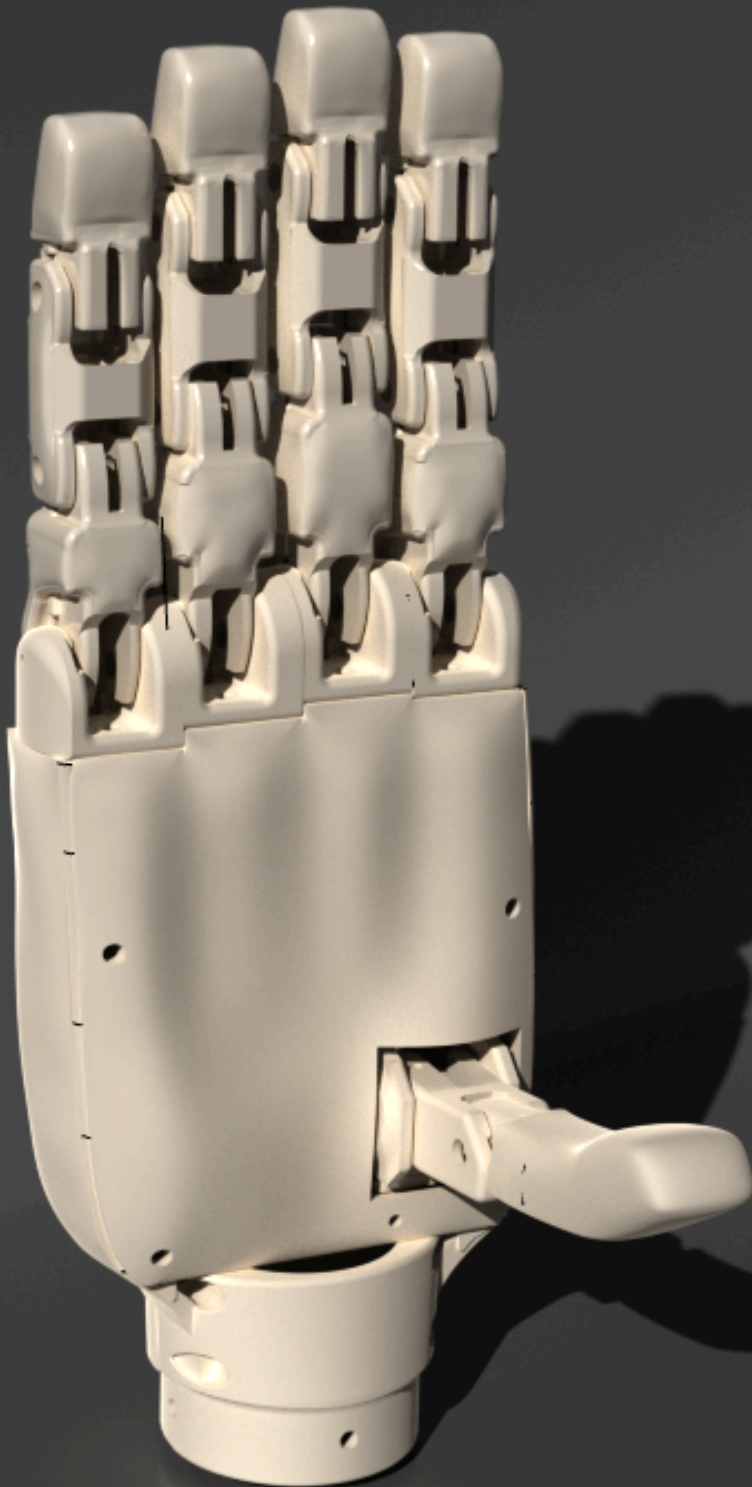




JK LAKSHMIPAT UNIVERSITY
Institute of Design
NAAC 'A' Grade Accredited

Surface Modelling and Material Optimization for a Human-Like Prosthetic Hand

VOL 1 of 1

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Programme:
Bachelor of Design (B.Des)
Product Design

THE 
**GRADUATION
PROJECT 2024**

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Surface Modelling and Material Optimization for a Human-Like Prosthetic Hand





acknowledgement

I would like to express my sincere gratitude to my academic advisor, DEVANUJ KANTA BALKRISHAN, for their invaluable guidance and support throughout this project. Your expertise and encouragement were crucial to the successful completion of my work.

A special thanks to the team at SYMBICA Pvt.Ltd and my mentor, NILOTPAL BARUAH, for their invaluable mentorship and resources. Your practical insights and support have been incredibly beneficial.

I am deeply grateful to my family and friends for their unwavering support and encouragement. Your belief in my abilities kept me motivated and focused during this journey.

I also appreciate my peers and colleagues for their collaboration and feedback. Sharing ideas and overcoming challenges together has been a rewarding experience.

Lastly, I extend my thanks to the users and participants in my research for their valuable insights. Your willingness to share your experiences has greatly informed the design and development of the prosthetic hand.

This project has been a profound learning experience, and I am thankful to everyone who contributed to its success

Thank You



synopsis

This project focuses on designing and developing a prosthetic hand, emphasizing aesthetics, material selection for the glove, and user research.

Aesthetic Design:

Aiming for a human-like appearance, the project balanced visual appeal and functionality. Iterative prototyping and feedback ensured the prosthetic hand looks natural and boosts user confidence.

Material Selection:

Extensive research and testing identified materials that provide durability, flexibility, and comfort. The chosen materials offer a natural feel and appearance while meeting practical requirements.

User Research:

Surveys, interviews, and focus groups gathered insights into user preferences and needs. The feedback guided design and material choices to ensure the prosthetic hand is comfortable, appealing, and user-friendly.



preface as designer

As a designer, this project has been a journey to create a prosthetic hand that combines functionality with visual appeal. My goal was to design a hand that not only meets practical needs but also boosts user confidence through its aesthetic design.

I focused on selecting materials that ensure durability, flexibility, and comfort. Extensive research and testing helped identify materials that provide a natural look and feel while being practical for everyday use.

User research played a pivotal role in shaping this project. Through surveys and interviews, I gathered insights into user preferences and needs, which guided the design and material choices.

This project has deepened my understanding of user-centered design and reinforced the importance of empathy in creating impactful products. It has been a valuable learning experience, enhancing my skills and passion for innovative design in prosthetics.



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About Company

About the Founders
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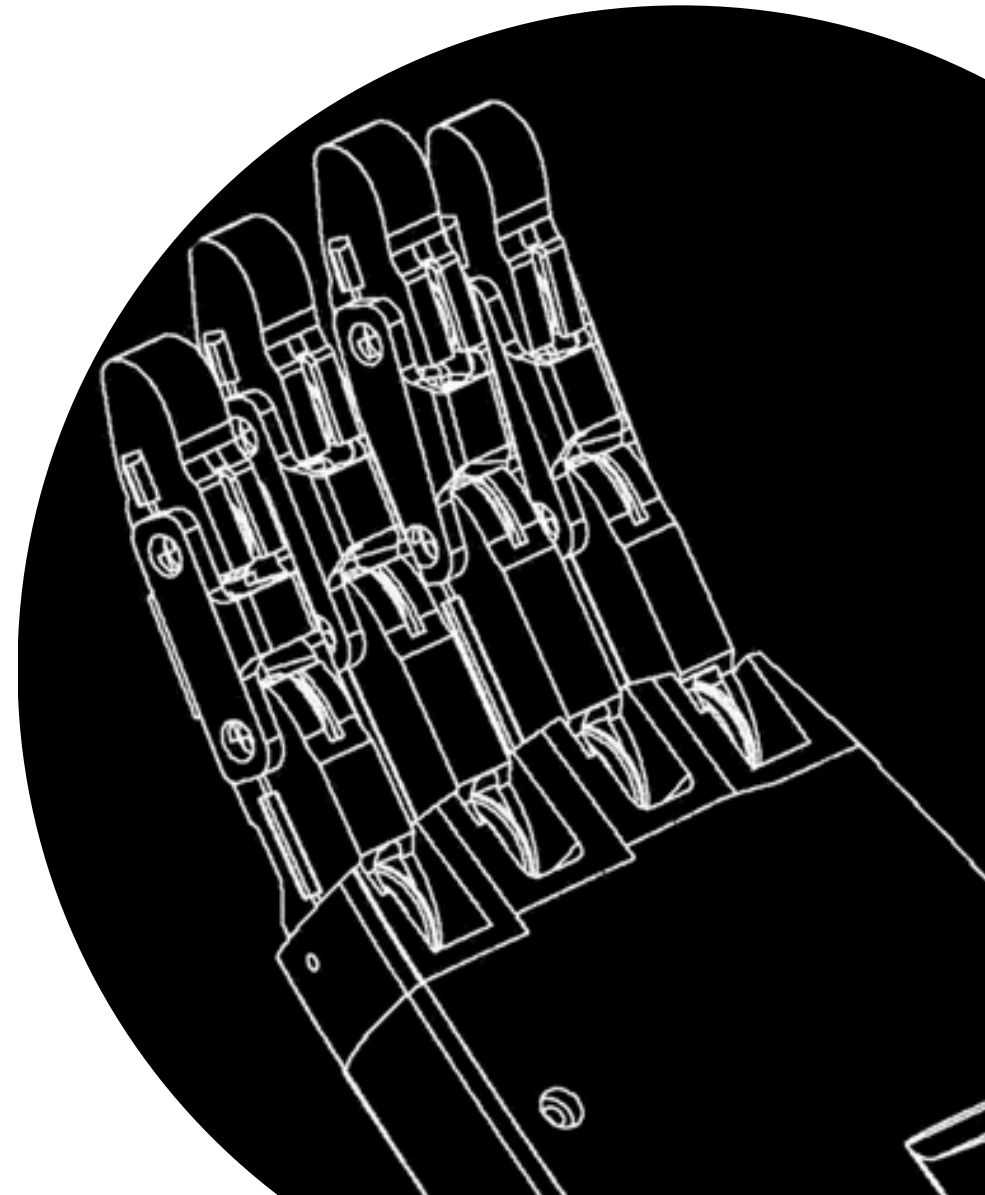
company profile

Symbica Pvt. Ltd. is a prosthetic hand company born from the creative minds of Nilotapal Baruah and Subrajit Dhar.

As an IIT-incubated venture, Symbica is dedicated to enhancing the quality of life for individuals with limb loss through innovative prosthetic solutions.

It harness cutting-edge technology to develop prosthetic hands that are both highly functional and aesthetically pleasing.

Its mission is to seamlessly integrate advanced technology with human-centric design, offering prosthetics that provide superior performance and a natural appearance.





about the Founders

Nilotpal Baruah:

Nilotpal, the founder of Symbica Pvt. Ltd. completed his graduation with a B.E. in Electrical, Electronic, and Communication Engineering from Jorhat Institute of Science and Technology. With a strong background in bio-inspired robotics design, Nilotpal brings a unique blend of technical expertise and innovative vision to the company. His passion for integrating advanced technology with human-centric design drives Symbica's mission to create cutting-edge prosthetic solutions.

Subrajit Dhar:

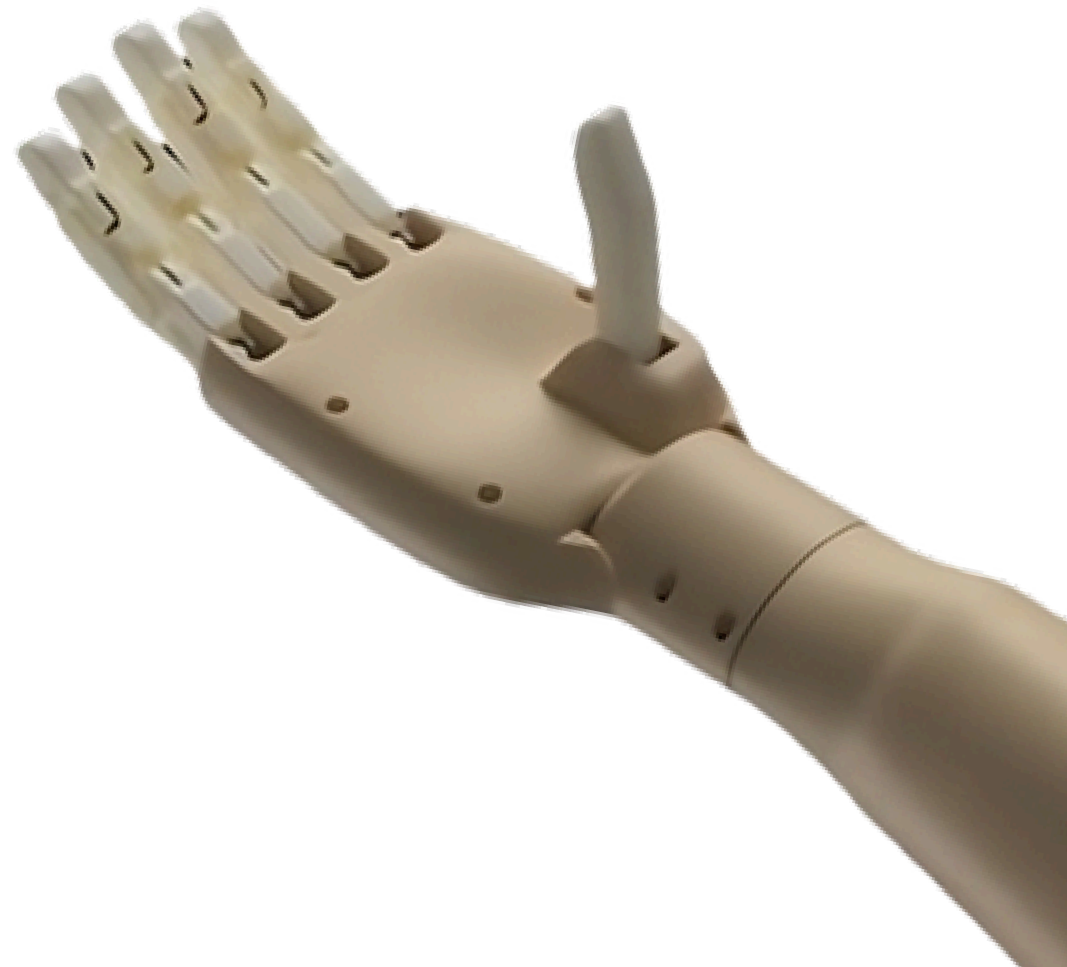
Subrajit Dhar, co-founder of Symbica Pvt. Ltd., completed his graduation in Mechanical Engineering from Punjab Technical University. With extensive expertise in advanced manufacturing techniques and product design, Subrajit plays a crucial role in shaping the company's innovative prosthetic solutions. His commitment to enhancing the functionality and user experience of prosthetic technologies significantly contributes to Symbica's success.

mission

Our mission is to empower amputees to regain control and confidence in their daily lives through the development and delivery of innovative myoelectric prosthetic hands that mimic the appearance and movement of a real human hand.

vision

Our vision is to redefine the standard of prosthetic technology by providing individuals with limb differences access to myoelectric prosthetic hands that offer unparalleled realism, functionality, and comfort.



design philosophy

User-Centric Design:

We prioritize the needs, preferences, and comfort of our users, ensuring that our prosthetics not only meet functional requirements but also align with individual lifestyles and aesthetic desires.

Innovative Technology:

Leveraging cutting-edge technology and bio-inspired robotics, we strive to push the boundaries of what prosthetic hands can achieve, integrating the latest advancements to deliver superior performance and adaptability.

(cutting edge technology- Cutting-edge technology is the newest and most advanced technology that leads the way in innovation and performance.)

Aesthetic Integration:

We believe that prosthetics should complement the natural appearance of the user. Our designs focus on achieving a realistic and visually appealing look, ensuring that the prosthetic hand blends seamlessly with the user's body.

Durability and Reliability:

Our prosthetic hands are crafted from high-quality materials and undergo rigorous testing to ensure they are durable and reliable, providing users with long-lasting performance and confidence.

Project proposal

Project Brief
Objective
Methodology
Features
Uniqueness
Project timeline

02

project brief

What are prosthetic hand?

Prosthetic hands are artificial devices designed to replace the function and appearance of a human hand that has been lost due to injury, illness, or congenital conditions. These devices aim to restore the ability to perform daily tasks and improve the overall well-being of the users.

The primary goal of a prosthetic hand is to replicate the functions of a natural hand, allowing users to perform a wide range of activities such as gripping, holding, and manipulating objects. They also aim to enhance the user's self-esteem and social integration by providing an aesthetically pleasing appearance.

Brief

The project introduces an innovative initiative to develop myoelectric prosthetic hands that set new standards in realism, functionality, and user experience. By applying design thinking principles, its aim to replicate natural hand movements while addressing users' emotional and aesthetic needs. Key features include individual finger control, a lightweight and ergonomic and aesthetic design, durable skin-like materials, better gripping technology,

A core focus is creating a prosthetic skin that mimics the appearance, texture, and flexibility of natural skin. This will enhance comfort and confidence for the wearer. Through advanced materials and techniques, we aim to exceed user expectations and ensure a seamless integration with their lifestyle.

objective

Surface Modelling



Develop a realistic surface model that mimics the texture, color, and appearance of a natural human hand while integrating seamlessly with the mechanical components.

User Needs Research



Conduct comprehensive surveys and interviews to gather insights into user preferences and needs, ensuring the design addresses real-world challenges and desires.

Material Research



Identify and test materials that provide durability, comfort, and breathability, allowing for easy daily replacement akin to changing socks.

methodology

01

Define Objectives

Outline the goals for surface modeling, user research, and material selection to ensure a clear focus on realism, user needs, and material properties.

02

Conduct User Research

Perform surveys and interviews to collect detailed insights into user preferences and needs, identifying key factors that will influence the design.

03

Develop Surface Model

Create and refine a realistic surface model that replicates the texture, color, and appearance of a natural hand while integrating smoothly with the mechanical components.

04

Material Research

Identify potential materials that offer durability, comfort, and breathability. Test these materials to ensure they meet the requirements for daily use and replacement

05

Integrate Findings

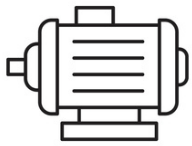
Combine insights from user research with the surface model and material findings to create a cohesive and functional prosthetic hand design.

06

Prototype and Test

Build a prototype incorporating the surface model and selected materials. Test the prototype to gather user feedback and make necessary adjustments to refine the design.

features & uniqueness



Single Motor Design

Despite its intricate finger control, the prosthetic hand will utilize a single motor for each finger, optimizing efficiency and simplicity.



Long Lifespan

Durable materials will be employed in the construction of the prosthetic hand, ensuring longevity and reliability for the user.



Lifelike Appearance

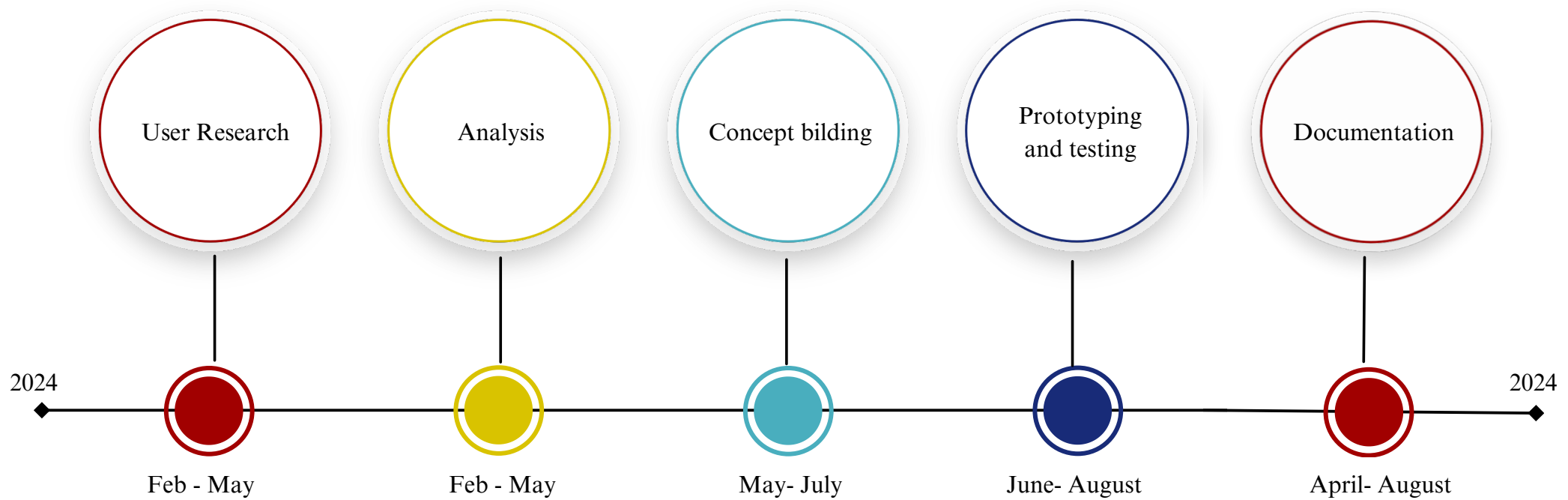
The exterior skin (gloves) will be made from materials that closely resemble human skin, enhancing the prosthetic hand's realism and user satisfaction.



Individual Finger Control

Each finger of the prosthetic hand will operate independently, allowing for natural and versatile movement.

project timeline



Research & analysis

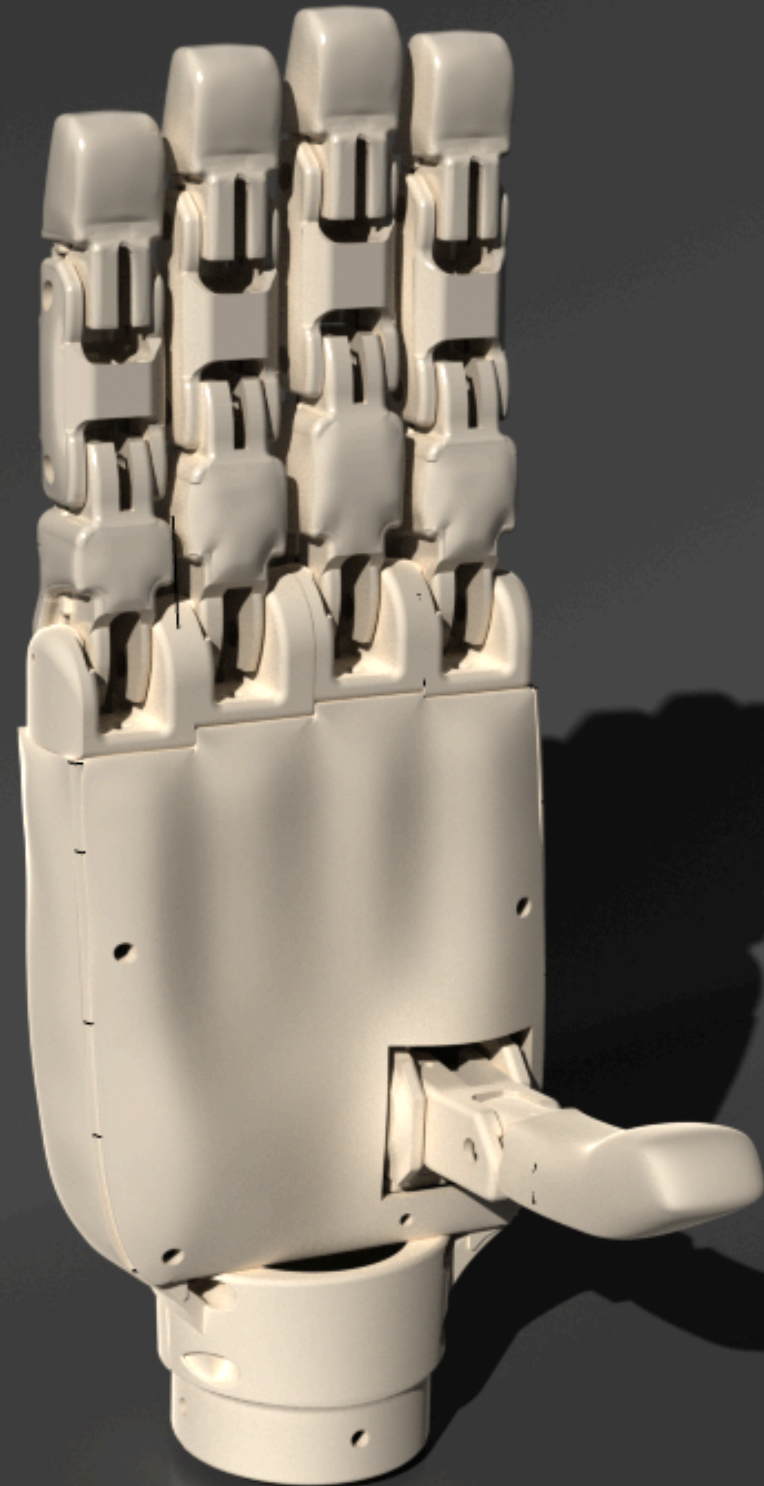
- About hand and fingers
 - Gripping Patterns
- Usability of gripping patterns
 - User Survey
- Market study
- Existing types prosthetic hands
 - competitors
- Problem Analysis
- Target Audience
- Material research for gloves

03

prosthetic hand importance

Prosthetic hands are of immense importance for individuals who have lost a hand due to injury, illness, or congenital conditions. These advanced devices are designed to restore the ability to perform essential daily tasks, such as gripping, holding, and manipulating objects, which significantly enhances the user's independence and quality of life. By replicating the complex movements of a natural hand, prosthetic hands enable users to engage in a wide range of activities, from simple household chores to more intricate tasks like typing or cooking.

Beyond their functional benefits, prosthetic hands also play a crucial role in improving the emotional well-being and social integration of users. A well-designed prosthetic hand that closely mimics the appearance and texture of a natural hand can greatly boost a user's self-esteem and confidence. This is particularly important in social settings, where a natural-looking prosthetic can help reduce feelings of self-consciousness and promote more positive interactions with others.



fingers

In the study of prosthetic hand design, understanding the anatomy and functionality of the finger joints is crucial.

The fingers have three main joints that allow for a wide range of motion and dexterity:

Distal Interphalangeal (DIP)

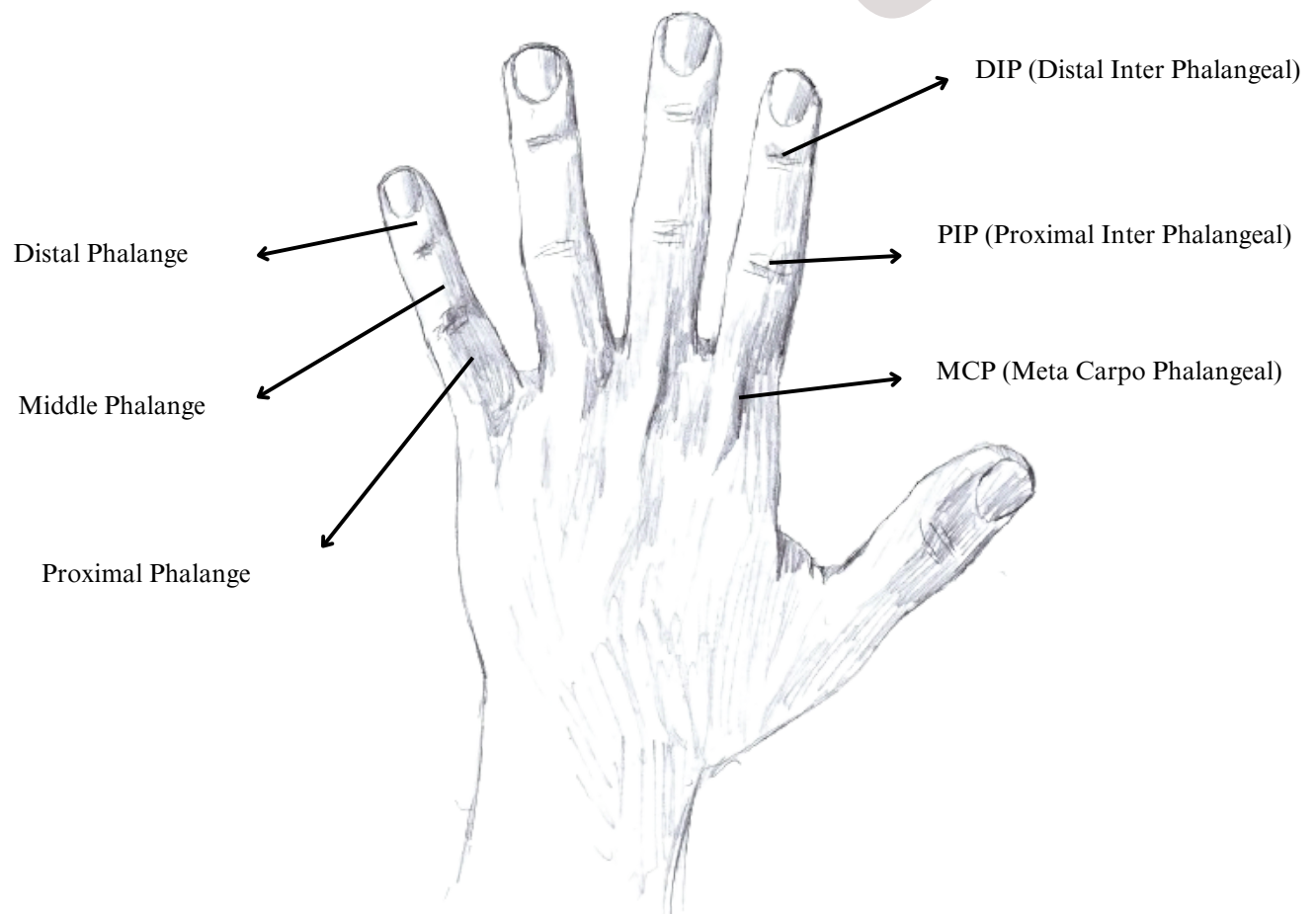
Proximal Interphalangeal (PIP)

Metacarpophalangeal (MCP) joints

Understanding and replicating the movement of these joints ensures that the prosthetic hand can perform complex tasks that require coordination and precision.

By focusing on the DIP, PIP, and MCP joints, we ensure that the prosthetic hand mimics natural hand movements as closely as possible, enhancing user functionality and satisfaction.

**** Phalanges are the bones that make up the fingers of the hand**



dip joints

DIP Joint (Distal Interphalangeal Joint)

Location

This is the joint closest to the fingertip, connecting the distal phalanx to the middle phalanx.

Function

The DIP joint allows for the bending of the fingertip, essential for fine motor skills such as pinching and gripping small objects.

Importance in Prosthetics

Replicating the movement of the DIP joint is critical for tasks requiring precision, such as typing or handling delicate items.



pip joints

PIP Joint (Proximal Interphalangeal Joint)

Location

This joint is situated in the middle of the finger, connecting the proximal phalanx to the middle phalanx.

Function

The PIP joint provides the finger with a significant range of motion, enabling bending and straightening. It is crucial for gripping and holding objects.

Importance in Prosthetics

Proper articulation of the PIP joint is necessary for a strong and functional grip, which is fundamental for daily activities.



mcp joints

MCP Joint (Metacarpophalangeal Joint)

Location

This is the joint at the base of the finger, connecting the proximal phalanx to the hand's metacarpal bone

Function

The MCP joint allows for finger flexion, extension, and lateral movements. It plays a key role in the overall dexterity of the hand.

Importance in Prosthetics

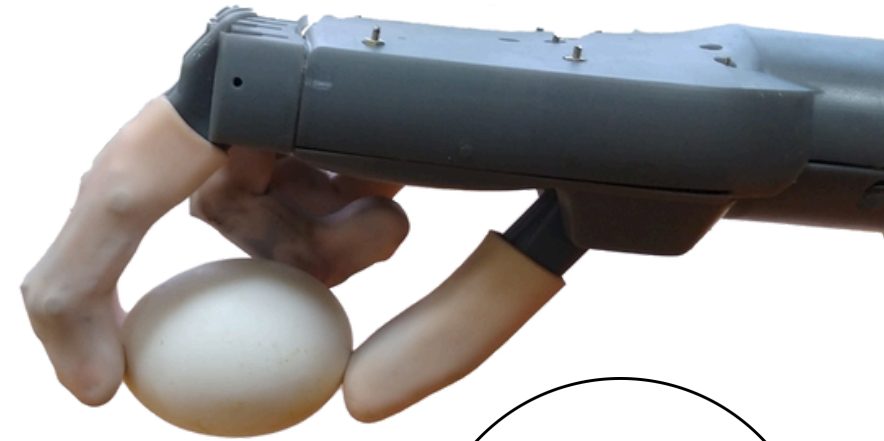
Ensuring the MCP joint can move accurately in a prosthetic hand is vital for a wide range of hand movements, from grasping large objects to performing intricate tasks



gripping pattern usability

Understanding and designing effective gripping patterns is crucial for prosthetic hand users -

- **Versatile Tasks:** Allows users to easily handle a wide range of items, from heavy objects to delicate ones.
- **User-Centric Design:** Addresses the diverse needs and challenges users face daily.
- **Enhanced Dexterity:** Enables seamless switching between different grip types, improving functionality.
- **Ergonomic Benefits:** Reduces strain and discomfort, ensuring long-term comfort and preventing fatigue.

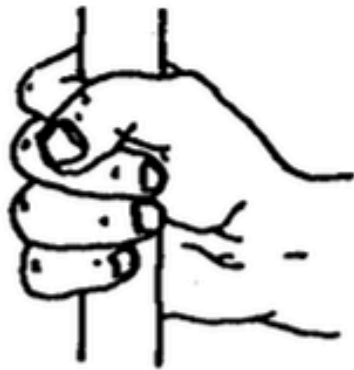


Smart Auto Grasp tech senses the shape and size of objects, adjusting the grip for you and helps you tackle everyday tasks with ease.

types of gripping patterns

We chose these gripping patterns because our research showed they are the most commonly used in daily activities.

By focusing on these specific grips, we could ensure that the prosthetic hand would be versatile and practical for most users' everyday needs.



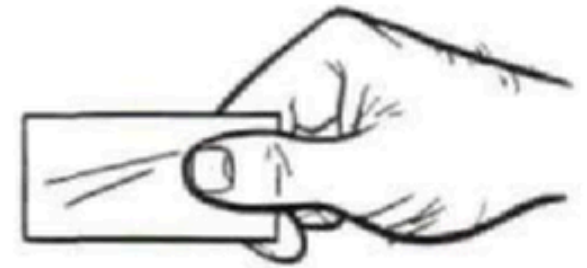
Power Grip

- Carrying grocery bags
- Using a hammer
- Buckets
- Gym equipment



Precision Grip

- Holding a pen or pencil
- Threading a needle
- Painting
- Navigating smartphones



Lateral Grip

- Holding and using credit cards
- Inserting and turning keys in locks
- Holding a knife
- Using screwdrivers

types of prosthetic hand

Myoelectric Prosthetic Hands

Description: Controlled by electrical signals generated by the user's muscles (myoelectric signals).

Mechanism: Electrodes placed on the skin detect muscle activity in the residual limb, which is then translated into movements of the prosthetic hand.

Advantages: Provides more natural and intuitive control, capable of complex and precise movements.

Disadvantages: Requires batteries, can be more expensive, and may require significant training to use effectively.

Functionality: Offers a wider range of movements and grips, including fine motor control for tasks like picking up small objects or typing.

Requires more maintenance due to electronic components and batteries.

Generally more expensive due to advanced technology and materials.



types of prosthetic hand

Passive Prosthetic Hand

Description: Designed primarily for cosmetic purposes and basic support, without active movement capabilities.

Advantages: Are Lightweight, need Low maintenance and Can be aesthetically matched to the user's skin tone.

Disadvantages: Limited or no functionality for gripping or holding objects, also Primarily serves an aesthetic purpose.

Requires less maintenance as it don't have any electronic components and batteries.

Generally less expensive as it is used primarily for cosmetic purposes.



types of prosthetic hand

Body-Powered Prosthetic Hands

Description: Controlled by physical movements of the body, typically using a harness and cable system.

Mechanism: The user moves their shoulder, upper arm, or another body part to pull on a cable, which opens or closes the prosthetic hand.

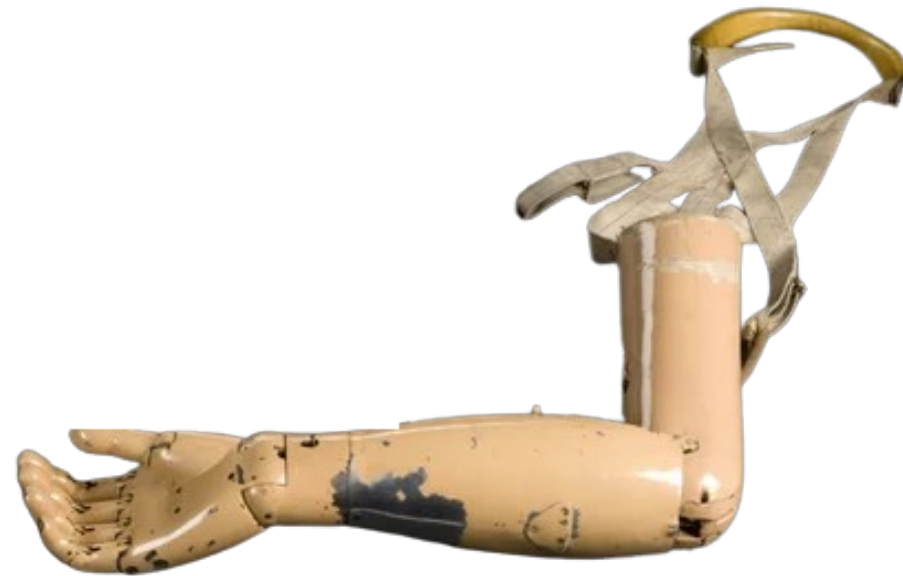
Advantages: Simple, robust, and reliable; does not require batteries or electrical components.

Disadvantages: Can be physically demanding to operate, less precise control compared to myoelectric hands.

Functionality: Typically allows for basic open and close functions, suitable for tasks requiring strong grip but limited in fine motor skills.

Generally low maintenance due to simpler mechanical design.

Generally less expensive than myoelectric hand.



competitors



TASKA Hand.

Features: Advanced grip patterns, durable and water-resistant design, natural movement, user-friendly interface, and realistic appearance.

Benefits: Enhanced independence, versatility for diverse activities, comfort during extended use, and greater user confidence in social settings.



i-limb hand

Features: Individually motorized fingers, multiple grip patterns, customizable control via mobile app, proportional control, and aesthetic design with customizable covers.

Benefits: Superior dexterity, intuitive operation, comfortable fit, natural appearance, and robust performance

competitors



Bebionic Hand by Ottobock

Features: 14 selectable grip patterns, proportional control, individual finger movement, and robust design.

Benefits: High precision in performing tasks, reliable performance, ergonomic design for comfort, and a natural look that improves user confidence.



Hero Arm by Open Bionics

Features: Lightweight design, multi-grip functionality, customizable covers, and affordable pricing.

Benefits: Accessibility due to cost-effectiveness, personalized aesthetics, comfortable and lightweight for daily use, and functional versatility for various tasks

competitors



Vincent Evolution 3 by Vincent Systems

Features: 14 selectable grip patterns, proportional control, individual finger movement, and robust design.

Benefits: High precision in performing tasks, reliable performance, ergonomic design for comfort, and a natural look that improves user confidence.



Zeus Prosthetics hand

Features: Individual Finger Control, Multiple Grip Patterns, Ergonomic Design, High-quality materials for longevity, Sleek black finish and stylish design.

Benefits: Perform complex tasks with ease, Reduced strain during long-term use, Reliable for daily activities, Boosts user confidence with a modern look.

problem analysis

1. High maintenance
2. Lack of sensory feedback, (making it difficult to gauge pressure and grasp objects effectively.)
3. Feeling judged or treated differently by others

Factors required while buying the hand-

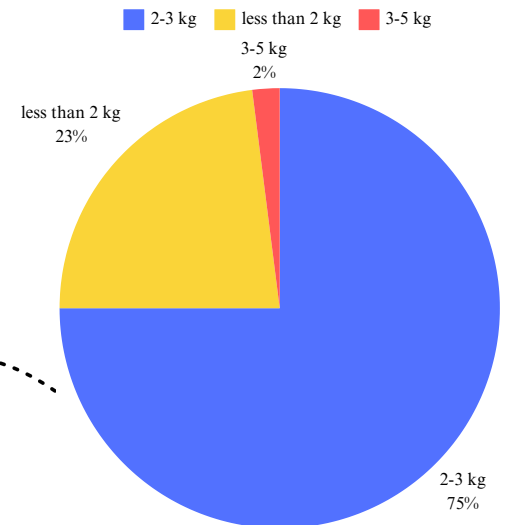
- cost
- comfort
- functionality
- aesthetic
- weight

Users prioritize realistic color tone, fingernails, veins, wrinkles, and skin textures for human-like prosthetic hands.

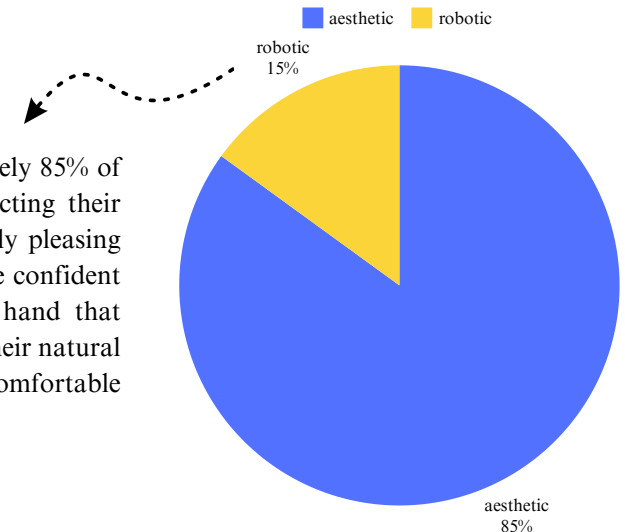
Buying gloves with the prosthetic hand is entirely dependent on user preferences, driven by needs such as aesthetics, protection, comfort, grip enhancement, or hygiene.

Hand design should evoke comfort, empowerment, confidence, joy, and happiness.

Our research that 75% of user prefer a prosthetic hand that weights between 2-3 kg. A prosthetic hand within this weight range closely mimics the weight of a natural human hand, which helps users feel more balanced and natural when performing everyday tasks.



Our research shows that approximately 85% of users prioritize aesthetics when selecting their prosthetic hand. Because Aesthetically pleasing prosthetic hands help users feel more confident and accepted in social settings. A hand that looks realistic and blends well with their natural appearance helps users feel more comfortable and confident in their daily lives.



target audience

The target audience for prosthetic hands includes individuals who have experienced limb loss due to trauma, accidents, congenital conditions, or medical procedures. This group encompasses amputees, veterans, accident victims, and those with congenital limb deficiencies. Additionally, active individuals, such as athletes, and elderly populations benefit from prosthetic hands to maintain independence and perform daily tasks. Children and adolescents also form a significant audience, requiring prosthetics for development and social integration. Healthcare providers, rehabilitation centers, and insurance companies are key stakeholders in providing and supporting these advanced prosthetic solutions.



material

research for gloves

Silicone gloves offer several advantages, including a realistic appearance, comfort, and ease of cleaning. They are ideal for everyday use due to their flexibility and durability. However, they can be expensive and may not provide the best grip strength.

Durability: Silicone is highly resistant to wear and tear, making it ideal for daily use.

Flexibility: Offers excellent flexibility, allowing for natural finger movement.

Aesthetic: Can be customized to match skin tone and texture, providing a realistic appearance.

Hypoallergenic: Safe for users with sensitive skin or allergies.

Maintenance: Easy to clean and maintain.

Comfort: Soft and comfortable to wear for extended periods.



Silicone glove

material

research for gloves

Resin gloves are lightweight, puncture-resistant, and chemically resistant. They are made from materials like nitrile, latex, or vinyl, offering flexibility and durability. However, they may be less comfortable for long-term use and have limited flexibility.

Strength: Resin is known for its rigidity and strength, providing robust protection.

Precision: Can be molded with high precision, ensuring a snug fit and detailed aesthetics.

Durability: Long-lasting and resistant to environmental factors like UV light.

Customization: Easily customizable for specific user needs and aesthetics.

Stability: Offers stability and support, beneficial for users needing a strong grip.

Surface Finish: Can achieve a glossy, lifelike finish.



Resin Gloves

material

research for gloves

Neoprene gloves provide good insulation, excellent grip, and resistance to oils and chemicals. They are known for their flexibility, durability, and water resistance, making them suitable for various outdoor tasks. However, they can be bulky and cause sweating.

Flexibility: Extremely flexible, allowing for a wide range of motion.

Insulation: Provides good thermal insulation, keeping the hand warm in colder climates.

Water Resistance: Highly resistant to water and moisture, suitable for various environments.

Comfort: Soft and comfortable, reducing friction and irritation.

Durability: Resistant to oils, chemicals, and abrasion, ensuring long-term use.

Grip Enhancement: Textured surface enhances grip, useful for handling various objects.



Neoprene Glove

Mood Board

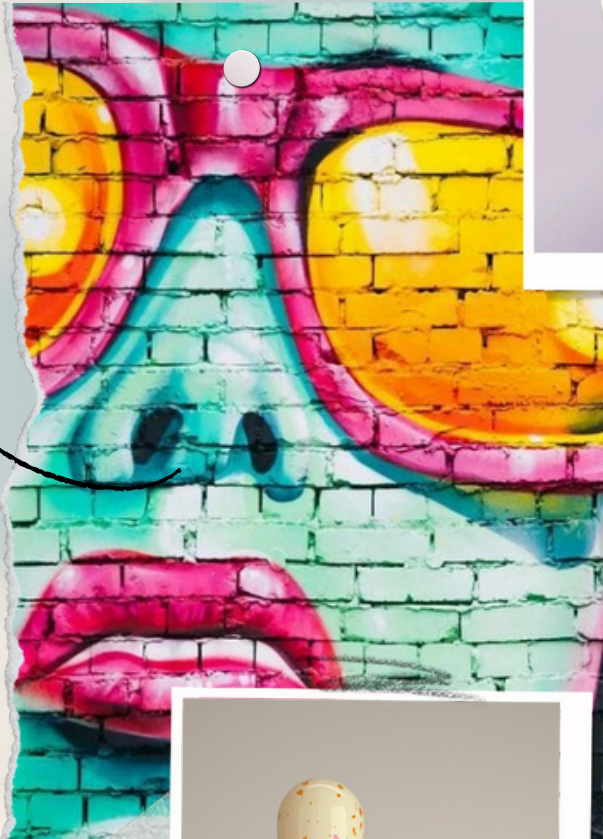
Creating mood boards for influencers and gym enthusiasts serves a strategic purpose in aligning designs with user preferences and ensuring optimal integration with their work or hobbies. By analyzing visual elements and trends specific to these groups, mood boards facilitate a deeper understanding of their aesthetic and functional needs.

It helps:

1. To capture the styles and elements that appeal to each group.
2. Understand current trends and interests.
3. Align designs with the target audience's tastes.
4. Provide a clear visual reference for ideas.

MOOD BOARD
INFLUENCERS

Abstract art



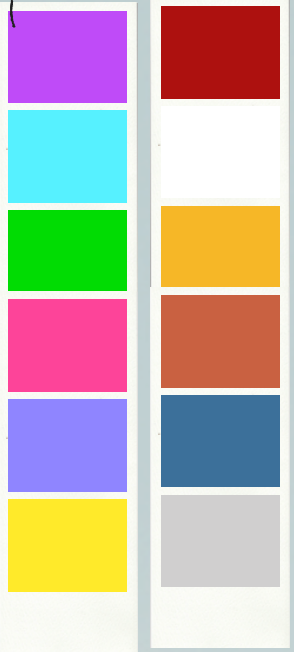
Sleek & futuristic design



Minimalistic design



Vibrant colours + pastel colours



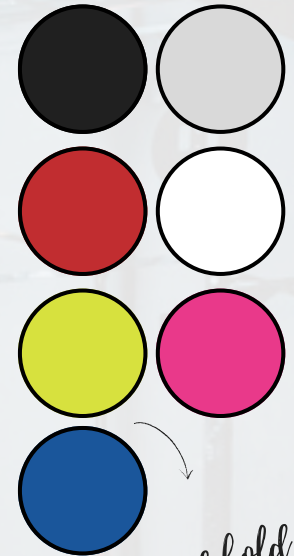
smooth and transparent object



Natural textures (wood, leather)

MOOD BOARD
FITNESS FANATIC

Gritty and
rugged
textures

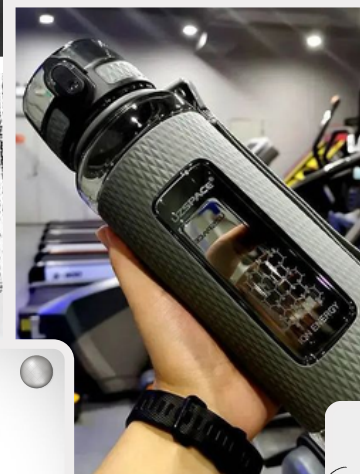


Energetic and bold
colors

Bright pops of
color to convey
energy and
motivation.



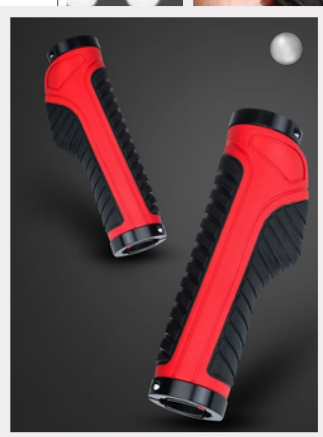
Accents of black
and metallic tones
for a sleek and
modern aesthetic.



Sleek and
smooth design



Mesh and
perforated
textures



Rubberized and
grippy textures

Ideation

Different approaches
Replicating the Human Hand
Improving the Basic Model to an Aesthetic One
Gloves material exploration

D4

replication of real hand

In this approach, we aimed to create a prosthetic hand that closely mimics a real hand's texture and appearance while integrating mechanical components discreetly.

1. Used 3D scanning technology to capture the exact dimensions and intricate details of a real hand.
2. The scanned data was used to create a detailed digital model, preserving the natural contours and surface characteristics.
3. Incorporated pulleys, motors, and other necessary mechanical parts into the digital model.
4. To fit these components, we added material to certain areas, which led to some bulging.
5. Efforts were made to blend added surfaces seamlessly with the original model, aiming for a natural look.
6. Prototypes were created and tested for functionality and aesthetics, guiding further refinements.



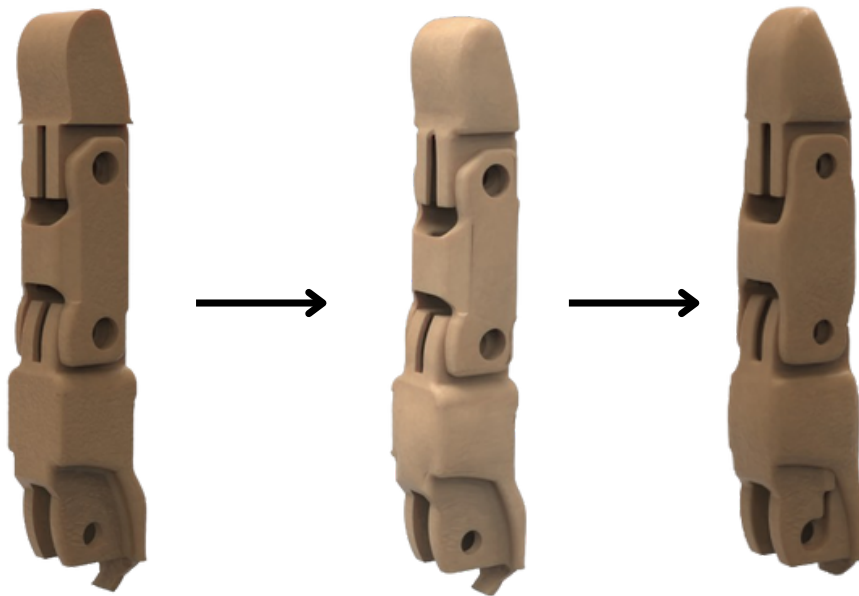


Limitations:

1. **Bulging:** Adding material to accommodate mechanical parts often resulted in a bulkier appearance.
2. **Aesthetic Discrepancies:** The adjustments compromised the hand's natural look, affecting user acceptance.
3. **Comfort and Fit:** The added bulk could impact the fit and ergonomics, reducing user comfort.

This approach highlighted the challenge of balancing functionality with a natural appearance, guiding us toward alternative methods for better integration.

Improving the Basic Model to an Aesthetic On



In this approach, I aimed to create a prosthetic hand by using average measurements of fingers combined with the necessary mechanical component dimensions.

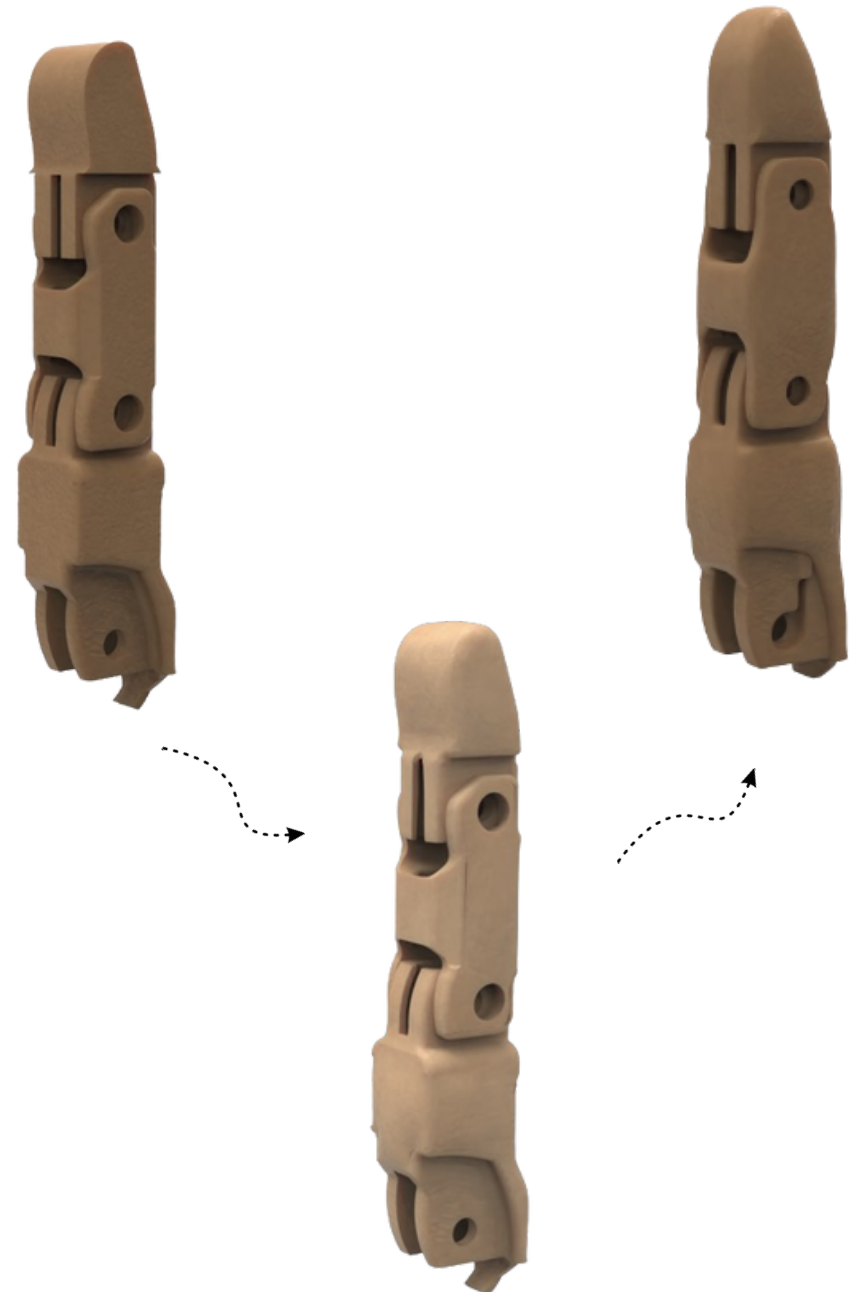
1. Gathered average finger dimensions from a representative sample to establish a standard baseline.
2. Created a digital model using these average measurements, including the basic shape and size of fingers and the hand structure.
3. Incorporated pulleys, motors, and other mechanical parts into the digital model without significant alterations.
4. Developed an initial prototype to assess accuracy and functionality
5. Provided a reliable base model that could be adjusted to fit individual user needs.
6. Tested the base model for functionality and comfort, using feedback to guide further improvements.

Benefits:

1. Using average measurements streamlined the design process, allowing for quicker initial model creation.
2. The base model could be easily adapted and customized for individual users, providing a good starting point for further personalization

Limitations:

1. This approach did not initially accommodate individual variations in finger and hand dimensions, potentially affecting the fit and comfort for some users.
2. Relying on average measurements might result in less precise fitting compared to a fully customized model, necessitating additional adjustments.



glove exploration

We tested two types of silicone gloves with varying thicknesses to evaluate their suitability for prosthetic hands. These tests aimed to determine the durability, functionality, and overall performance of the gloves in different conditions.



Thickness: 2mm



Thickness: 1mm

glove exploration

Thin Material Susceptibility:

The thinner silicone gloves, while offering better tactile feedback and flexibility, showed a higher tendency to tear during regular wear and usage. This susceptibility to tearing reduces the lifespan of the gloves and necessitates frequent replacements.

The thinner material provides less protection to the mechanical components of the prosthetic hand, making them more vulnerable to damage from external impacts or abrasions.

Pressure on Motors:

When the prosthetic hand's fingers are folded, the thin silicone material stretches, applying excessive pressure on the motors. This strain can reduce motor performance and lifespan, potentially causing mechanical failures and requiring more frequent maintenance. Additionally, it can make movements less smooth and increase energy consumption.



Prototype

Renders
Hand

05

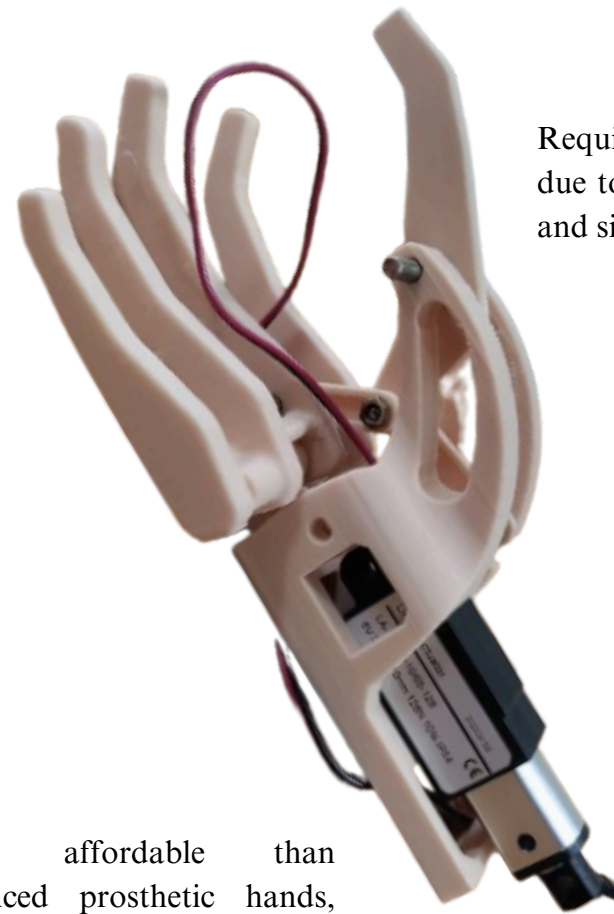
Myoelectric prosthetic hand

Choosing a myoelectric hand over body-powered or passive hands offers several advantages. Myoelectric hands provide more precise control and a wider range of movements due to their use of electrical signals from muscle contractions. This allows users to perform complex tasks with greater ease and functionality. Unlike body-powered hands, which rely on cables and mechanical systems for movement, myoelectric hands offer a more natural range of motion and less physical strain. Compared to passive hands, which are mainly cosmetic and lack active functionality, myoelectric hands deliver both aesthetic appeal and practical benefits, enhancing the overall user experience.

myoelectric hand

Claw like prosthetic hand

The claw-like prosthetic hand, designed for an NGO, is a simple, durable, and cost-effective solution for individuals who cannot afford expensive prosthetics and prioritize functionality over aesthetics. Made with robust materials, this hand features two or three prongs for basic gripping tasks, offering essential assistance for daily activities. It is ideal for those who need a reliable tool for work without the need for a lifelike appearance.



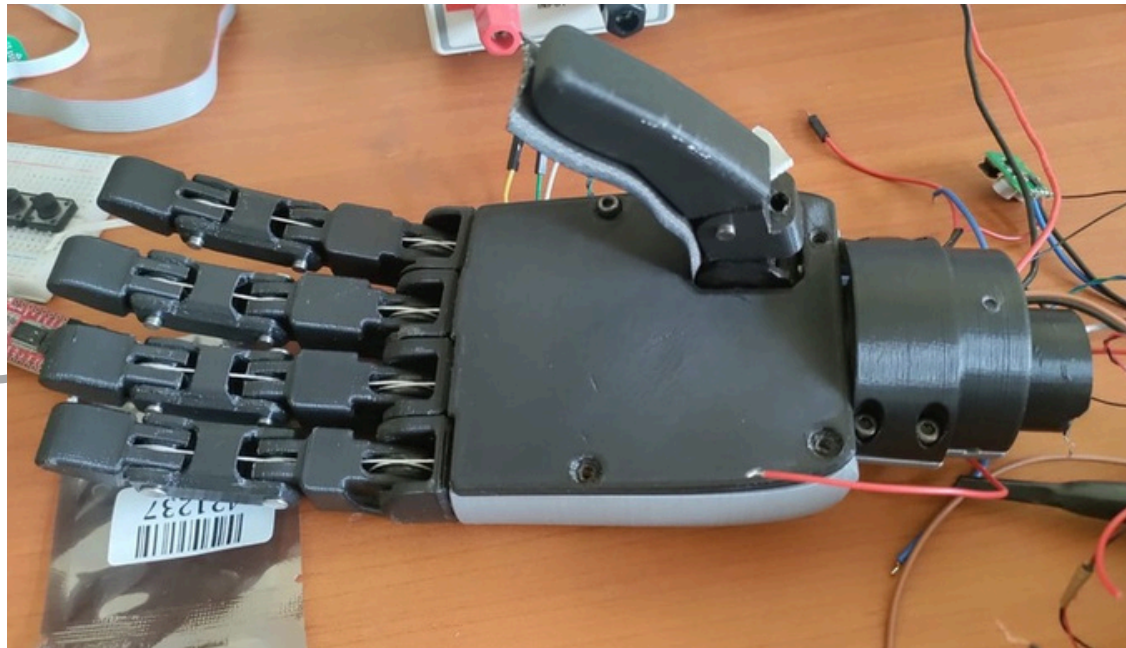
Requires low maintenance due to fewer moving parts and simple mechanics.

More affordable than advanced prosthetic hands, making it accessible to a wider range of users.

myoelectric hand

Controlled by electrical signals generated from the user's muscle contractions

Generally more expensive due to advanced technology and materials used



Typically includes sensors, motors, batteries, and a microprocessor for precise control.

Suitable for a wide range of activities, from delicate tasks like typing to more robust actions like lifting.

Often designed to closely mimic the appearance of a natural hand, enhancing user confidence and social acceptance

render
of hand



render
of fingers



Back view



Side view

learning

my learningd

06

my leanings

Despite working diligently over the past few months on developing the prosthetic hand, I've come to realize that there's much more to my journey than just this project. Here's what I've learned through this process

- I've had to manage the entire project lifecycle independently. This involved planning tasks, setting deadlines, allocating resources, and prioritizing activities to keep everything on track.
- Adapting to both minor and significant changes, whether within or beyond my control, was challenging. I learned the importance of resilience and perseverance in overcoming obstacles and setbacks.
- This project deepened my understanding of design thinking. I learned to approach design problems from multiple perspectives, brainstorm effectively, and push the boundaries of conventional thinking to create original solutions.
- Conducting both field and online research taught me how to gather and analyze data on user needs, market trends, and technological advancements. This research informed my design decisions and improved the product's relevance and functionality.
- Collaborating with professionals from various fields enhanced my communication skills. I learned how to present ideas clearly, actively listen, provide constructive feedback, and work effectively as part of a team. Embracing feedback and making iterative improvements was crucial.
- I gained technical knowledge in programming, design principles, prototyping, and production procedures specific to prosthetics. I also learned about materials procurement, supplier management, and logistics.

Thus, this graduation project served as both the pinnacle of my academic experience and a springboard for a future in design, giving me the confidence and a head start on an endless cycle of design creation

2024

Graduation project
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Product Design

