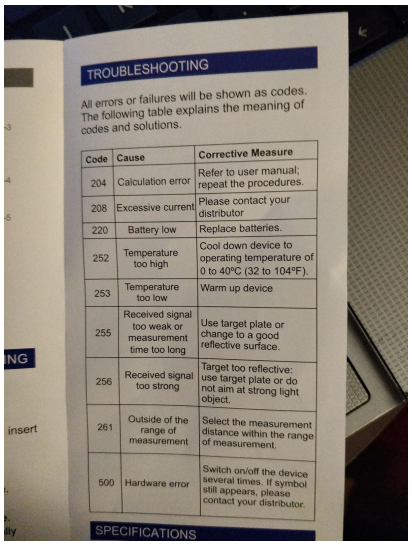
Figure 1 - Directions for using Laser Distance Measurer











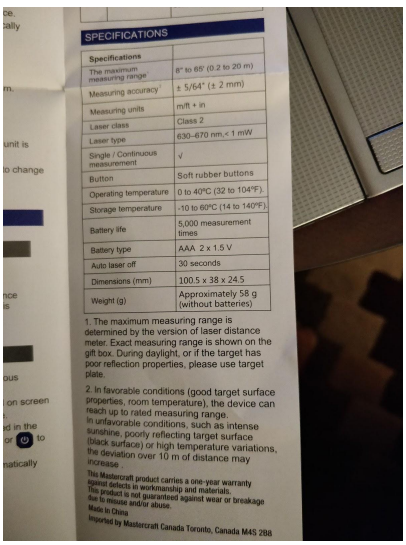
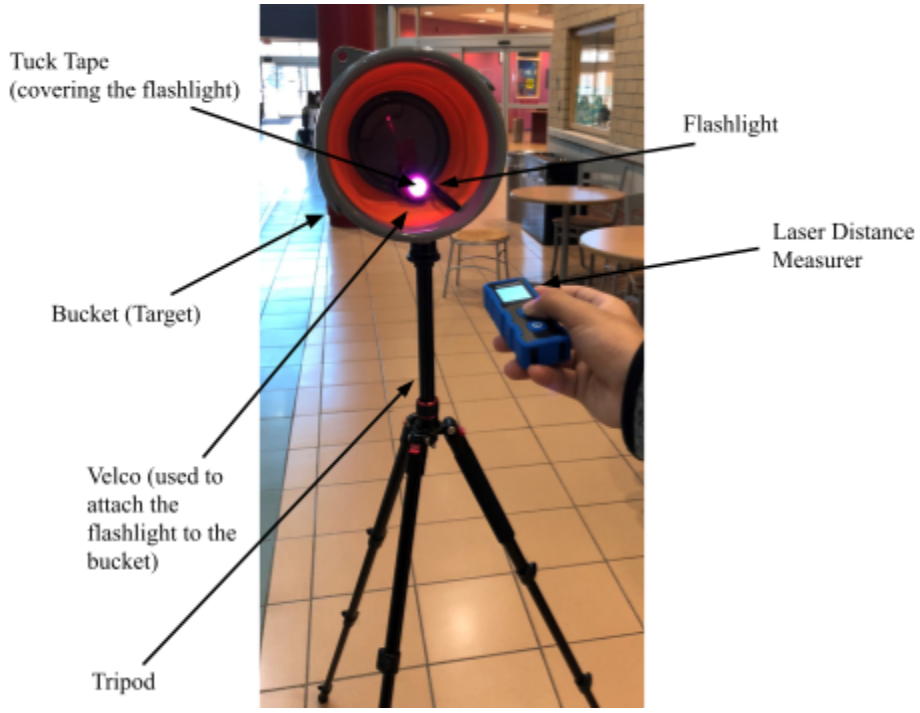


Figure 2: Detailed Labelling of the Accuracy Enhancer



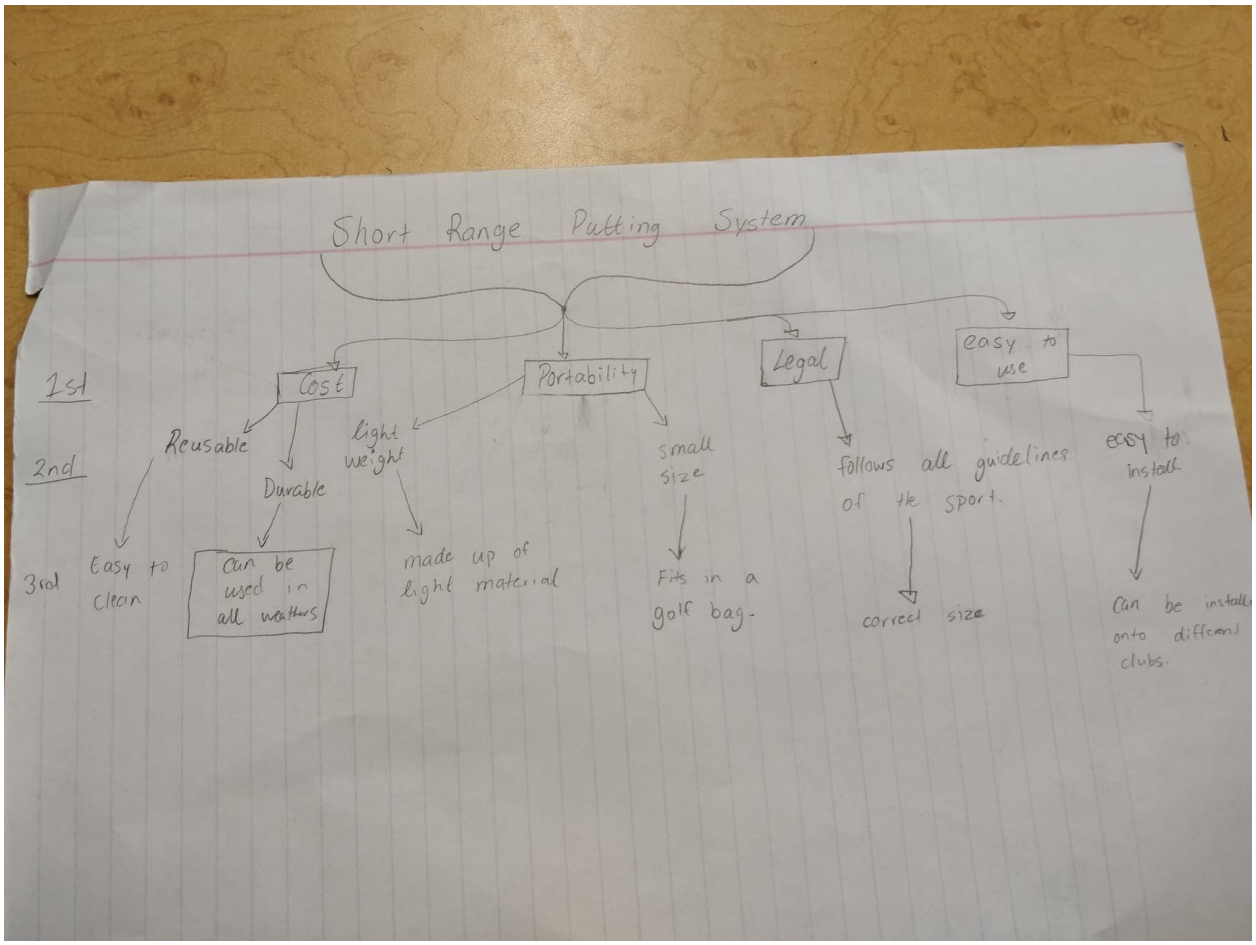
Appendix B - Tutorial Workbook Information

Initial Problem Statement

Design a system that helps golf players with poor vision in their accuracy of short range putting.

Objective Tree and Metrics

Figure 01: Objective Tree



Metrics:

Table 01: Metrics (Tutorial 4)

Objective:	Can be used in all weathers
Metric:	**Weather Conditions (Extreme):** • Rain • Hail • Heat • Wind • Humidity • Snow **Point System:** • Can survive all conditions: 100 points • 3+ conditions 70 points • 2 conditions 50 points • 1 condition 20 points • No conditions 0 points

Objective:	Lightweight
Metric:	**Weight Test of the System:** • 80g - 100 Points • 90g - 70 Points • 100g - 50 Points • 110g - 30 Points • 120g - 20 Points • 130g - 0 Points

Objective:	Reusable
Metric:	**Point System:** • 50+ uses - 100 Points • 35+ uses - 70 Points • 20+ uses - 50 Points • 10+ uses - 30 Points • 5+ uses - 10 Points

	• 5 or less uses - 0 points

Redefined Problem Statement

Design a system that helps golf players with visual disabilities in the accuracy of their short range putting. The system will be easy to use and carry, cost-effective, and follows the guidelines of the sport.

Morph Chart

Table 02: Morphological Chart (Tutorial#5)

Morphological Chart

Functions	**MEANS**				
Gives position of the hole	Microwave Signals	Sensor	Compass	Audio	Measuring Tape
Tells position of the ball	Sensors	Magnet	Audio	Rail	Eyesight
Communicate with user	Vibration	"Beeps"	Human voice		
Hold the device in place	Clip/hook	Velcro	Strap	Clamps	Portable to fit in Pocket
Allow for range of motion	Light weight	Small	Attach to the golf club or person to avoid interference.		
Provide Comfort And Safety	Foam Padding	Smooth Edges	Small (Fits in pocket and able to attach to the golf club		

Preliminary Alternatives

Figure 02:First Design Alternative(Tutorial #5)

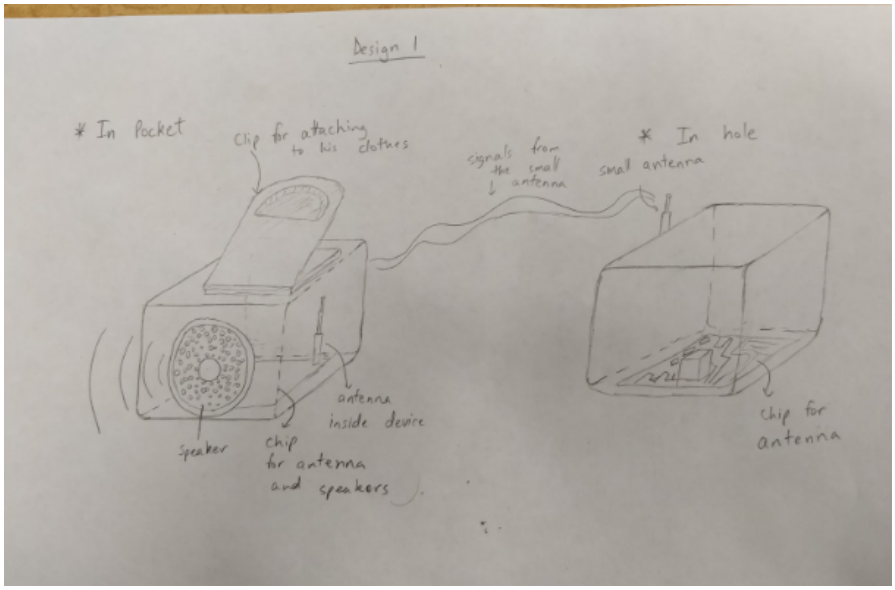
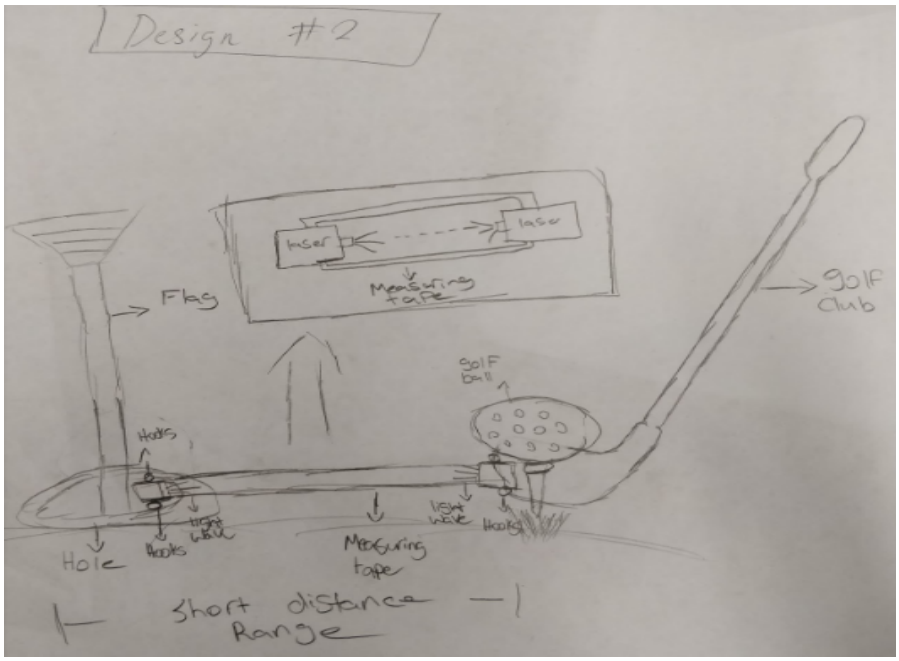


Figure 03:Second Design Alternative(Tutorial #5)



Explanation of design alternatives:

Design 1:

- Two devices; one at the hole and one on body
- On body device:
    - Speakers
    - Padded
    - Contains clip so the user can attach it to the body. Also rotates so user can move it around for convenience
    - Antenna to omit and receive signals from the other device.
- Device in hole:
    - Small antenna for communication to and from the body device.

Design 2:

- Uses measuring tape to connect the hole and golf club.
- Uses light/laser to show direction to the user from the ball to the hole
- Device is connected to the club. Other part is connected to the hole
- Used only for short range putting and increased accuracy
- Variety of users can use this function.

Decision Matrix and Evaluation

Table 03: Decision Matrix (Tutorial #6)

Design Constraints (C) and Objectives (O)	Priority (✓)	Sensor-based device	Physical Guideline from the ball to the hole
C: No sharp edges		✓	✓
C: Covers more 8m		✓	✓
C: Less than $ 200		✓	✓
C: Fits in a golf bag		✓	✓
O: Can be used in different weather conditions	✓	0x✓	1x✓ ✓
O: Lightweight	✓✓	1x✓✓ ✓✓	1x✓✓ ✓✓
O: Comfortable to use (does not affect his range of motion)	✓✓✓	1x✓✓✓ ✓✓✓	0x✓✓✓
Total:		5✓	3✓

Evaluation of the decision matrix and final decision:

The decision matrix chart is used to provide us with a clear vision of what objectives are priorities in our project. The more check marks there are, the more important it is in our project. Looking at our decision matrix we can clearly see that our most important objective is the device being comfortable to use, which tells us that we must incorporate it in the design. In order to accomplish the objective of comfortable to use it must not interfere with the player's golf experience. For our final decision, we chose the objective comfortable to use for our sensor-based system as our main objective because we prioritize our user's golf experience over

anything else. This will help the user to have a better experience in different aspects of golf such as, lining up the shot and estimating the range of the shot for short putting.

The more weather conditions (from the conditions outlined under) the device can sustain, the better the device is at sustaining weather conditions, and the more durable the device is. We said that the Physical Guideline from the ball to the hole is better at sustaining more weather conditions, than the sensor based device, because the sensor based device, does not work under rain, hail, and snow, while the Physical Guideline from the ball to the hole works in all conditions except snow.

Lightweight is one of the objectives chosen with the priority of two checkmarks. The two devices match evenly in being lightweight. The sensor-based device is given full check marks as it has minimal weight due to its small size (not much content inside to increase its weight). The physical guideline device also receives all the checkmarks. The components involved in this device do not weight much (the measuring tape, hooks, etc are all light) which is why it gets all the checkmarks in this category. Lightweight does not hold as much priority to us as customer satisfaction (comfort); however, it holds more priority than being durable enough to survive multiple weather conditions (as golf is mostly played when there is minimal/no precipitation.

Final Design Alternatives and Prototypes

Figure 04: First low fidelity prototype (design review 1 - Tutorial 7)

Figure 05: Visual representation/sketch of the actual prototype:

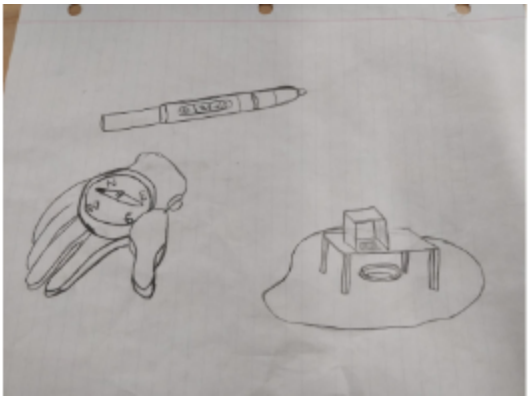


Figure 06: Another visual representation/sketch of the actual prototype:

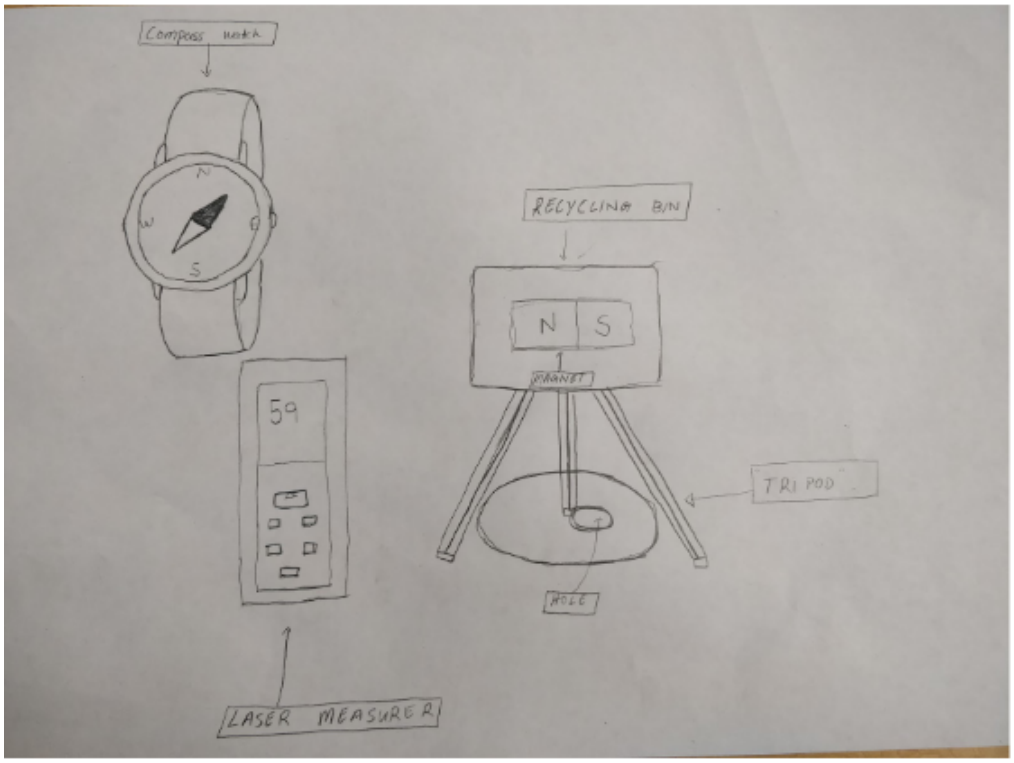


Figure 07: Second medium fidelity prototype (design review 2 - Tutorial 9)

Appendix C - Design Review Feedbacks

Tutorial 7 Design Review Feedback

Science Review Feedback:

- Is there a good type thing that would cover a large range?
    - Yes but that product has preloaded course so it may not cover the courses he plays at. We are focusing on short range putting so the device does not need to cover large distances (<= 8ft)
- How frequently does he go to the same gold club so would he need to preload courses before going to a golf course (like the Golf Buddy Voice 2)
- Make something that would attach to the golf club
- Why does the device have a target (bin) on a tripod and not on the pole?
    - Need the stability and the surface to support the magnet (the magnet is heavy)
- Would the magnet interfere with the other devices?
    - No
- Good thought about lasting weather conditions
- Have audio for the compass so it can be used even if he loses vision completely; an easier method to communicate the information to him
- Creative design
- Maybe create a bag to hold the many components

Peer Review Feedback:

- What if the glove interferes with him hitting it?
    - Can attach a strap to the compass; will somewhat be like a watch (attached to the wrist and the compass will be the face)
- What if the thing is out of range?
    - Focusing on short-range putting; finding a magnet that covers the distance for that distance
- Is it sticking into the ground?
    - Yes
- What if the ball hits the leg? Will it bounce off?
    - The legs are gonna be made thinner so the probability of hitting the legs is smaller than it is now
- What if it starts to rain? Can it last in that condition; same with the laser pointer
    - Made with material that is waterproof
- How would he wash the glove?
    - Make the compass removable

Tutorial 9 Design Review Feedback

Science Review Feedback:

- Where and who would set up the design?
    - The design is set up above the hole by his trainer.
- Would it be portable enough for him to carry around and fit in his truck?
    - Yes, it would be foldable and it would be possible for him to fit it in his golf bag,

and obviously his truck.

- Would it possible to incorporate some type of audible device?
    - Yes, it would be possible however the visual idea of the flashlight flashing at him would be better as it would give him a more accurate direction of where the hole is as opposed to an audio-based device that just informs him of the general position of the hole. In addition, we do not have the material or the expertise to get that job done.
- How would the laser be used?
    - The laser is used by aiming it at the target and it simply measures the distance from the origin to the point of contact at the target. This way Tim has a quantitative value to process and adjust his power accordingly.
- Have you guys thought of where the light is shining into Tim's direction?
    - The light is shining roughly around eye level so Tim can see a light being aimed in his direction which would allow him to estimate the direction of the hole.
- Are you guys thinking of changing the size of the design itself so it doesn't disturb his golf experience?
    - Yes, making a smaller target and thinner, yet sturdy, stand is what we plan to do so that it is portable and so that the stand does not interfere with his shot.
- We are thinking of making the box smaller and out of plastic that is compressible
    - Having a compressible plastic target is not what we thought of. We were initially trying to incorporate just a plastic design. However, now that it was mentioned, a

foldable plastic target would be more convenient so the device can fit in appropriate places.

- Did you guys think about the cost of the design?
    - Yes, and we should be able to finalize this design in under $100 if we use our materials effectively.
- Is it durable enough to last years?
    - Since the stand would be made of aluminum and the target would be plastic, we predict that this product will have a long lifespan due to its durable materials.
- Do you think your product is a better approximation of what the distance is to the hole?
    - Yes because it gives Tim a numerical value to process as opposed to the coach just telling him how many steps away the hole is from the ball. Getting information such as “the hole is 6.4 feet away” is easily comprehensible as opposed to “the hole is 8 steps away”
- What materials are you guys thinking of using in the final design?
    - A 3 legged stand made of light aluminum and a target that the laser can at for lightweight.
- Is drilled into the ground? Will it survive wind?
    - Yes because it will be dug into the ground and will be hard to destabilize since it is not free to move.
- Are you guys confident that the design works?

    - We predict that this design would work well because it makes the coach's job easier and also helps Tim be more independent while also improving his golf experience.
- Good thinking on making his game more independent!

Peer Review Feedback:

- Is it portable enough to fit in his bag?
    - Since the stand is going to be collapsible, it should fit inside his bag for easier transportation. Even if it is hard to squeeze the stand into the bag, then the coach can still hold onto it and walk around since it would be relatively lightweight.
- Is the light strong enough to work in daylight?
    - Because it may be hard to differentiate between the light and surrounding daylight, we plan to cover the head of the flashlight with Tuck Tape which is a Red colored transparent tape. By doing this, the light that he sees flashing at him would be bright red to allow him to see where to roughly aim at.
- Would this only work for putting or also long range putting?
    - We prioritized short range putting, therefore, this product would only be useful for short distances.