

# ForeSight Innovators

*Founded by:*

Emma  
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# Introduction

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## **Overview:**

This project began with the goal of addressing challenges faced by adaptive golfers. Observing the barriers to participation in golf for individuals with disabilities, our initial focus was on improving accessibility and reducing physical strain in the sport.

## **Problem:**

Golfers with physical disabilities often experience difficulty maintaining grip, managing wrist strain, and accessing equipment tailored to their needs. These challenges limit their ability to fully engage in the sport.

## **Target Audience:**

Our work targets adaptive athletes, particularly those with upper limb impairments, as well as other individuals requiring specialized support to enjoy golf.

## **Objectives:**

At the project's inception, we aimed to:

- Explore solutions to improve accessibility in golf.
- Identify ways to reduce physical strain for adaptive athletes.
- Develop concepts that enhance inclusivity and engagement in the sport.

# Research Plans

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1. Start with an area of interest.
  - a. Example – adaptive sports participation
2. Formulate research questions once you have picked an area(s) of interest.
  - a. What do you need to know?
  - b. Are you interested in outcomes after participating in adaptive sports?
  - c. Barriers to participating in adaptive sports?
3. Search for available sources:  
Google Scholar, EBSCO, [www.sci-hub.se](http://www.sci-hub.se), interlibrary loan
4. Gather several articles
  - a. skim abstracts, then review the full articles if the abstract matches your question
5. Take notes

- a. What did the articles find? Can you use their results in your interview? Your Innovation Day presentation?
- 6. Interview stakeholders
  - a. Does their lived experience match what you read in your literature review?
- 7. Keep building your story
  - a. How will your product meet an unmet need? What would meeting that need mean for stakeholders?

## Resource Links:

- ADA. (n.d.). *ADA checklists for existing facilities*. Retrieved from <https://www.ada.gov>
- Adaptive Golfers. (n.d.). Retrieved from <https://www.adaptivegolfers.org>
- BBC News. (n.d.). *Primary children test 'world-first' prosthetic arm at Woburn*. Retrieved from <https://www.bbc.com>
- Fillauer TRS. (n.d.). *Golf Pro - Fillauer TRS prosthetics*. Retrieved from <https://fillauer.com>
- Digital Commons. (n.d.). *Assistive devices for people with motor disabilities*. Retrieved from <https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1108&context=mesp>
- IOS Press. (n.d.). *Physiotherapeutic effects of an innovative golf swing-assist device on discomfort and mobility in amateur golfers with low back pain: A randomized controlled trial*. Retrieved from <https://www.iospress.com>
- GAIARENA. (n.d.). *Golf wrist brace wrist hinge swing aid: Efficient golf swing training equipment to correct wrist angle and develop muscle memory for golf beginners (Left-handed golfer)*. Retrieved from <https://www.gaiarena.com>
- Fillauer TRS. (n.d.). *Golf Pro - Fillauer TRS prosthetics*. Retrieved from <https://fillauer.com>
- BBC News. (n.d.). *Primary children test 'world-first' prosthetic arm at Woburn*. Retrieved from <https://www.bbc.com>

## Research Questions

1. What unmet needs are there for golfers with disabilities?
2. Do we want to create adaptive equipment?
  - a. Improve already existing equipment?
    - i. *We could do this by making things easy to take apart, carry, make it lightweight, etc.*
3. Do we want to create a more accessible environment?
  - a. Improve the existing environment?
4. Do we want to help golfers who get injured and have to go to physical therapy?

- a. More specifically, create something that helps them get back into golf (training) post injury.
- 5. There are so many types of equipment that we could innovate//create, what do we want to do specifically?
  - a. Physical Disability - Hands, arms, feet, legs, etc
  - b. Cognitive Disability - Understanding

## Inspiration & Context

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The photos below demonstrate accessibility and adaptability within the sport of golf for individuals with physical disabilities:

1. **Photo 1:** Depicts a single-rider mobility cart, designed for golfers with mobility impairments. It highlights accessibility equipment that allows players to navigate the course and play efficiently without damaging the greens. This aligns with the inclusivity focus in adaptive golf.
2. **Photo 2:** Shows an adaptive golfer with a specialized club and stance, emphasizing modifications in equipment and techniques to enable individuals with disabilities to play golf competitively or recreationally.
3. **Photo 3:**  
This photo highlights the use of a **single-rider adaptive cart**, an essential tool for golfers with mobility challenges. The cart allows players to navigate the course and maintain stability while playing, promoting inclusivity and accessibility in adaptive golf.

**Image Source Citation:** [Adaptive Golf Solutions for Players with Disabilities]. (n.d.). Retrieved from <https://www.usga.org>.





# Innovating, Inventing, or Adapting Golf

Golf can be played by people with disabilities through modified rules, equipment, and accessibility features:

## A) Modified rules

The R&A and USGA have rules that apply to players with disabilities, including modifications to the definition of "stance" and "replace".

## B) Modified equipment

Golf clubs with adjustable angles, lightweight shafts, and modified grips can help players with limited mobility or hand strength.

## C) Accessibility features

Golf carts with hand controls or swivel seats can help players with mobility limitations get around the course.

## D) Adaptive golf

The USAGA is a non-profit organization that provides golf training and live golf experiences for people with disabilities.

The R&A and USGA. (n.d.). *Rules for golfers with disabilities*. Retrieved November 19, 2024, from <https://www.usga.org/content/usga/home-page/rules/rules-for-golfers-with-disabilities.html>

United States Adaptive Golf Alliance (USAGA). (n.d.). *Promoting inclusive golf for individuals with disabilities*. Retrieved November 19, 2024, from <https://www.usaga.org>

## Relevant Organizations:

### The World Golf Handicap System

The R&A. (n.d.). *Golf for the disabled*. The World Golf Handicap System. Retrieved November 19, 2024, from

<https://www.igfgolf.org/about/golf-for-the-disabled#:~:Golf%20is%20a%20sport%20for,in%20golf%20for%20the%20disabled>.

### The American Disabled Golfers Association

United States Golf Teachers Federation. (n.d.). *American Disabled Golfers Association*.

Retrieved November 19, 2024, from

<https://www.usgtf.com/american-disabled-golfers-association/#:~:The%20American%20Disabled%20Golfers%20Association%20helps%20to%20create%20handicapped%20accessibility,well%20being%20for%20the%20disabled>.

## The G4D Open

The R&A. (n.d.). *World's most talented golfers with disabilities to play in the G4D Open.*

Retrieved November 19, 2024, from

<https://www.randa.org/articles/worlds-most-talented-golfers-with-disabilities-to-play-in-the-g4d-open#:~=Woburn%20has%20a%20rich%20history,the%20globe%20to%20the%20championship%E2%80%9D.>

## The USGA

United States Golf Association. (n.d.). *Making golf courses more accessible.* Retrieved

November 19, 2024, from

<https://www.usga.org/content/usga/home-page/articles/2022/07/making-golf-courses-more-accessible-.html>.

## Team Charter

<b>Team name</b>	ForeSight Innovators
<b>Team member names</b>	Jades, Emma, Nikhila, Khairi, Carter, Connor
<b>Activity</b>	Golf
<b>Team's collective view about the organization and goals of the team</b>	<ul style="list-style-type: none"><li>- Research adaptive golf</li><li>- Compile information from interviews and literature review to be informed of current issues about adaptive golf</li><li>- Develop a solution to improve the sport</li><li>- Make the sport more inclusive towards people with various disabilities</li></ul>
<b>Tasks and role assignments, including</b>	<ul style="list-style-type: none"><li>- Explorer/Innovator/Checker - Nikhila</li><li>- Recorder/Reporter/Timekeeper- Khairi</li><li>- Devil's Advocate/Prioritizer - Jades</li><li>- Facilitator/Harmonizer - Emma</li><li>- Checker/Runner/Wildcard - Carter</li></ul>
<b>Expectations for team member behavior</b>	<ul style="list-style-type: none"><li>- Respond to team communication on group chats within 24 hours of receiving</li><li>- Showing up on time for meetings</li><li>- Complete assigned tasks</li></ul>
<b>Strategies to encourage meeting expectations and consequences for team member failure</b>	<ul style="list-style-type: none"><li>- Clear communication channels</li><li>- Sending meeting reminders</li><li>- Doing progress check-ins</li><li>- Encouragement</li><li>- Flexible Scheduling</li></ul>
<b>Schedule and deliverables for the project</b>	<ul style="list-style-type: none"><li>- Meet biweekly to check in with the team and assign tasks<ul style="list-style-type: none"><li>- Week 0 (9/2)<ul style="list-style-type: none"><li>- Formulate Interview Questions</li><li>- Literature Review</li><li>- Research potential Interviewers</li><li>- Reach out to personal coordinator</li></ul></li></ul></li></ul>

	<ul style="list-style-type: none"> <li>- Week 1 (9/9) <ul style="list-style-type: none"> <li>- Compile Literature Results</li> <li>- Make Research Deck</li> <li>- <b>Interview Dylan Sims</b></li> <li><b>Sep 9, 2024 11:00 AM</b></li> </ul> </li> <li>- Week 2 (9/16) <ul style="list-style-type: none"> <li>- Compile data from interviews</li> </ul> </li> <li>- Week 3 (9/23) <ul style="list-style-type: none"> <li>- Come up with prototype concept</li> </ul> </li> <li>- Week 4 (9/30) <ul style="list-style-type: none"> <li>- Prepare presentation</li> </ul> </li> <li>- Week 5 (10/4) <ul style="list-style-type: none"> <li>- Prepare presentation</li> </ul> </li> <li>- Week 6 <ul style="list-style-type: none"> <li>- Prepare presentation</li> </ul> </li> <li><b>- Week 7 (10/18) - DEMO DAY WEEK</b> <ul style="list-style-type: none"> <li><b>- Presentation</b></li> </ul> </li> <li>- Week 8 (10/28) <ul style="list-style-type: none"> <li>- Create Prototype</li> </ul> </li> <li>- Week 9 (11/4) <ul style="list-style-type: none"> <li>- Report Writing</li> </ul> </li> <li>- Week 10 (11/11) <ul style="list-style-type: none"> <li>- Prepare Final Presentation</li> </ul> </li> <li><b>- Week 11 (11/18) - Innovation Day Week</b> <ul style="list-style-type: none"> <li><i>- include Demo Day presentation on October 18<sup>th</sup> and Innovation Day presentation on November 22<sup>nd</sup></i></li> </ul> </li> </ul>
<b>Forecast of budget needs</b>	<i>180 USD</i>

## The Interview

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*To keep in mind:*

- A. What do you want to know?
- B. How will you get that information?
- C. Gather background
- D. Pose open-ended questions
- E. Before you ask the question, ask yourself how it will be helpful
- F. What do you like about the sport?
- G. What could improve your experience of participating in the sport?
- H. Anything related to your equipment?
- I. What do you like about your current equipment?
- J. What don't you like?

## **Interview Information**

Coordinator: Dylan Sams (dsams@sralab.org)

Date: Monday, September 9th at 11am

Location: South Shore Golf Course, 7059 S South Shore Dr, Chicago, IL 60649

## **Interview Q&A**

- Introduce yourselves, what the course is, and what the purpose of your interview is
- Rehab Engineering for Adaptive Sports and the Built Environment!

### **Team ForeSight Interview Questions - Approved**

1. How did you get started with golfing?
  - a. If before, what made you choose golf instead of any other sport?
2. What kind of adaptive equipment do you currently use?
3. How/how long did you learn to use your current golf equipment?
4. What would you like to change about your current golf equipment?
  - a. **Follow-up:** Are there any specific improvements you would like to see?
5. What are your favorite parts of being able to play?
6. What do you like most about your current golf equipment?
  - a. **Follow-up:** Can you provide specific features or aspects that you find particularly beneficial?
7. How long does it take you to assemble/disassemble your adaptive equipment currently? **Time**
8. What are some features in old equipment that restricted your use?
9. What would you like to see in new or improved adaptive equipment?
  - The overall key is to make this interview a conversation, so we can really learn what needs to be achieved in our design.
  - The more open ended we can be, the more room they have to give us data back.

## **Interview Results**

- 1. How did you get started with golfing?**
  - Some athletes choose golf because it is great for networking and relatively affordable.
- 2. What kind of adaptive equipment do you currently use?**
  - Examples include AFOs (ankle-foot orthoses), gloves for stability, and adaptive carts like the Varticat.
- 3. How long did it take you to learn to use your current golf equipment, and what was the learning process like?**
  - "It took about a month to adjust."
- 4. What would you like to change about your current golf equipment?**
  - Athletes mentioned they would like gloves that provide more stability and friction pressure.
  - Follow-up: Are there any specific improvements you would like to see?
    - Not applicable.
- 5. What are your favorite parts of being able to play golf?**
  - Golf is valued for networking and the social aspect of the sport.
- 6. What do you like most about your current golf equipment?**
  - Not applicable.
  - Follow-up: Are there specific features or aspects that you find particularly beneficial?
    - Not applicable.
- 7. How long does it take you to assemble and disassemble your adaptive equipment currently?**
  - Not applicable.
- 8. Are there any features in your old equipment that restricted your use or made playing difficult?**
  - Not applicable.
- 9. What would you like to see in new or improved adaptive equipment?**
  - Athletes would like equipment that makes swinging the club easier.
- 10. If you were to go golfing independently, what aspects of the game would you need the most help with?**
  - Challenges include retrieving balls, picking up flags, and setting up tees.

## **Follow up Questions with Dylan**

What aspects do you help the athletes with?

- Picking clubs
- Grabbing clubs
- Driving carts
- Teaching swings

- Retrieving balls

What would make it easier?

- Funding
- More staff

## Interview Observations

- Employees act as caddies for athletes.
- The equipment is often used in inpatient settings.
- There is a long process involved in transporting the equipment.
- The United Spinal Cord Association is involved with some of the athletes.
- It's important to understand why adaptive golf equipment costs \$30,000.
- There is potential to create attachments for golf carts to improve accessibility.

## Specific Athlete Observations

- **Player with Cerebral Palsy:**
  - Uses AFOs (ankle-foot orthoses) for stability.
  - Faces challenges with finding golf balls, retrieving flags, and setting up tees.
- **Golfer 1:**
  - Has an injured left shoulder and swings with his right arm.
  - Plays golf for fun and wears a glove for support.
- **Golfer 2:**
  - Rides his own adaptive scooter on the golf course.
  - Uses a Varticat, which costs \$30,000, and includes features like giant tires, a place for a golf bag, hand controls, and a swivel chair.
  - Notes that adaptive carts can be hit or miss, and this model cannot be used by paraplegic players.
  - Plays independently and for fun.
- **Golfer 3:**
  - Aspires to play golf seriously.

## Follow-Up Questions for Dylan

1. What specific aspects do you assist the athletes with?
  - Picking clubs.
  - Grabbing clubs.
  - Driving carts.
  - Teaching swings.
  - Retrieving balls.
2. What changes or tools would make these tasks easier for you and the athletes?

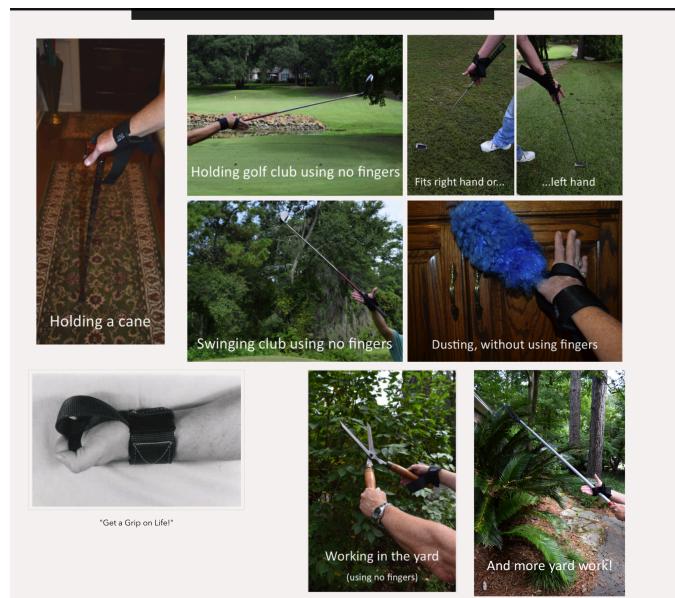
# Product Ideas

Idea generation and creative thinking is necessary for us to achieve a successful and profitable product. In this section we review what we need to address, as well as come up with concepts for how we can address the problem. The problem at hand is how can we aid the adaptive golfers we interviewed, based on what they provided us with. With minimal instruction from them, there are many directions we can take our product in. Below are ideas group members brainstormed to generate a basis for our product; market research.

## Considerations:

- Evaluate the effects of extended use of one arm during golf by researching biomechanical impacts and long-term strain.
- Innovate the glove design to improve grip and overall functionality for adaptive athletes.
- Explore ways to decrease the weight of golf clubs to reduce strain and improve usability.
- Investigate the potential for integrating exoskeleton technology to support players' mobility and strength.
- Research advancements in prosthetics to assist players with limb differences.
- Develop custom golf clubs tailored to individual needs, focusing on weight, length, and grip modifications.
- Design braces to support range of motion and consider incorporating hydrogel materials for comfort and flexibility.
- Address colorblindness by creating visually distinct golf balls to enhance gameplay for those with color vision deficiencies.
- Identify and resolve challenges related to getting players to and around the golf course, ensuring accessibility and ease of mobility.
- Assess the necessity and demand for adaptive golf gloves and shoes to better understand their relevance to users.

1. Adaptive grip attachments: example: <https://www.gripmate.com/>



2. **Magnetic ball picker:** Basically most standard golf ball pickers operate using a suction based mechanism or simple claw system that grabs the ball when it's on the ground.



Golf Ball Retriever Logo Printed  
\$5.29

Golf Ball Retriever Or Pick Up Tool  
Logo Printed  
\$4.87

Golf Ball Retriever Telescopic  
Custom Branded  
\$3.63



Golf Ball Retriever Telescopic With  
Automatic Locking Scoop Custom  
Branded  
\$6.58

Logo Printed 3-Prong Golf Ball  
Picker Upper  
\$1.31

Logo Printed 4-Prong Golf Ball  
Retriever for  
\$0.81

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Cons: standard golf balls are made of plastic and rubber materials, which are non magnetic. Unless we attach small magnetic attachments to the ball.

3. **Swingless Golf Club:** The swingless golf club has a lever at the back that allows you to change the power. You use some little power strips, like little bullets, and you insert them into the head. From there, you then pull the top to start it off, pull the safety catch, and then hit the trigger button.

## GOLF CLUBS

Golf clubs that suit a wide range of abilities are available. In addition to a standard golf club, swingless golf clubs and custom golf clubs are available. See below to learn more...

### Swingless Golf Club

The swingless golf club allows the athlete to control the distance the golf ball travels once hit, anywhere from 50-200 yards. No swing is required to engage in the sport of golf, as this golf club uses a power strip to provide the energy to hit the golf ball once a trigger is pulled.



Information & photo pulled from Power 2 Golf. [Swingless Golf Club](#).

<https://shop.powergolfclub.com/collections/power2golf-club>

- Maybe we can use a nerf gun mechanism? Making it cheaper is the idea.

4. Golf cart attachment
5. Golf club attachment
6. Golf club prosthetic
7. Glove for arthritis and injury prevention

### Research Articles:

The articles address current research done for the aid of adaptive golfers, and will assist us in the formation of our final product idea.

- 1) The Bear Paw design inspired the revolutionary golfing equipment by emphasizing the importance of adaptable support and stability for users, similar to how the Bear Paw allows for quick attachment of tools while enhancing grip and dexterity. The incorporation of elastic bands and rods in the wrist sleeve reflects the Bear Paw's focus on providing functional assistance to prevent strain and potential issues like arthritis during activities such as golfing.

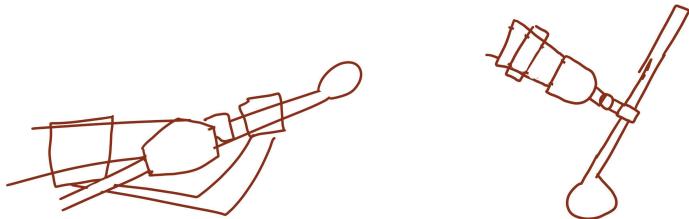
Juangarcia, H. U., Hokanson, K., & Lima, Z. (2022). The Bear Paw: A quick-release wearable device to assist transmetacarpal amputees. *Augmenting Human Dexterity – Spring 2022*

<https://edg.berkeley.edu/wp-content/uploads/2022/05/AHD-2022-group5.pdf>

# Prototype Concept

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Observing the need for better grip and support inspired the initial concept of a product designed to empower athletes with disabilities and promote inclusivity in sports. These images are the very broad and polished ideas to our proposed problem.



## RESEARCH ARTICLES SUPPORTING PROTOTYPE

- 1) **Golfers who rely predominantly on one arm may develop arthritis due to the imbalance and repetitive strain placed on the joints, as highlighted by the biomechanical impact of asymmetrical training on joint health.**  
[Effects of core and non-dominant arm strength training on drive distance in elite golfers - ScienceDirect](https://doi.org/10.1016/j.jshs.2015.02.001) [Sung, D. J., Park, S. J., Kim, S., Kwon, M. S., & Lim, Y.-T. (2016). Effects of core and non-dominant arm strength training on drive distance in elite golfers. *Journal of Sport and Health Science*, 5(2), 219–225].  
<https://doi.org/10.1016/j.jshs.2015.02.001>
- 2) **Osteoarthritis risk can be raised by persistent misuse of one limb, particularly in repetitive, high-impact sports like golf.** This disorder causes joint discomfort and stiffness as a result of cartilage degradation from repeated stress. The risk is increased for amputees who rely primarily on one arm because the unaffected limb experiences a disproportionate amount of biomechanical strain. According to studies, unilateral overuse is a major risk factor for osteoarthritis because cartilage deterioration speeds up under constant stress without sufficient recuperation time (Lohmander et al., 2007).  
<https://pubmed.ncbi.nlm.nih.gov/17761605/> [ Lohmander, L. S., Englund, P. M., Dahl, L. L., & Roos, E. M. (2007). The long-term consequence of anterior cruciate ligament and meniscus injuries: Osteoarthritis. *The American Journal of Sports Medicine*, 35(10), 1756-1769. ]
- 3) **People who do repetitive actions related to sports are more likely to have joint degeneration over time** (Felson, 2013).  
<https://pubmed.ncbi.nlm.nih.gov/23041436/> [Felson, D. T. (2013). Osteoarthritis as a disease of mechanics. *Osteoarthritis and Cartilage*, 21(1), 10-15.]

# Competitive Analysis

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The **ArthroGrip Glove** stands out in a market dominated by general-purpose wrist braces and golf aids. Existing products, such as standard wrist braces, offer basic compression and stability but lack the customization and ergonomic design needed by adaptive athletes. The ArthroGrip Glove differentiates itself by combining:

- **Adjustable Elastic Support:** Unlike traditional braces, it allows users to fine-tune tightness for optimal comfort and grip.
- **Tension Rods for Wrist Stability:** Provides enhanced wrist alignment specifically for one-armed golfers, a feature absent in most competitors.
- **Multi-Functional Design:** Offers grip security and wrist protection while being versatile enough for other activities.

This unique focus on adaptive sports, coupled with thoughtful design innovations, positions the ArthroGrip Glove in a niche with little direct competition, addressing unmet needs in both functionality and inclusivity.

## Competitor 01

- Copper Fit Reversible Wrist Brace
- \$24.99, OS
- Compression around wrist
- Lacks flexible support, functions strictly as a brace

## Competitor 02

- Scott Edward Golf Wrist Brace
- \$9.90, OS
- Wrist Brace including flexible support
- A singular point of security

## Competitor 03

- Dr. Arthritis Wrist Brace
- \$19.95, OS
- Light support, versatile design
- Not capable of stronger support, for a higher requirement of support/aid

# Materials for Construction

The initial prototype utilized basic, lightweight materials, such as elastic bands and a simple fabric base, to provide adjustability and comfort. The construction emphasized ease of use and affordability, with minimal components to test functionality and durability during early development stages. These materials laid the groundwork for refining the design to include more durable and specialized components.

Ramya Smooth Solid Color White Faux Leather Sheets 1Rolls 12"x 53" (30cm x 135cm),Faux Leather is Great for Handmade DIY Craft Projects, Bows,Leather Earrings (White) \$10.99  
In Stock  
prime  
FREE delivery Mon, Nov 4  
FREE Returns  
Color: White  
Qty: 1 Delete Save for later Share

16 Pieces Wale Corduroy Fabric Solid Plain Thick DIY Sewing Crafts Materials Stretch Corduroy Fabric for Coat Shirt Dress Pants Costume Sofa DIY Sewing Craft Material \$15.99  
In Stock  
prime  
FREE delivery Mon, Nov 4  
FREE Returns  
Color: White  
Qty: 1 Delete Save for later Share

EBOOT Elastic Spool (2 Inch x 11 Yard, White) \$9.99  
In Stock  
prime  
FREE delivery Mon, Nov 4  
FREE Returns  
Color: White  
Size: 2 Inch x 11 Yard  
Qty: 1 Delete Save for later Share

30 Pieces 12 Inch Acrylic Dowel Rods for DIY Crafts 0.25 Inch Diameter Acrylic Round Rods Acrylic Strip Sticks Cake Topper Rod for DIY Handwork Supplies (Clear,12 Inch) \$9.99  
In Stock  
prime  
FREE delivery Mon, Nov 4  
FREE Returns  
Color: Clear  
Qty: 1 Delete Save for later Share

Difenni Silicone Gripper Elastic Band Non-Slip Elastic Band Black Silicone Gripper Tape for Clothing Elastic Gripper Band for Garment Sewing Project Wig Making Accessories 5Yards (Black 1.5inch) \$12.99  
In Stock  
prime  
FREE delivery Mon, Nov 4  
FREE Returns  
Color: Black  
Qty: 1 Delete Save for later Share

# Final Concept

Our product will be a wrist support, targeting arthritis prevention in golfers. Golfers face challenges in arthritis development through repeated wrist activation and torsion. Our product will counteract this by offering increased wrist stability, additional grip, and functional support through swinging with both dual and single-armed individuals. We want to target both adaptive golfers, as well as arthritis prevention as a whole to broaden our reach, and create a more successful product.

## Example: Interview Insights Produce Design Criteria

Week 2 (Fall 2024)  
Course

### Insight (What I know)

Participation in adaptive sports (wheelchair basketball) helps athletes feel a sense of meaning and belonging.  
Participants who started late did not know about programs, were concerned about ability to participate, or could not access specialized adaptive equipment

### Design Criteria (What do I do)

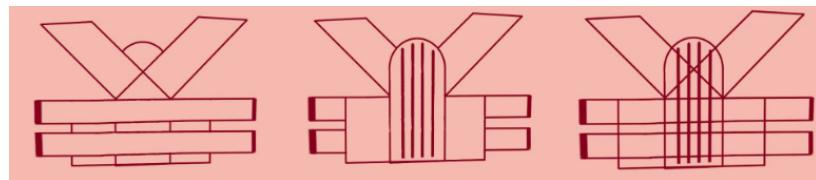
Encourage adaptive sports participation as soon as possible after disability onset  
Evaluate an accessible (low cost and effective) improvement to existing equipment  
Evaluate ways to improve athlete safety  
Evaluate communication strategies to get the word out

# Prototype Sketch

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## Initial Prototype Design and Idea

The initial concept for the **ArthroGrip Glove** focused on addressing the challenges faced by one-armed golfers, specifically preventing arthritis and enhancing grip. The design included basic support features, such as a simple wrist brace for stability and an adjustable elastic grip to improve control. This early version aimed to explore functional support while maintaining comfort and usability, serving as the foundation for further innovation and refinement.



# Final Prototype Design

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The **ArthroGrip Glove** is an adaptive solution designed to prevent wrist injuries and enhance grip for one-armed golfers. It features adjustable elastic bands with Velcro for a customizable fit, tension rods for wrist stability, and a criss-cross pattern for enhanced grip and club security. Made with ethically sourced materials, it prioritizes affordability, accessibility, and inclusivity, with applications beyond golf.



# Pre-existing ADA for Golf

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The Americans with Disabilities Act (ADA) has several requirements for golf courses to be accessible to people with disabilities, including:

**A) Accessible routes**

Golf courses must have accessible routes that connect all accessible spaces, including the parking lot, clubhouse, pro shop, bag drop, cart rental, public restrooms, restaurants, and bars. These routes can be any surface that can accommodate golf cart traffic, such as fairways, rough areas, or prepared paths. [How Courses Can Be More Accessible for Adaptive Golfers - USGA](#) [United States Golf Association. (2022, July 12). Making golf courses more accessible. United States Golf Association.

[https://www.usga.org/content/usga/home-page/articles/2022/07/making-golf-courses-more-accessible-.html\]](https://www.usga.org/content/usga/home-page/articles/2022/07/making-golf-courses-more-accessible-.html)

**B) Accessible route width**

Accessible routes must be at least 36 inches wide, but if handrails are provided, they must be at least 60 inches wide. <https://www.access-board.gov/files/ada/guides/golf.pdf> [U.S. Access Board. (n.d.). ADA guide for golf courses. U.S. Access Board.  
<https://www.access-board.gov/files/ada/guides/golf.pdf>]

**C) Accessible teeing stations**

At least 5% of practice teeing grounds must be accessible, and there must be enough space for a golf car to enter and exit.

<https://www.access-board.gov/ada/guides/chapter-10-golf-courses/#:~:text=The%20accessible%20route%20must%20be,Single%20Rider%20Adaptive%20Golf%20Cars> [U.S. Access Board. (n.d.). Chapter 10: Golf courses. U.S. Access Board.]

**D) Accessible route slope**

U.S. Department of Justice. (2010). *2010 ADA Standards for Accessible Design*. Retrieved from <https://www.ada.gov>

The standard specifies that an accessible route should have a slope no steeper than 1:12 (approximately 8.33%) to ensure usability for individuals with disabilities. This information is detailed in Section 405 of the ADA Standards.

**E) Accessible route adjacency to playing surface**

If an accessible route is next to the playing surface, it must be no more than 36 inches from any area where golf balls are placed.

<https://employerdefensereport.com/2015/09/17/are-your-golf-courses-accessible-to-guests-with-disabilities-how-does-the-ada-apply-to-your-club/#:~:text=The%20DOJ%20may%20also%20obtain,necessary%2C%20implement%20all%20required%20changes>

[Bodnar, J. (2015, September 17). Are your golf courses accessible to guests with disabilities? How does the ADA apply to your club? *Employer Defense Report.*]

F) USGA Accommodating Golfers with Disabilities Article:

<https://www.usga.org/content/usga/home-page/course-care/forethegolfer/2018/accommodating-golfers-with-disabilities.html>

## Action Report (Rolling):

### Week # 1

Date: 9/13/2024

Preparer: Jades

Recorder: Khairi

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input checked="" type="checkbox"/> <del>Jades and Carter completed interview</del> <input type="checkbox"/> Ongoing group discussion on interview results <input type="checkbox"/> ALL: Completing action report	Highlights:  <ul style="list-style-type: none"><li>• Finished Interview</li><li>• Brainstorming Solution</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>• Brainstorm ideas for prototype</li><li>• <b>Individual</b> literature review to assist with ideas</li></ul>
New Actions:  <input type="checkbox"/> <b>Individual</b> research to find specific issue to tackle <input type="checkbox"/> Analyze interview results more deeply to find problems in their current adaptive golf technologies	Challenges:  <ul style="list-style-type: none"><li>• There's not a lot of issues to be found in the sport from specific interviewees</li><li>• We had a very small sample size, limiting our ability to get more information on the challenges that they are facing.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>• Improving the golf cart seat to allow standing for players</li></ul>

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## Conclusion/Summary

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- Conducted interview, brainstorming prototype concept, and literature review.

## Week # 2

Date: 9/20/2024

Preparer: Jades

Recorder: Khairi

---

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Designing prototypes <input type="checkbox"/> Find research articles related to adaptive golf	Highlights:  <ul style="list-style-type: none"><li>Figured out what issue to tackle<ul style="list-style-type: none"><li>Golfing attachment for amputees</li></ul></li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Figure out the design of the prototype</li><li><a href="https://iit.instructure.com/courses/7852/pages/week-6-overview-2?module_item_id=47224">https://iit.instructure.com/courses/7852/pages/week-6-overview-2?module_item_id=47224</a></li></ul>
New Actions:  <input type="checkbox"/> Come up with a solid design for our rough prototype idea	Challenges:  <ul style="list-style-type: none"><li>Making the prototype practical and buildable</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>How do we make our prototype a real product?</li></ul>

---

## Conclusion/Summary

- 
- Found research articles related to adaptive golf. (attached below)
  - Decided on an issue to tackle.
  - Brainstorm prototype ideas (attached below)

### **Research Articles:**

- 1) <https://content.iospress.com/articles/technology-and-health-care/thc236013>

Park, C., Kim, K., Yoon, S., Park, I., & Cha, Y. (2023). Physiotherapeutic effects of an innovative golf swing-assist device on discomfort and mobility in amateur golfers with low back pain: A randomized controlled trial. *Technology and Health Care*, 31(S1), 137–144. <https://doi.org/10.3233/THC-236013>

- 2) <https://edg.berkeley.edu/wp-content/uploads/2022/05/AHD-2022-group5.pdf>

Juangarcia, H. U., Hokanson, K., & Lima, Z. (2022). The Bear Paw: A quick-release wearable device to assist transmetacarpal amputees. *Augmenting Human Dexterity – Spring 2022*

- 3) <https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1108&context=mesp>

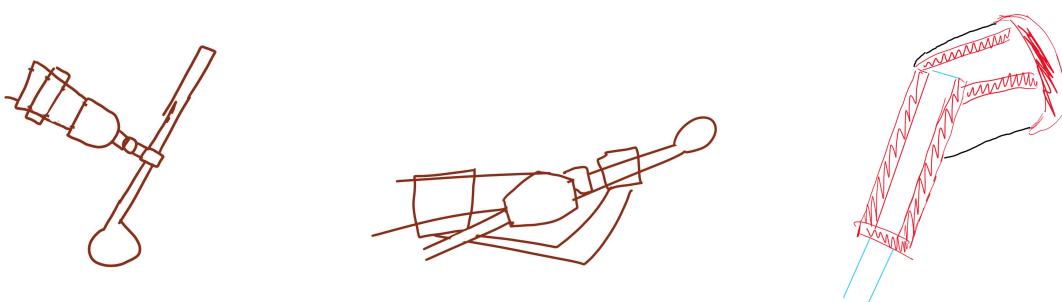
Barcus, J., Wilson, L., & Satcher, R. (2011). Golf prosthesis: Final design report. QL+.

- 4) <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=392923be21c88b6ea776f4aef919f267df08dc79>

Kumar, V., Rahman, T., & Krovi, V. (1997). Assistive devices for people with motor disabilities. In the Wiley encyclopedia of electrical and electronics engineering. Wiley. (Forthcoming).

### **Prototype Ideas:**

Images below are ideas brainstormed during our weekly meeting:



## Week # 3

Date: 9/27/2024

Preparer: Jades

Recorder: Khairi

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Assigning tasks for next week <input type="checkbox"/> Preparing for demo day <input type="checkbox"/> Connect with the interviewees for further clarification	Highlights:  <ul style="list-style-type: none"><li>Touch base with professor on the prototype idea</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Prepare for Presentation (All)</li><li>Peer Eval</li></ul>
New Actions:  <input type="checkbox"/> Email Dylan for Adeara's Info on glove <input type="checkbox"/> (Emma and Connor) <input type="checkbox"/> Literature review supporting our prototype. (Nikhila) <input type="checkbox"/> Competitive Analysis <input type="checkbox"/> (Connor) <input type="checkbox"/> Manage materials and finances <input type="checkbox"/> (Emma) <input type="checkbox"/> Continue designing prototype for support glove <input type="checkbox"/> (Khairi, Jades, Carter)	Challenges:  <ul style="list-style-type: none"><li>Communicating ideas is pretty difficult,</li><li>Had a setback with the previous prototype idea, created a new one.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>Improvise a glove with attachment to enhance grip and reduce pressure on a single arm.</li></ul>

### Conclusion/Summary

- Upon talking to the professor, we were able to gain more insight on our current ideas.
- We will be researching and gathering more information to enhance our prototype.

## Week # 4

Date: 10/4/2024

Preparer: Jades

Recorder: Connor

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input checked="" type="checkbox"/> Assigning tasks for next week <input checked="" type="checkbox"/> Preparing for demo day <input checked="" type="checkbox"/> Connect with the interviewees for further clarification <input type="checkbox"/> Start on Demo Day presentation	Highlights:  <ul style="list-style-type: none"><li>Touch base with professor on the prototype idea</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Preparing for Presentation (All)</li><li>Continue competitive analysis</li><li>Continue research on the materials.</li></ul>
New Actions:  <input checked="" type="checkbox"/> Email Dylan for Adeara's Info on glove <input checked="" type="checkbox"/> (Emma and Connor) <input checked="" type="checkbox"/> Literature review supporting our prototype. (Nikhila) <input type="checkbox"/> Competitive Analysis <input type="checkbox"/> (Connor) <input type="checkbox"/> Manage materials and finances <input type="checkbox"/> (Emma) <input checked="" type="checkbox"/> Continue designing prototype for support glove <input checked="" type="checkbox"/> (Khairi, Jades, Carter)	Challenges:  <ul style="list-style-type: none"><li>Communicating ideas is pretty difficult,</li><li>Had a setback with the previous prototype idea, created a new one.</li><li>Interviewees have yet to respond to our further questions, awaiting that for more information.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>Improvise a glove with attachment to enhance grip and reduce pressure on a single arm.</li></ul>

### Conclusion/Summary

- Upon talking to the professor, we were able to gain more insight on our current ideas.
- We will be researching and gathering more information to enhance our prototype.

## Week # 5

Date: 10/11/2024

Preparer: Jades

Recorder: Khairi

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Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Finishing our presentation	Highlights:  <ul style="list-style-type: none"><li>• Finished demonstration poster</li><li>• Discuss prototype</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>• Preparing for demo day</li></ul>
New Actions:  <input type="checkbox"/> Discuss materials for creating prototype <input type="checkbox"/> Preparing our presentation for demo day	Challenges:  <ul style="list-style-type: none"><li>• No challenges were boolean'</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>• Improve design based off people's feedback from the presentation</li></ul>

---

### Conclusion/Summary

- Gained clarity on the content of our presentation.
- Discussed the prototype design.

## Week # 6 - DEMO DAY PRESENTATION

# ForeSight Innovators

### Presented By:

Jades Luu  
Connor Schommer  
Carter Vonk  
Emma Diamon  
Nikhila Panyam  
Khairifa Razie

IPRO 493

Demo Day

OCT 2024

## Adaptive Golf

### Our Goal

Developing adaptive sports equipment that empowers individuals with disabilities.

### Why It Matters

Making golf accessible to a wider audience and promoting inclusivity in sports.

### Inspiration

Interviewed and observed adaptive athletes that gave way to the idea of our product



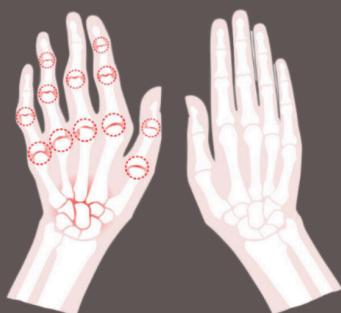
## Introduction

# The Interview

- Able to engage and observe the adaptive golfers to better understand their challenges
- Primarily focused on one of the golfers, Adera
- Many challenges for a one arm swing

*"She doesn't currently use a glove. This is something that could be of assistance or even a glove that offers more of a grip supports and 'holds' the club for her."*

- Dylan Sams on Adera



## The Issue

Golfers with only one functional arm maybe at risk for developing arthritis.

- Repetitive motion and overuse of an arm can cause arthritis.
- Osteoarthritis is caused by the wear and tear of the joint over time or because of overuse.

**Sources:**  
[How to Treat Elbow Arthritis - Deep Medicine](#)  
[Repetitive strain injury \(RSI\) - NHS](#)

# Research

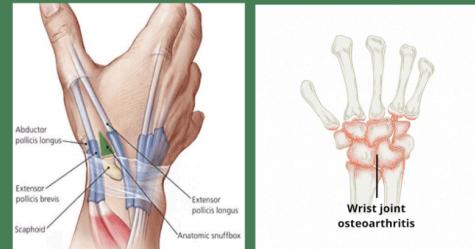
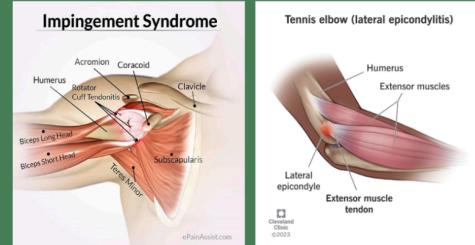
A study of problems in the remaining arm of unilateral upper limb amputees.

The loss of one arm is followed by the transfer of that arm's function to the other arm.

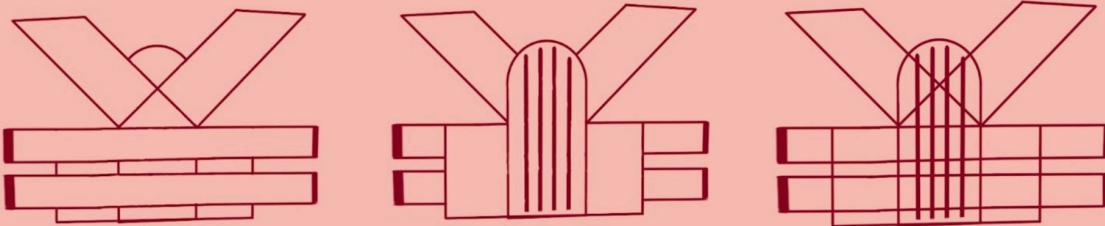
- The **increased workload for the remaining arm may, at some time in the person's life, produce minor aches and pains or more serious conditions** of impingement in the shoulder, tenosynovitis in the abductor pollicis longus tendon, epicondylitis or other overuse syndromes. (Novak and Mackinnon, 1997).
- In a study conducted in 1999, the results revealed that subjects' problems not only consisted of overuse symptoms, but also of an **exacerbation of arthritis and injury due to trauma or wear and tear** to the remaining arm during the accident (Jones, L. E., & Davidson, J. H., 1999).

**Sources:**

Jones, L. E., & Davidson, J. H. (1999). Save that arm: A study of problems in the remaining arm of unilateral upper limb amputees. *Prosthetics and Orthotics International*, 23(1), 55-58. <https://doi.org/10.3109/03093369909071016>  
Novak, C. B., & Mackinnon, S. E. (1997). Repetitive use and static postures: a source of nerve compression and pain. *Journal of hand therapy: official journal of the American Society of Hand Therapists*, 10(2), 151-159. [https://doi.org/10.1016/S0894-1130\(97\)80069-5](https://doi.org/10.1016/S0894-1130(97)80069-5)



## The First Look





## The ArthroGrip

Overuse of joints may increase the risk of arthritis. Single-handed golfers may be at higher risk of this than dual-handed golfers as they do not have the extra support that a second hand provides, which leads them to overwork their joints. Our revolutionary golfing glove provide rigid support to the joints of the arm, while still being adjustable and comfortable for any activity.

\*This is a first look into our product, design is subject to change\*



# Competition



### Competitor 01

- Copper Fit Reversible Wrist Brace
- \$24.99, OS
- Compression around wrist
- Lacks flexible support, functions strictly as a brace



### Competitor 02

- Scott Edward Golf Wrist Brace
- \$9.90, OS
- Wrist Brace including flexible support
- A singular point of security



### Competitor 03

- Dr. Arthritis Wrist Brace
- \$19.95, OS
- Light support, versatile design
- Not capable of stronger support, for a higher requirement of support/aid

### Sources:

"Best Golf Wrist Braces." Buyer's Guide, 2024, <https://buyersguide.org/golf-wrist-brace/best-golf-wrist-brace-reviews/> Accessed 18 Oct. 2024.  
Amazon.com. Dr. Arthritis Doctor Developed Copper Lined Wrist Brace for Golfers. <https://www.amazon.com/Dr-Arthritis-Doctor-Developed-Copper-Lined-Wrist-Brace-for-Golfers/dp/B0BZKJZL7Z> Accessed 18 Oct. 2024.  
Amazon.com. Dr. Arthritis Doctor Developed Copper Lined Wrist Brace for Golfers. <https://www.amazon.com/Dr-Arthritis-Doctor-Developed-Copper-Lined-Wrist-Brace-for-Golfers/dp/B0BZKJZL7Z> Accessed 18 Oct. 2024.  
Amazon.com. Scott Edward Golf Wrist Brace. <https://www.amazon.com/Scott-Eduard-Golf-Wrist-Brace/dp/B09VQH7XWY> Accessed 18 Oct. 2024.  
Amazon.com. Copper Fit Reversible Wrist Brace. <https://www.amazon.com/Copper-Fit-Reversible-Wrist-Brace/dp/B07R5P8D2F> Accessed 18 Oct. 2024.  
Amazon.com. Copper Fit Reversible Wrist Brace. <https://www.amazon.com/Copper-Fit-Reversible-Wrist-Brace/dp/B07R5P8D2F> Accessed 18 Oct. 2024.

## Proposal for continuation and focus

### Next Steps

- **Material Research:** Identify materials that are lightweight, durable, and flexible.
- **User testing:** Start testing the prototype with adaptive golfers to gather feedback on fit, comfort and functionality.
- **Design Improvement:** Refine the glove's design, focusing on enhancing grip support and ensuring the glove is comfortable as possible.

### Needs

- **Refinement of Prototype:** Further adjustments based on real-world testing and research into material.
- **Cost Estimation:**
  - Material costs: Estimating the price for fabrics and the brace components.
  - Development costs: tooling, prototyping and any additional R&D.

### Market

- **Target Market:** Growing niche of adaptive golfers, especially with people who have upper limb impairments.
- **Market Impact:** Focuses on entering a very niche market with little to no competitors. Our product has the potential to make golf truly accessible for everyone.

# Continuation

# Thank You.

### Presented By:

Jades Luu  
Connor Schommer  
Carter Vonk  
Emma Diamon  
Nikhila Panyam  
Khairifa Razie



# **Week # 7 - LIST OF EDITS AND IMPROVEMENTS**

**Assignment:** Provide a list of edits/improvements to be made to your project (one person submits per team) by 11:59 pm on 10/22.

## **Areas for Improvement:**

### **1. Detailed Problem Description:**

- Provide more context for those unfamiliar with golf and arthritis.

### **2. Clarity of Purpose:**

- Clarify if the product aims to prevent or treat arthritis, as current messaging is somewhat ambiguous.

### **3. Product Design:**

- Differentiate the product from existing solutions (e.g., braces) and consider its applicability to a broader audience.
- Explore unique features that enhance convenience and usability for individuals with upper body disabilities.

### **4. Prototype Development:**

- A real-life prototype is needed to better convey the product's functionality and advantages.

### **5. Presentation Flow:**

- Ensure the presentation is well-organized to avoid confusion; address any unclear concepts proactively.

### **6. Engagement and Delivery:**

- Strive for equal presentation time among all team members and maintain consistent engagement levels.

### **7. Conceptual Considerations:**

- Think about how the product can not only prevent injuries but also promote muscle coordination and confidence in users.

## **Additional Comments:**

- Consider storytelling techniques to enhance the emotional connection to the product.
- Be mindful of ethical practices, such as de-identifying interviewees when sharing insights.

## Week # 8

Date: 10/25/2024

Preparer: Jades

Recorder: Connor

---

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input checked="" type="checkbox"/> Finishing our presentation	Highlights: <ul style="list-style-type: none"><li>• Finished demonstration slides</li><li>• Discuss prototype</li></ul>	Upcoming Actions: <ul style="list-style-type: none"><li>• Preparing for final presentation with list of edits and improvements</li><li>• Compiling report</li></ul>
New Actions:  <input type="checkbox"/> Determine materials for prototype <input type="checkbox"/> Purchase materials for prototype <input type="checkbox"/> Construct Prototype <input type="checkbox"/> Peer evaluations #2	Challenges: <ul style="list-style-type: none"><li>• Selecting and further researching materials options</li></ul>	Recommendations: <ul style="list-style-type: none"><li>• Improve design based off people's feedback from the presentation</li></ul>

---

### Conclusion/Summary

- Gained clarity on the content of our presentation.
- Discussed the prototype design.

## Week # 9

Date: 11/1/2024

Preparer: Emma

Recorder: Connor

---

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Finishing our presentation <input type="checkbox"/> Preparing Prototype	Highlights:  <ul style="list-style-type: none"><li>• Finished demonstration slides</li><li>• Prototype has been discussed and planned</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>• Preparing for final presentation with list of edits and improvements</li><li>• Compiling report</li><li>• Constructing Prototype</li></ul>
New Actions:  <input checked="" type="checkbox"/> Determine materials for prototype <input checked="" type="checkbox"/> Purchase materials for prototype <input type="checkbox"/> Construct Prototype <input checked="" type="checkbox"/> Peer evaluations #2	Challenges:  <ul style="list-style-type: none"><li>• Awaiting the arrival of materials from Amazon to construct our prototype</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>• Improve design based off people's feedback from the presentation</li></ul>

---

### Conclusion/Summary

- Emailed materials list to the instructor for approval.
- Discussed the prototype design.
- Next steps include refining the presentation and beginning prototype construction once materials are approved and received.

## Week # 10

Date: 11/8/2024

Preparer: Emma

Recorder: Nikhila

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Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Received materials for final prototype. <input type="checkbox"/> In the process of putting the materials together. <input type="checkbox"/> Preparing slides for the final presentation.	Highlights:  <ul style="list-style-type: none"><li>Completed the final design for the prototype.</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Preparing slides for the final presentation.</li></ul>
New Actions:  <input type="checkbox"/> Construct Prototype <input type="checkbox"/> Airtable Update <input type="checkbox"/> Peer Evaluation 3 <input type="checkbox"/> Review Innovation day rubric	Challenges:  <ul style="list-style-type: none"><li>Having technical challenges figuring out how to assemble our materials.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>Meet in person next week to put materials together and create the final design.</li></ul>

---

### Conclusion/Summary

- Materials have been received, final design is ready. We just need to create it.

## Week # 11

Date: 11/15/2024

Preparer: Emma

Recorder: Nikhila

---

Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Received materials for final prototype. <input type="checkbox"/> In the process of putting the materials together. <input type="checkbox"/> Preparing slides for the final presentation.	Highlights:  <ul style="list-style-type: none"><li>Completed the final design for the prototype.</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Preparing slides for the final presentation.</li></ul>
New Actions:  <input type="checkbox"/> Construct Prototype <input type="checkbox"/> Airtable Update <input type="checkbox"/> Peer Evaluation 3 <input type="checkbox"/> Review Innovation day rubric	Challenges:  <ul style="list-style-type: none"><li>Having technical challenges figuring out how to assemble our materials.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>Meet in person next week to put materials together and create the final design.</li></ul>

---

### Conclusion/Summary

- Materials have been received, final design is ready. We just need to create it.

## Week # 12

Date: 11/8/2024

Preparer: Emma

Recorder: Nikhila

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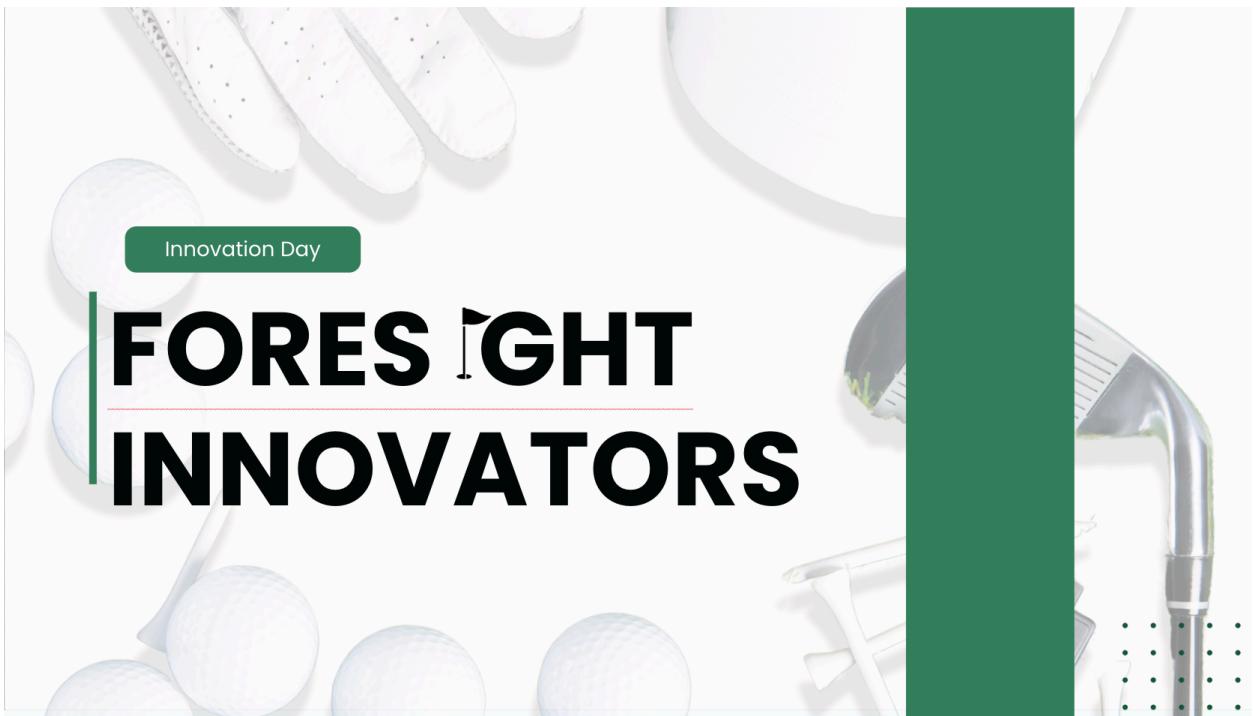
Action Items:	Progress Summary:	Next Steps:
Ongoing Actions:  <input type="checkbox"/> Received materials for final prototype. <input type="checkbox"/> In the process of putting the materials together. <input type="checkbox"/> Preparing slides for the final presentation.	Highlights:  <ul style="list-style-type: none"><li>Completed the final design for the prototype.</li></ul>	Upcoming Actions:  <ul style="list-style-type: none"><li>Preparing slides for the final presentation.</li></ul>
New Actions:  <input type="checkbox"/> Construct Prototype <input type="checkbox"/> Airtable Update <input type="checkbox"/> Peer Evaluation 3 <input type="checkbox"/> Review Innovation day rubric	Challenges:  <ul style="list-style-type: none"><li>Having technical challenges figuring out how to assemble our materials.</li></ul>	Recommendations:  <ul style="list-style-type: none"><li>Meet in person next week to put materials together and create the final design.</li></ul>

---

### Conclusion/Summary

- Materials have been received, final design is ready. We just need to create it.

## Week #13 - FINAL PRESENTATION



## CONTENT

- 01** Project Overview
- 02** Problem and Purpose
- 03** Research and Insights
- 04** Solution and Product Design
- 05** Prototype Development
- 06** Testing and Refinement
- 07** Conclusion



# PROJECT OVERVIEW

*Adaptive golf is a modified version of golf designed to make the sport accessible and enjoyable for individuals with physical, cognitive, or sensory disabilities by using specialized equipment, techniques, and inclusive environments.*



## PROBLEM AND PURPOSE



### **Problem Statement:**

Adaptive golfers face complications, with arthritis being a leading development from single-arm swinging



### **Project Objective:**

Prevent injuries, enhance grip, and boost confidence while promoting inclusivity in adaptive sports. Designed to assist in preventing wrist arthritis for one-armed golfers.

## RESEARCH

Studies indicate that unilateral overuse is a significant risk factor for osteoarthritis, as cartilage wear accelerates under continuous stress (Lohmander et al., 2007). Additionally, individuals engaged in repetitive sports-related motions are at an increased risk of joint degeneration over time (Felson, 2013).



## INSIGHTS

### Key Research Findings

*Continuous overuse of a single limb, especially in high-impact and repetitive activities like golfing, can increase the risk of developing osteoarthritis.*



### Field Insights

For amputees who rely heavily on one arm, the biomechanical strain is disproportionately placed on the unaffected limb, compounding the risk.



# SOLUTION AND PRODUCT DESIGN

Introducing the Adaptive Glove: **ArthroGrip**

The revolutionary golfing equipment made to provide support while preventing the development of Arthritis



## Unique Features and Differentiation:

**Differentiation:** With the elastics component of the glove, users are able to adjust the tightness and strength as they see fit.



## Broader Applicability:

Due to the design of the glove, the ArthroGrip can be used by various demographics and for non-golfing purposes.



## PROTOTYPE DEVELOPMENT

### Ethical and Practical Considerations:

Ethically sourced materials were used, affordability and accessibility was prioritized during production, privacy and confidentiality were maintained in user interviews.

# PROTOTYPE REFINEMENT

Elastic bands featuring velcro straps highlight the functionality, and the rods in the wrist sleeve facilitate wrist stability through the swinging motion



## Implemented Improvements:

The criss-cross pattern creates variation in function, whether its enhanced security by wrapping around the club shaft, or enhanced grip by using the adhesive elastic for additional club grip .

## Implemented Improvements:

The velcro straps aid in adjustability, for both comfort and security for our user



## Implemented Improvements:

Tension rods increase stability in the wrist, by providing security through the swing path

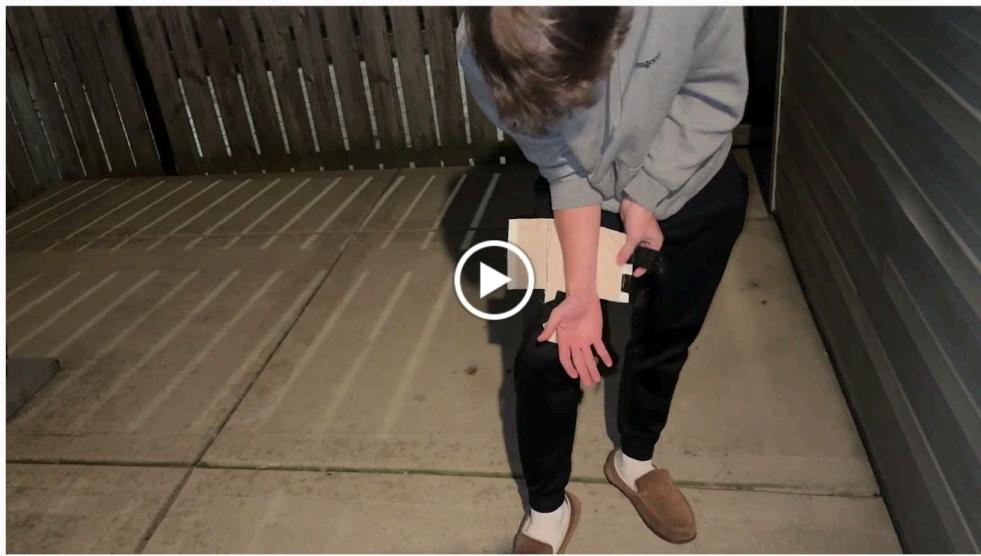
# WORK IN PROGRESS



## **ARTHROGRIP PHYSICAL**



## **ARTHROGRIP DEMONSTRATION**



# CONCLUSION

Summary of Key Points



PROBLEM

Golfers risk arthritis due to overworked joints.



SOLUTION

The ArthroGrip Glove offers rigid support with comfort and adjustability.



IMPACT

Supports joint health, broadens reach, and enhances golfer inclusivity.

# THANK YOU!