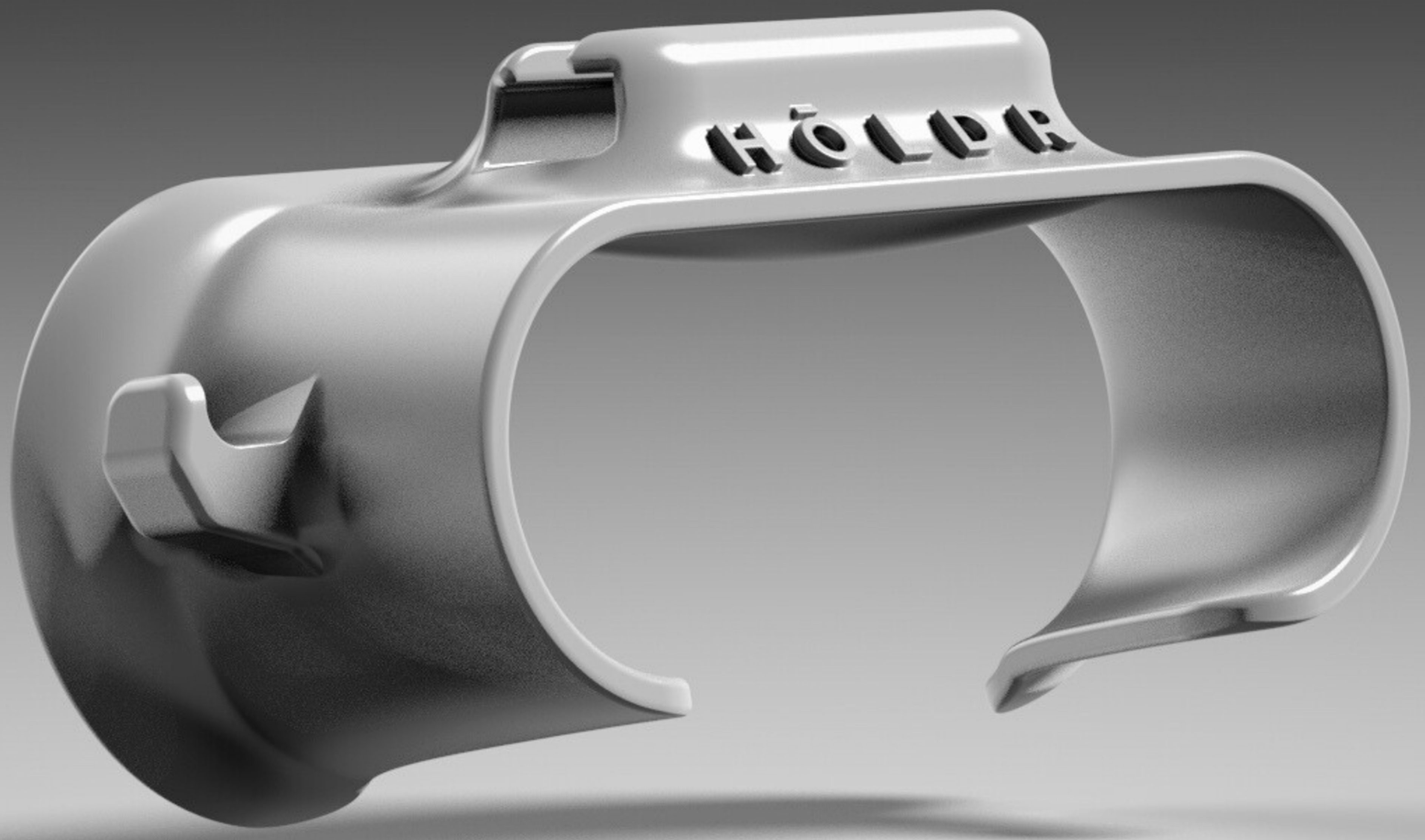
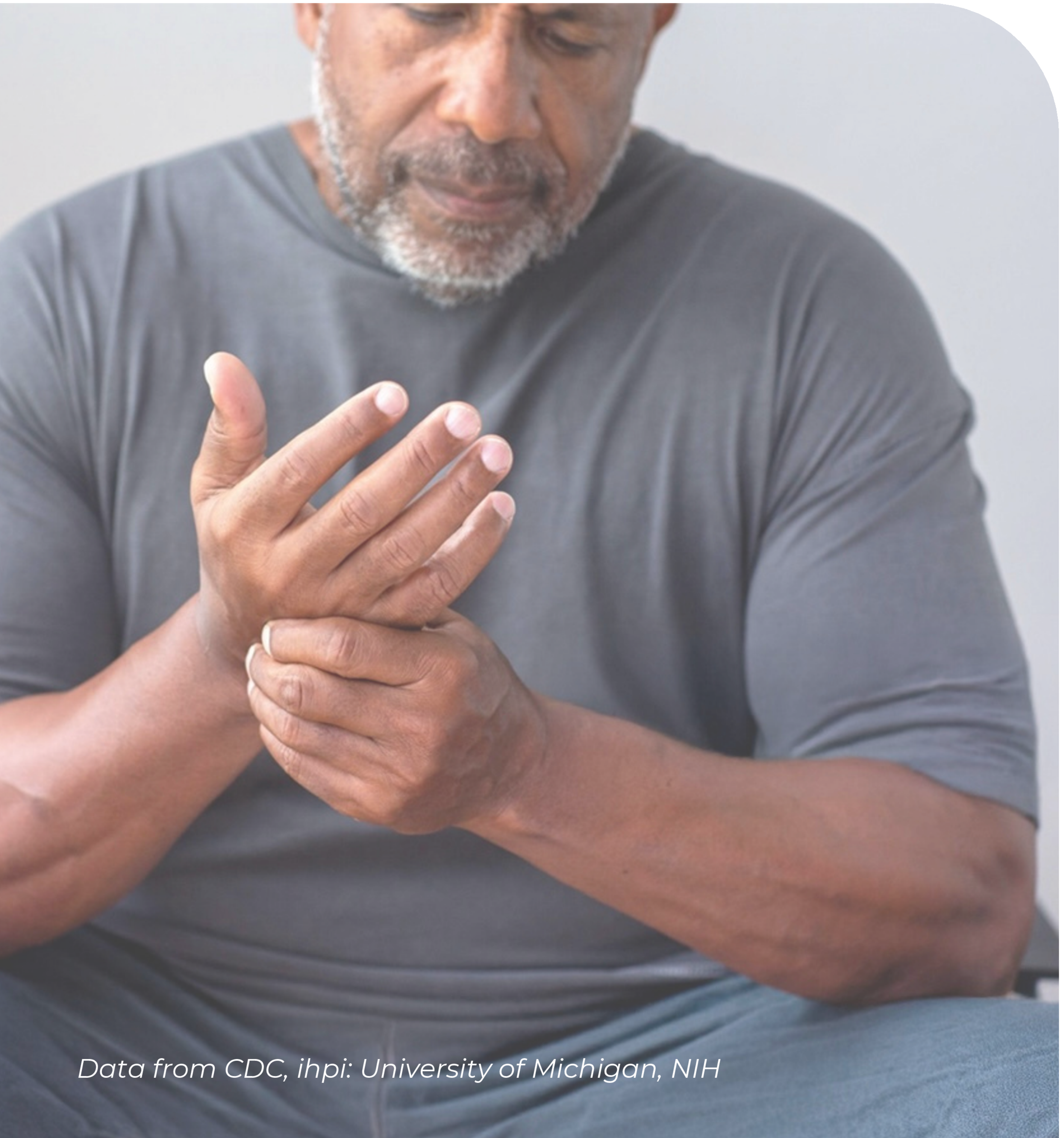
# HŌLDR

PROVIDING A BETTER GRIP ON LIFE



# BACKGROUND 1



Data from CDC, ihpi: University of Michigan, NIH

**15M+** Americans live with seriously impaired hand function

**58.5M+** U.S. adults have diagnosed Arthritis, **20M+** Americans have peripheral nerve damage or Neuropathy, Disorders like Multiple Sclerosis (MS), Parkinson’s disease (PD), stroke, and **Spinal Cord Injury (SCI)** further expand the population experiencing reduced hand function.

*SCI is one of the most life altering causes of hand dexterity loss*

# BACKGROUND 2


*Data from United Spinal Association, NSCISC*

**300K+** Americans live with spinal cord injuries

**Everyday activities** like eating, shaving, holding objects, and dressing can be **difficult or impossible**

Most rely on caregivers and adapted, bulky, clinical tools

*Tasks which most people do without thinking becomes a daily barrier*

# STAKEHOLDERS + RESEARCH

- Conducted observations and task based interviews
- Quadriplegic Individuals with C5–C8 Spinal Cord Injuries
- Family members, friends, and caregivers of the affected population
- Occupational Therapists and Physical Therapists
- Partnered with the world renowned *Miami Project to Cure Paralysis*

# PRIMARY STAKEHOLDERS

## Woody B

Age: 35

**C6 - C7 SCI**

**Pain Points:**

Getting out of bed in the morning, Difficulty shaving and brushing teeth, Opening package, Picking up items, Annoyed with accessory devices that are bulky and expensive.

## Helen S

Age: 41

**C5 - C6 SCI**

**Pain Points:**

Reliant on caregivers,  Washing face, Handling utensils or cutting food, Wearing uncomfortable adaptive devices all day, Applying makeup, Brushing hair, Putting on clothing takes a long time.

## Juan G

Age: 48

**C6 SCI**

**Pain Points:**

Trimming beard, Post shower hygiene, Using small tools (screwdriver, pen), Zipping jackets, Applying deodorant, Constant back pain.

# STAKEHOLDER INTERVIEWS

Bulky Adaptive tools

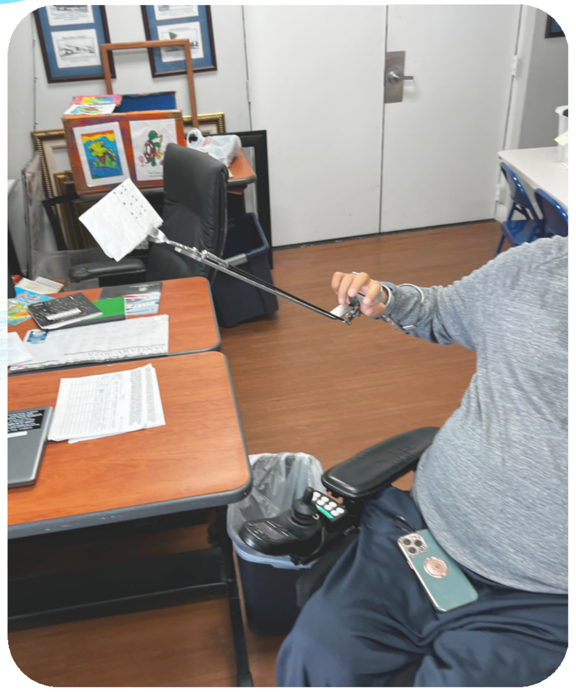
Raised desk for wheelchairs

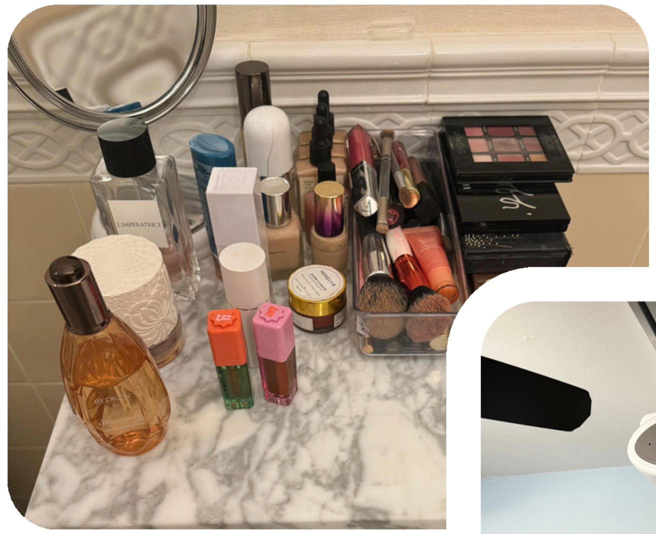
Challenge to hold & grab tools

Laundry

Wheelchair attachments

Grabbing tools





Makeup

Overhead ceiling lift

"I get sick of asking for help"

Carrying around many accessories

"So many of these(accessibility devices) are more of an annoyance, Id rather just live without"

# THE PROBLEM

The **loss of hand stability and dexterity leads to loss of independence and dignity** in everyday routines and tasks.

## THE NEED

People living with limited or no hand dexterity need a **multi Purpose accessory for daily self care tasks.**

# Design DIRECTIONS

## Household Tasks

EX: Opening packages, stabilizing objects, cleaning, cooking prep,  taking medications

## Shaving & Grooming

EX: Using an electric razor, trimming hair

## Hygiene & Makeup

EX: applying make up, washing face, skin care routines, holding small self-care tools, combing/brushing hair

# MARKET ASSESSMENT

### Sammons Preston

- Uncomfortable
- Hard to Don
- Clinical Look
- Limited Movement
- Clunky
- Not Durable
- Velcro
- Hard to Clean

### EaZyHold bands

- Child-Like
- Breaks Easily
- No Stability
- Single Purpose
- Not Discreet
- Slips Easily
- Cheap


### Active Hands

- Complicated Setup
- Restrictive
- Ugly
- Scratchy
- Attention-Drawing
- Velcro
- Overkill for Tasks
- Expensive

### Quadtool gripper

- Very expenive
- Awkward Shape
- Too Big & Heavy
- Not Pocket Friendly
- Custom Made
- Hard to Control
- Rigid
- Medical Looking

### iRoll Hand Hook

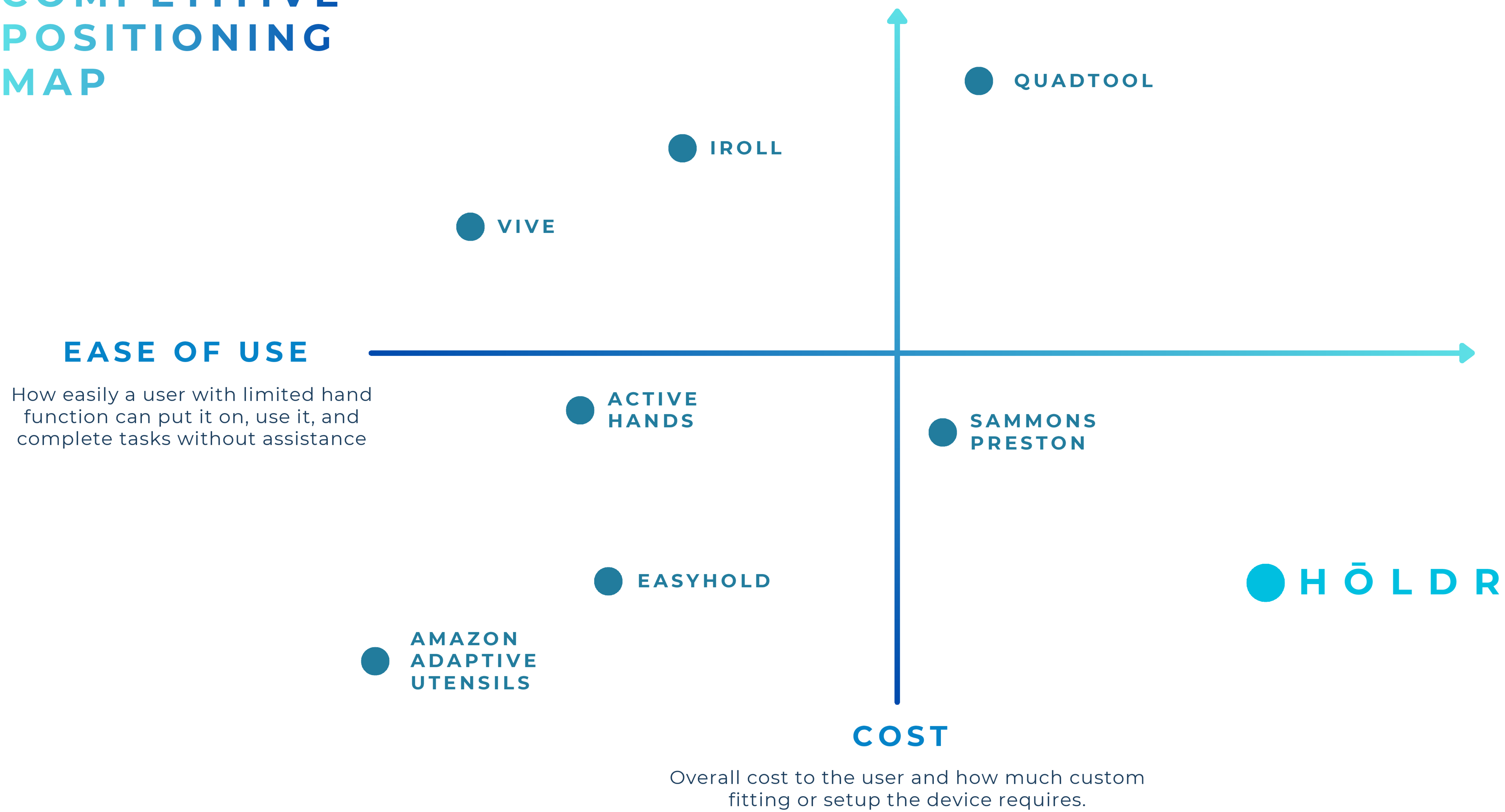
- Poor Fit
- Cheap Material
- Velcro
- Creates rash
- Low Stability
- Obtrusive
- Sweaty and Hot

### Functional Hand

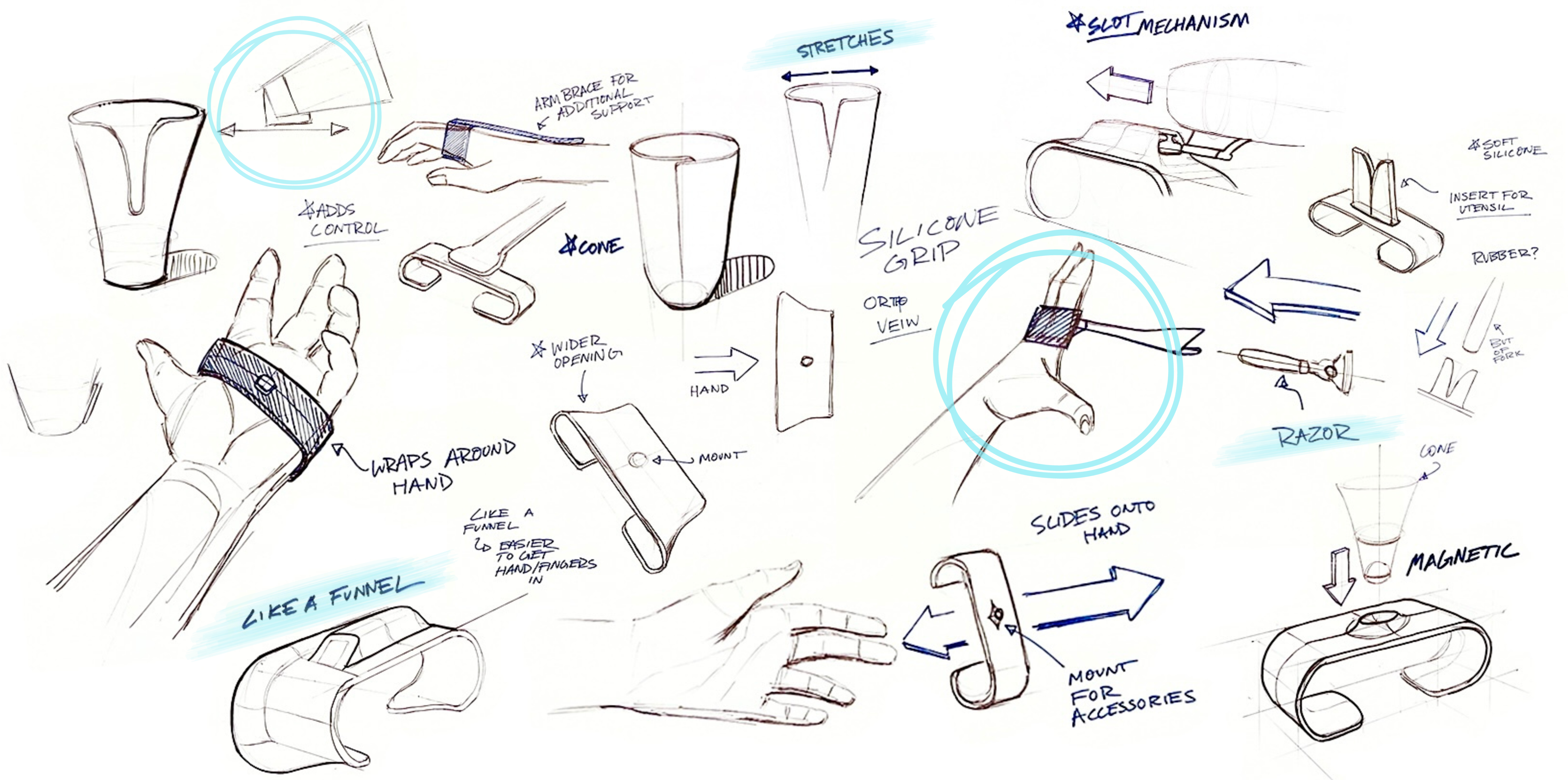
- No Grip
- Hard to Control
- No Stability
- Child-Like
- Degrading
- Limited Function

*Information gathered from users, online product reviews, Occupational Therapists, amazon.com*

# COMPETITIVE POSITIONING MAP



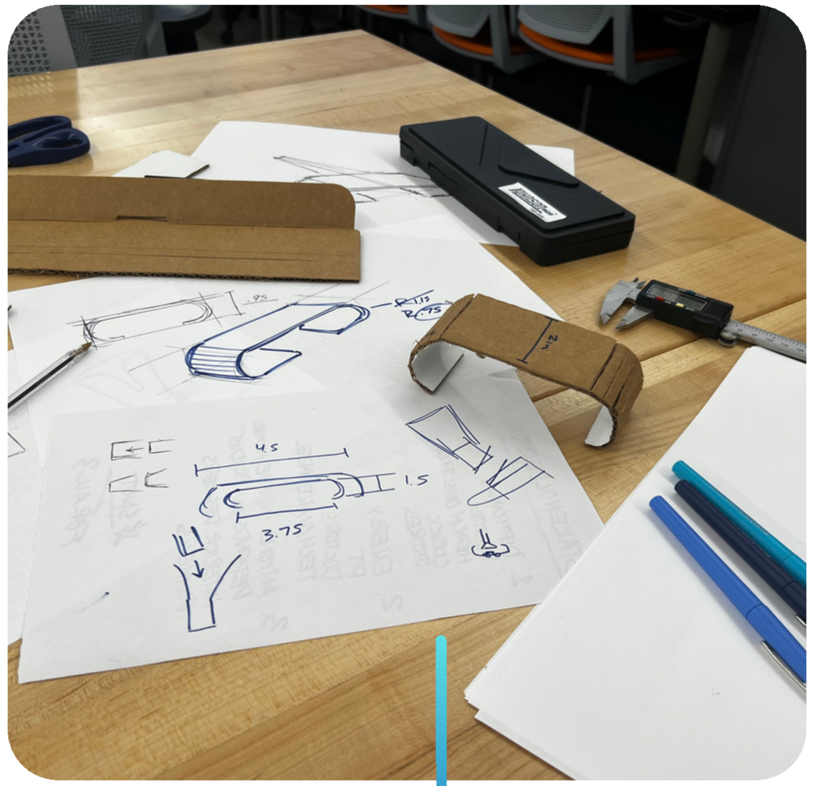
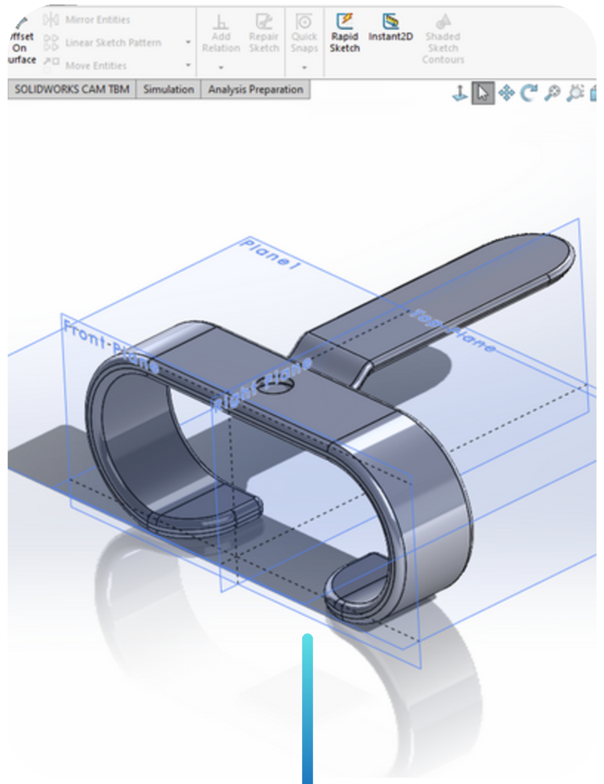
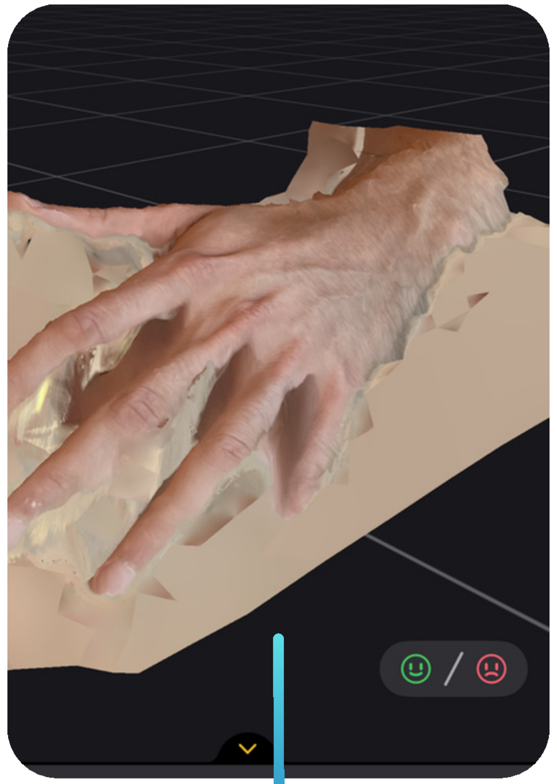
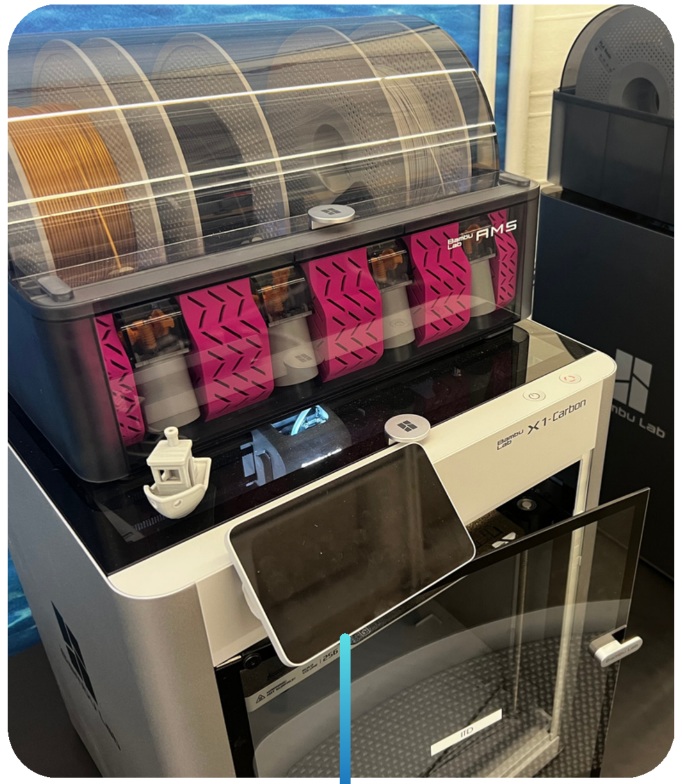
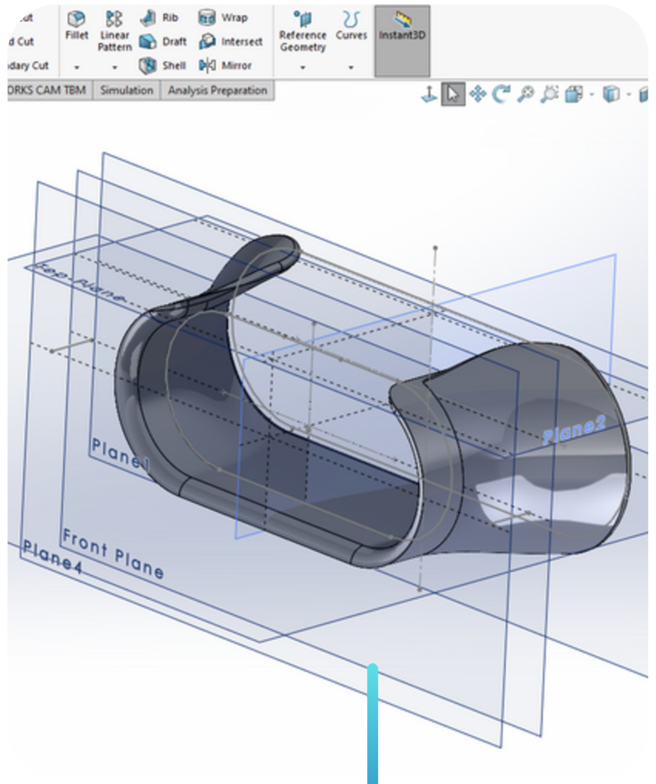
# SKETCH IDEATION



# MOOD BOARD


# EARLY PROTOTYPING

Rapid Prototyping to explore form, fit, ergonomics, and function

| CARDBOARD & DIMENSIONIONG | CAD EXPLORATION | 3D HAND SCANNING | 3D PRINTING PROTOTYPES | CAD ITERATION |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

*Early CAD with brace*

*Rapid 3D printing*

*Quick mockups used to validate size, form, and thickness before CAD*

*3D scans used to model natural finger curl, palm volume, knuckle contour, ergonomic fit*

*Funnel shaped surface*

# PRODUCT EVOLUTION

*Over 20 Separate iterations on grip, attachment, accessories, etc.*

# STAKEHOLDER FEEDBACK

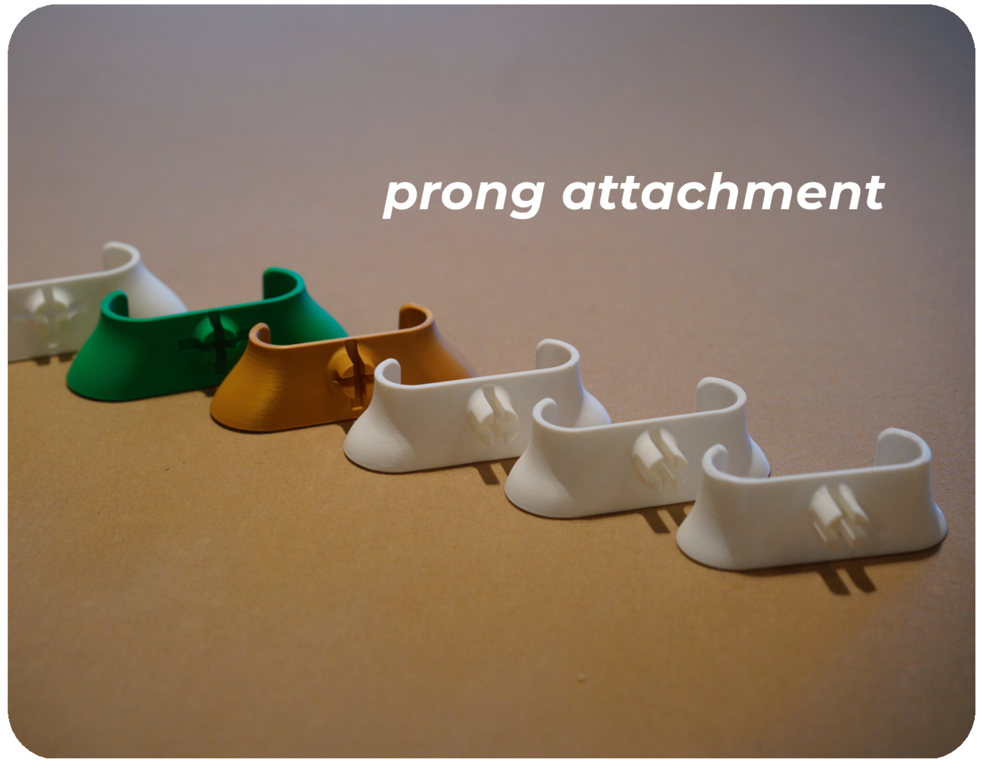

Juan testing it out

**Removed forearm brace**
→ Users didn't want bulky support

**Funnel-shaped entry**
→ Fingers can slide in naturally without force

**Slimmer + tighter grip**
→ More control, better comfort

**Slot universal connector**
→ Better position, More secure


prong attachment


Evolution of the funnel design


1st grip


Testing out electric razor

# STAKEHOLDER FEEDBACK

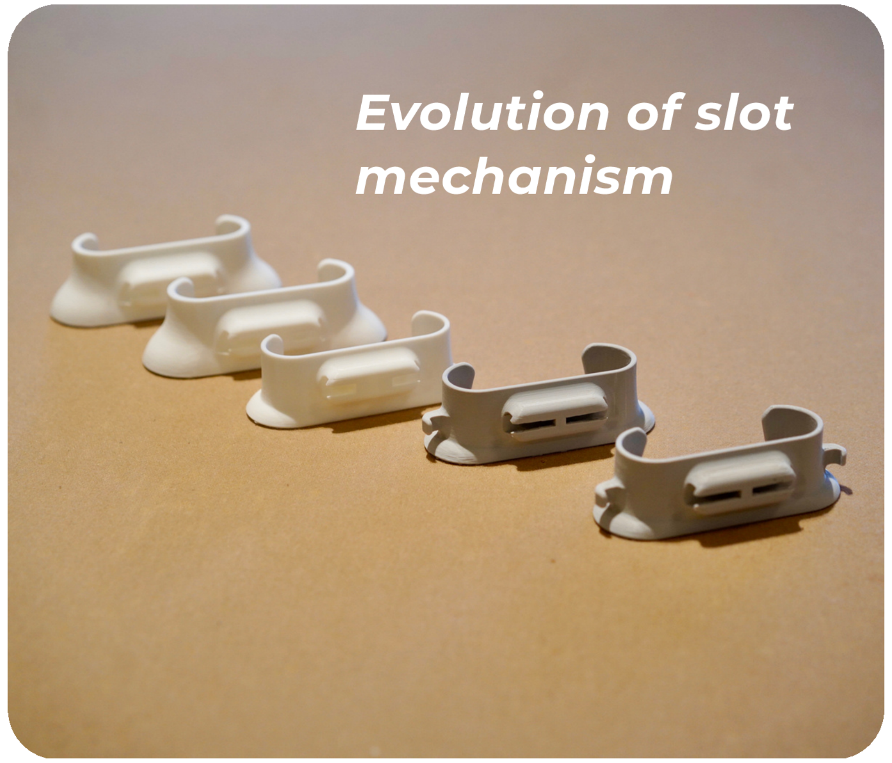

*Woody tesing it out*

**Angled accessory mount (~15°)**
→ Aligns with motions: shaving, brushing teeth, etc

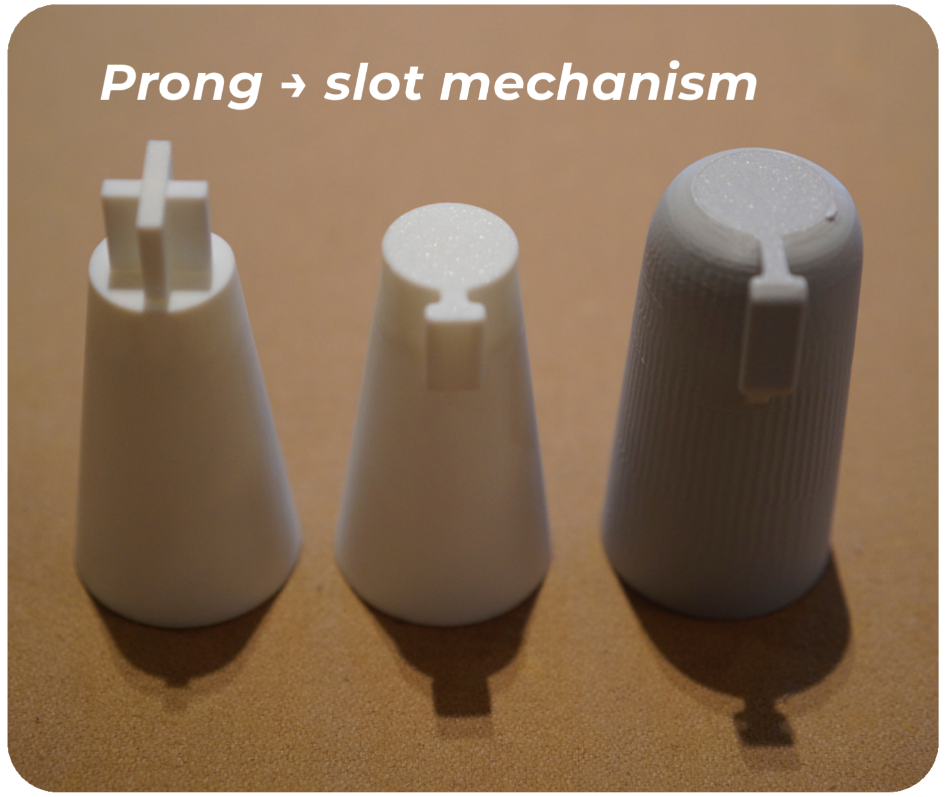
**Palm-conforming underside**
→ No shifting during movement

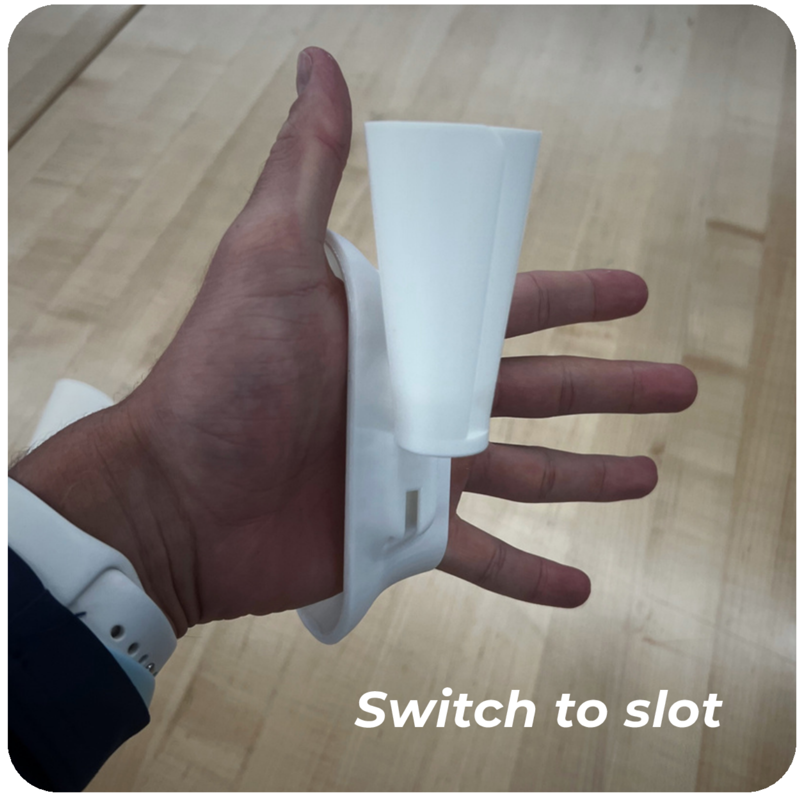
**Deeper, tapered lock geometry**
→ Easer insertion, still locked during use

**Added zipper + bag hooks**
→ Zippers, buttons, Carrying small items

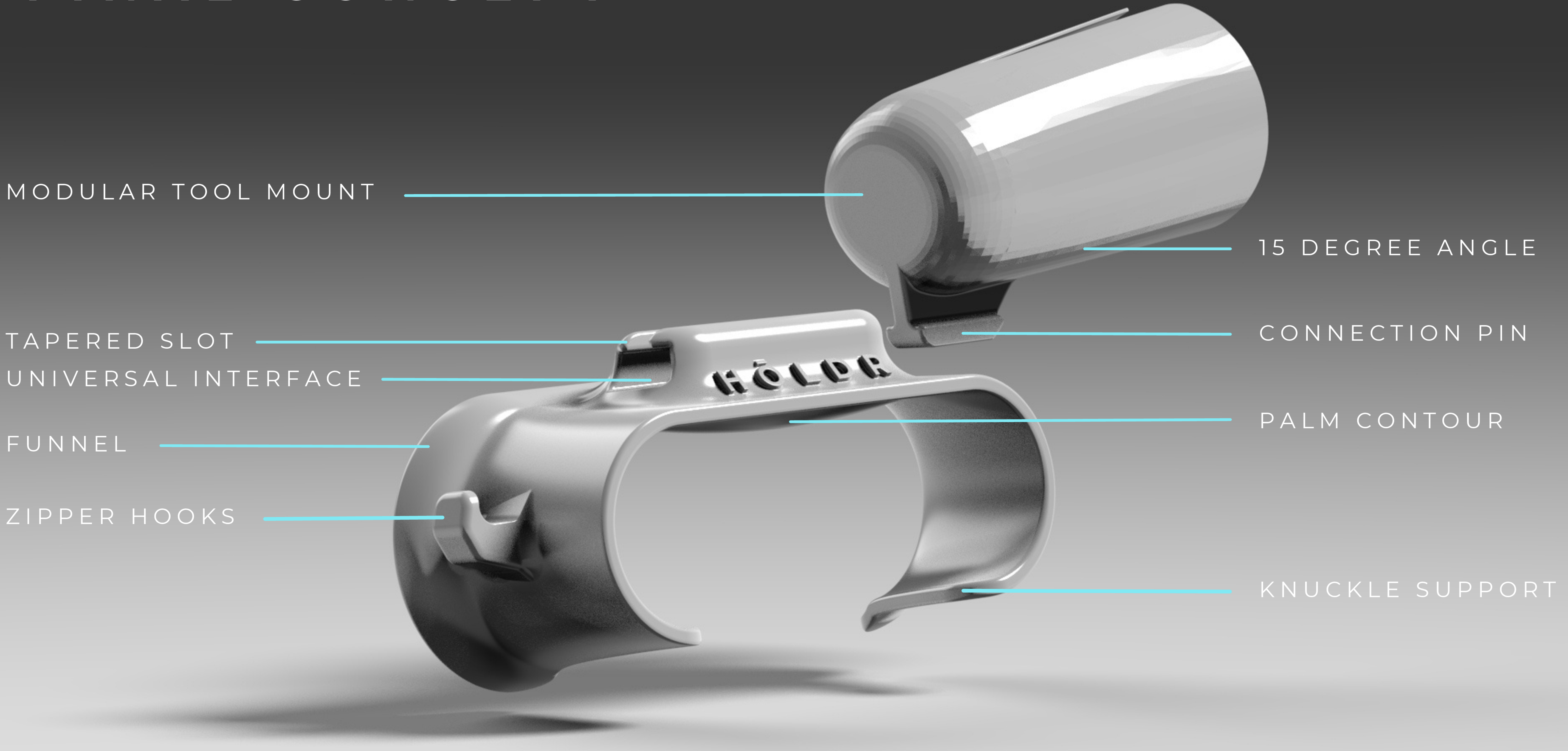

*Evolution of slot mechanism*


*Evolution of cone attachment*


*Prong → slot mechanism*


*Switch to slot*

# FINAL CONCEPT



HŌLDR

IN USE

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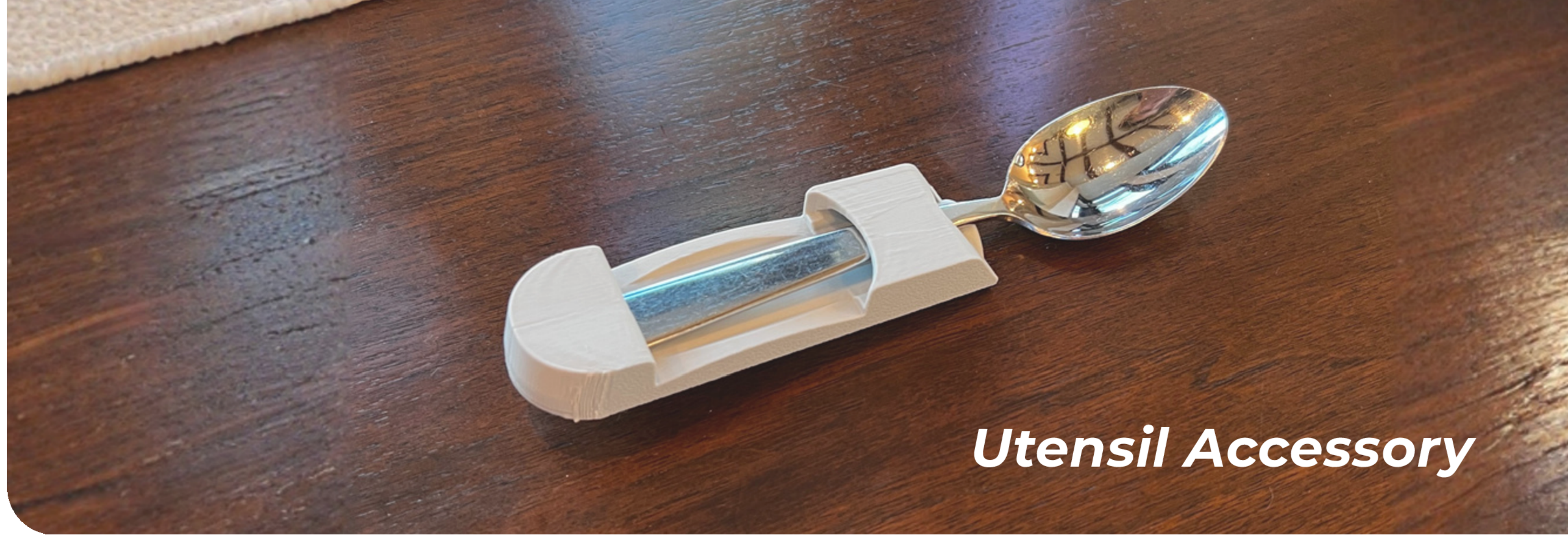
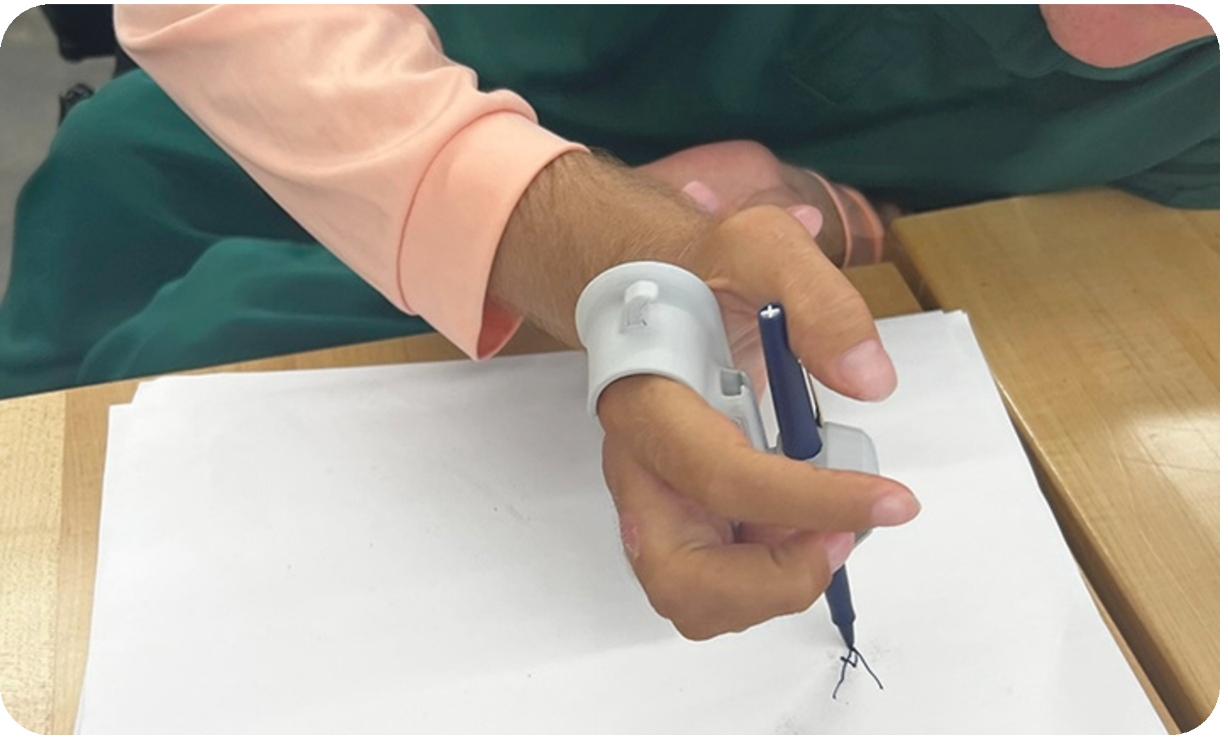


Utensil Accessory



Pen attachment

Shaving with an electric razor

**“I HAVE BEEN WAITING FOR THIS FOR 17 YEARS”**

*-Alan(Stakeholder)*

# VERSATILITY

*Electric toothbrush • Screwdriver • Lipstick • Fork • Zipper pull • Hairbrush • Allen key • Marker • Deodorant • Door handle assist • Spoon • Makeup brush • Key • Nail file • Bag handle • Stylus • Blush • Small tools • Pen • Leash handle • Electric razor • Comb • Knife • Wheelchair accessories • Mascara • Button hook • Pencil • Cooking appliances*

# WHATS NEXT?

**Real-World Use**
HŌLDR is now being distributed through a partnership with The Miami Project to Cure Paralysis. Over 100 users are currently using the device, with parts being produced through scalable 3D printing.

**Personalized Fit**
The grip is designed to be easily resized. A simple 3D scan of a user’s palm can be used to adjust the geometry for improved comfort and stability without redesigning the system.

**Open Source Access**
HŌLDR is published on Makers Making Change and other open-source CAD platforms, allowing users and makers to download, adapt, and create new attachments.

**Continued Growth**
Ongoing work includes expanding attachments and exploring higher-volume manufacturing for broader access.

# SOURCES


https://www.uofmhealth.org/conditions-treatments/rehabilitation/spinal-cord-injury
https://www.ninds.nih.gov/health-information/disorders/spinal-cord-injury
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6293171/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6766765/
https://www.cdc.gov/spinalcordinjury/index.html
https://www.sralab.org/lifecenter/resources/assistive-technology-hand-function
https://www.mayoclinic.org/diseases-conditions/spinal-cord-injury/symptoms-causes https://www.archives-pmr.org/article/S0003-9993(18)30027-6/fulltext
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