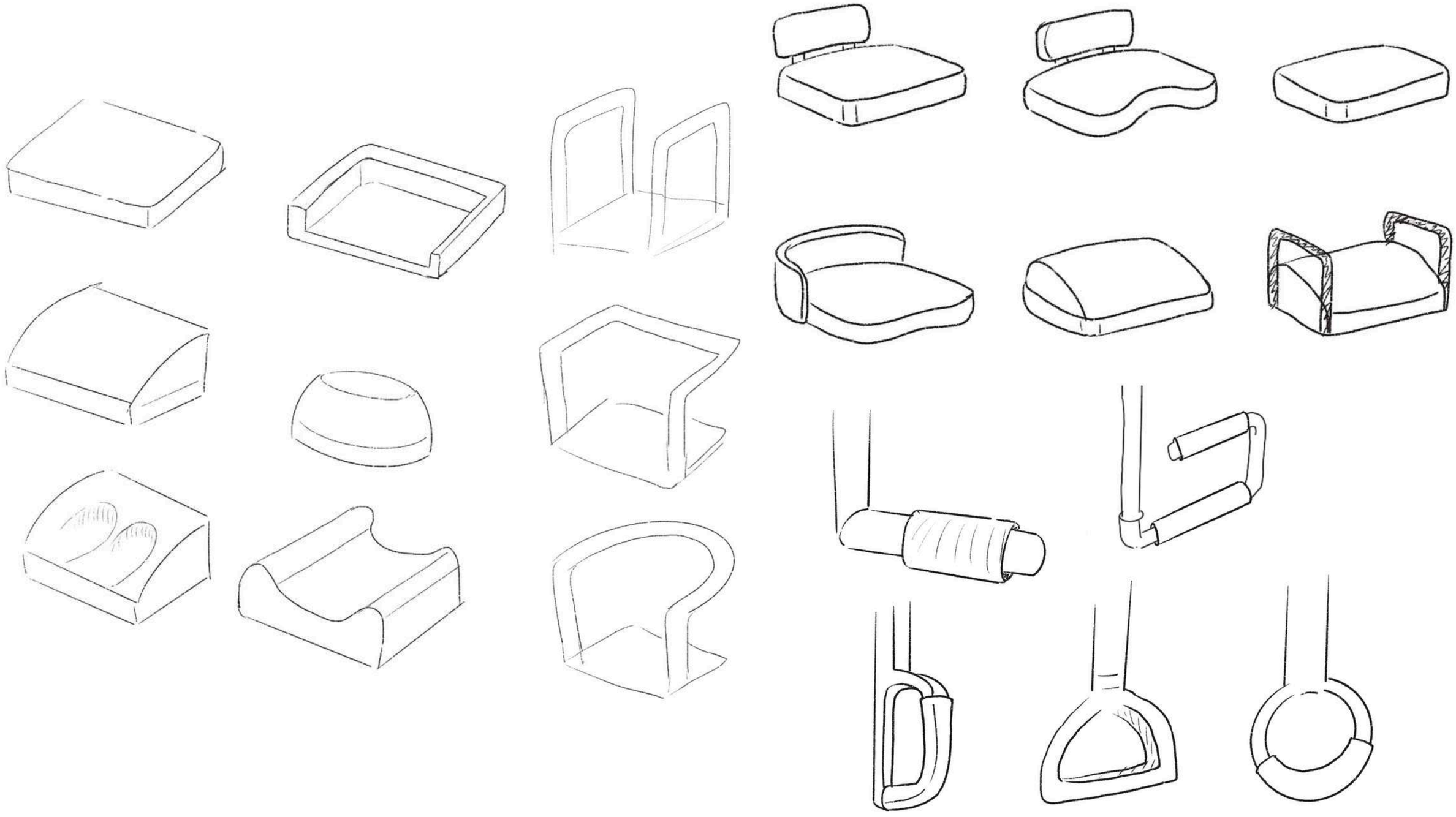
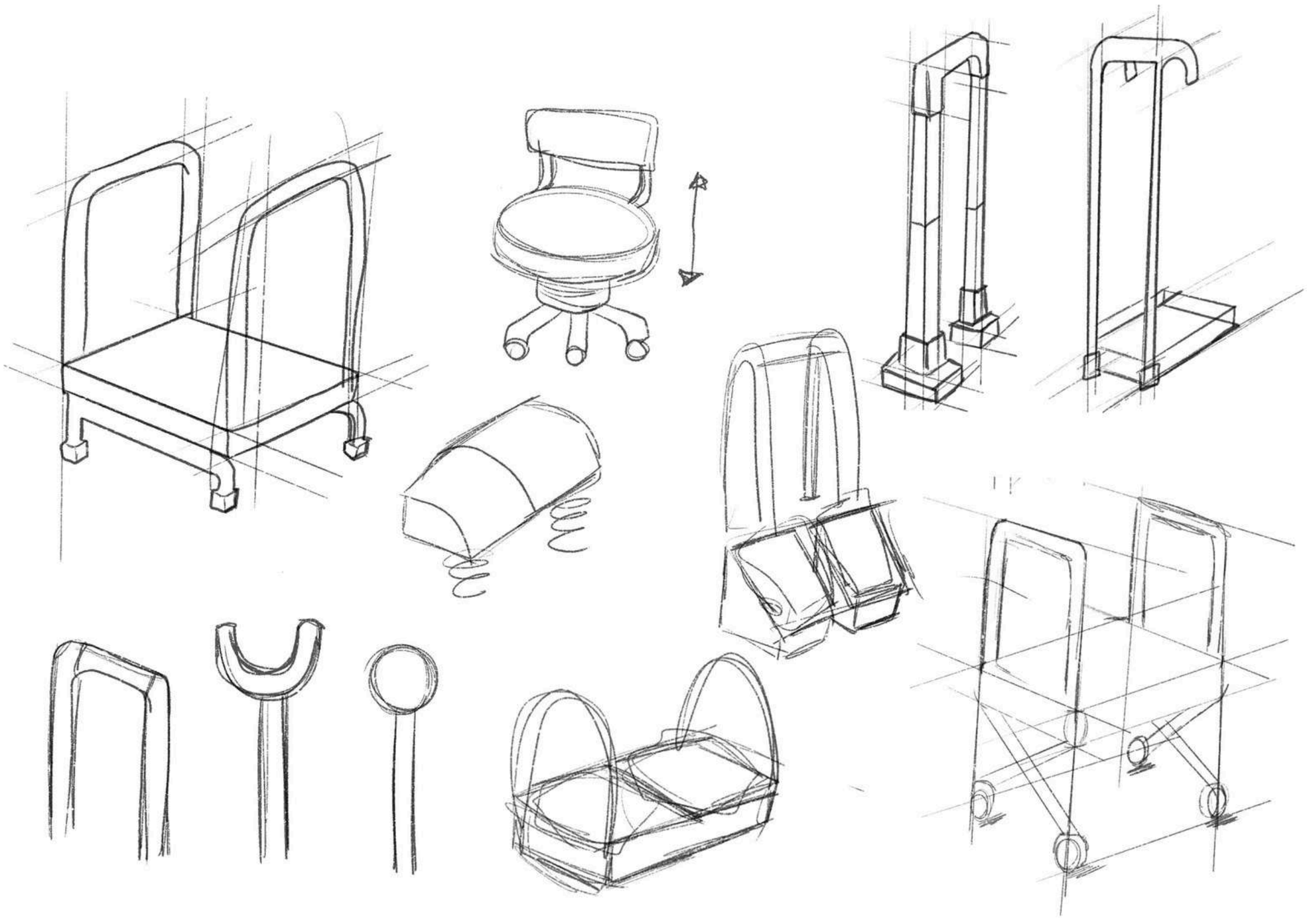
04

CONCEPT EXPLORATION & SELECTION

INITIAL IDEATION

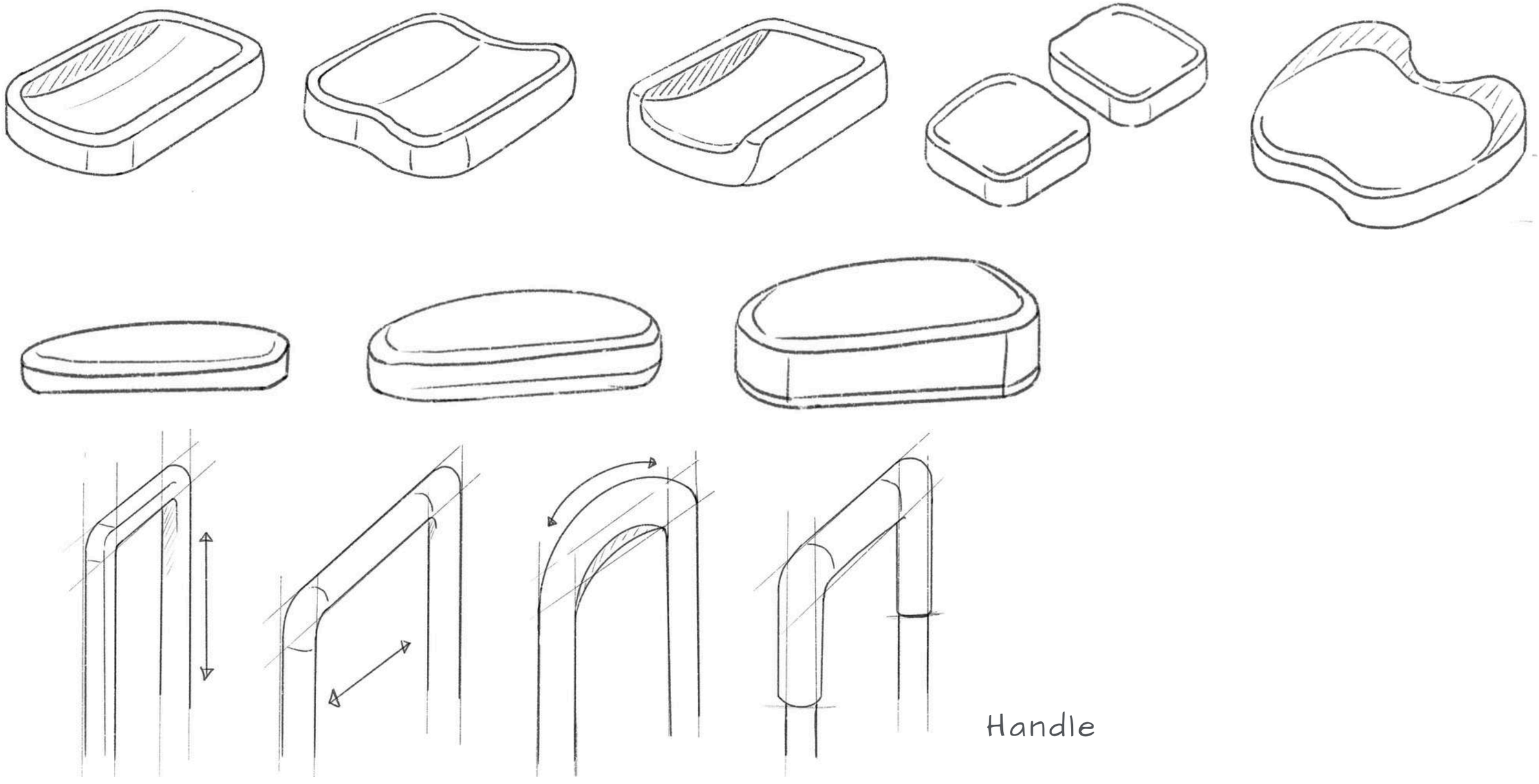


INITIAL IDEATION

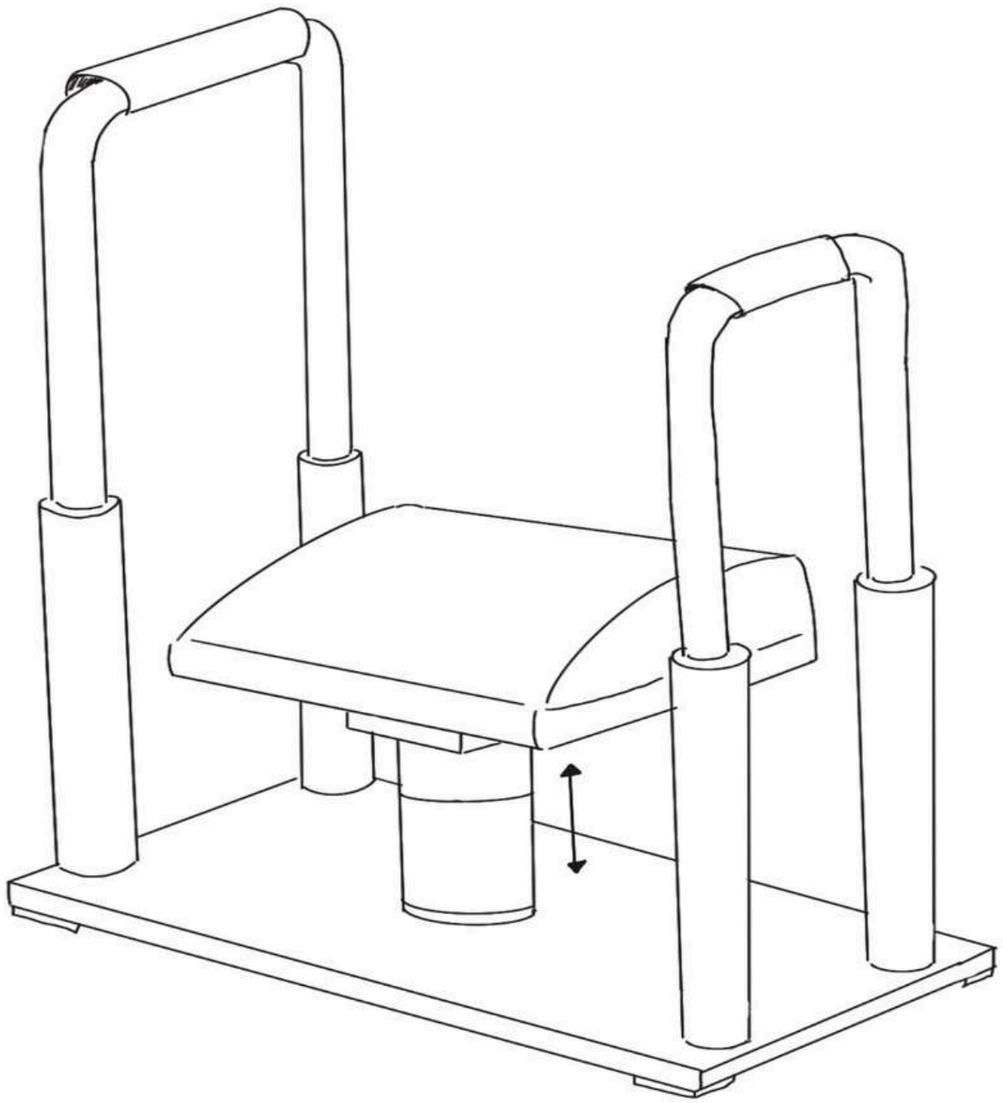


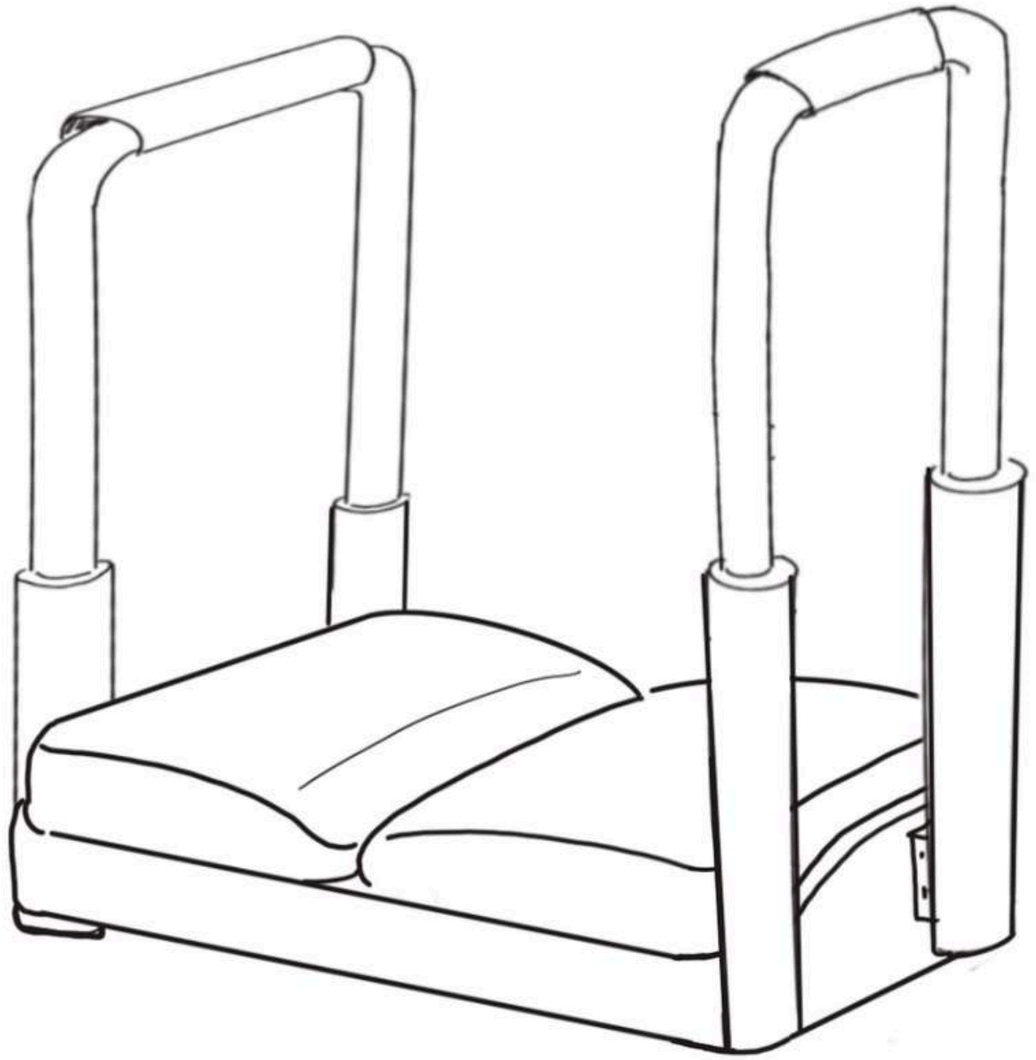
CONCEPT 1 _ ASSISTED KNEE PLATFORM

Form Exploration



CONCEPT 1 _ ASSISTED KNEE PLATFORM



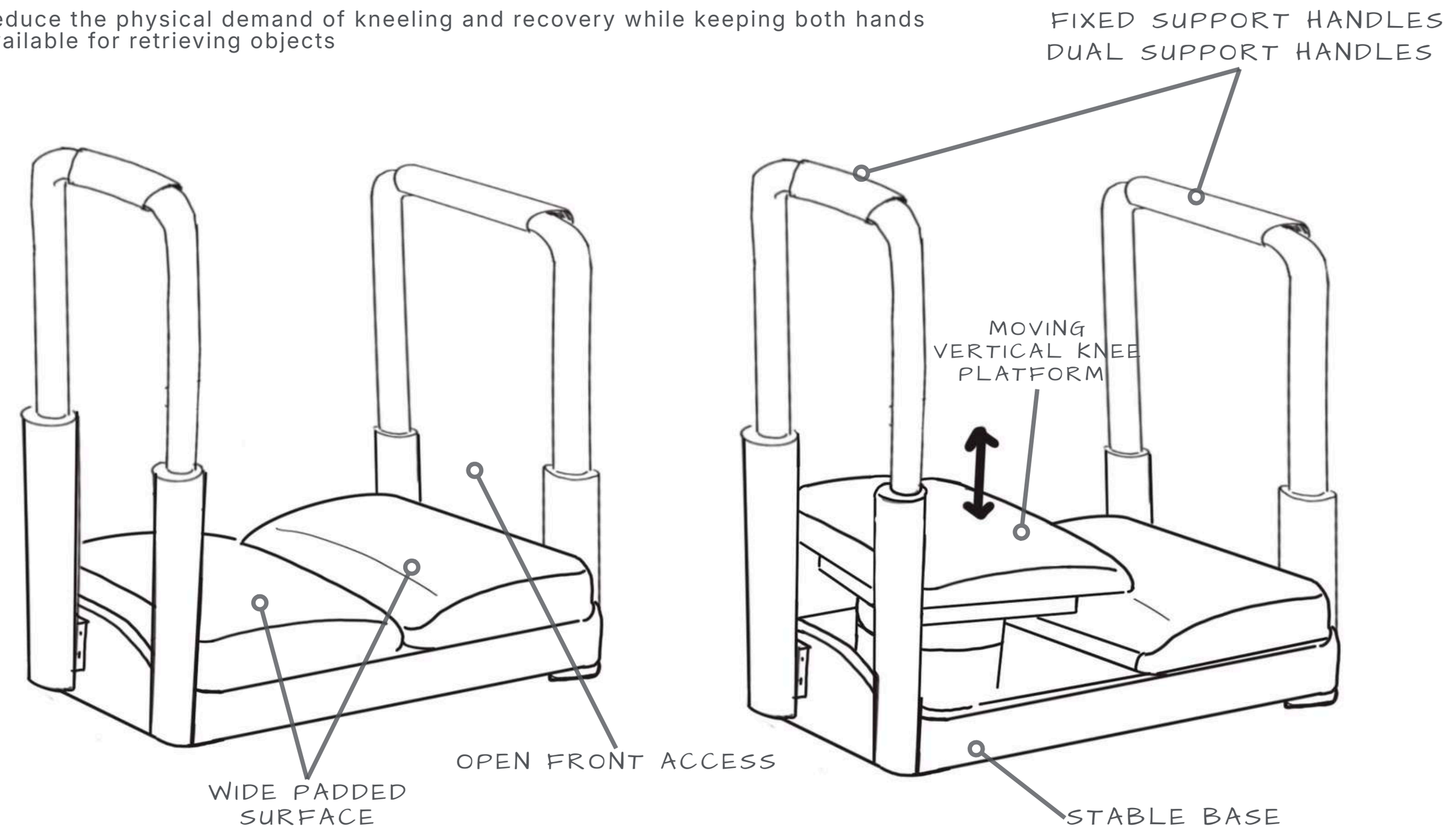


CONCEPT 1 _ ASSISTED KNEE PLATFORM

WEEK 08

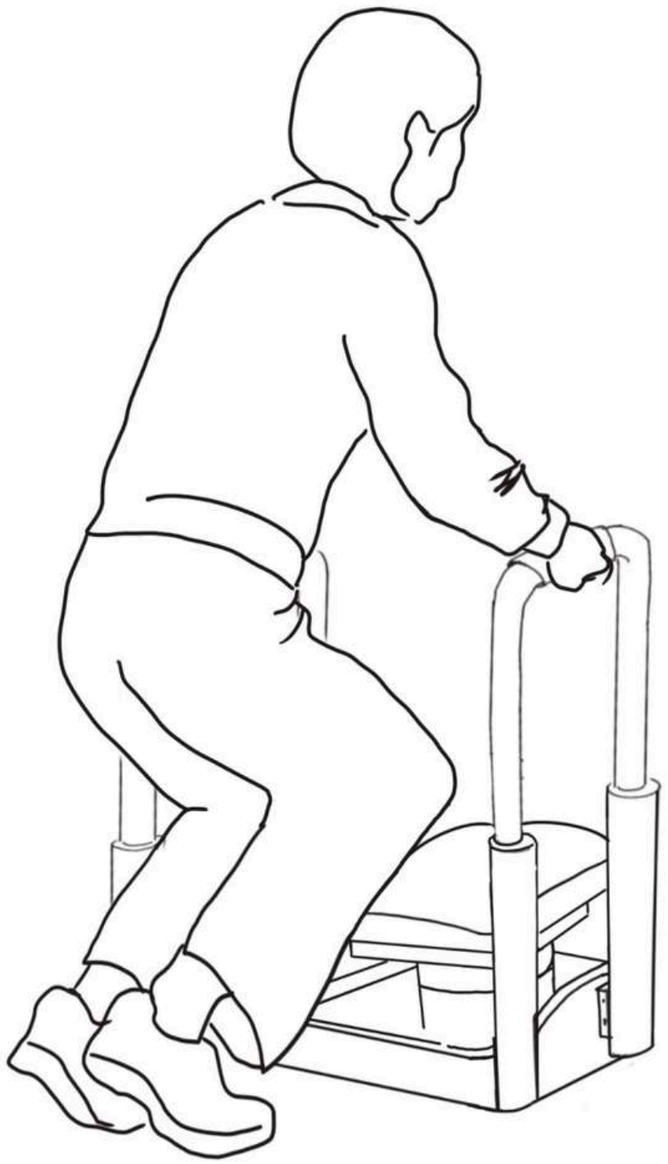
DESIGN REASON

Reduce the physical demand of kneeling and recovery while keeping both hands available for retrieving objects



CONCEPT 1 _ ASSISTED KNEE PLATFORM

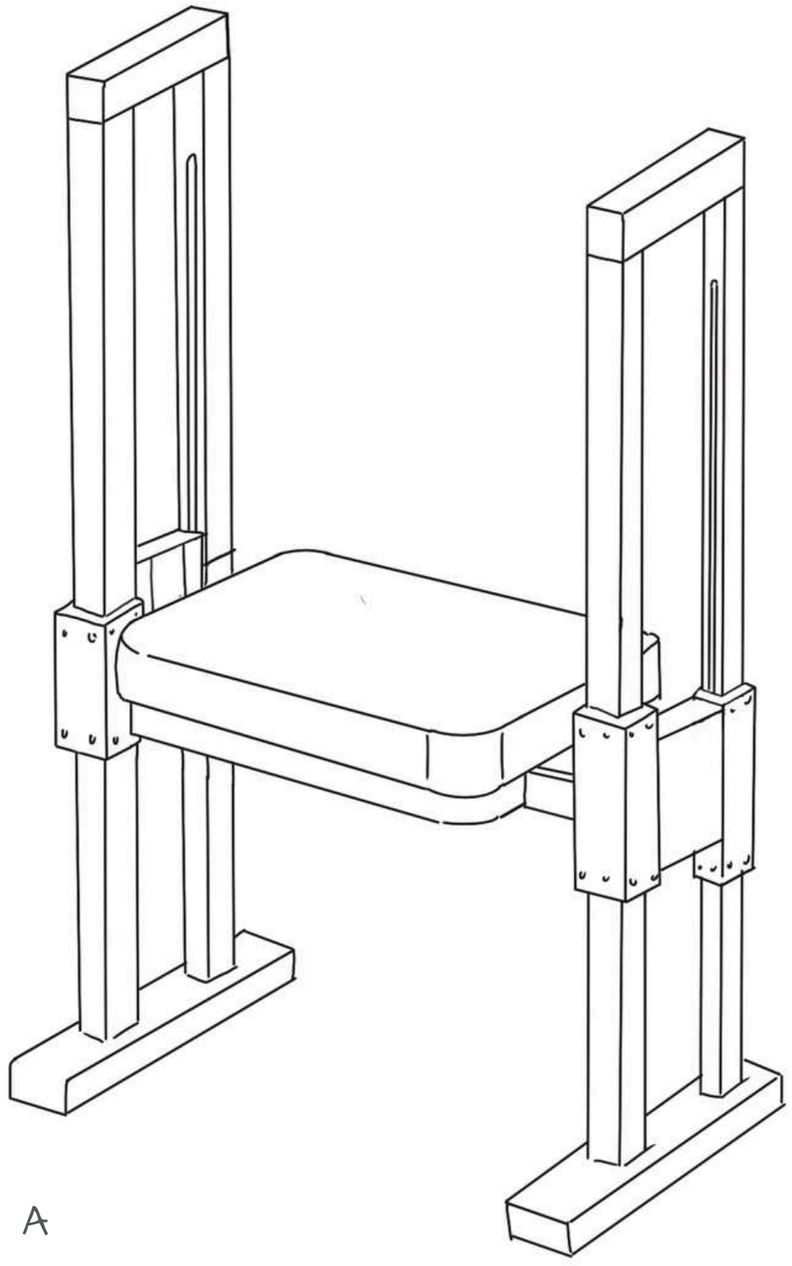
User Interaction



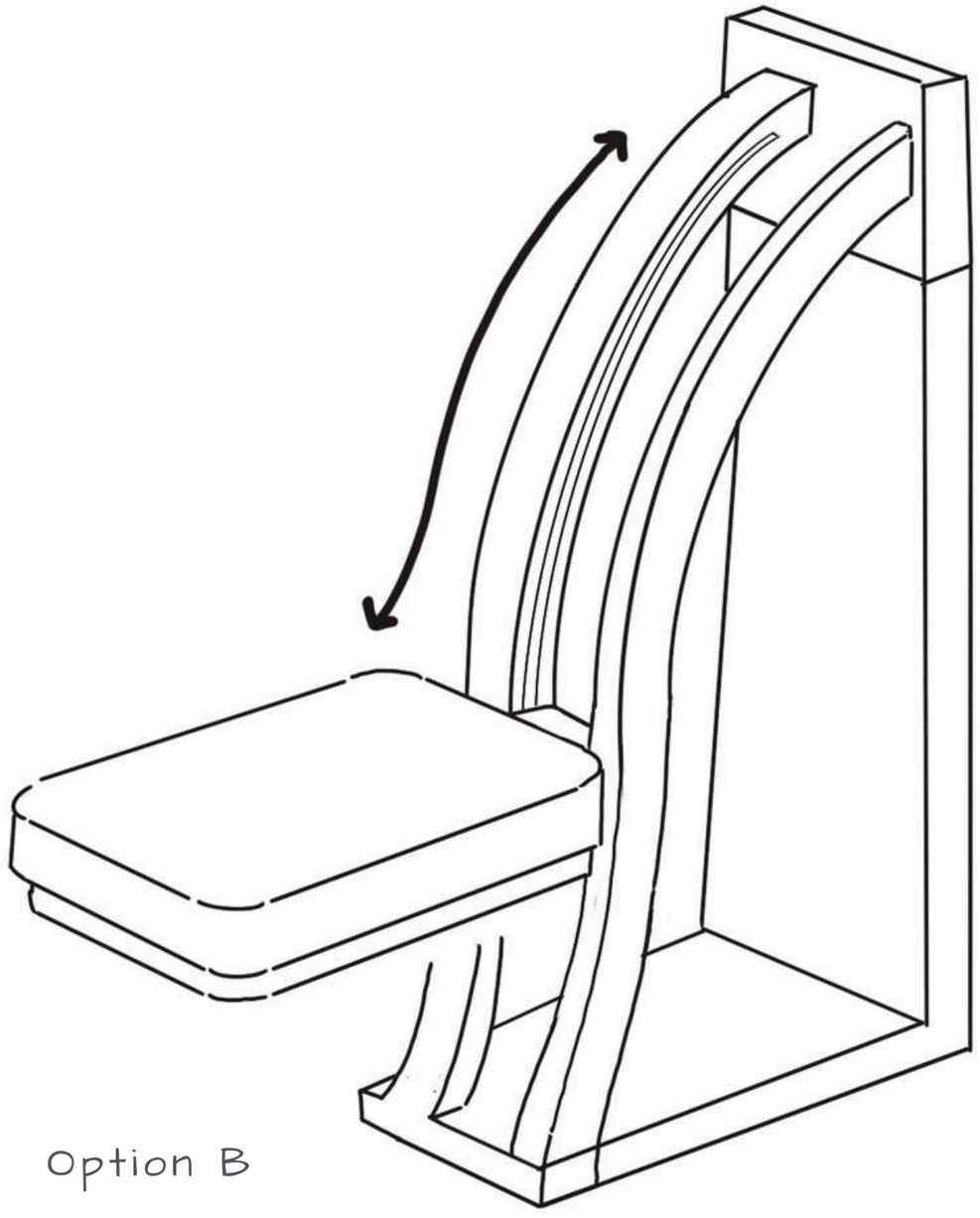


CONCEPT 2 _ SLIDING PELVIC SUPPORT

HERO SKETCH



Option A

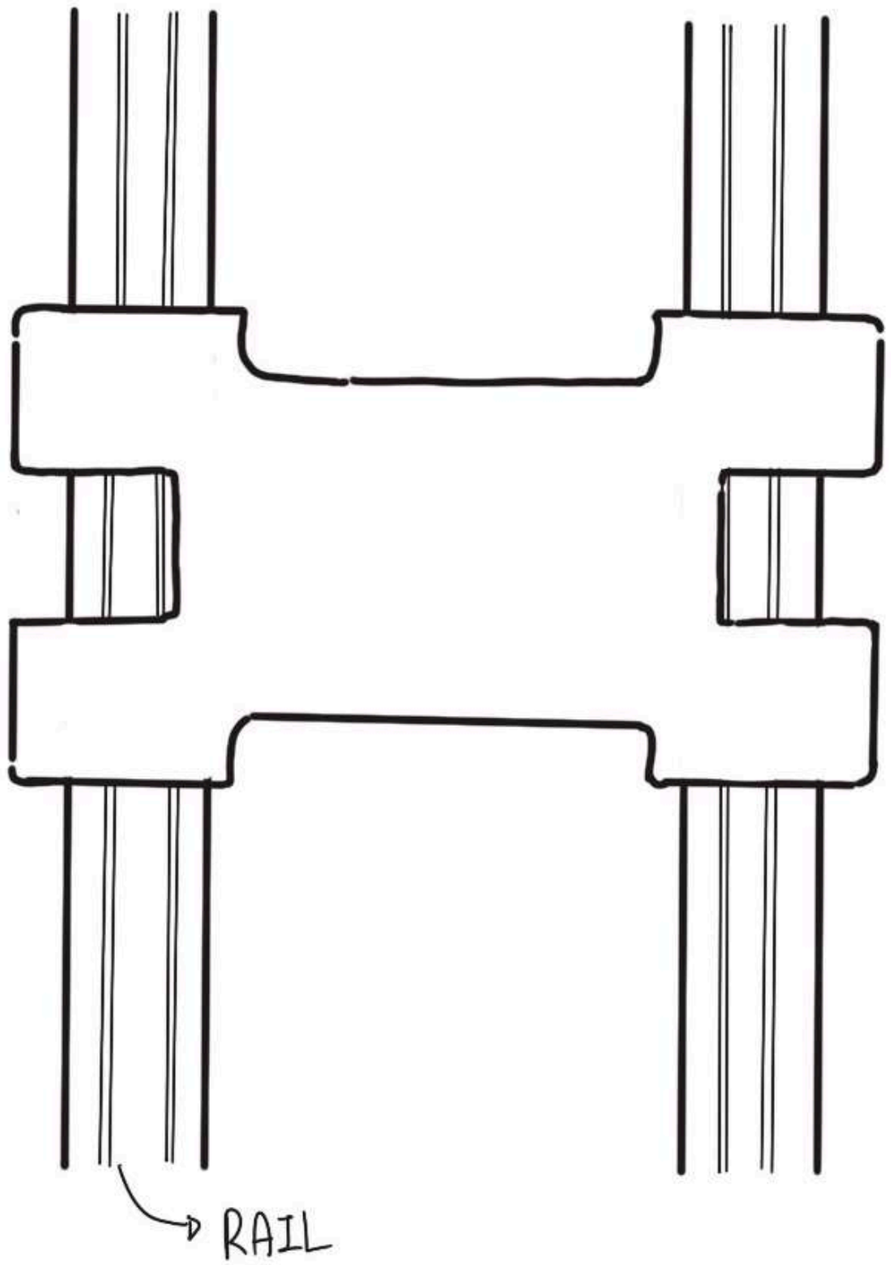


Option B

CONCEPT 2 _ SLIDING PELVIC SUPPORT

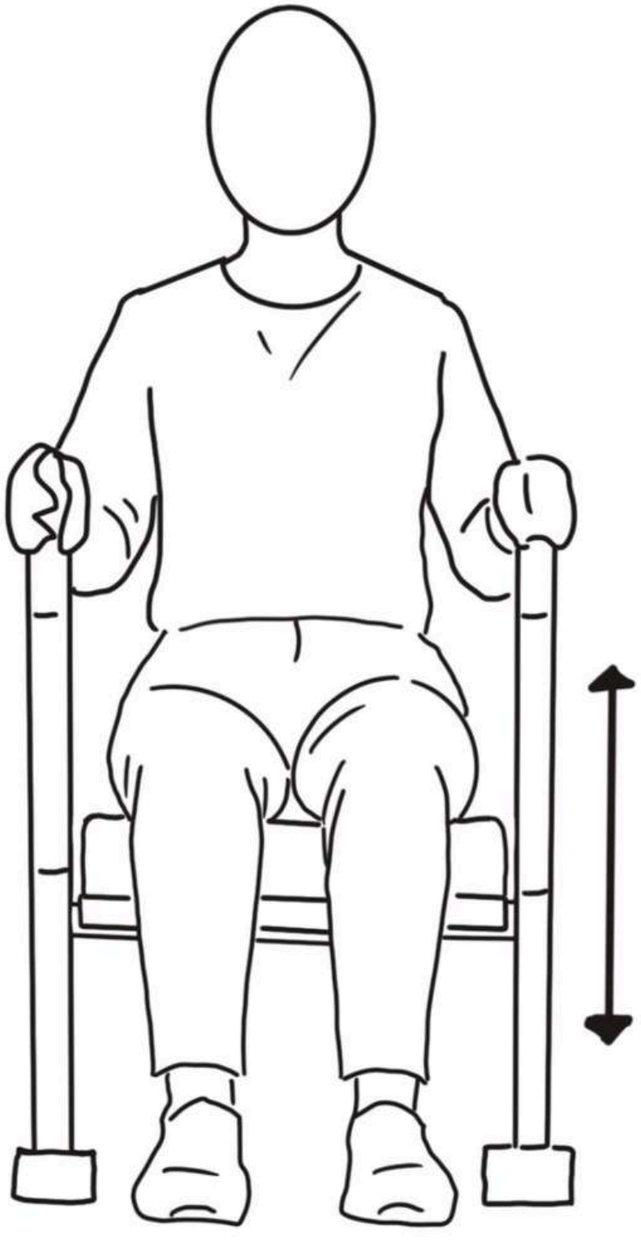
DESIGN REASON

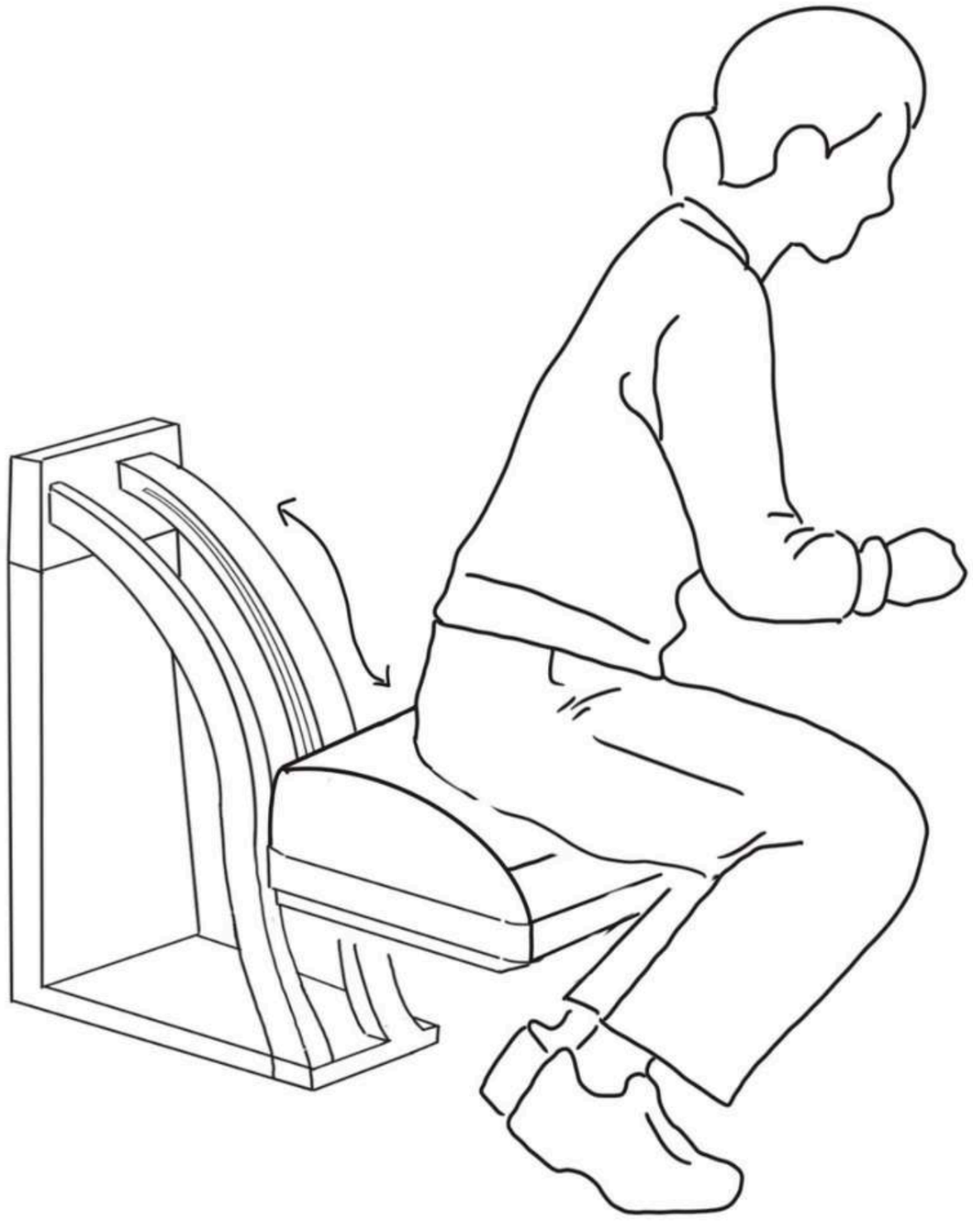
Support the pelvis throughout the movement while allowing the user to remain partially weight-bearing through the legs



CONCEPT 2 _ SLIDING PELVIC SUPPORT

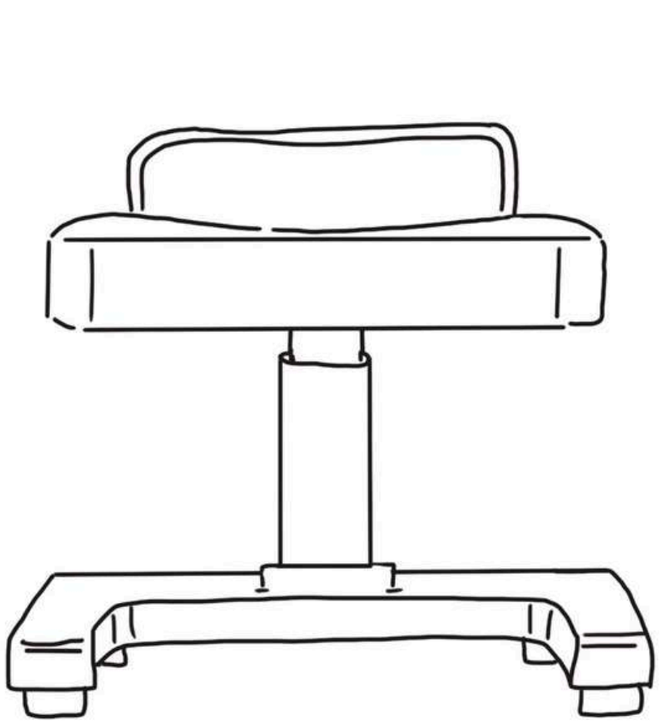
User Interaction

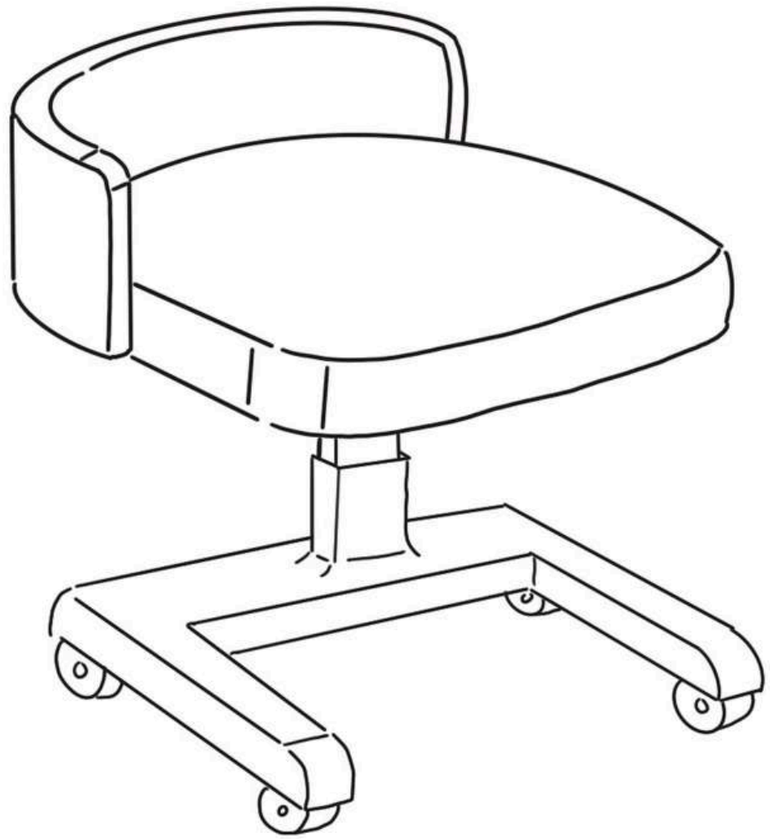


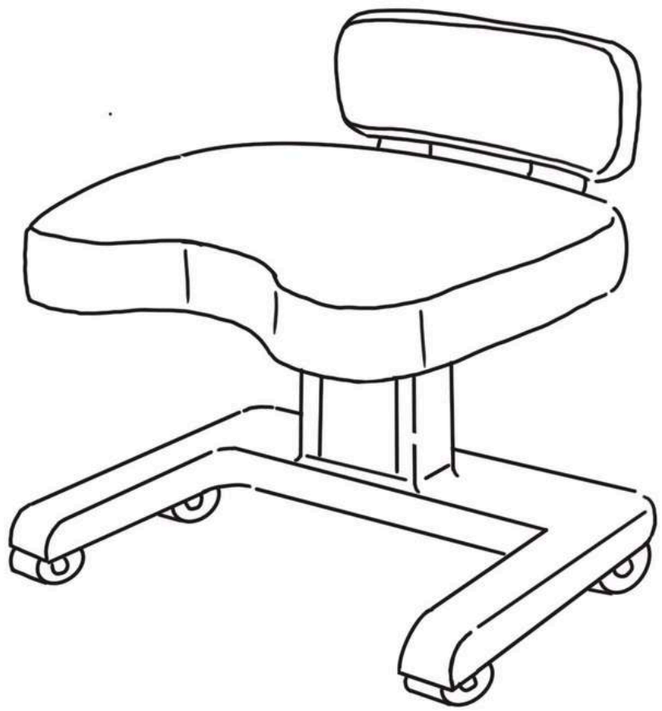


CONCEPT 3 _ ASSISTED LOW SEAT

Form Exploration



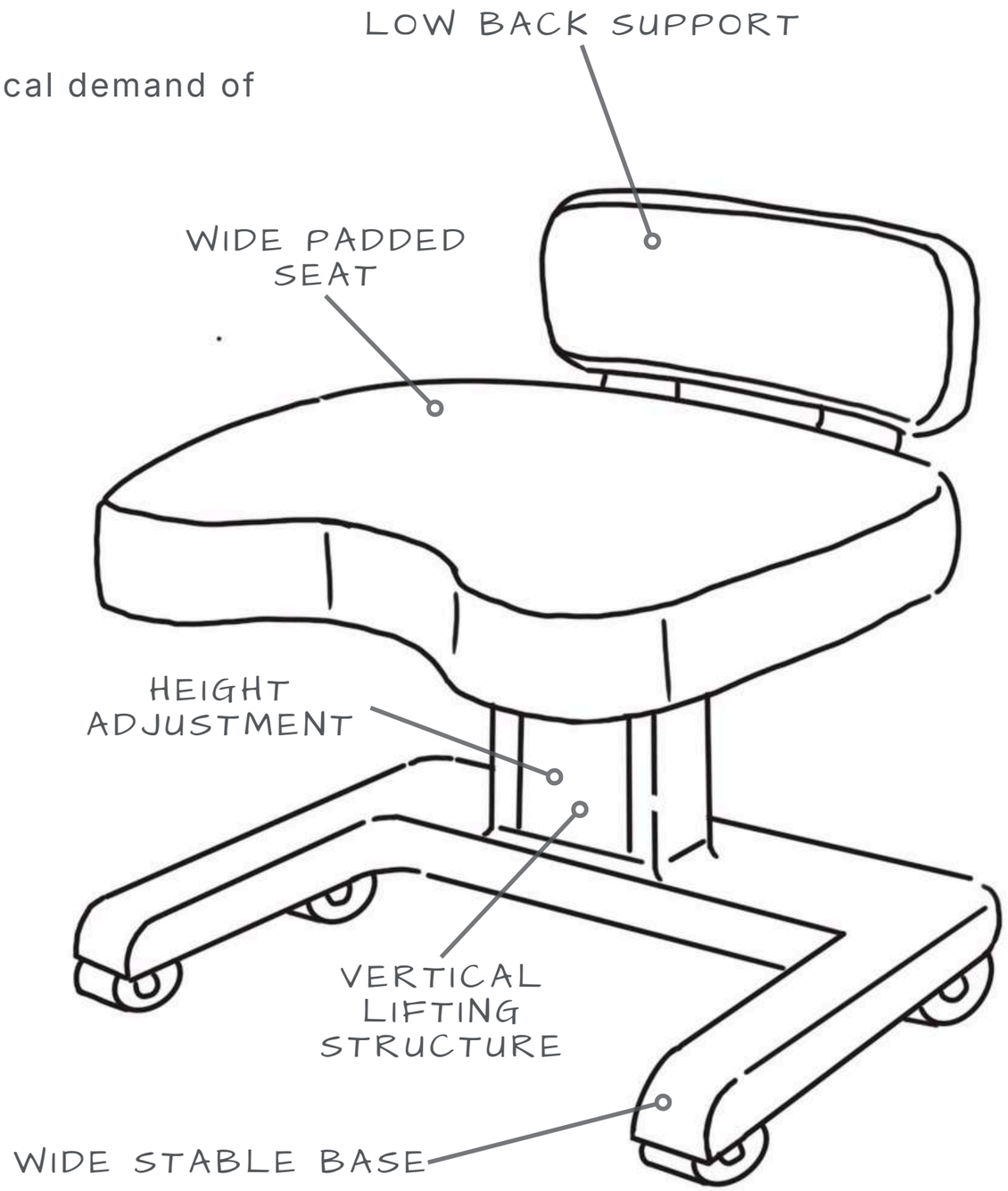




CONCEPT 3 _ ASSISTED LOW SEAT

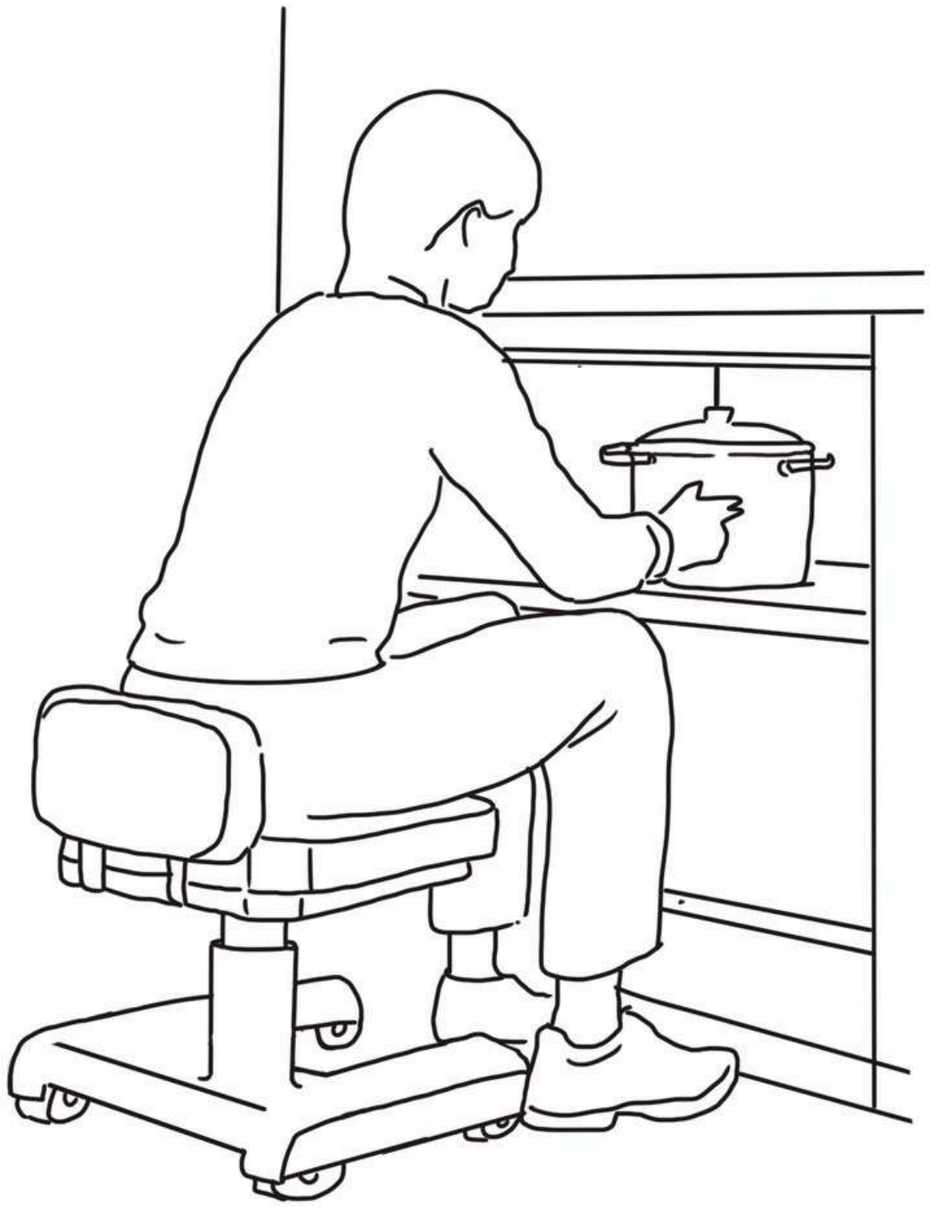
DESIGN REASON

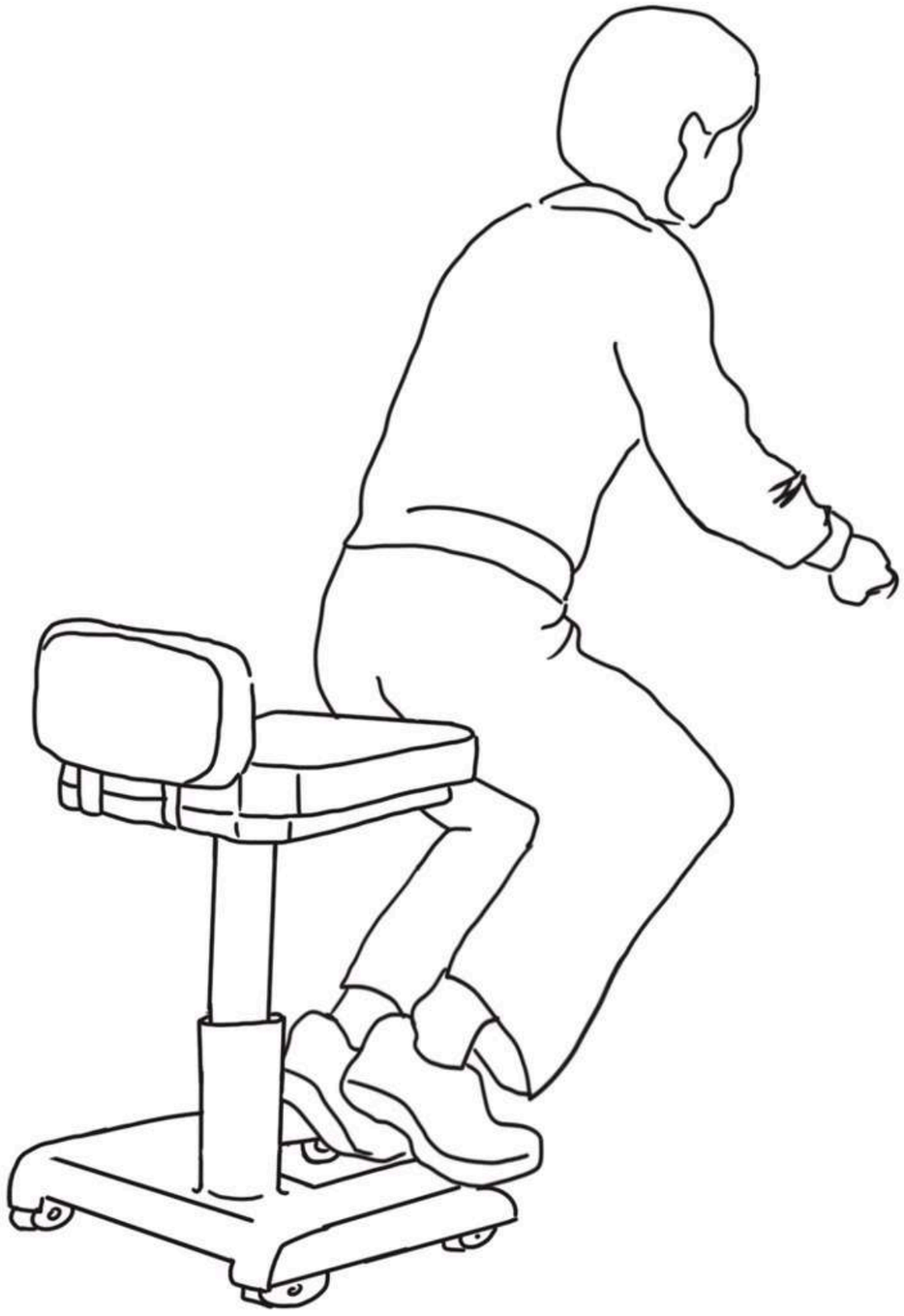
Explore whether full seated support can reduce the physical demand of lowering and recovery more than partial body support



CONCEPT 3 _ ASSISTED LOW SEAT

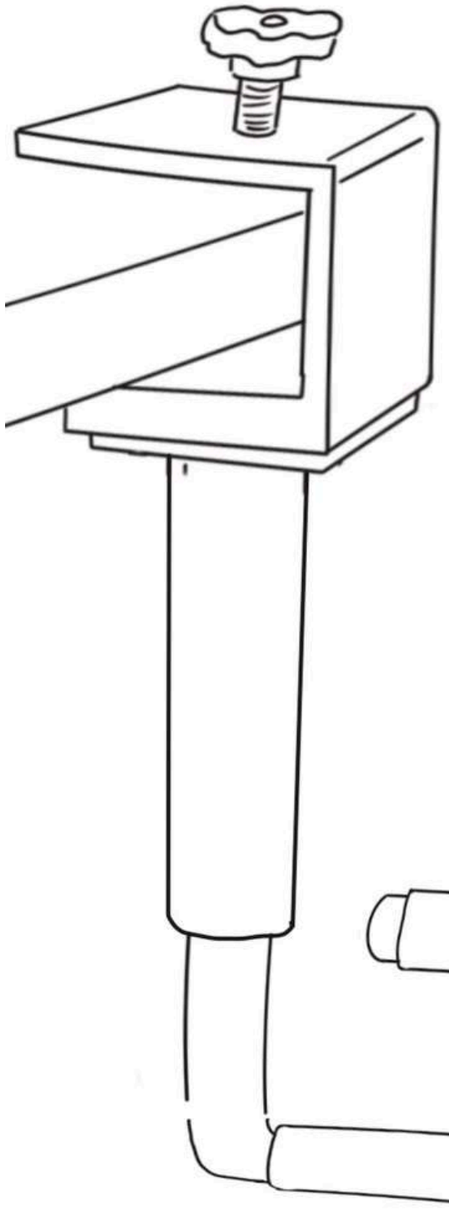
User Interaction

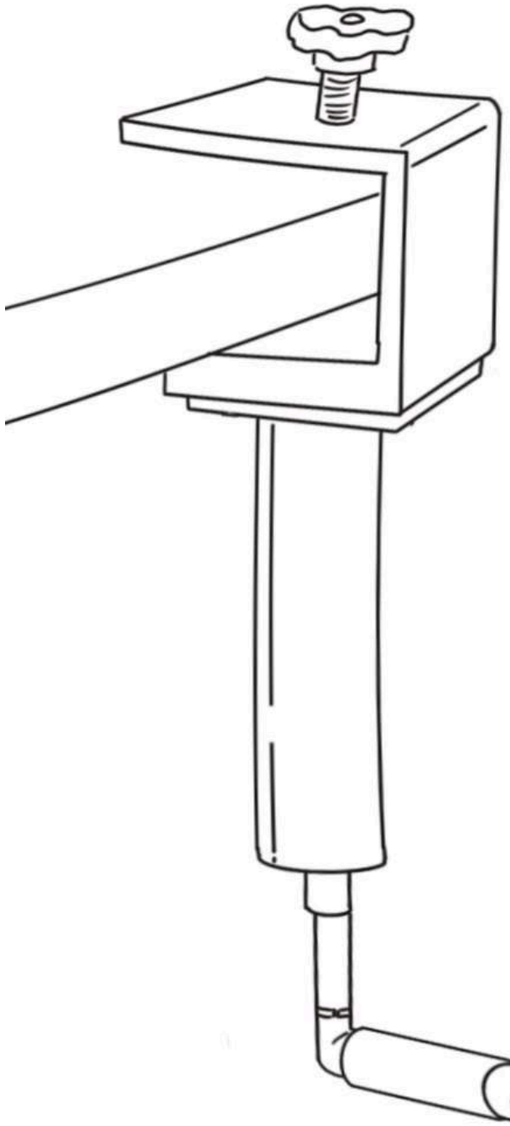




CONCEPT 4 _ CLAMP-ON HANDLE

Form Exploration

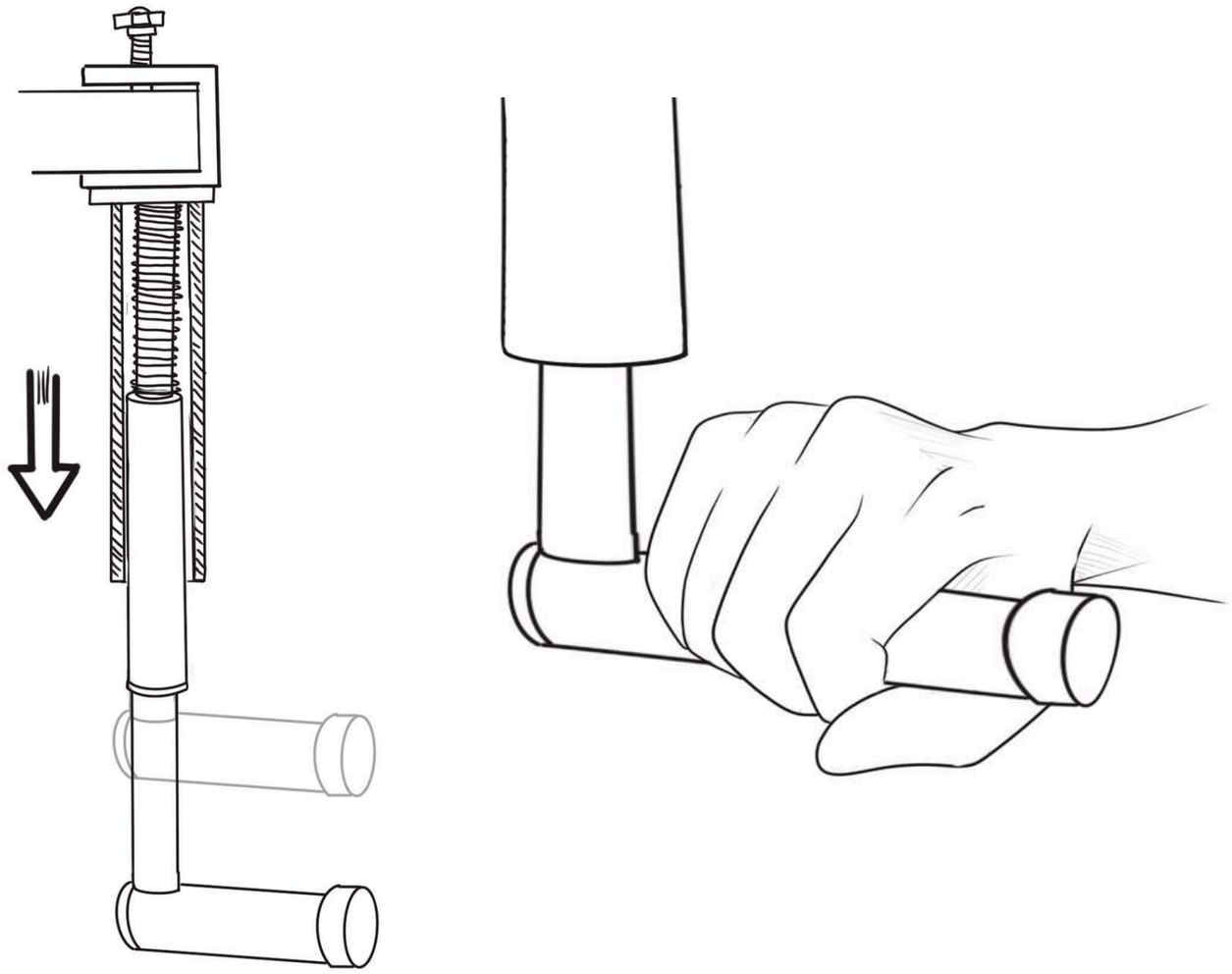


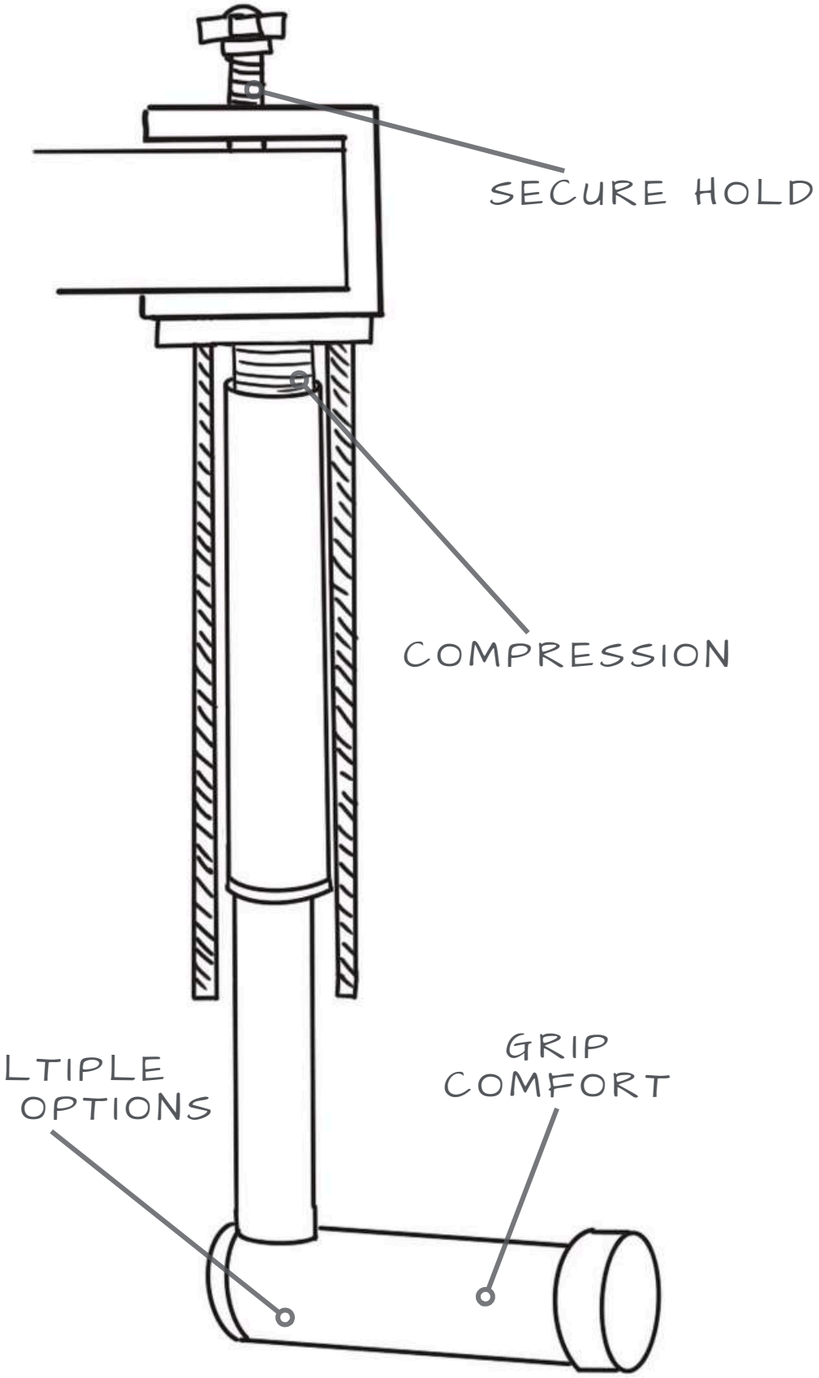


CONCEPT 4 _ CLAMP-ON HANDLE

DESIGN REASON

Provide temporary external support without requiring a large floor-standing product or permanent installation

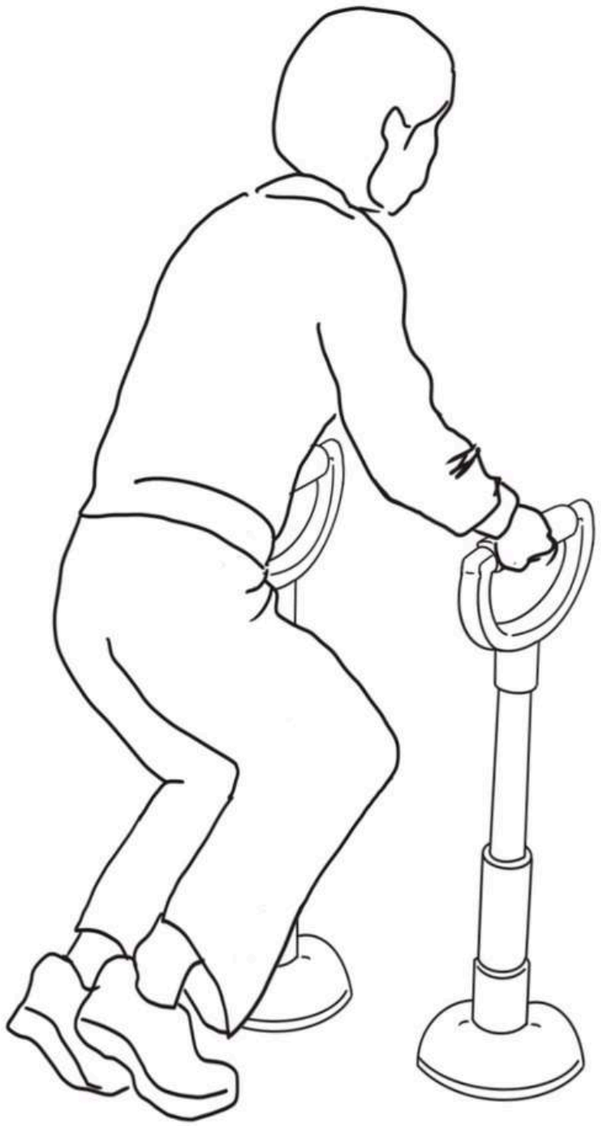


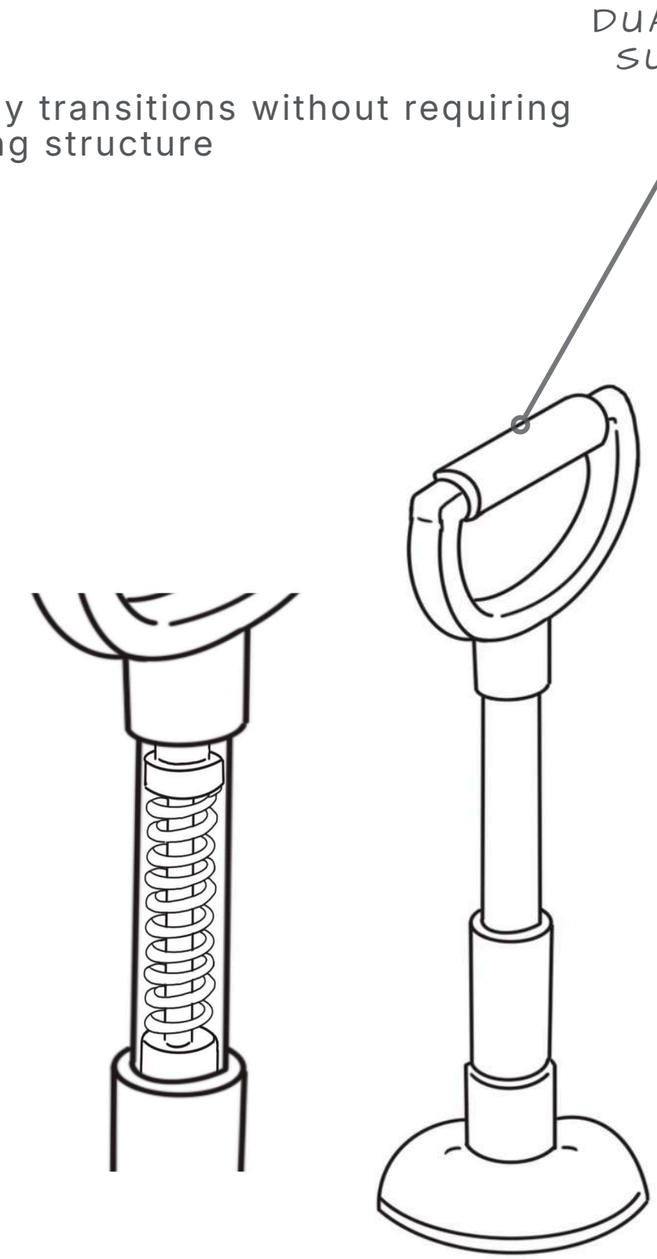


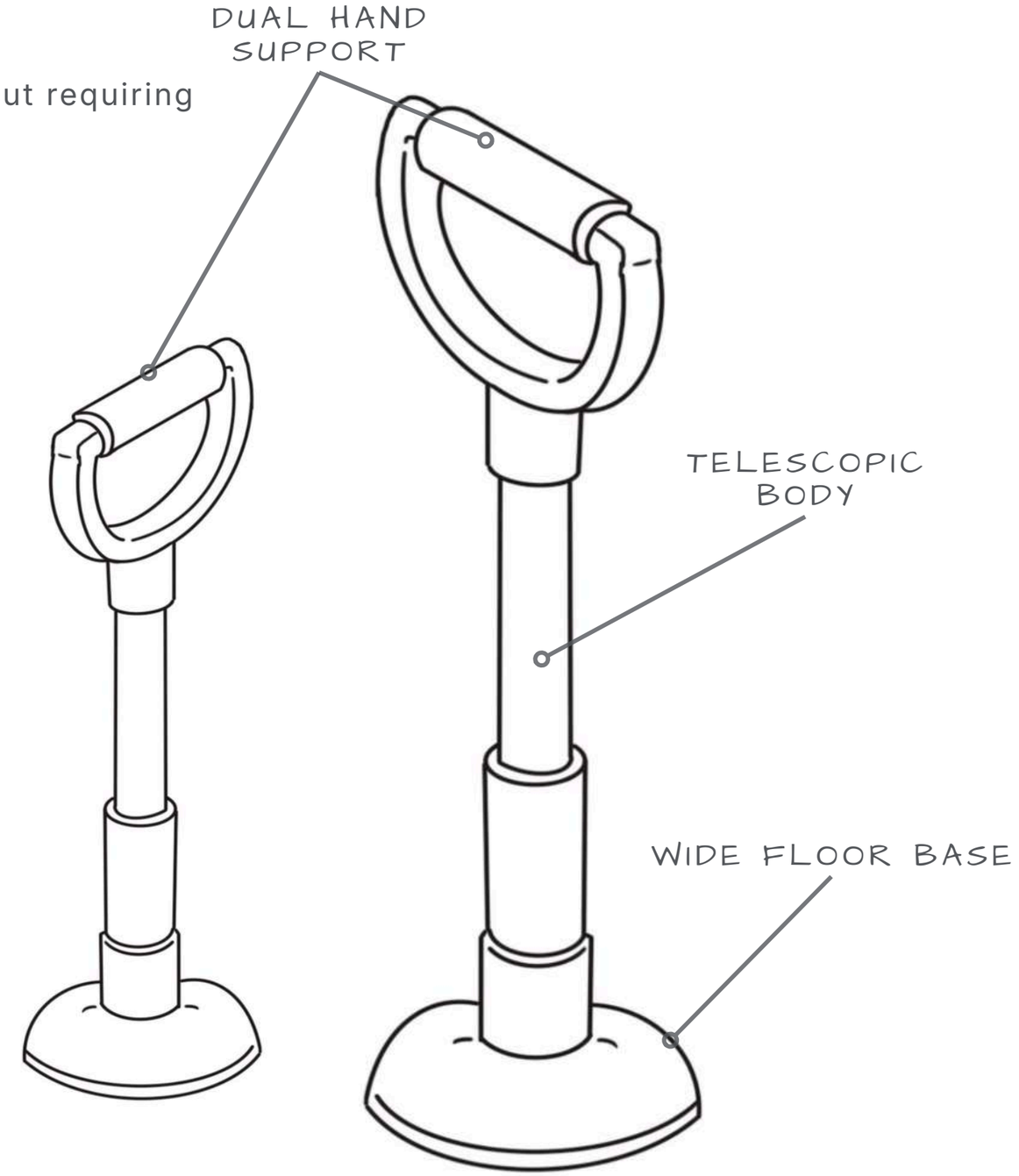
CONCEPT 5 _ TELESCOPIC RISE SUPPORTS

DESIGN REASON

Explore hand-supported assistance for body transitions without requiring attachment to furniture or a large supporting structure







SUPPORT STRATEGY MAP

DIRECT BODY SUPPORT

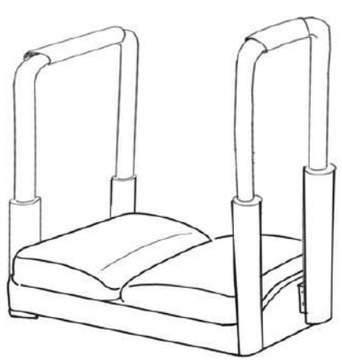
support through body contact



CONCEPT 01

KNEE PLATFORM

support the knees when lowering and working at low level

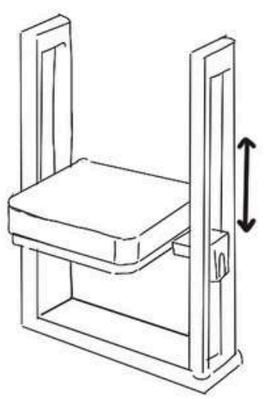




CONCEPT 02

PELVIC SUPPORT

support the hips with a sliding moving seat or platform





CONCEPT 03

LOW SEAT

provides a seat that lowers to the workingheight and assists rising



USER - HELD SUPPORT

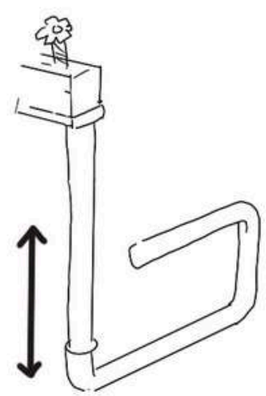
support through hands/ armst



CONCEPT 04

CLAMP ON HANDLE

a clamp on handle that assusts lowering and rising using one hand

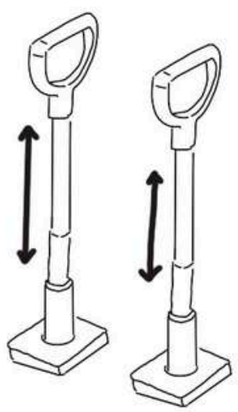




CONCEPT 05

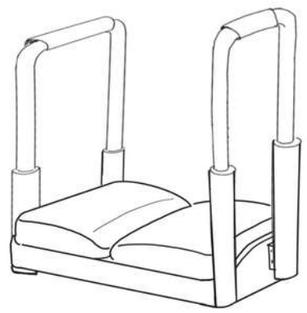
TELESCOPIC RISE

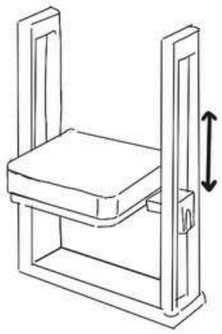
portable frame providing two handholds for stability during lowering and rising

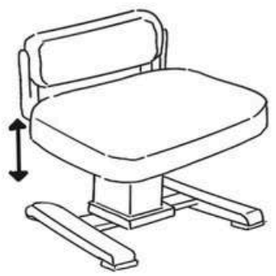


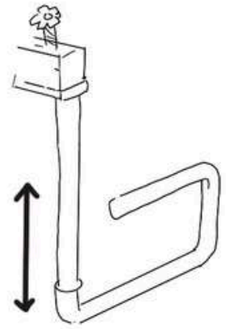
DESIGN COMPARISON

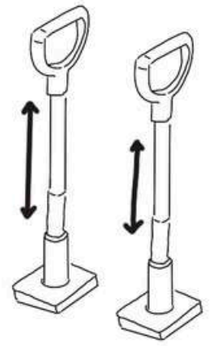
●●● STRONG ALIGNMENT
●●○ MODERATE ALIGNMENT
●○○ LIMITED ALIGNMENT







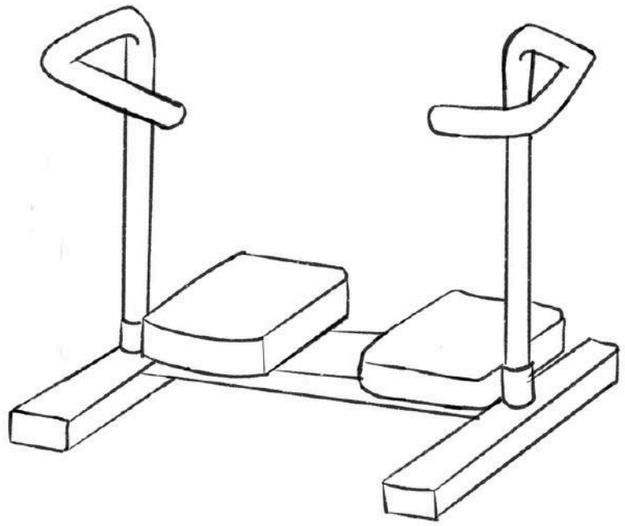


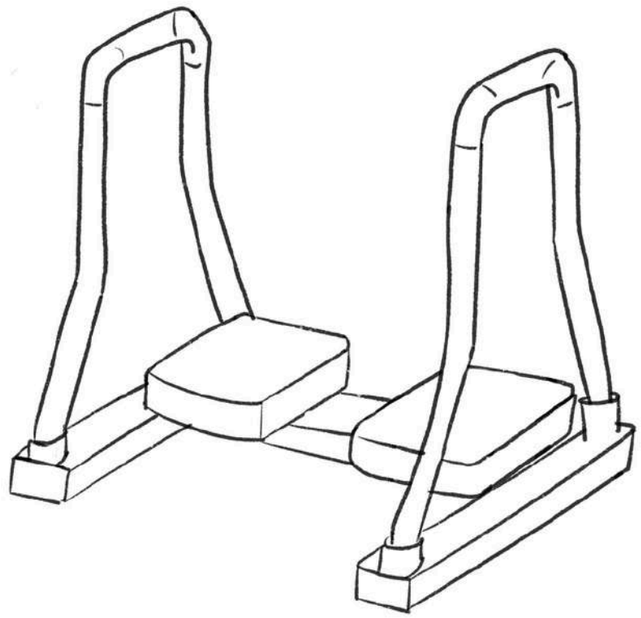


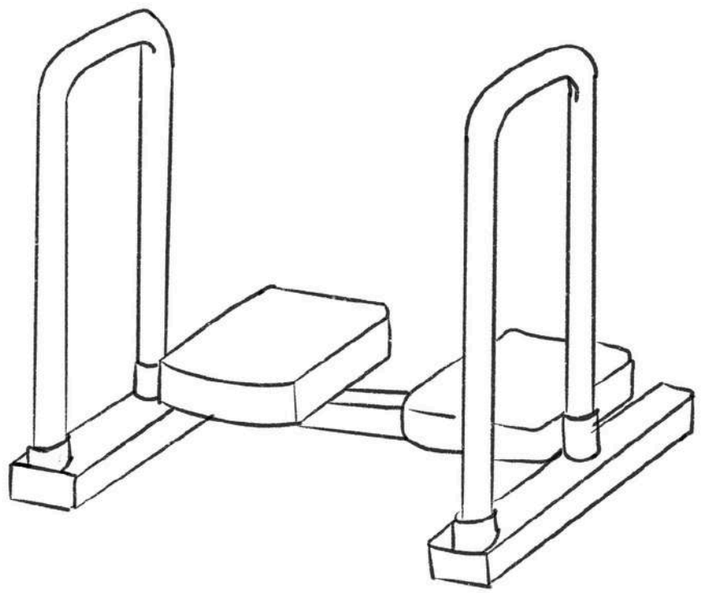
	Concept 1	Concept 2	Concept 3	Concept 4	Concept 5
Reduction of Deep Body Lowering	●○○	●●○	●●●	●○○	●○○
Recovery Assistance	●●○	●●○	●●●	●●○	●●○
Hands Available for Retrieval	●●●	●●●	●●●	●○○	●○○
Movement Flexibility	●○○	●●○	●○○	●●○	●●●
Heavy / Large Object Handling	●●○	●●●	●●●	●○○	●○○
Space / Storage Efficiency	●○○	●○○	●○○	●●●	●●●

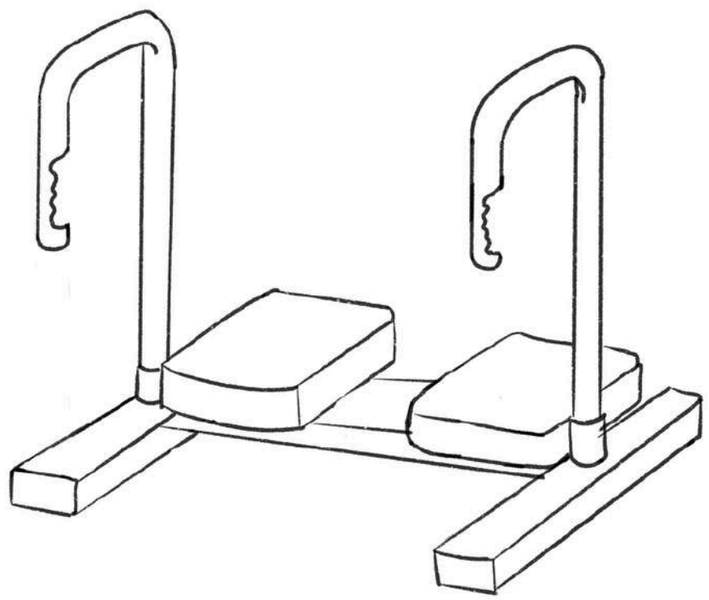
CONCEPT 1 _ DEVELOPMENT SKETCH

Foam Development



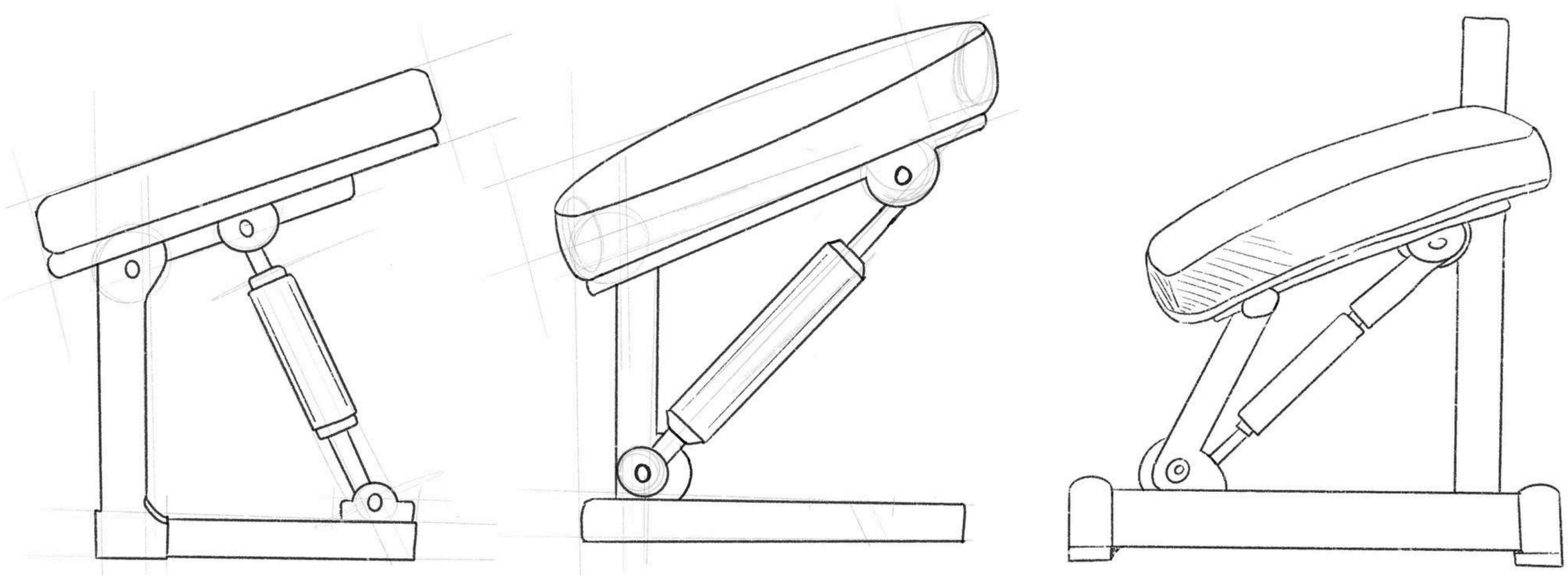






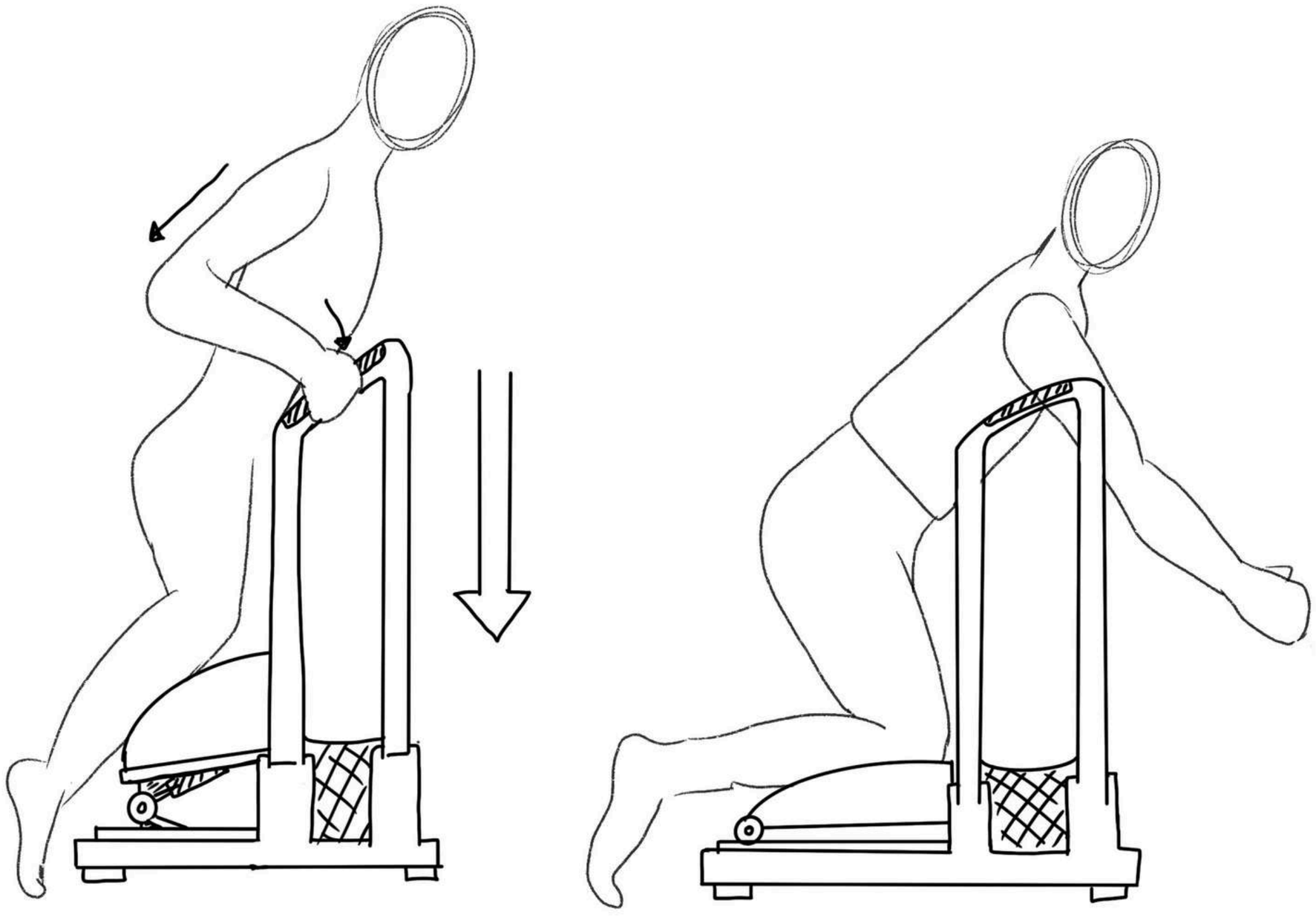
CONCEPT 1 _ DEVELOPMENT SKETCH

Side View



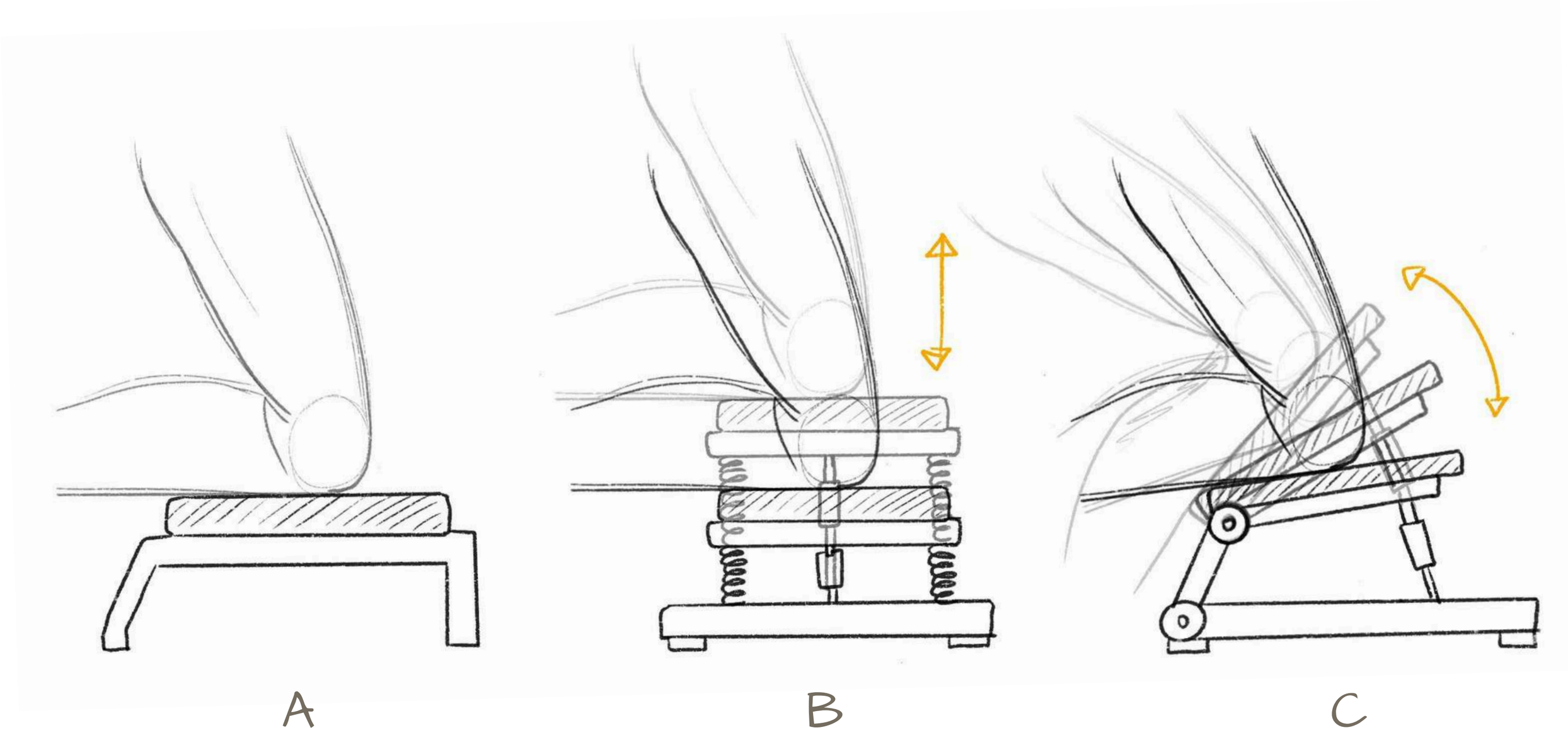
CONCEPT 1 _ DEVELOPMENT SKETCH

User Interaction



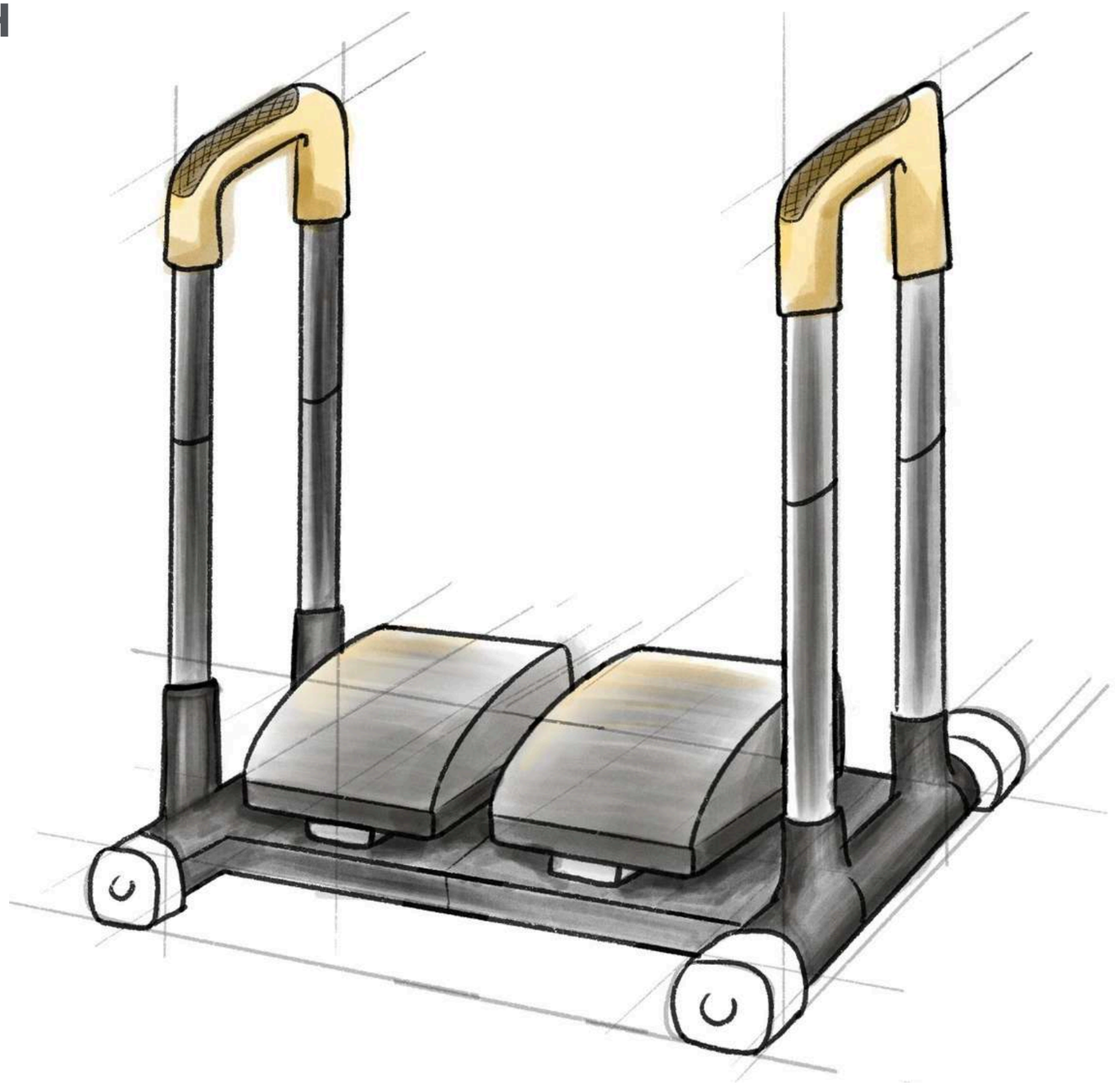
CONCEPT 1 _ DEVELOPMENT SKETCH

User Interaction



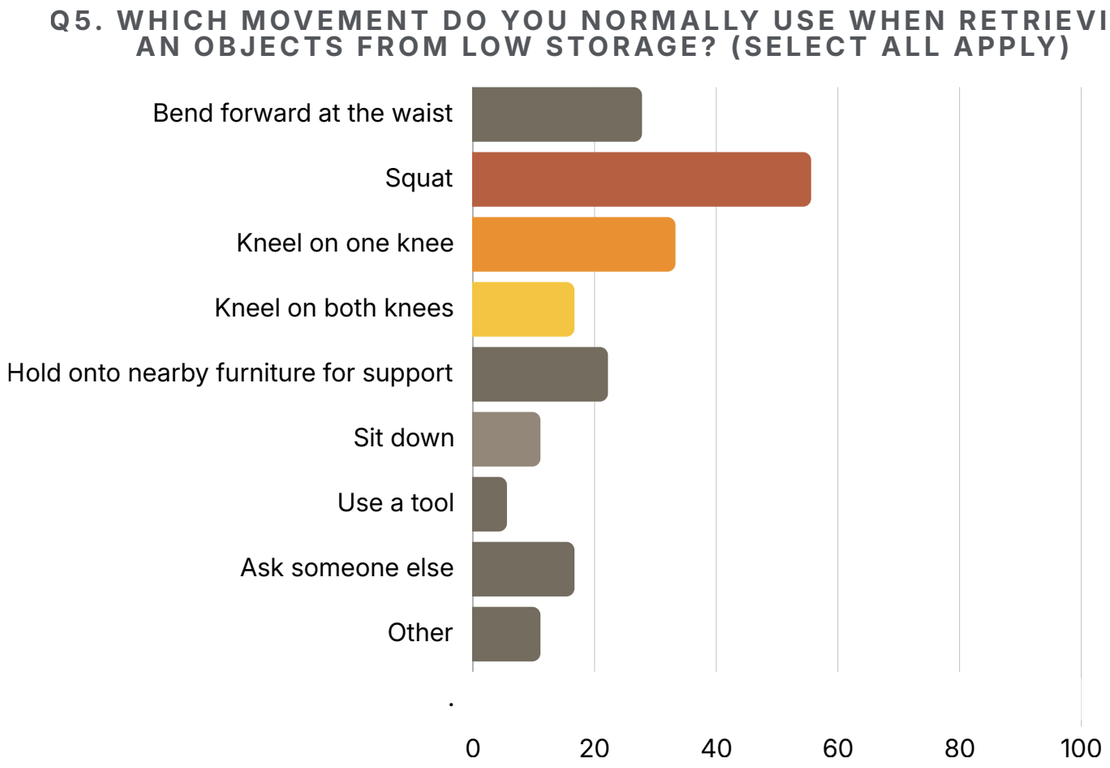
CONCEPT 1 _ DEVELOPMENT SKETCH

HERO SKETCH



DEVELOPMENT RESEARCH

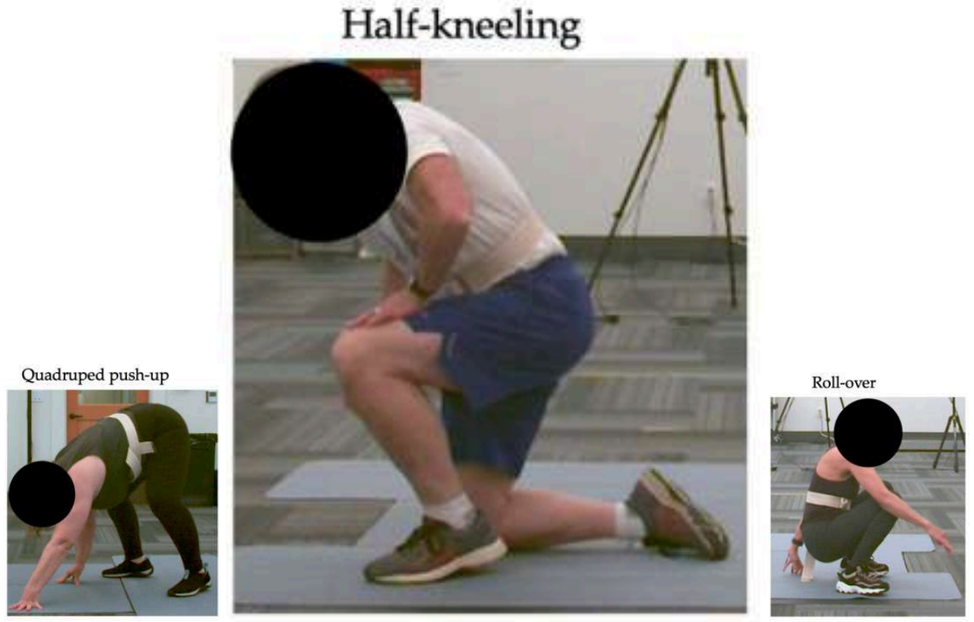
Why support the knees?



SURVEY FINDING

Squatting was the most commonly used movement when accessing low storage However, participants also reported kneeling on one knee or both knees

Related Research



Source: Floor-to-Stand Transfers in Older Adults (Stutzenberger & Whited,. 2025)

Half-kneeling is an established movement strategy used by older adults during floor-to-stand transfers

DESIGN OPPORTUNITY

Could an existing kneeling strategy be supported during low-storage access?

DESIGN RESPONSE

Two independent knee pads allow the user to choose between one-knee and two-knee support

DEVELOPMENT RESEARCH

SUPPORTING THE RECOVERY MOVEMENT

A



Source: Comparing the impact of active floor-rise training with video demonstration on fear of falling and independent floor-rise ability in older adults living in the community (Seeley et al,. 2026)

RESEARCH FINDING

Half-kneeling to standing was used as a functional floor-rise assessment for adults aged 65 years and over

DESIGN INSIGHT

Supporting the kneeling position alone does not address the recovery movement back towards standing

DESIGN RESPONSE

The knee pads should move with the user during lowering and recovery, rather than acting as fixed cushions

DEVELOPMENT RESEARCH

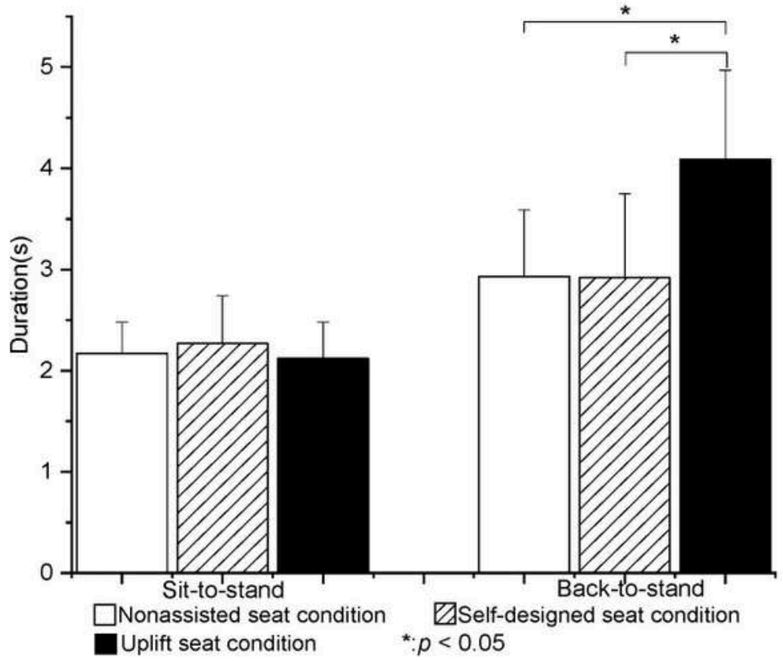
Can a lifting mechanism actually reduce physical demand?



(a)



(b)



Source: Effects of Different Assistive Seats on Ability of Elderly in Sit-To-Stand and Back-To-Sit Movements (Lou et al,. 2021)

RESEARCH FINDING

A study with **28 older adults** compared a normal seat with two assistive lifting seats during sit-to-stand and back-to-sit movements

KEY RESULT

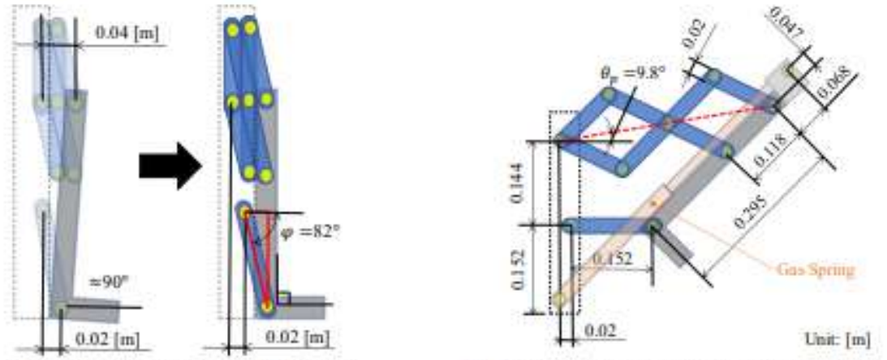
Both assistive lifting seats significantly reduced knee and hip joint moments during the movements

DESIGN INSIGHT

Existing lifting seats assist the body through the hip. Concept 01 explores whether a similar passive lifting principle could be adapted to support each knee independently

DEVELOPMENT RESEARCH

Why not simply move the knee pads straight up and down?



(a) The fixed position of the joints *B* and *D*

(b) The dimensions of the pantograph-type apparatus



(a) The initial and final postures of the apparatus

(b) The initial posture in the experiment

Source: Development and evaluation of an assistive apparatus with pantograph mechanism for standing-up motion of elderly (Liao et al,. 2017)

RESEARCH FINDING

The proposed apparatus used a pantograph linkage and gas spring to provide passive assistance during standing

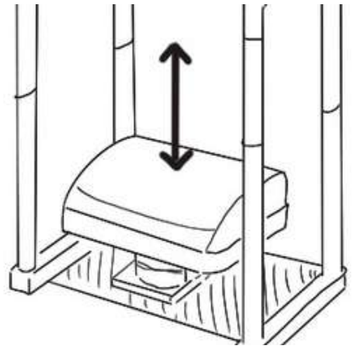
KEY INSIGHT

An opening linkage can provide assistance while creating a controlled movement path

MECHANISM EXPLORATION

Option A - Vertical Lift

Raises the knee support vertically



Option B - Pivoting Assisted Path

The knee support rotates through a guided upward path during recovery

FURTHER DEVELOPMENT

Explore whether a pivoting assisted path can support the knee while helping guide the user towards standing

DEVELOPMENT RESEARCH

PRECEDENT STUDY — DU CHAIR MECHANISM

WHAT IT IS

A non-electric assistive chair that supports sit-to-stand and stand-to-sit movement using passive mechanical assistance



Source: Good Design Australia (2024).

HOW IT WORKS

- Parallelogram linkage
- Spring-assisted lifting
- Adjustable assistance
- Guided movement path
- User remains actively involved

RELEVANCE TO CONCEPT 01

The DU Chair demonstrates how passive assistance and a guided linkage can support body movement without electric actuation

DESIGN TRANSLATION

Explore adapting this principle from a seat-based system to two independent knee-support mechanisms

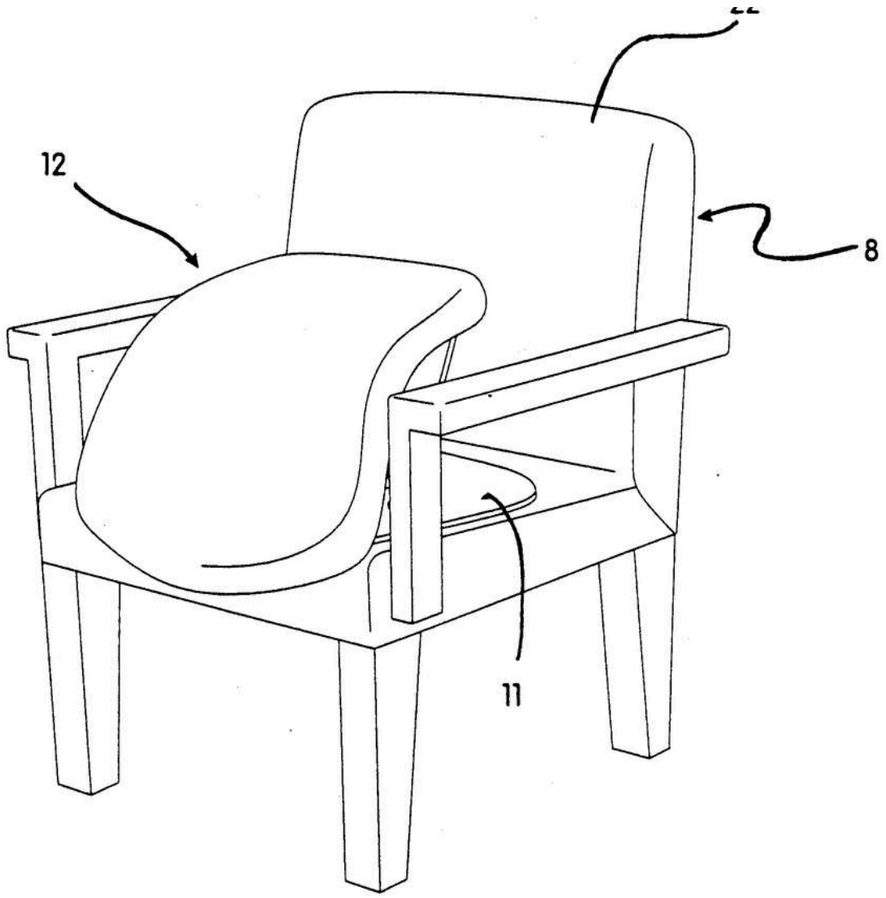
DEVELOPMENT RESEARCH

PRECEDENT STUDY — CAREX UPLIFT MECHANISM

WHAT IT IS

The Carex Uplift Premium Seat Assist is a self-powered lifting seat that uses a hydro-pneumatic gas spring. It does not require electricity or batteries.

The mechanism activates automatically as the user begins to stand and can provide up to 70% lift assistan



Source: Newman (1994)

HOW IT WORKS

BASE

↓

PIVOTING SEAT SUPPORT

↓

COMPRESSION / GAS SPRING

LOWERING

Body weight overcomes the spring force and lowers the seat

RECOVERY

As the user begins to rise and the load on the seat decreases, the gas spring extends and assists the upward movement

DEVELOPMENT RESEARCH

PRECEDENT STUDY — CAREX UPLIFT MECHANISM

ADJUSTABLE ASSISTANCE

The Carex patent allows the connection position of the gas spring to be changed. The spring pin fits into one of several recess/teeth positions, and depending on that position, the moment arm relative to the pivot changes, thereby varying the lifting assistance

KEY PRINCIPLE

Assistasnce can be adjusted by changing the spring mounting position

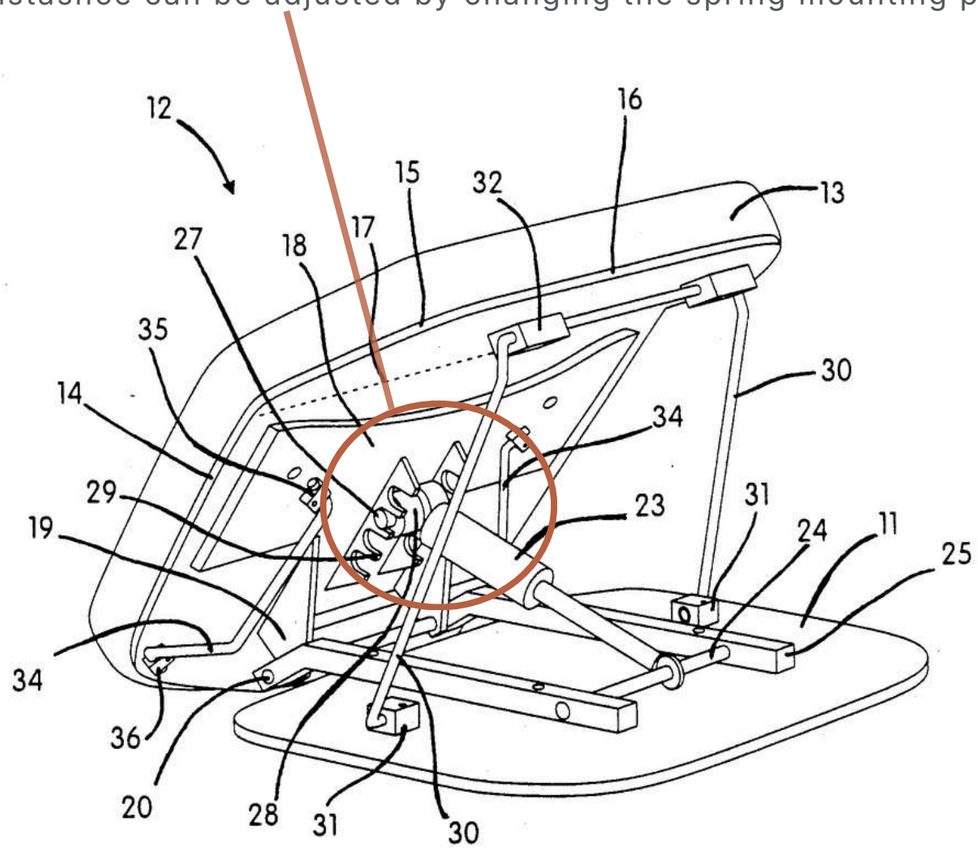


Fig 5 Source: Newman (1994)

CAREX
One seat

- Pivoting support
- Gas spring
- Passive lift assistance

CONCEPT 01
Two independent knee pads

- Individual pivoting supports
- Smaller gas springs
- Passive knee recovery assistance

Patent status: The patent is listed as Expired – Lifetime. The mechanism is therefore used here as a historical technical precedent, while Concept 01 develops a different knee-support application and geometry.

DEVELOPMENT RESEARCH

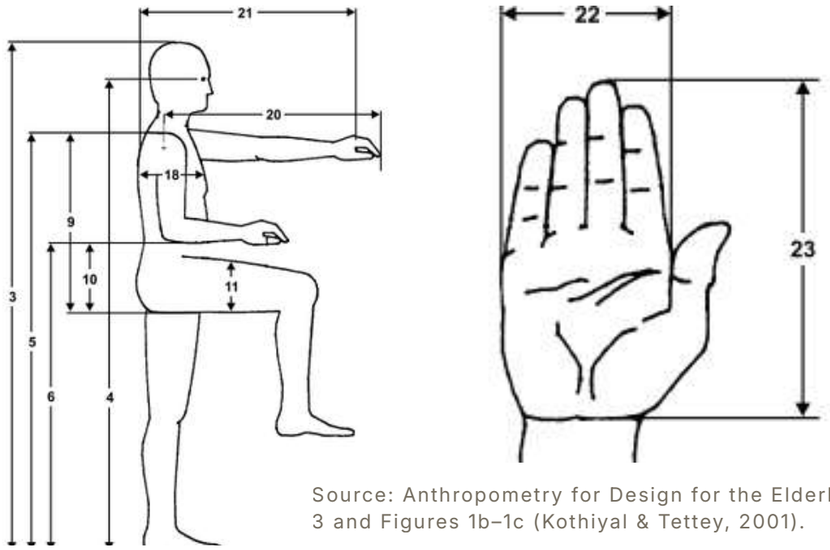
HUMAN FACTORS

Australian Older Adult Anthropometry

171 participants | 65+ | Australia | Male + Female

Kothiyal and Tettey (2001) collected anthropometric data from 171 Australian adults aged 65+, including both males and females.

The study measured 22 body dimensions, showing variation within the older adult population



Source: Anthropometry for Design for the Elderly, Tables 2–3 and Figures 1b–1c (Kothiyal & Tettey, 2001).

SELECTED ANTHROPOMETRIC DATA

Overall observed ranges across male and female participants

STATURE (3)
1300 ———————————————— 1824 mm

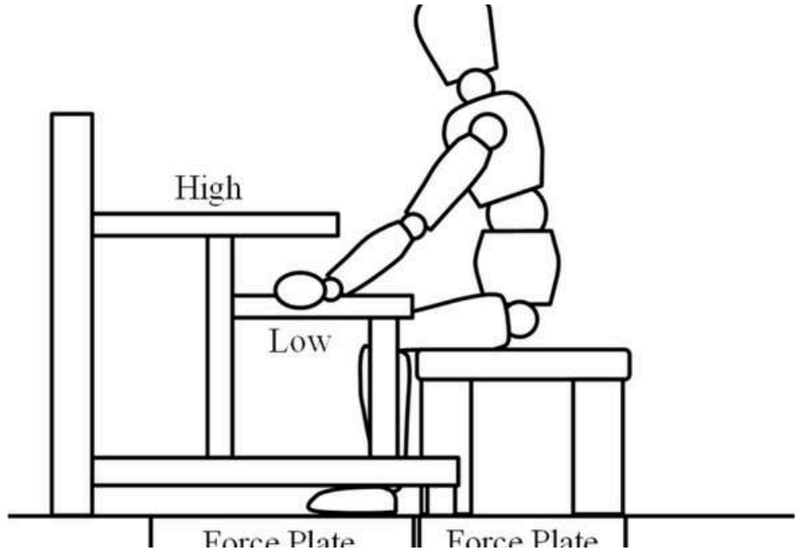
HIP BREADTH (17)
255 ———————— 440 mm

HAND BREADTH (22)
70 ——— 99 mm

WHY HANDLE POSITION MATTERS

Kinoshita et al. (2015) investigated how different handrail heights affected sit-to-stand movement, including 25 care-needing older adults

Different handrail heights changed body posture and centre-of-gravity movement during rising



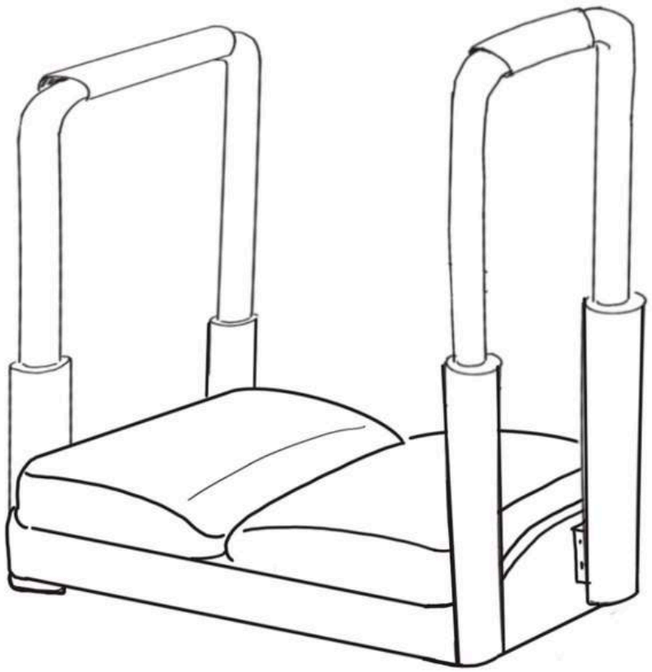
Source: Effect of Handrail Height on Sit-To-Stand Movement (Kinoshita et al,. 2015)

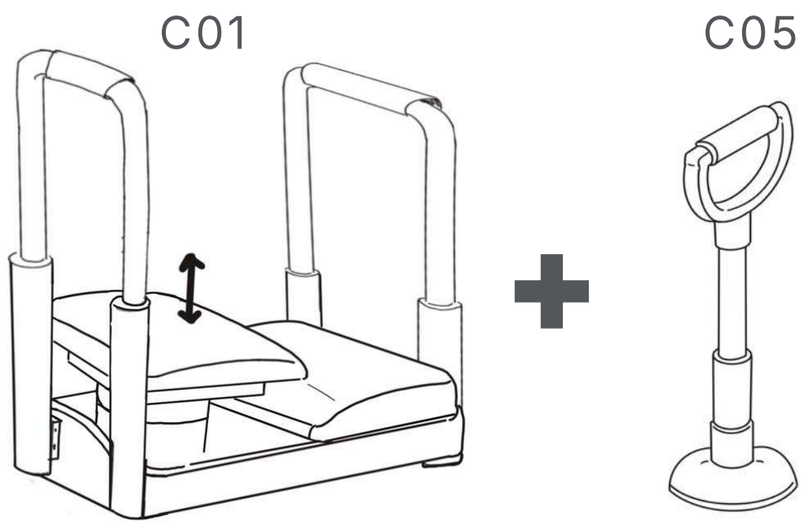
KEY FINDING

Different handrail heights changed body posture and centre-of-gravity movement during rising

DESIGN REFRAMING

From Knee Platform to Compact Kneeling Aid





C01 + C05 → LiVO
Assisted recovery + portable support
→ Compact one-knee kneeling aid

Earlier Direction

- Two knee pads
- Larger frame
- Pivoting / guided movement
- Both-knee support

Refined Direction

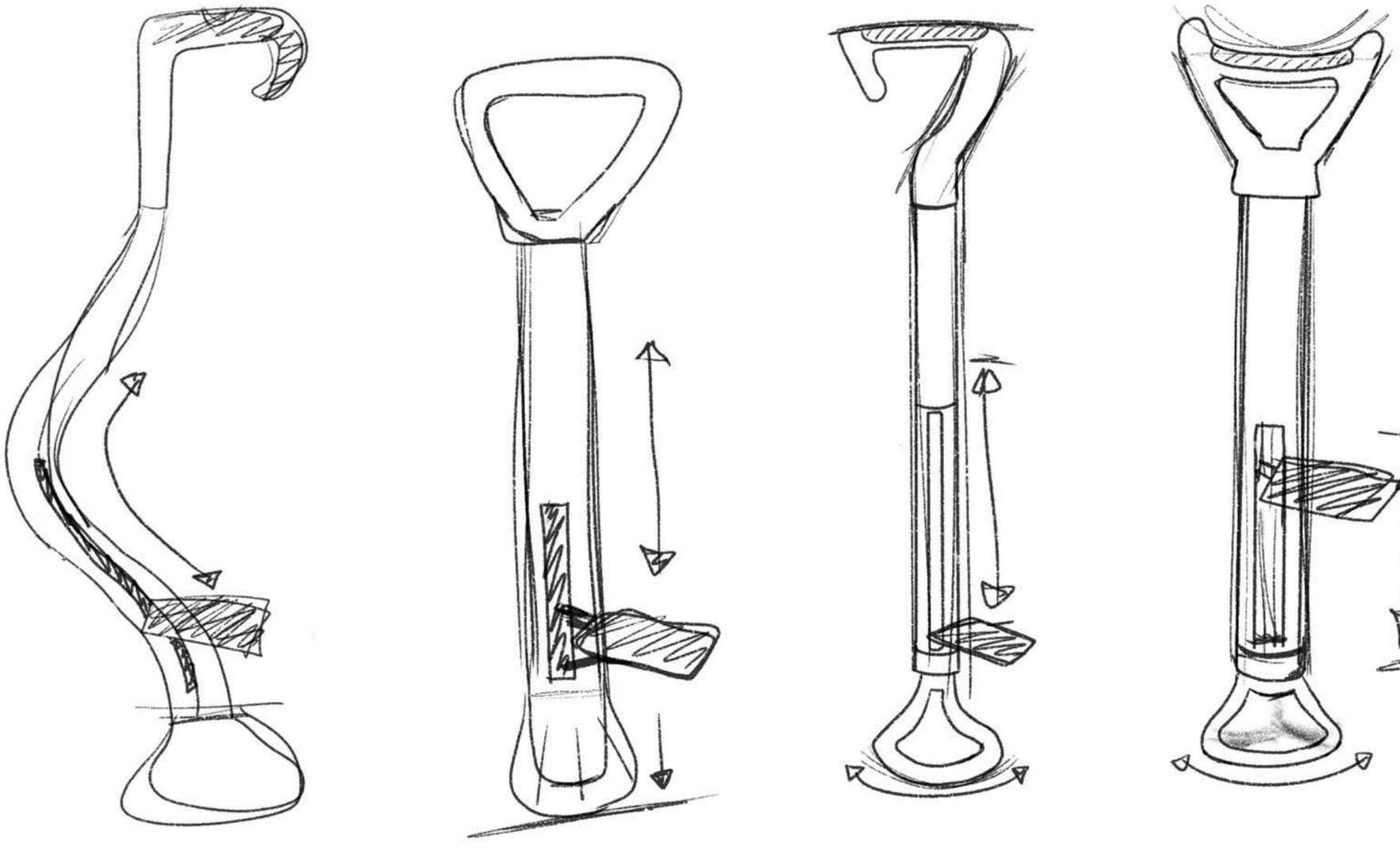
- One-knee / half-kneeling support
- Cane-based compact form
- Vertical sliding knee support
- Portable everyday use

The concept was simplified to reduce size, improve portability, and focus on one-knee recovery support

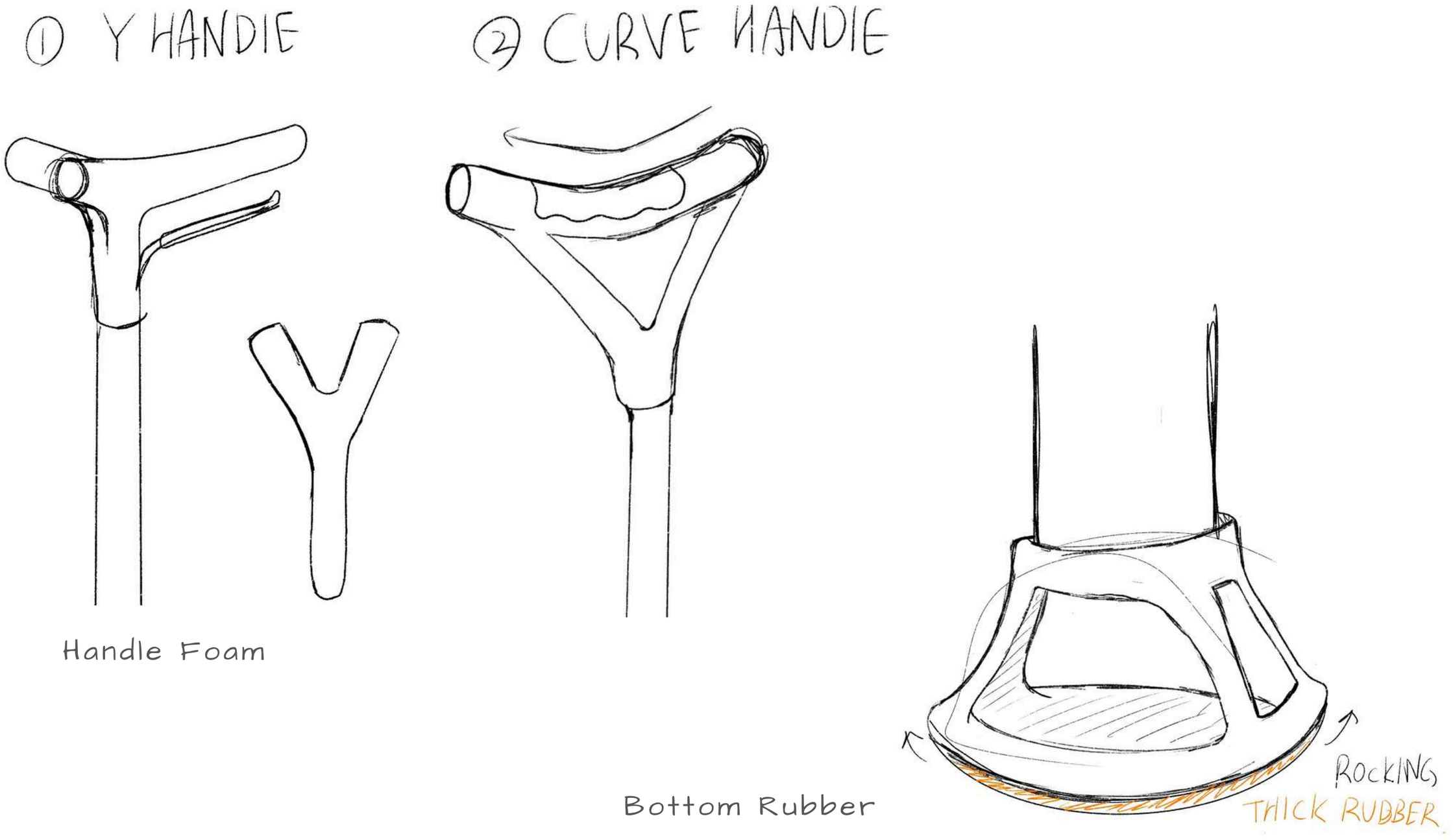
REFRAMING DESIGN SKETCH

Refined Direction

The concept began as a moving knee pad to support lowering and rising when accessing low storage. Tutor feedback encouraged me to explore an additional everyday use, leading to a walking cane with a removable knee pad



REFRAMING DESIGN SKETCH



PRODUCT-BASED TESTING



I bought and tested a cane. It was lighter than I expected



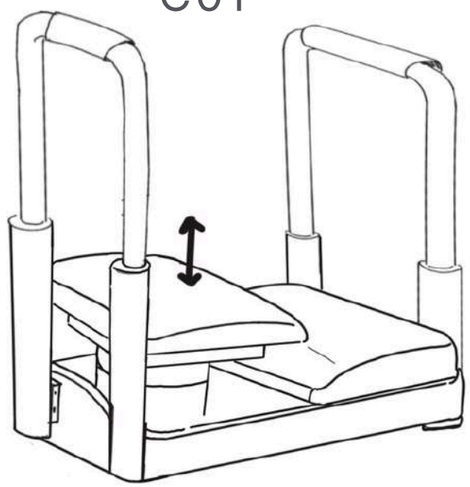
Ergonomically curved handle



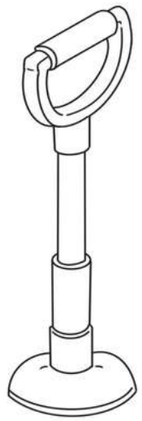
Pivoting rubber tip that adapts to the user's direction of movement

DESIGN DIRECTION REFINEMENT

C01



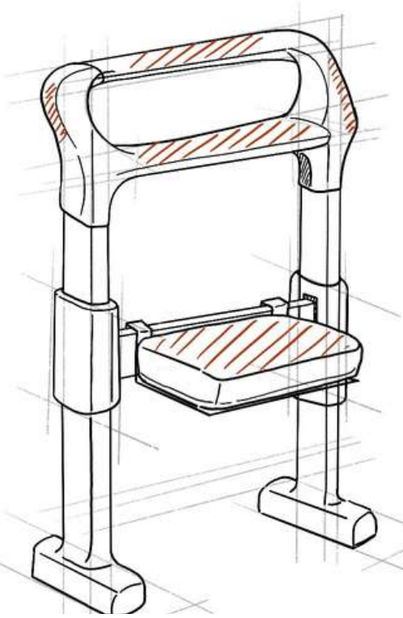
C05



C01 + C05 → LIVO
Assisted recovery + portable support
→ Compact one-knee kneeling aid

Reframing Direction

- One-knee / half-kneeling support
- Cane-based compact form
- Vertical sliding knee support
- Portable everyday use



The twin-rail direction was selected to improve guidance while maintaining a compact, portable form

Refinement Direction

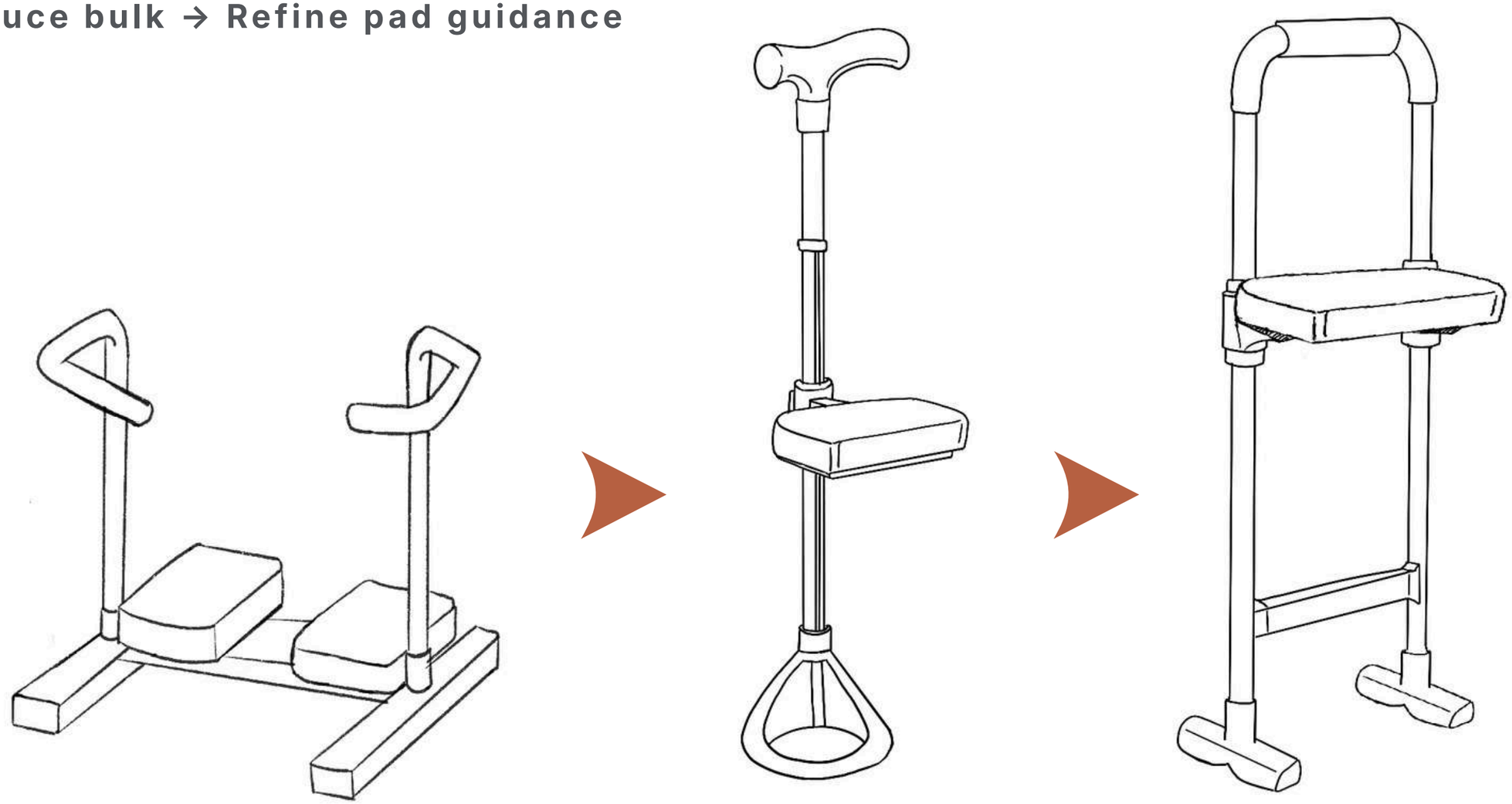
- Attaching the pad to a single post raised concerns about twisting and off-centre loading. I explored a four-foot cane base, but its size and appearance conflicted with the portable, non-medical character.

05

FORM & MECHANISM DEVELOPMENT

CONCEPT EVOLUTION

Reduce bulk → Refine pad guidance



01. Exploring knee support

A wide frame with two pads explored support for kneeling and rising

02. Cane portability

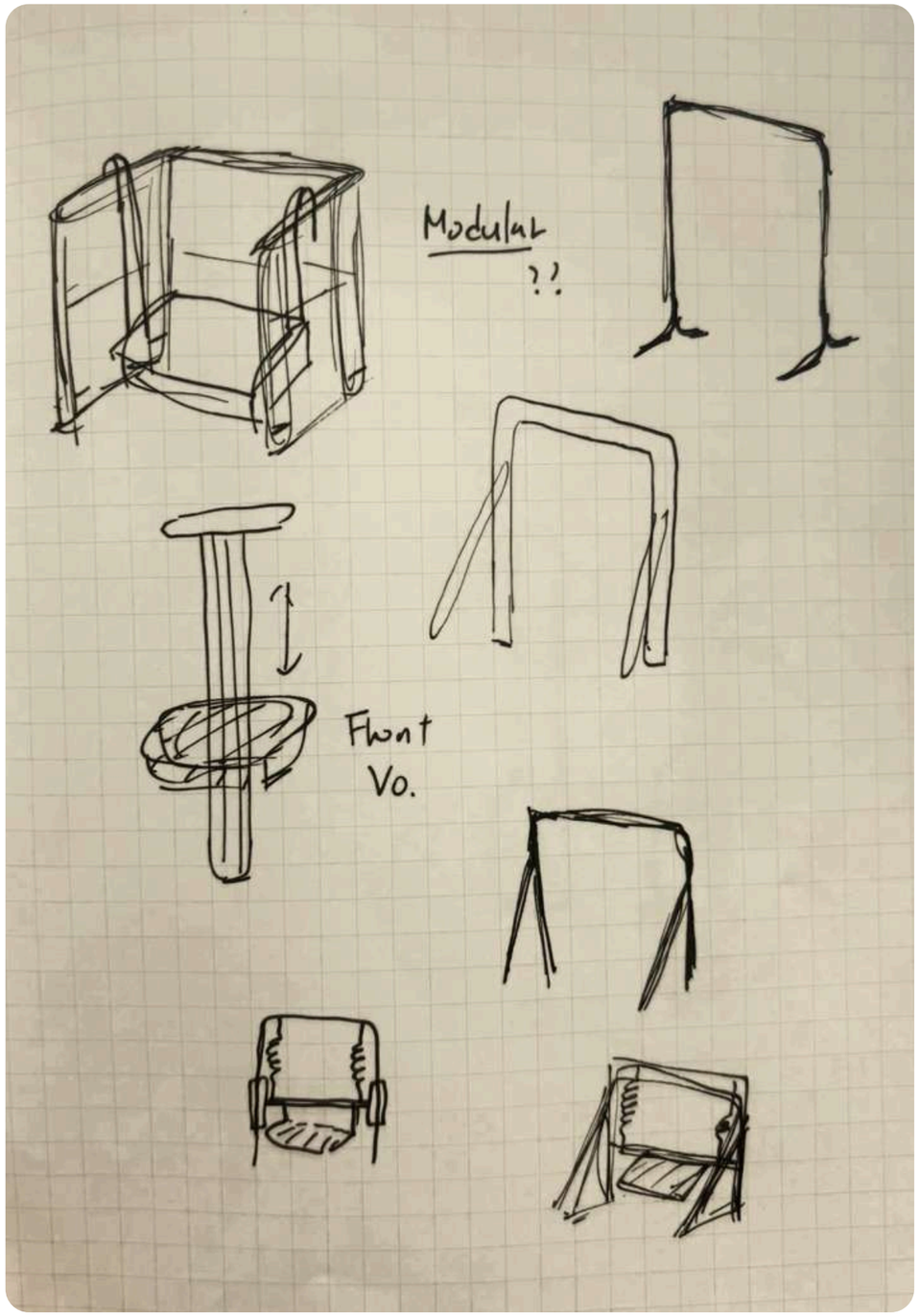
A single-column cane reduced bulk and introduced a moving knee pad

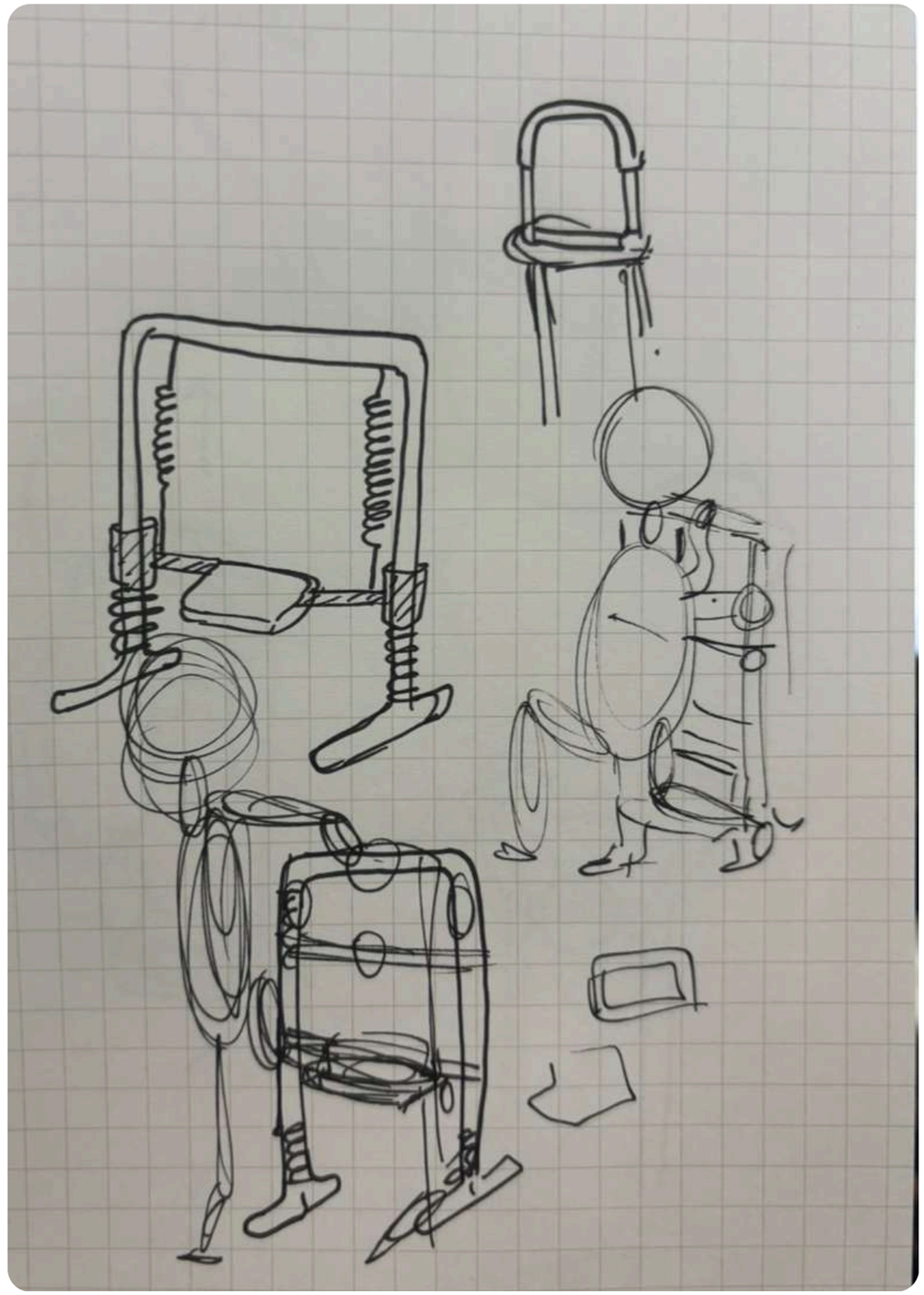
03. Guided frame

Two columns were introduced to guide the pad and distribute its load across both sides

CONCEPT DEVELOPMENT SKETCH

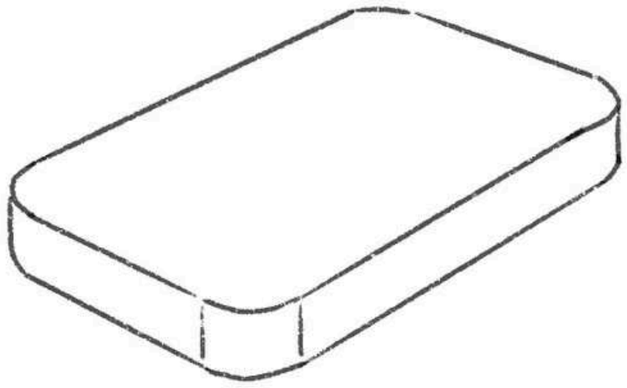
WEEK 10

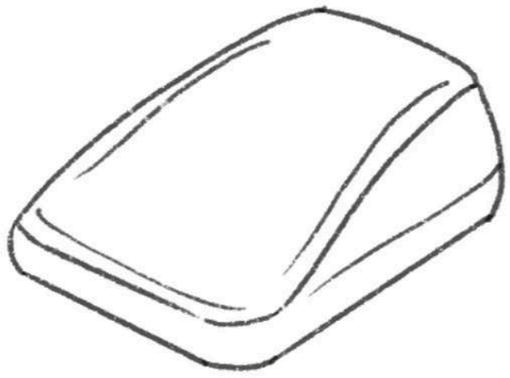


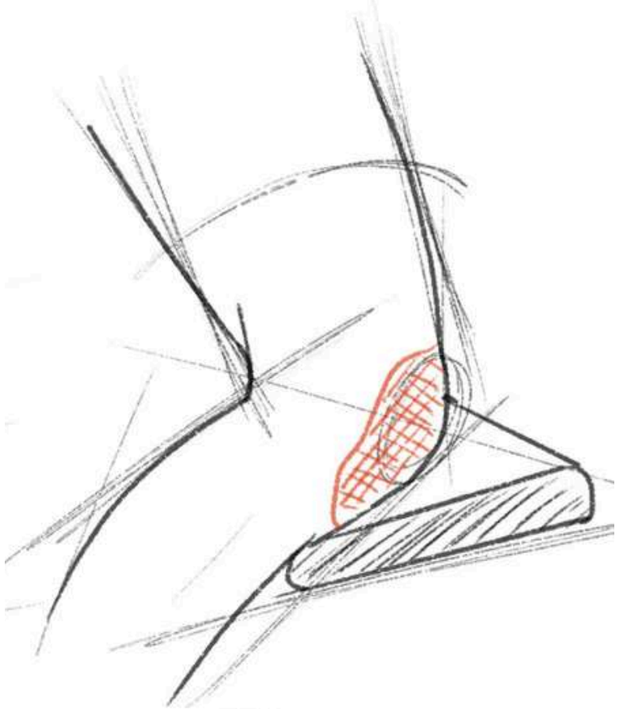


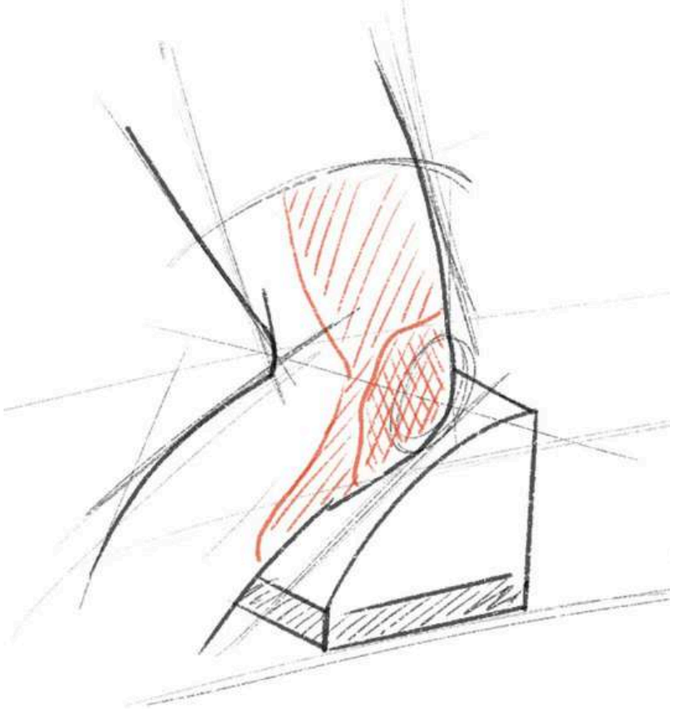
DEVELOPMENT SKETCH _ KNEE PAD

FOAM EXPLORATION





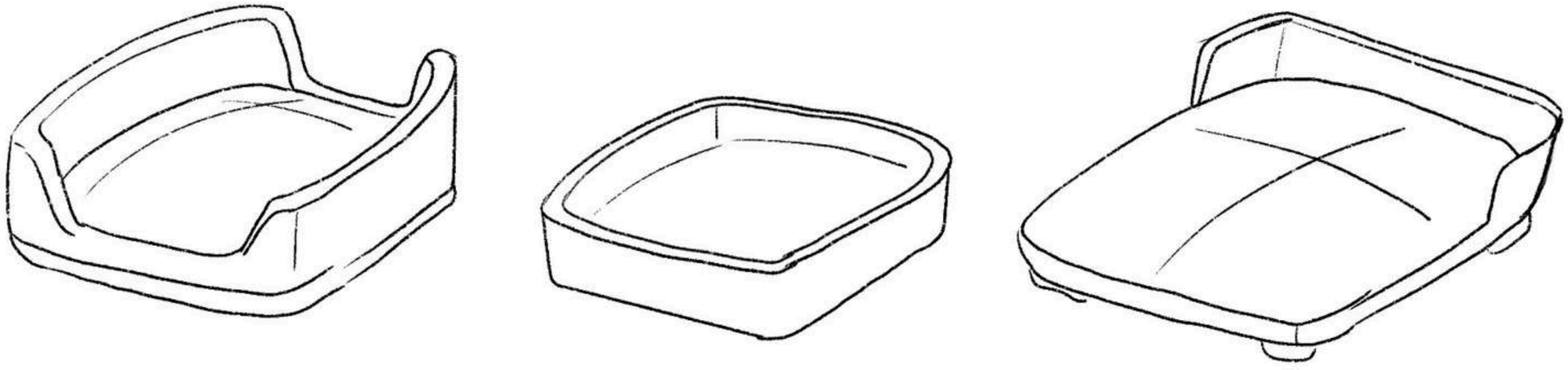


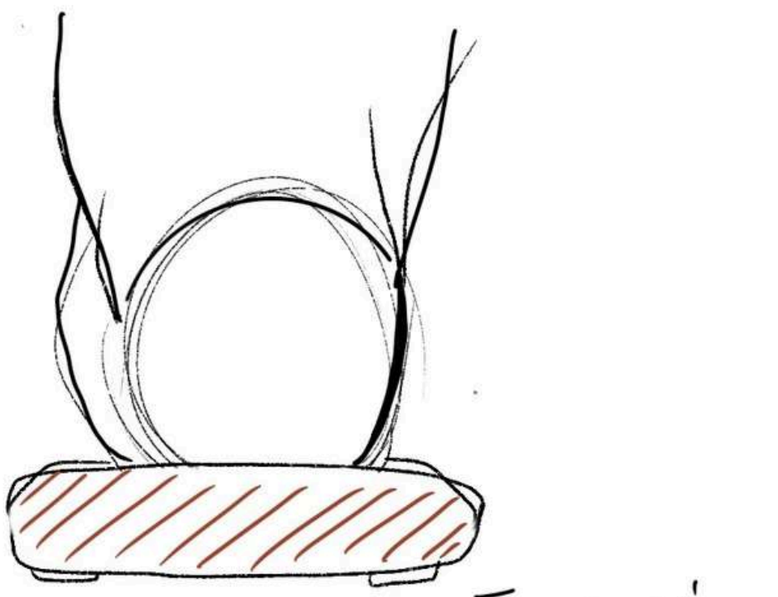


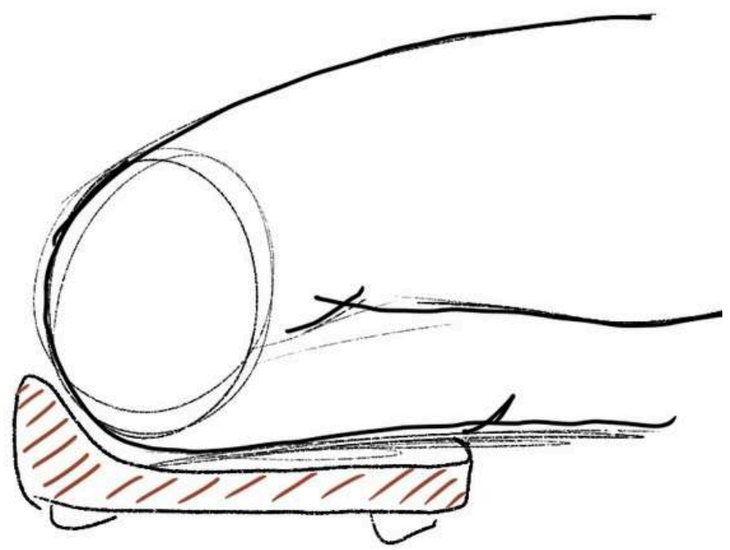
I explored flat and contoured pads to compare knee contact and access from the front and sides. A contoured surface may help locate the knee, but raised edges could restrict side access. I will also explore a flat pad with adaptable cushioning.

DEVELOPMENT SKETCH _ KNEE PAD

WEEK 10

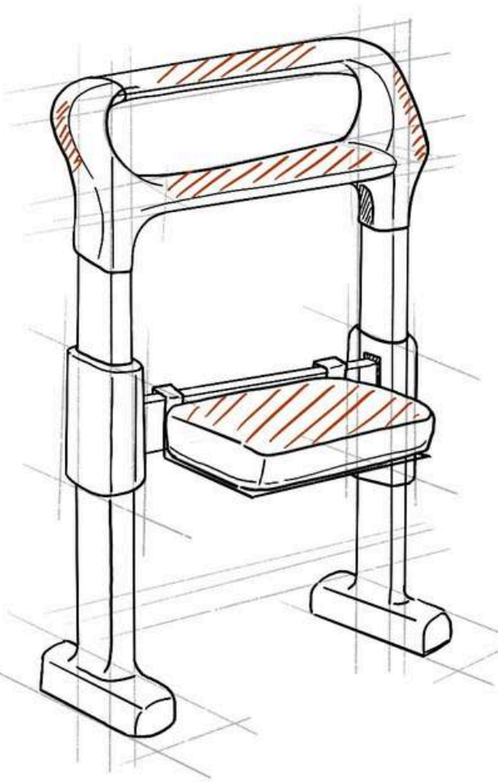




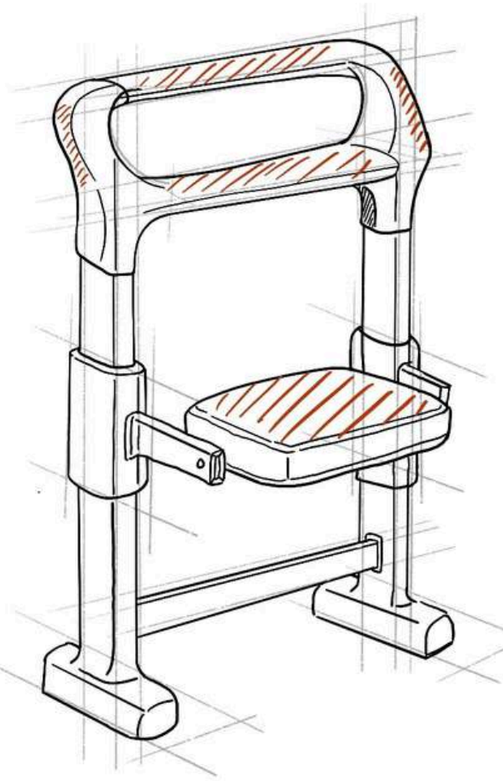


CONCEPT DEVELOPMENT SKETCH

V.01



V.02



V.03

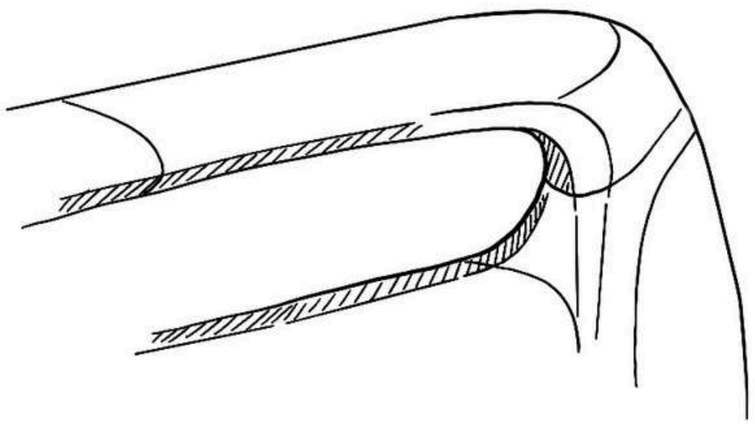


	V.01	V.02	V.03
Overall impression	Simple and visually light	Clearly shows construction	Distinctive and cohesive
Handle	Slim and restrained	Similar to Option 1	Defined side grips, but bulkier
Pad connection	Neat connections beneath the pad	Visible brackets highlight attachment	Neat connections emphasise the handle
Lower structure	Open base without a lower brace	Lower brace connects both posts	Smooth transitions from posts to feet
Perceived portability	Most portable-looking	More equipment-like	Visually heavier
Further development	Check post alignment without a lower brace	Reduce bracket protrusion and simplify the brace	Reduce handle and foot bulk

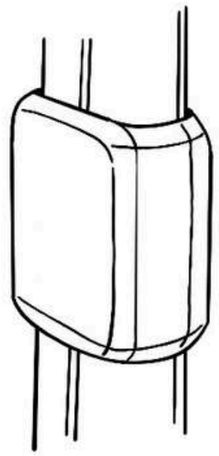
CONCEPT DEVELOPMENT SKETCH

WEEK 10

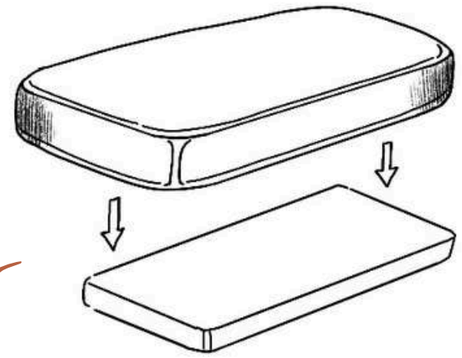
SOFT GRIP TRANSITION



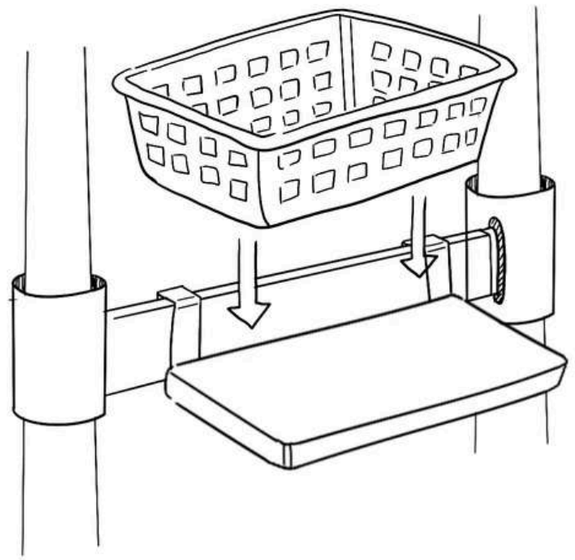
COVERED MECHANISM



DETACHABLE PAD

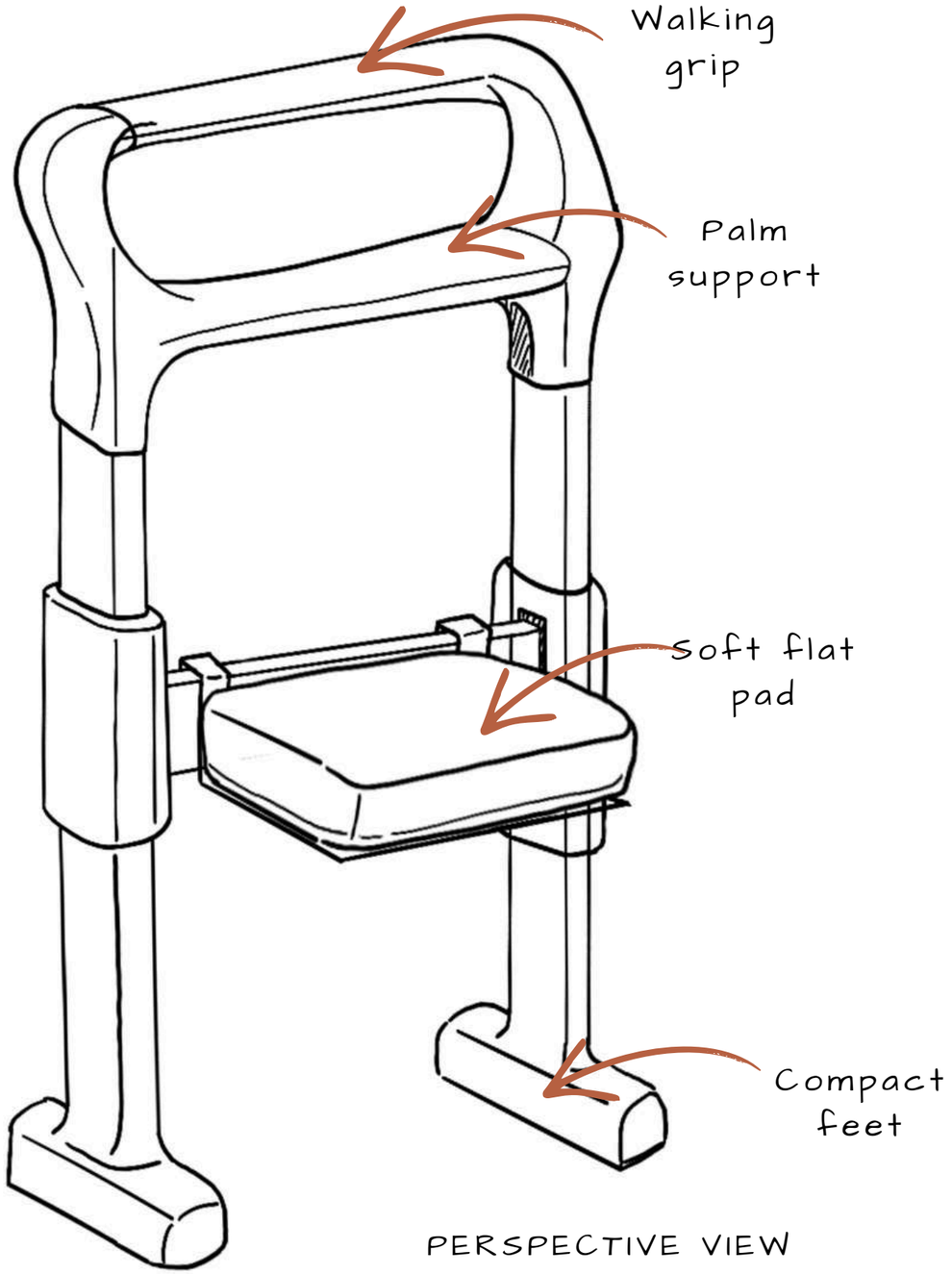


Removable pad

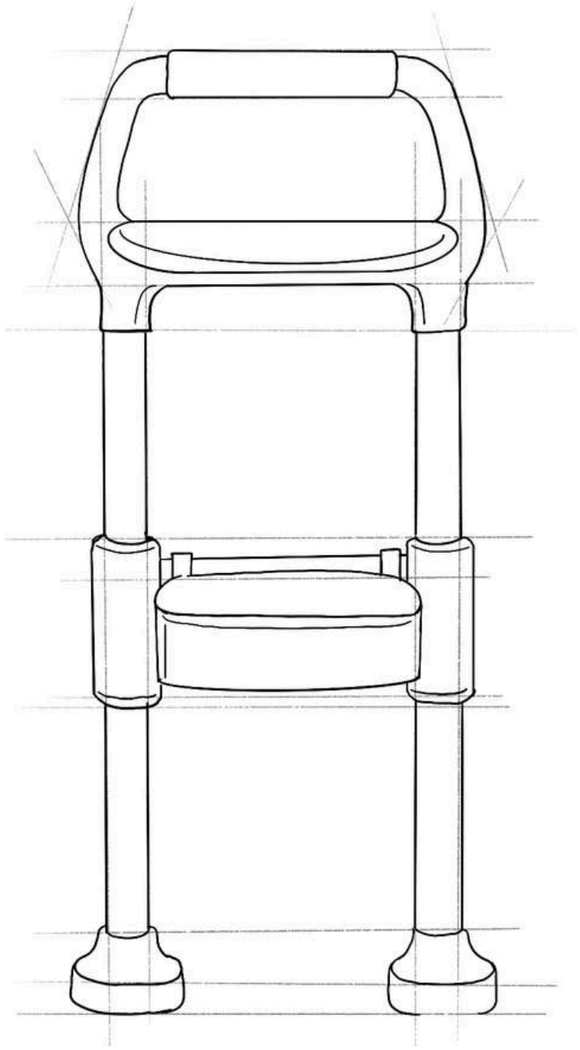


Basket option

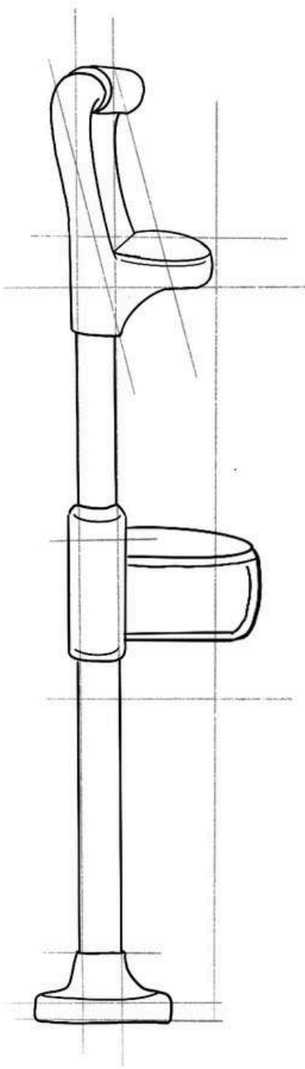
CONCEPT DEVELOPMENT SKETCH



PERSPECTIVE VIEW



FRONT VIEW



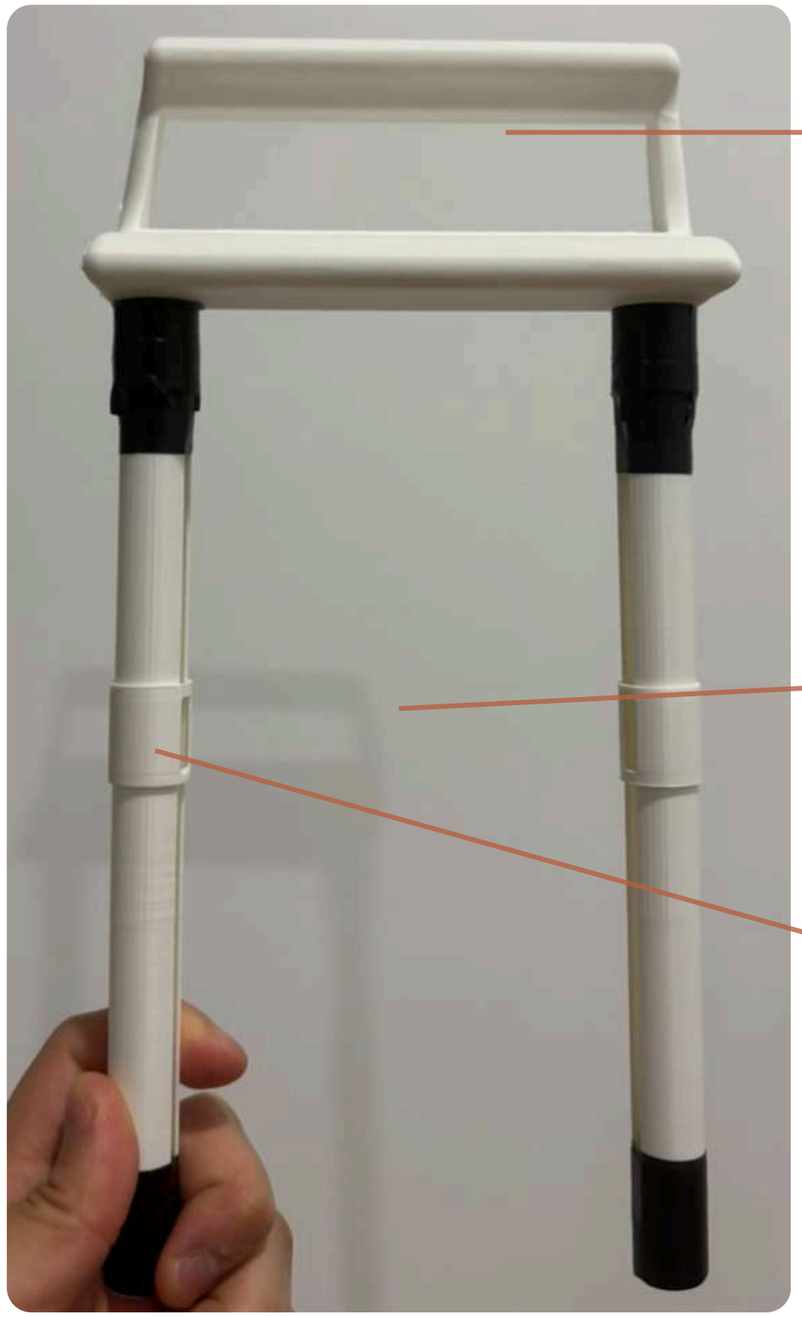
SIDE VIEW

3D PRINT FRAME PROTOTYPE

WEEK 11

MAIN BODY

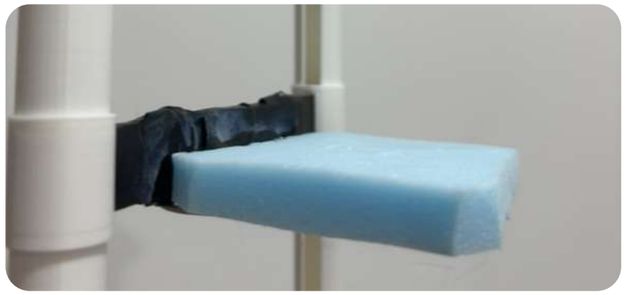
Two-column frame for stability and open access





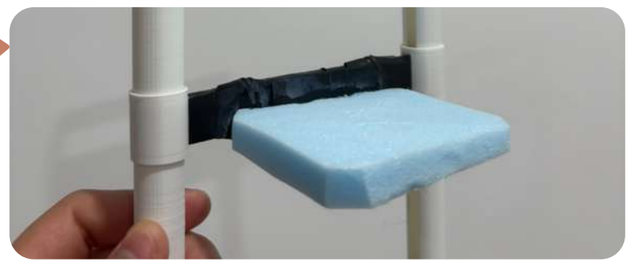
HANDLE

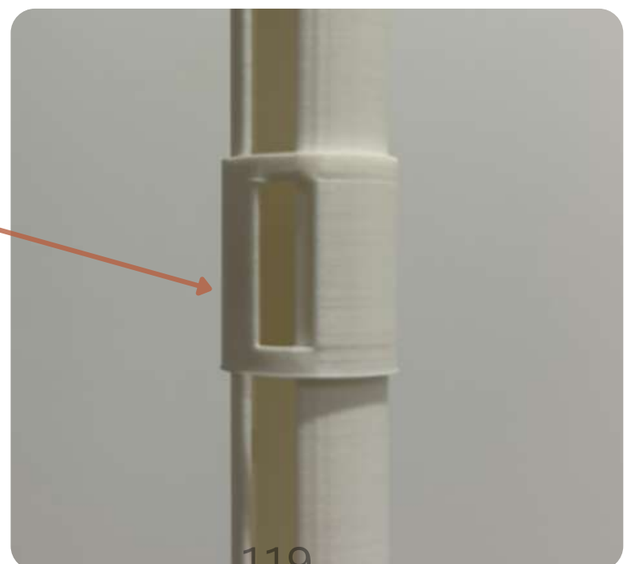
Rounded loop combines walking grip and palm support



KNEE PAD

Forward position supports the knee from the front or side





SLIDER

Guides the pad vertically and limits sideways movement

3D PRINT FRAME PROTOTYPE





PAD MOVEMENT

Pad moves vertically with the user’s lowering and rising motion





HANDLE USE

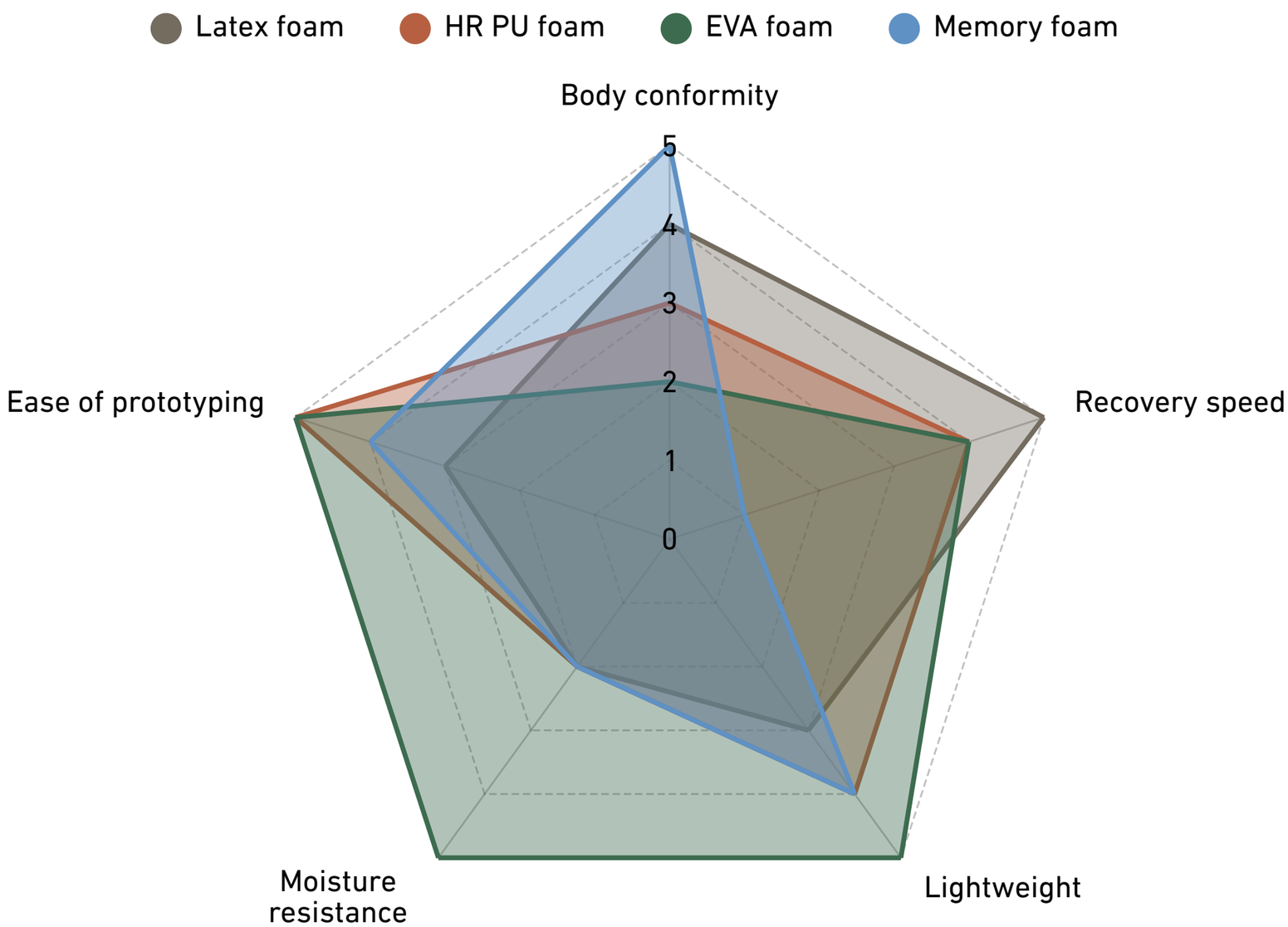
Upper grip supports walking; lower surface supports palm pressure

Prototype outcome

Used to test the vertical slide, also refine the frame, handle and pad proportions

METERIAL RESEARCH _ KNEE PAD

1 = Low / 5 = High



Latex foam	Conforming cushioning with fast recovery. A candidate for the upper comfort layer
HR PU foam	Responsive cushioning that is easy to shape for prototypes
EVA foam	Lightweight, moisture-resistant foam. A candidate for the firmer lower layer
Memory foam	Closely conforms to the body, but returns slowly after compression

**Indicative ratings based on material characteristics and assessment, not measured test results. Performance varies with grade, firmness and thickness.

MECHANISM RESEARCH

EXTENSION SPRING



An extension spring stores energy as it stretches and pulls the connected parts back together when the load is reduced. In my design, springs attached above the knee pad could resist lowering and help the pad return upward. The amount of assistance depends on the initial tension, spring rate and extension distance (Lee Spring, n.d.). My early prototype showed resistance when pressed by hand and returned upward as I reduced the pressure. This made extension springs worth exploring further, although the force and travel still need to be measured. A separate damper may be needed if the return movement is too fast.

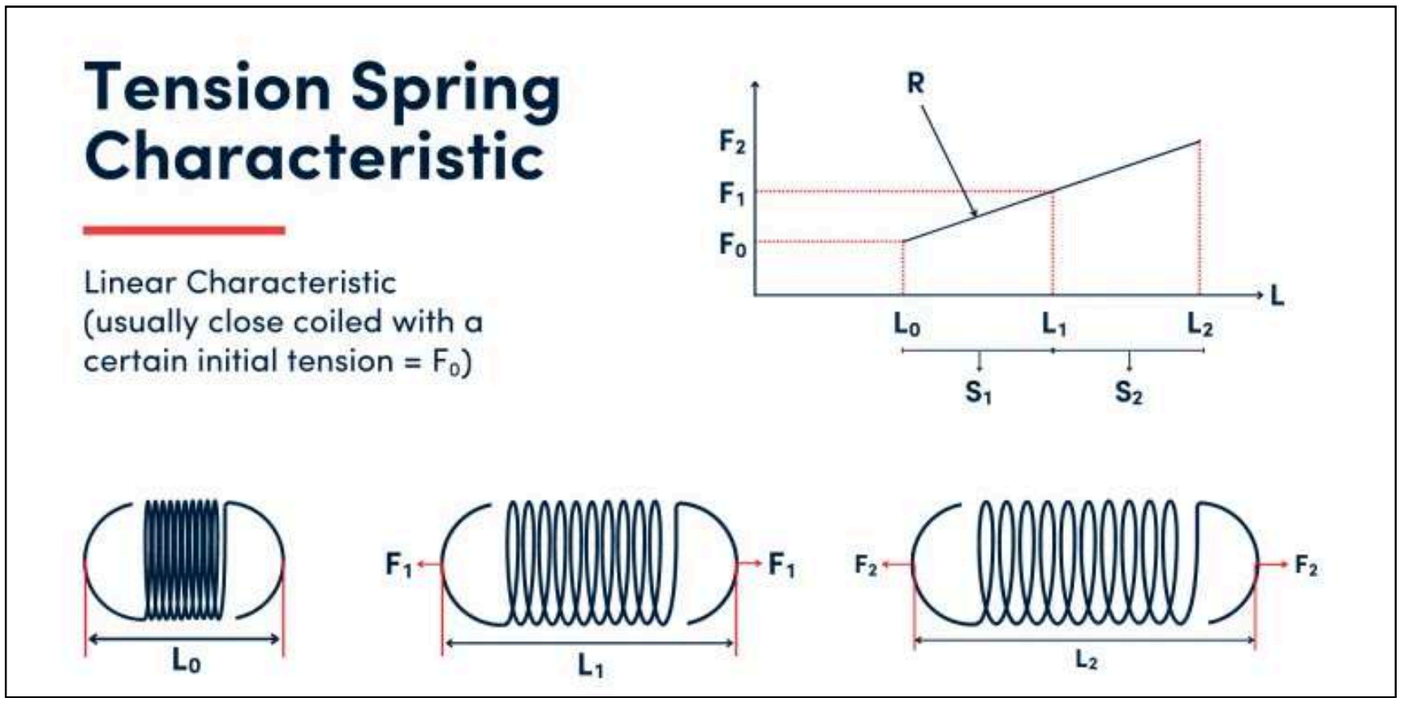


Image. (Lesjöfors, n.d))

MECHANISM RESEARCH

COMPRESSION SPRING





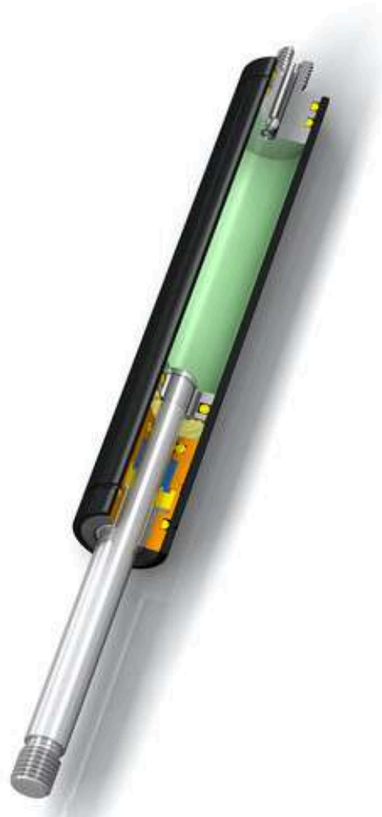


A compression spring stores energy when it is compressed and pushes back as it expands. I considered placing compression springs beneath the knee-pad carriage, with each spring surrounding a post. The posts would guide the springs and help reduce sideways bending, while suitable clearance would allow them to move freely (Lee Spring, n.d.). The available compression travel is important because the springs should not reach solid height, where all the coils touch, during normal use. This arrangement could provide upward assistance from below. However, combining it with the upper extension springs would also increase the resistance during lowering.

MECHANISM RESEARCH

PUSH-TYPE GAS SPRING





A push-type gas spring uses pressurised gas to extend its rod. If mounted between the lower frame and the knee-pad carriage, it could resist lowering and help push the pad upward. I considered this option because the mechanism could be enclosed within a slim cover. Some models include damping near the end of their stroke, but this does not guarantee slow movement throughout the full travel (ACE Controls, 2024). The force, stroke and mounting position would need to suit the pad's movement. The rails would also need to carry sideways loads because the gas spring should remain aligned with its direction of travel (Stabilus, n.d.).

MECHANISM RESEARCH

TRACTION-TYPE GAS SPRING



A traction-type gas spring pulls its rod inward rather than extending it. In my design, it could connect the upper frame to the moving carriage and pull the knee pad upward as the user reduces the load. This provides a similar direction of assistance to an extension coil spring, although the component and mounting requirements are different. I also found that damping is not standard on every traction gas spring. For example, ACE's standard GZ-28 has no end-position damping and requires an external travel stop (ACE Controls, n.d.). I would therefore need to check both the pulling force and return behaviour before selecting this option.

MECHANISM RESEARCH

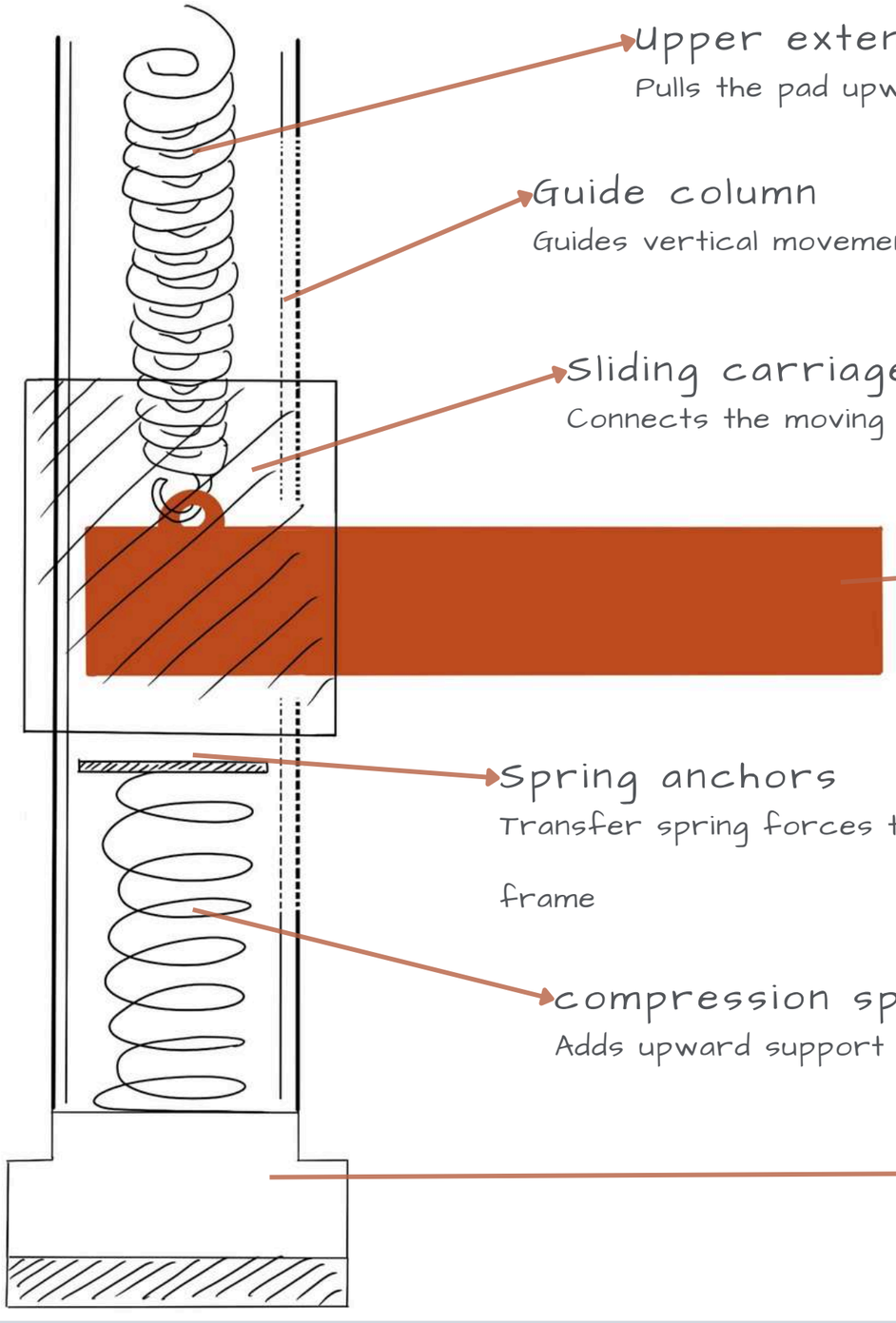
COMPARISION TABLE

Mechanical springs were prioritised for their simplicity, availability and non-electric operation

Mechanism	What it does	Advantage	Limitation	Fit
Extension spring	Pulls the pad upward	Simple; tested in prototype	Does not control speed	**High**
Compression spring	Pushes the pad upward from below	Can sit around a guide post	Does not control speed	**High**
Extension + compression springs	Both assist the pad upward	More support options	May make the pad harder to press down	Test later
Push-type gas spring	Pushes the pad upward	Compact can be concealed	Needs careful mounting and sizing	Medium
Traction-type gas spring	Pulls the pad upward	Provides upward assistance	More complex to source and mount	Medium–low
Hydraulic damper	Slows movement	Can reduce fast return	Does not lift the pad	**Only if needed**
Lock	Holds the pad in position	Keeps the pad at a set height	Adds parts and user steps	**Only if needed**

MECHANISM SKETCH

SECTION VIEW



Upper extension spring
Pulls the pad upward as it returns

Guide column
Guides vertical movement and supports the lower spring

Sliding carriage
Connects the moving pad support to the column

Pad support arm spring
Projects forward to carry the knee pad

Spring anchors
Transfer spring forces to the carriage and frame

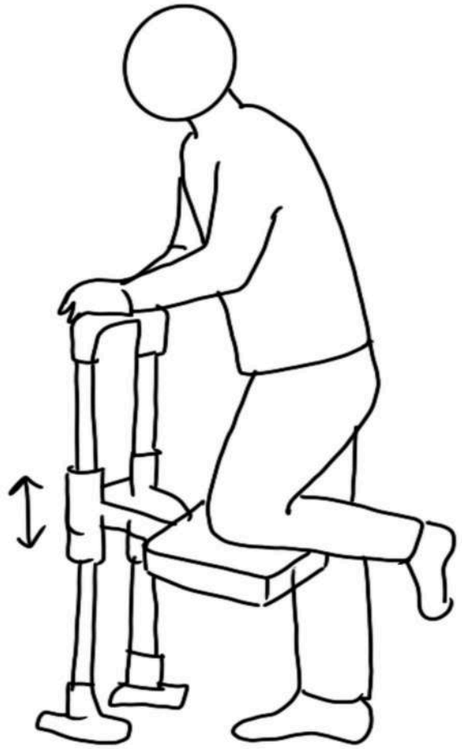
compression spring
Adds upward support when compressed

Base and rubber foot
Supports the column and provides floor grip

USER INTERACTION SKETCH



- One knee supported while the other foot remains grounded
- Allows the user to reach low shelves with less bending
- One hand holds the handle while the other remains available to retrieve items
- Knee pad stays close to the body for better balance
- Front and side access to the storage area

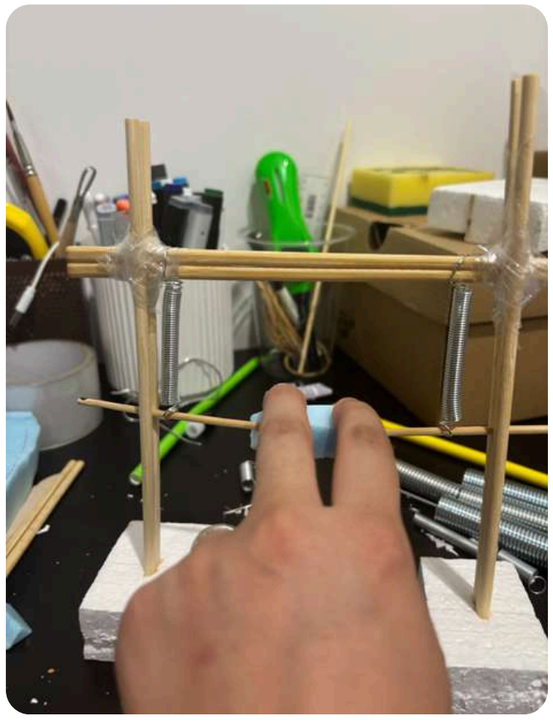
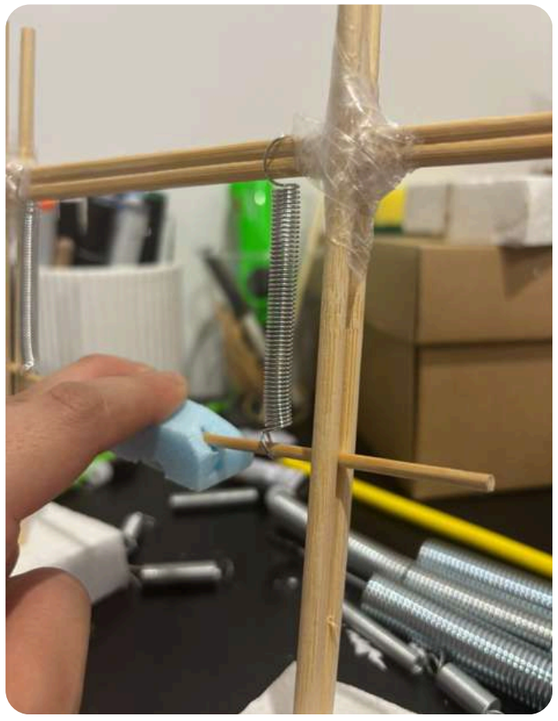


- Pad lowers gradually under body weight
- Controlled vertical movement follows the user’s knee
- Support is provided during both lowering and rising
- The user controls the movement through the handles
- Fixed feet maintain contact with the floor

MECHANISM PROTOTYPES

Small - Scale Model

I used timber sticks, foam and two extension springs to explore how a supported pad could move down and return upward.


Manual exploration

I then attached springs and a wire basket to existing supports. When pressed by hand, the basket lowered and returned as pressure was reduced. I could feel upward resistance during the movement.

Learning and limitations

These trials helped me understand the spring response, but did not establish suitable support force, safe return speed or body-weight capacity. The next prototype needs a guided carriage to assess movement under centred and off-centre loads.

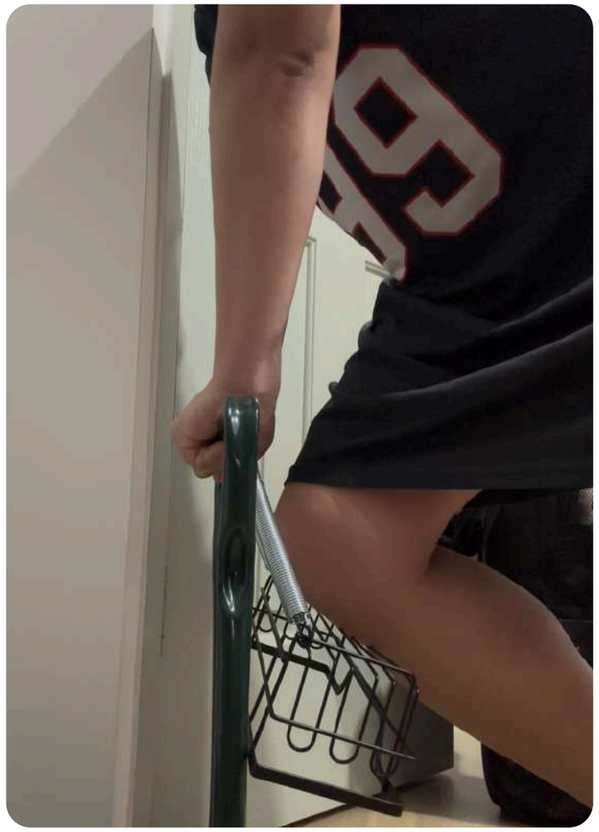
MECHANISM PROTOTYPES

Quick Testing

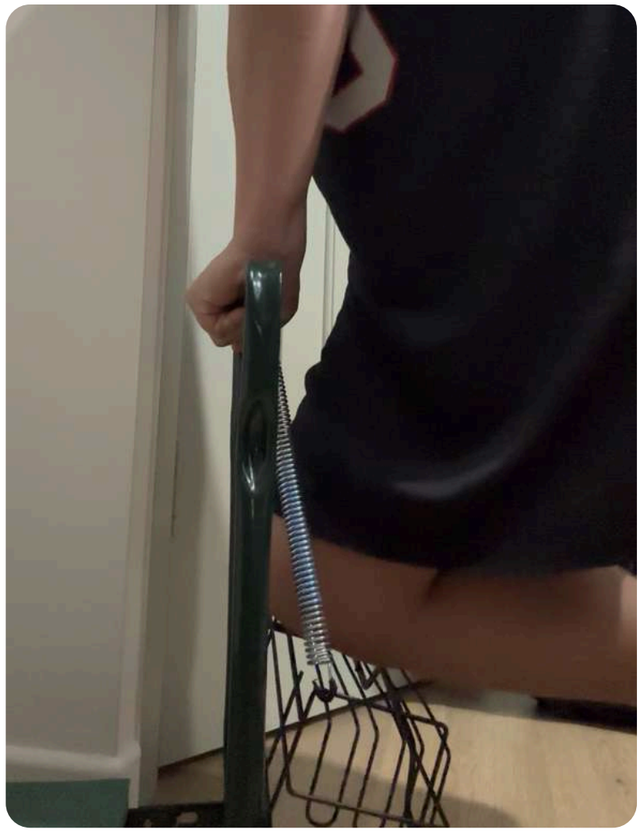
I attached two extension springs between the garden chair handle and a wire basket used as a temporary knee-pad proxy.
I explored the position and movement while lowering and rising.



2 pole garden chair used as the frame



Extension springs tested the upward pull



Wire basket used as a temporary pad

Observation

The springs provided some upward assistance as the basket returned. This test explored the interaction only; it did not assess load capacity or safety.

EXPLORING PASSIVE ASSISTANCE

WEEK 11

Mechanisms Material Considered

I compared a gas spring pushing from below, a gas traction spring pulling from above, and mechanical coil springs. The aim was to provide upward assistance without electricity.











Coil Spring Options

An extension spring stretches as the pad lowers and pulls it upward during return. A compression spring below the pad is compressed during lowering and pushes upward as it expands.

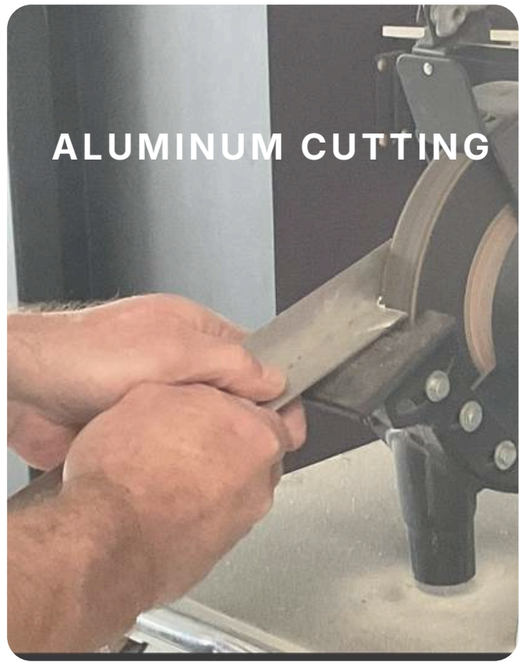
Prototype Decision

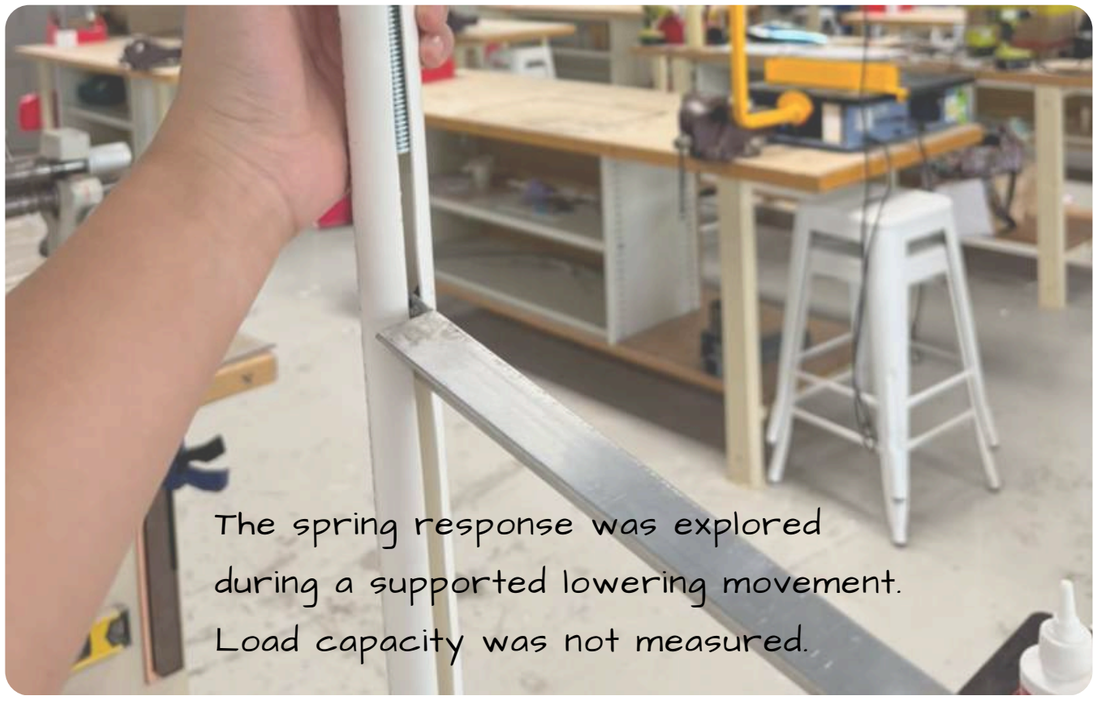
I started with PVC pipe and extension springs because they were available and easy to attach and adjust. Gas springs remained an alternative, but their dimensions, force and travel would need to match the design. Damping was considered separately for controlling movement speed.

MECHANISM PROTOTYPES

WEEK 11











Prototype Movement Test

The platform was pressed down by hand while lowering the body to explore its travel and spring resistance.

Off-centre pressure caused uneven movement, highlighting the need for better guidance and stronger connections between the two poles.

MECHANISM PROTOTYPES





PROTOTYPE FINDINGS

- Off-centre loading caused the platform to tilt, showing the need for better guidance

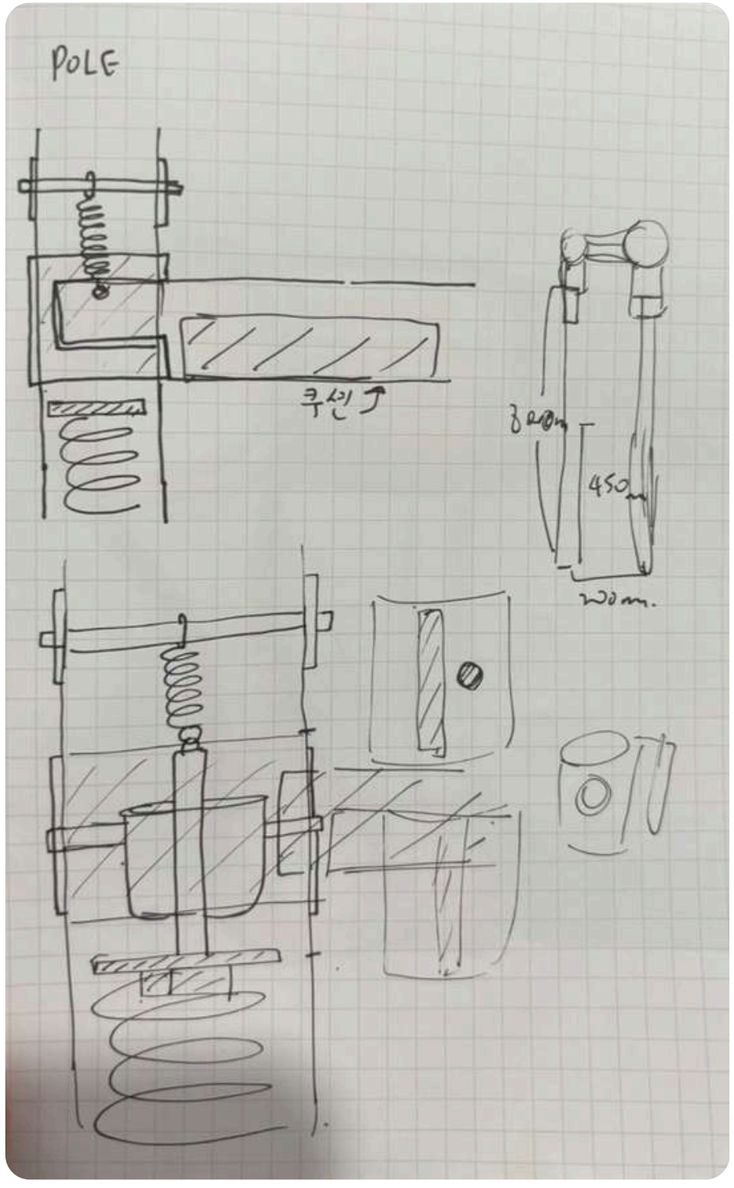
- The spacing between the two poles could be reduced for a more compact design

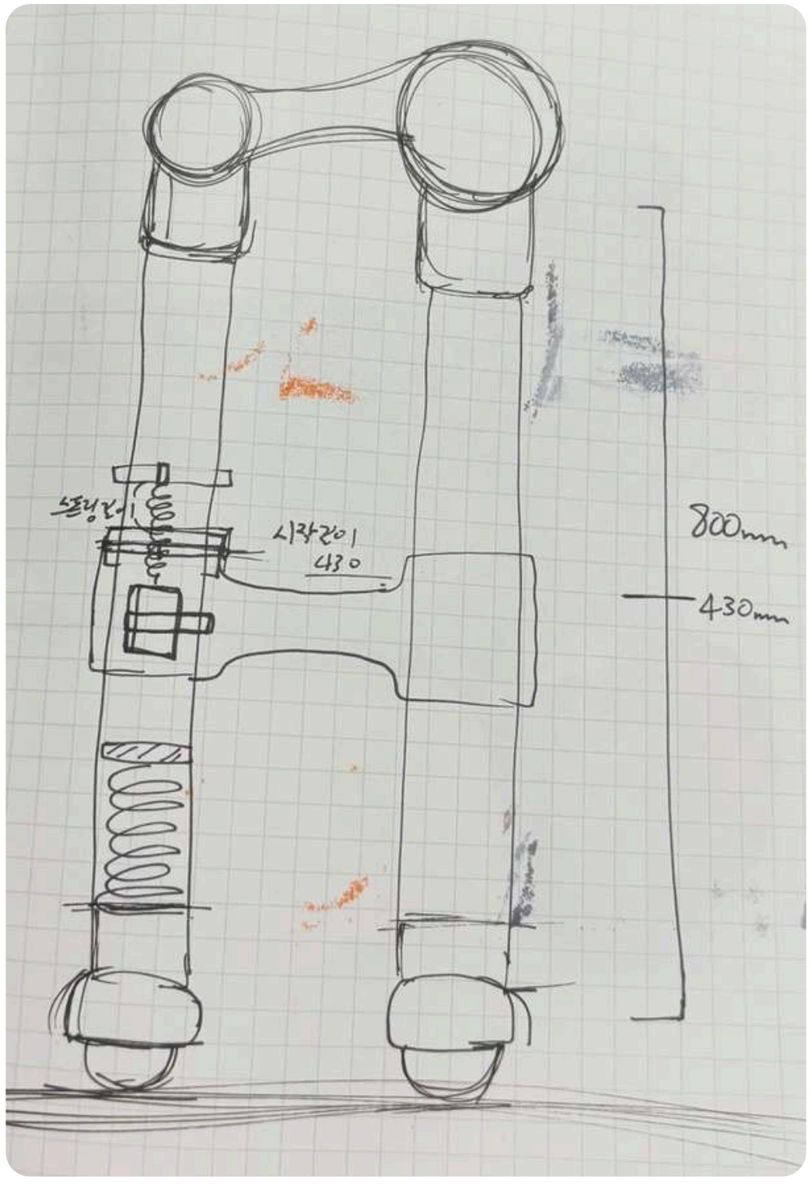
- The starting height needs adjustment for easier knee placement

The observed tilting led to the development of a connected twin-slider system

DEVELOPMENT SKETCH MECHANISM

WEEK 11





DEVELOPMENT SKETCH

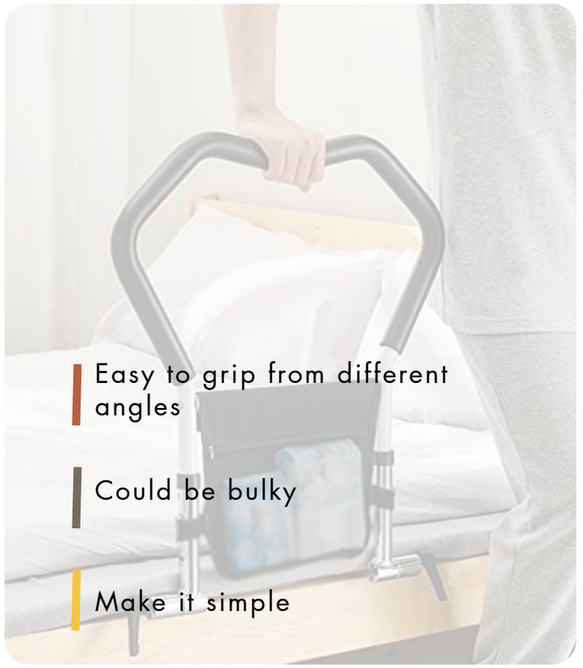
These sketches explore how the knee support could move vertically along two poles. An upper extension spring is intended to assist its return, while a lower compression spring provides support near the bottom of travel.

The external sliders are linked by an aluminium crossbar to help the knee platform move as one unit. Connections between the springs, internal moving parts and sliders require further development, particularly to limit tilting under uneven knee loading.

DEVELOPMENT RESEARCH _ HANDLE



- Good wrist support and unique shape
- Could be bulky
- Use its ergonomic curve



- Easy to grip from different angles
- Could be bulky
- Make it simple



- Stable and structurally strong
- May look like a medical aid
- Use the two-post connection



- Provides different gripping heights
- More complex to use
- Separate the walking grip and palm support

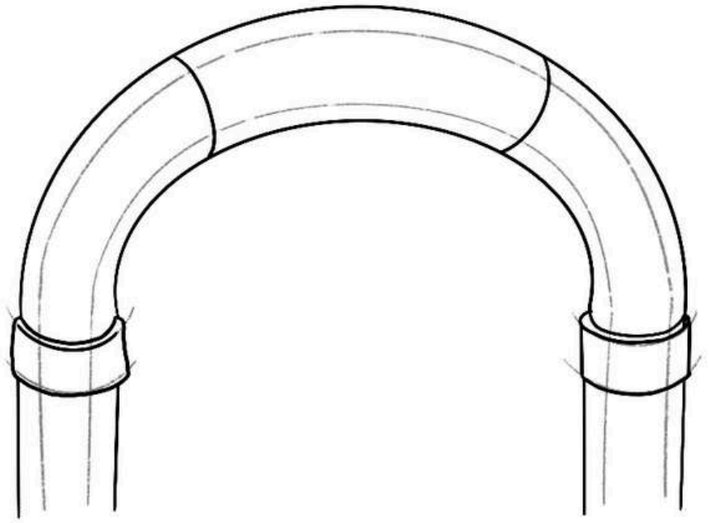


- Secure grip
- The hand may get trapped
- Use a partially open oval shape

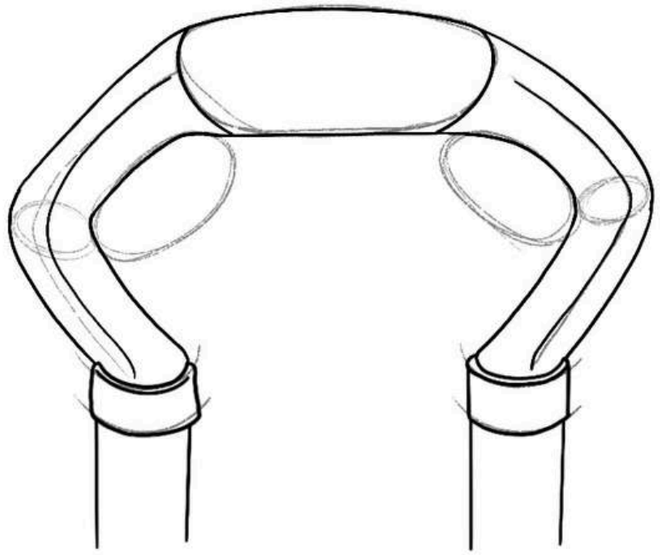


- Stable with multiple grip positions
- Too bulky and walker-like
- Use only the support-bar idea

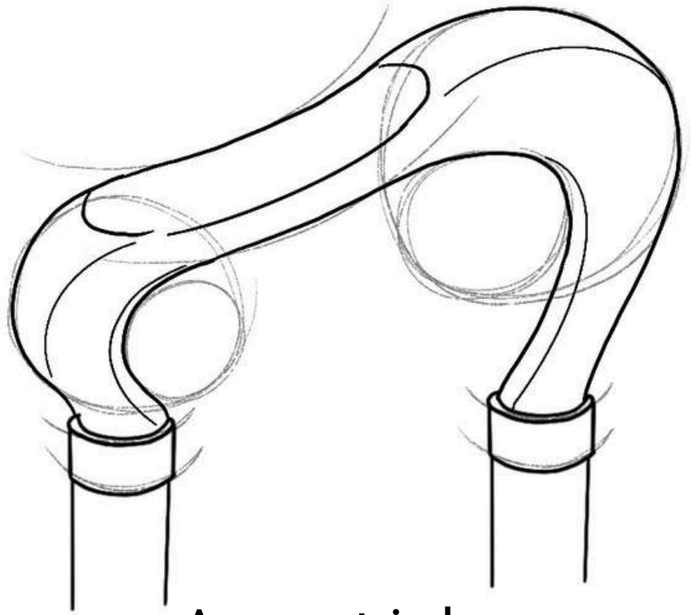
DEVELOPMENT SKETCH _ HANDLE



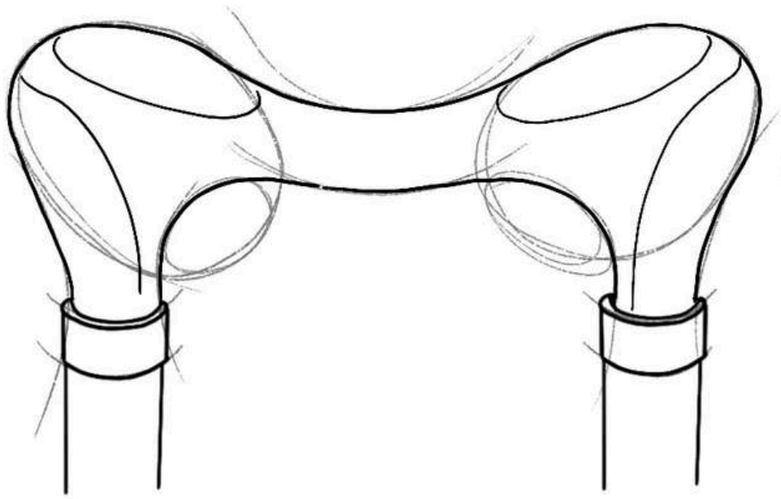
Arch



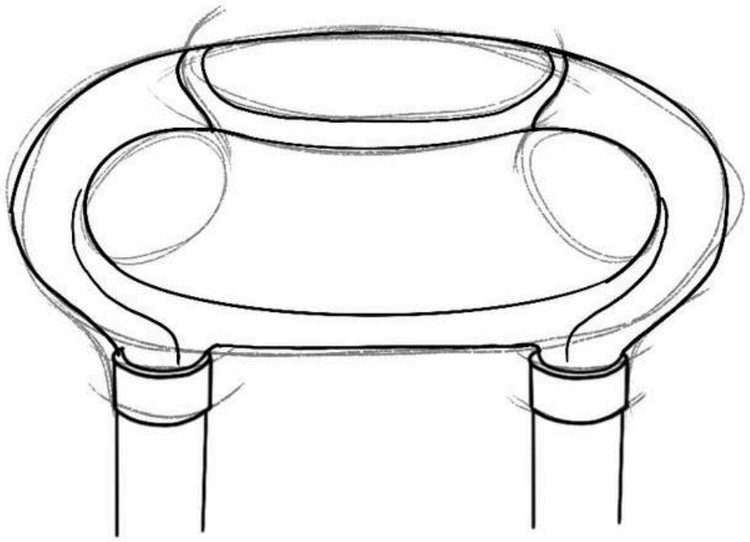
Soft Polygon



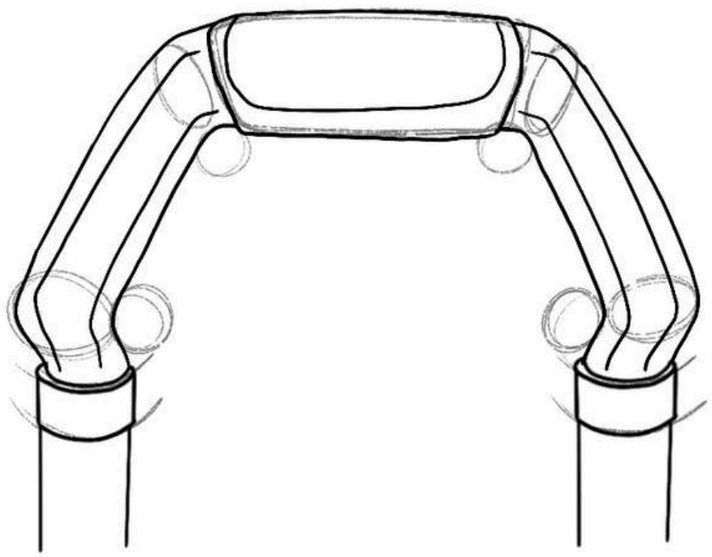
Asymmetric loop



Double curve

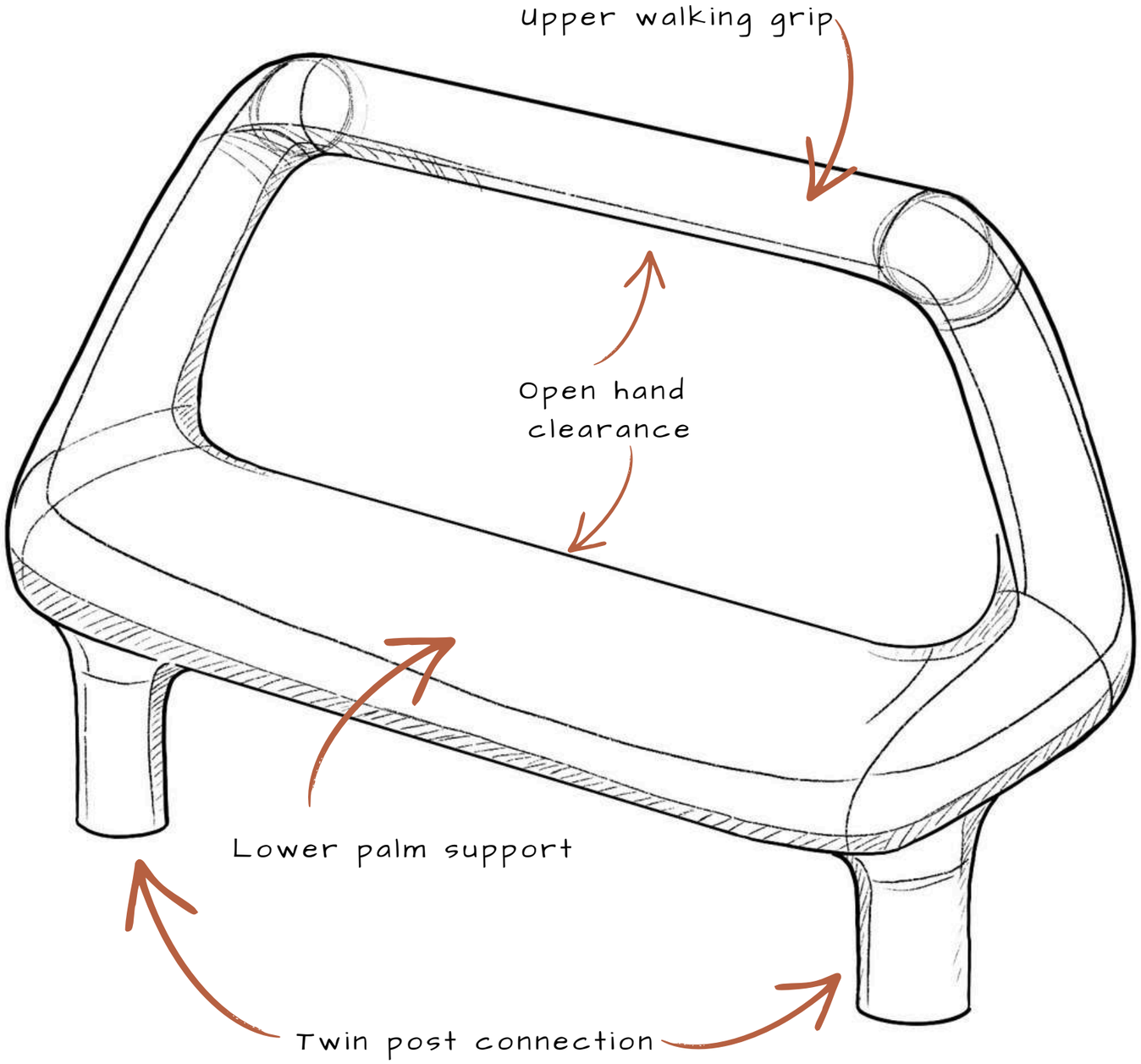


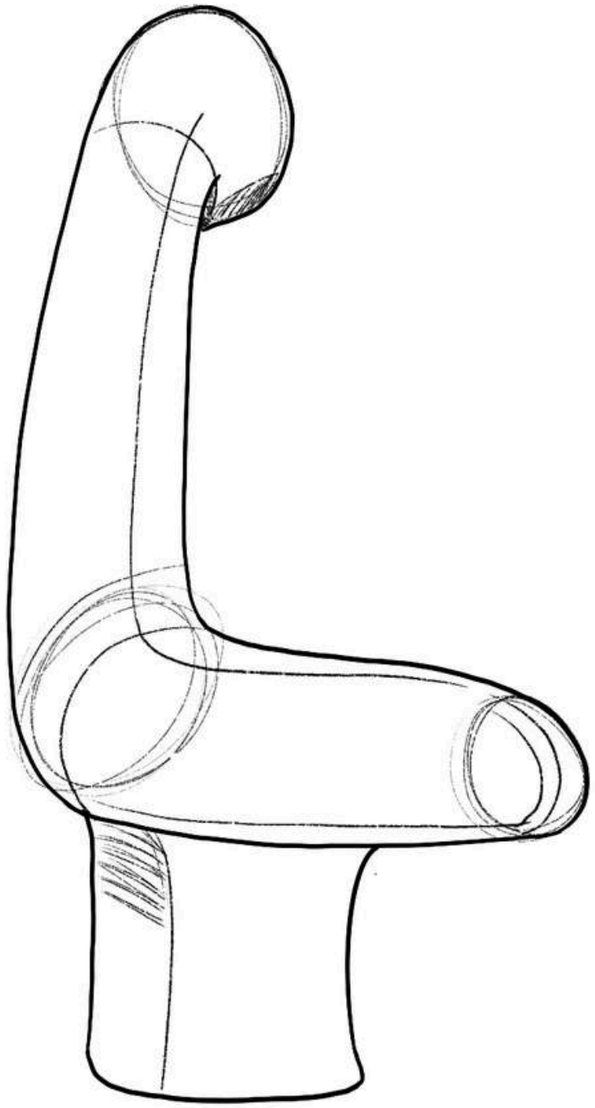
Oval loop



Angled sides

DEVELOPMENT SKETCH _ HANDLE

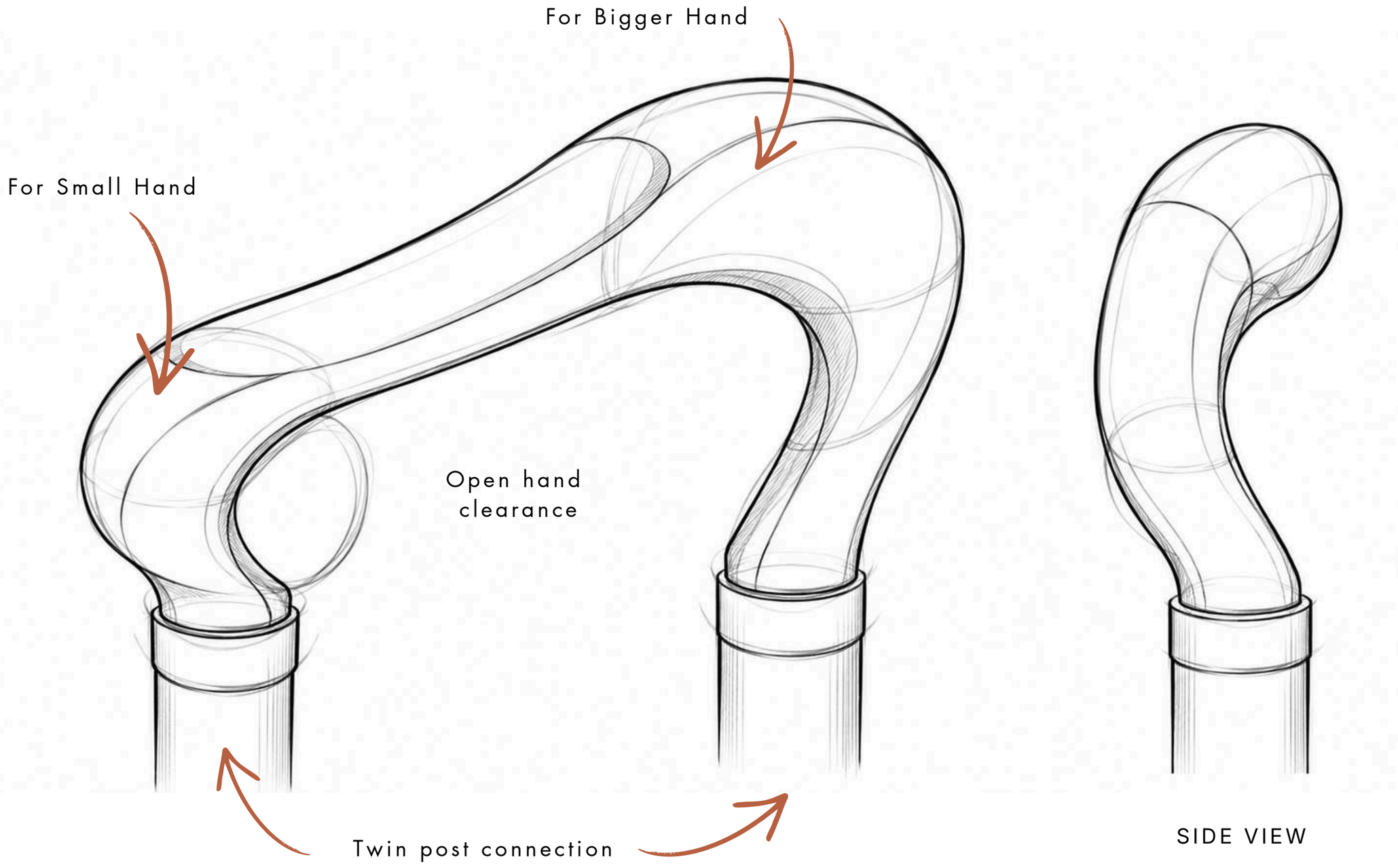




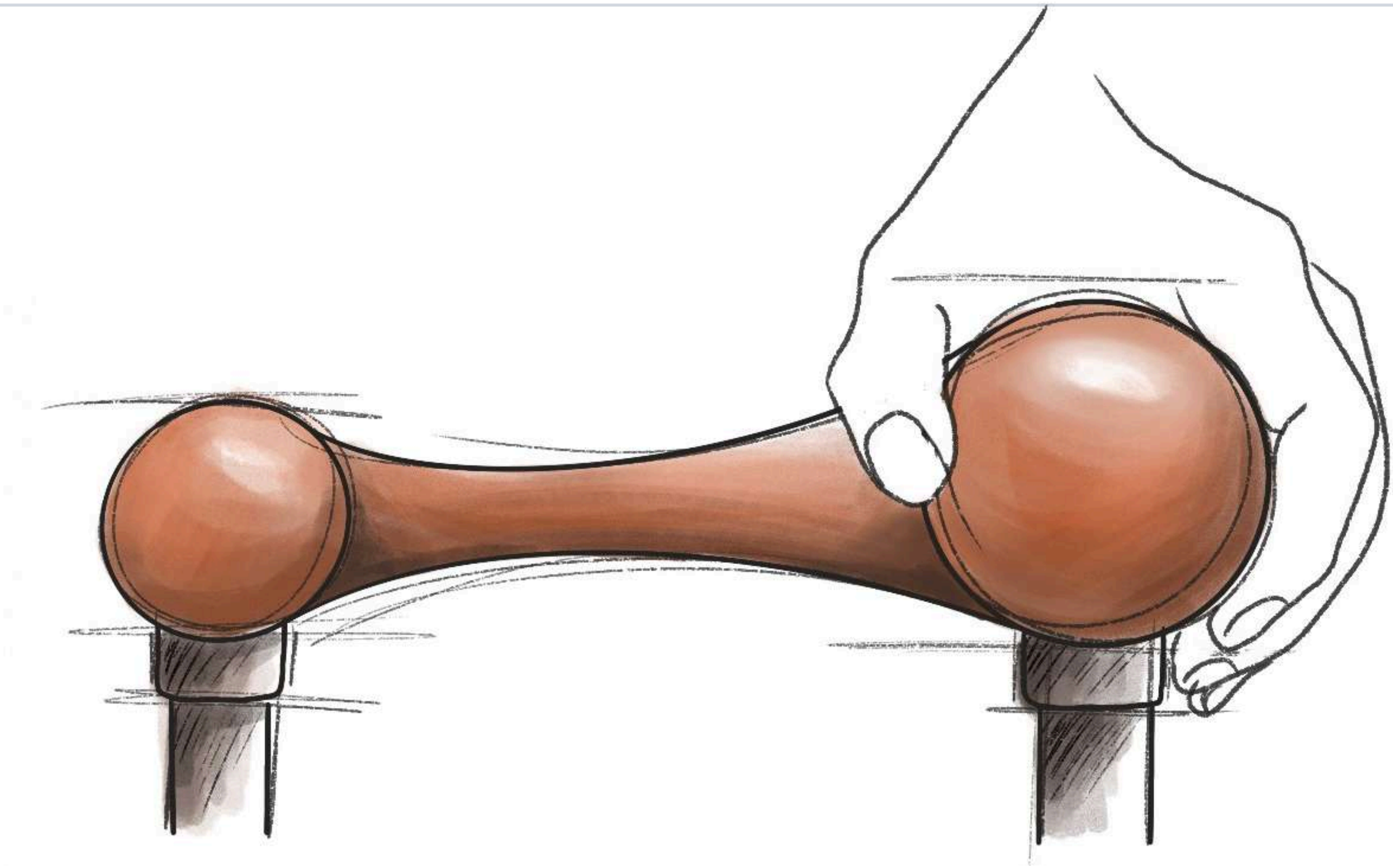
SIDE VIEW

DEVELOPMENT SKETCH _ HANDLE

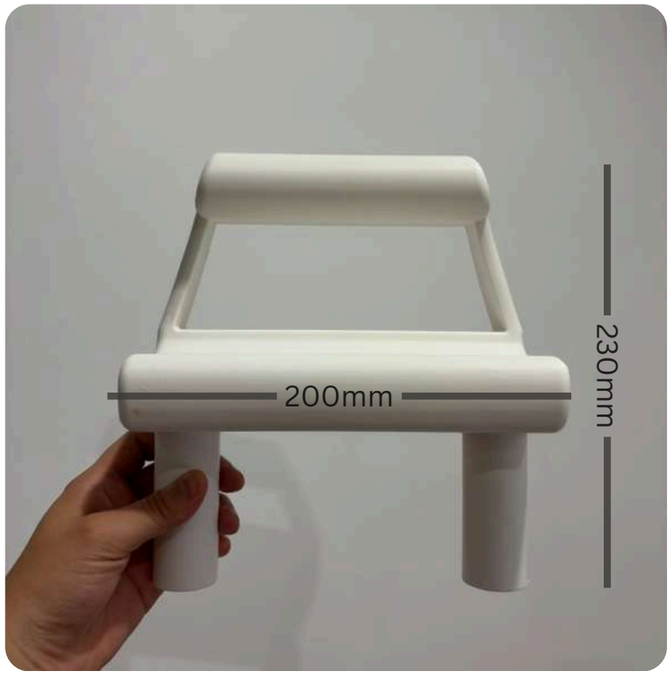
WEEK 11



DEVELOPMENT SKETCH _ HANDLE



3D PRINT PROTOTYPE _ HANDLE







GRIP AND FORM EXPLORATION

• The upper grip provides a conventional holding position, while the wider lower section offers palm support.

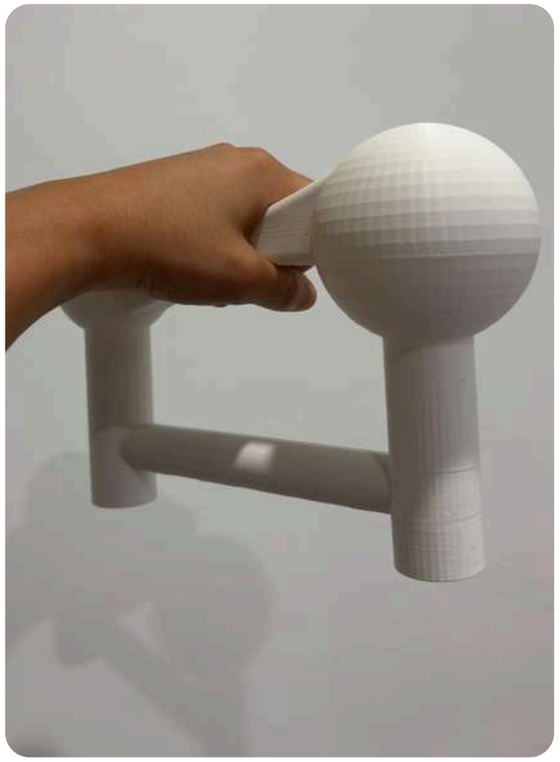
• The open space allows the hand to wrap around the upper grip, and the rounded surfaces soften the contact areas.

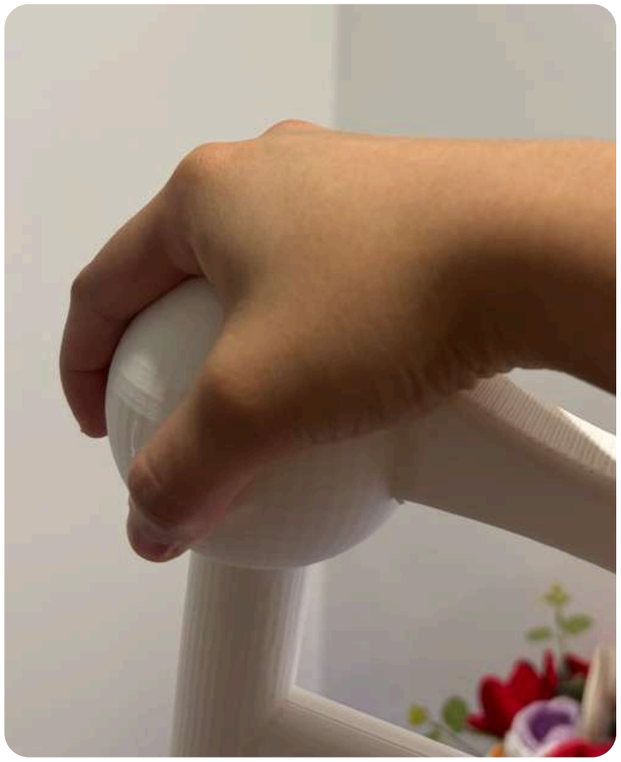
• Initial handling suggested that an overall width of approximately 200 mm could be sufficient.

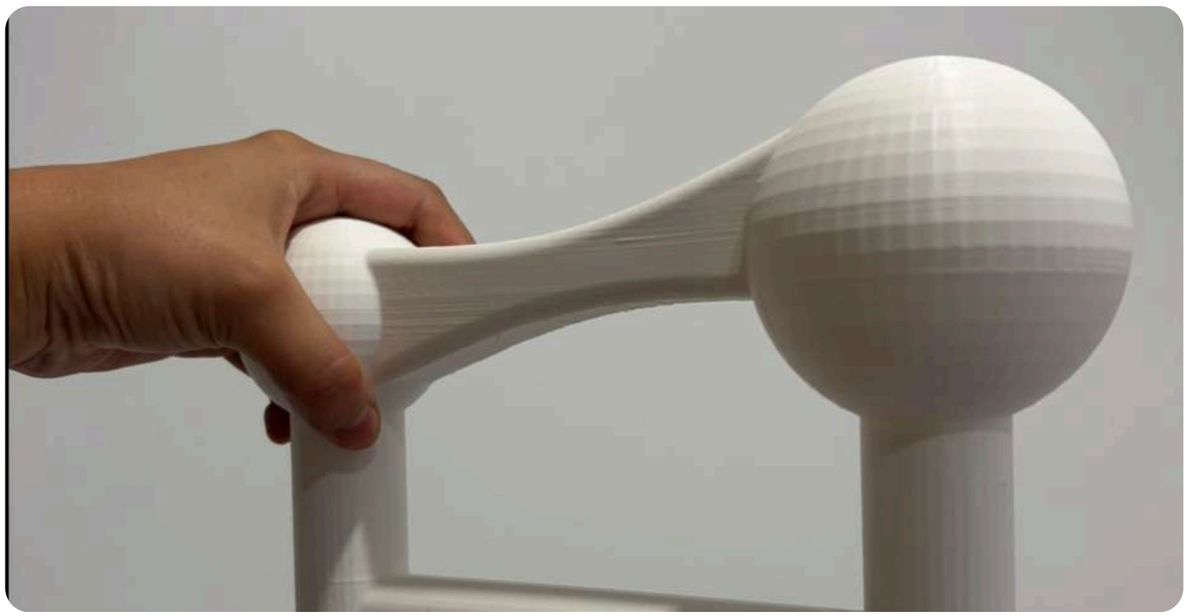
• The broad lower section gives the handle a visually bulky appearance. A more compact form is being explored to make the product look less like a conventional walking aid.

• This prototype informed further handle development. It is not the final design, and an asymmetric spherical grip is being explored as an alternative.

3D PRINT PROTOTYPE _ HANDLE







GRIP AND FORM EXPLORATION

• Different grip positions were explored using the small sphere (Ø30 mm), large sphere (Ø40 mm) and central bridge.

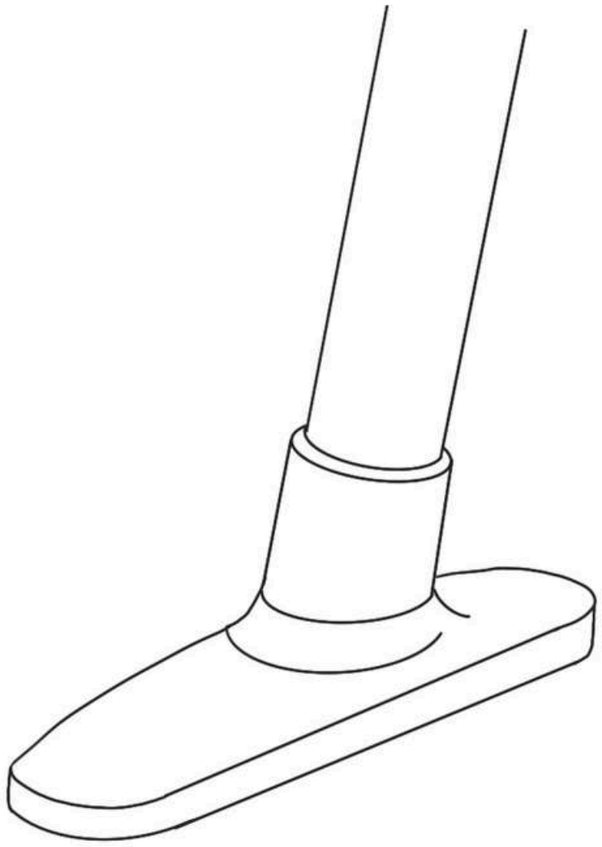
• Initial handling felt similarly comfortable to the previous handle, despite removing the separate palm-support surface.

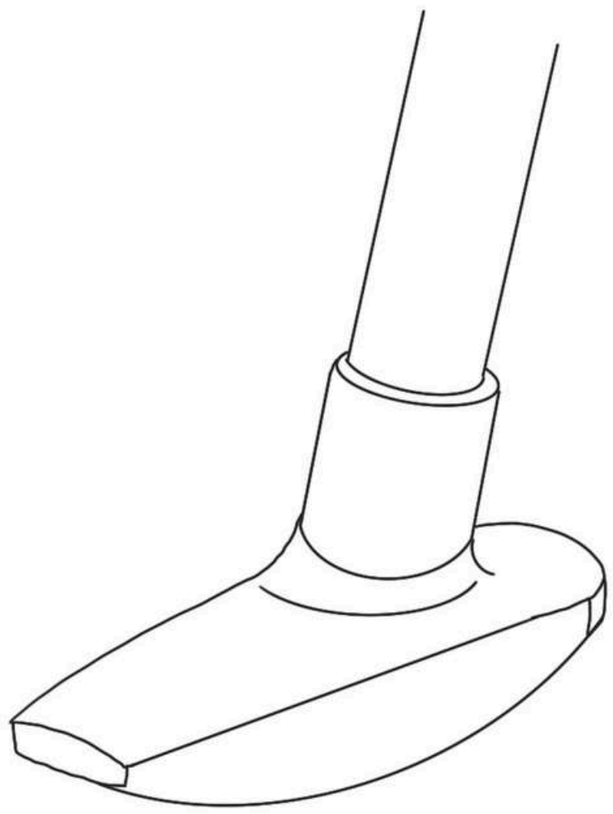
• The asymmetric form offers a more distinctive appearance, with less visual bulk than the previous design.

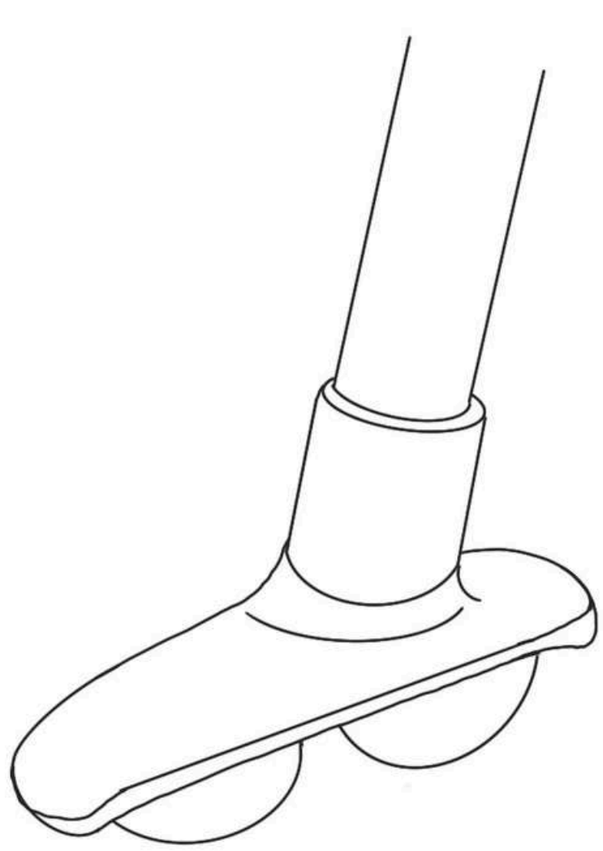
• Further development will explore raising the larger sphere and removing the lower crossbar for a simpler silhouette.

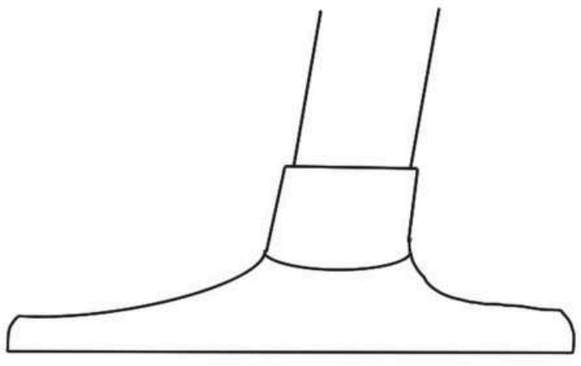
DEVELOPMENT SKETCH _ BASE

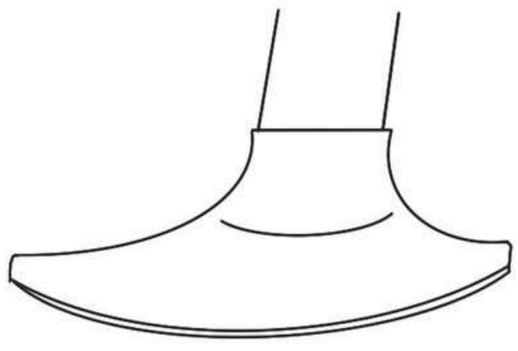
WEEK 11

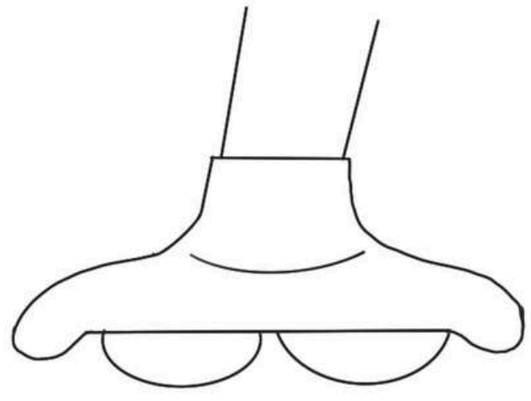






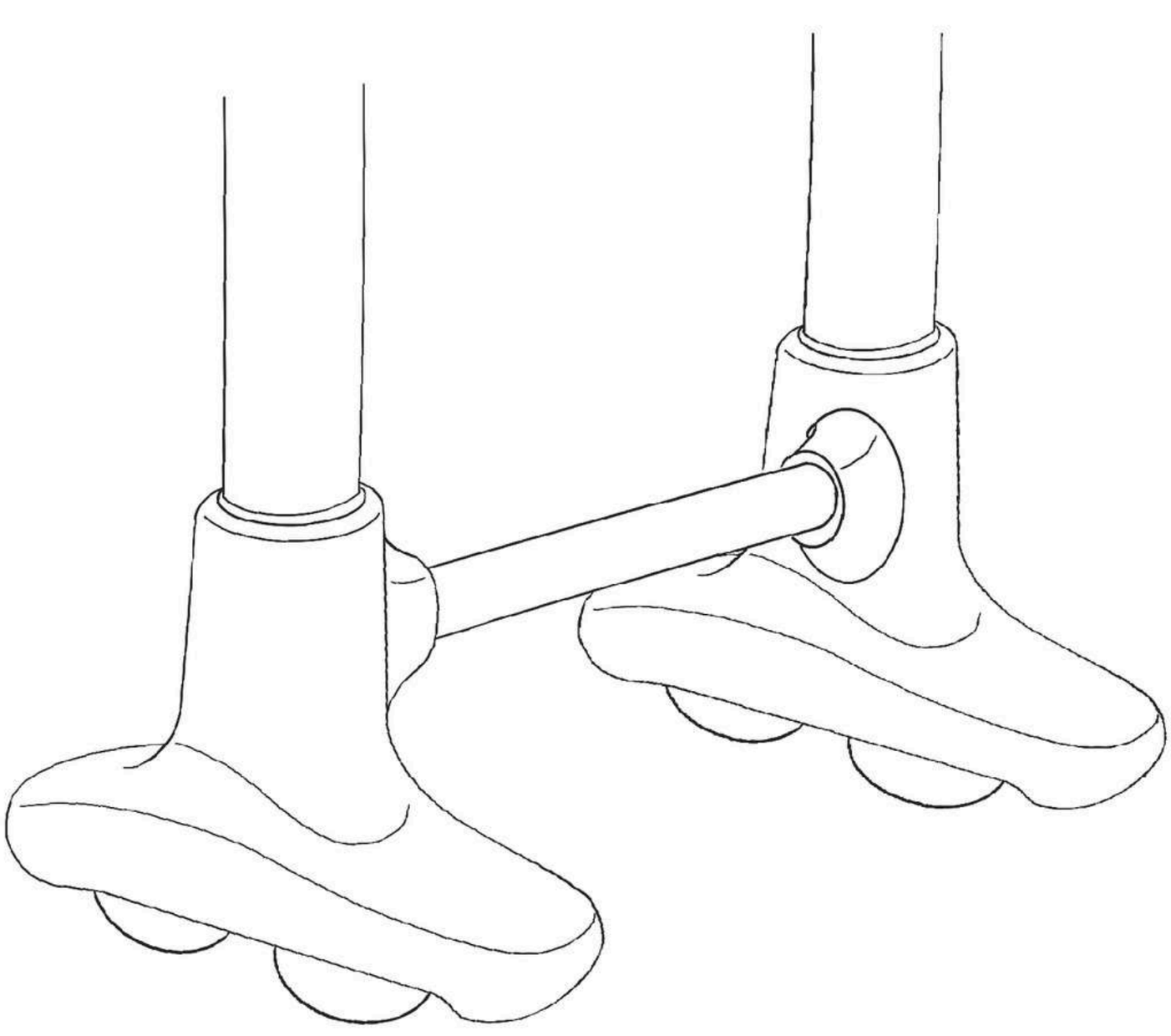


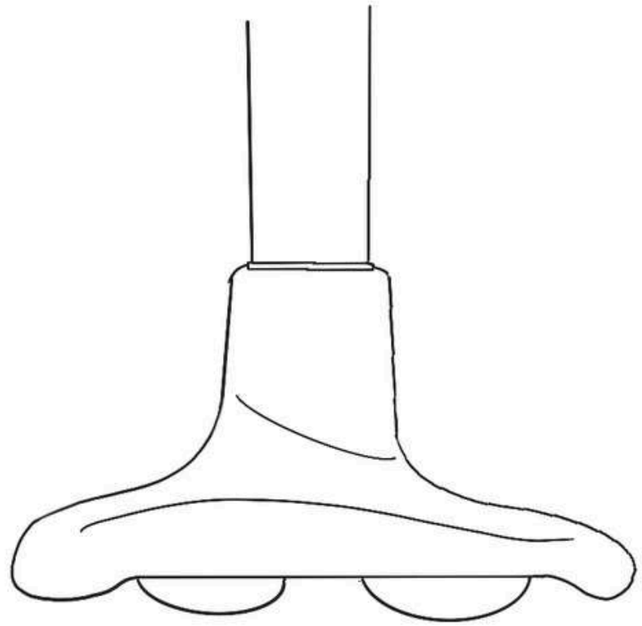


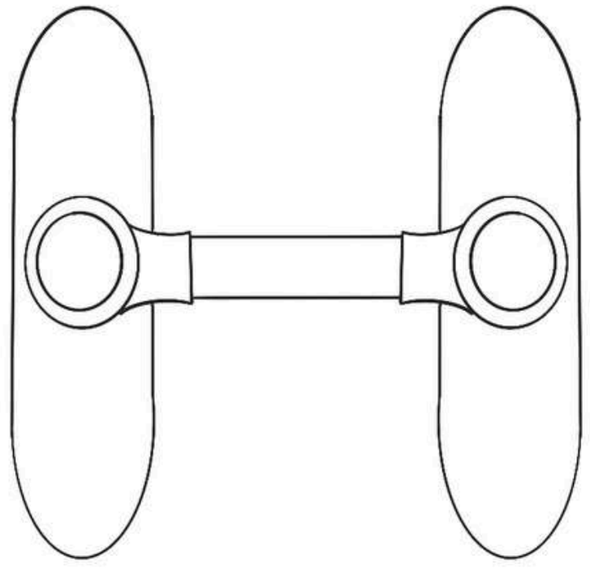


DEVELOPMENT SKETCH _ BASE

WEEK 11







PROTOTYPE _ BASE

SIZE TEST

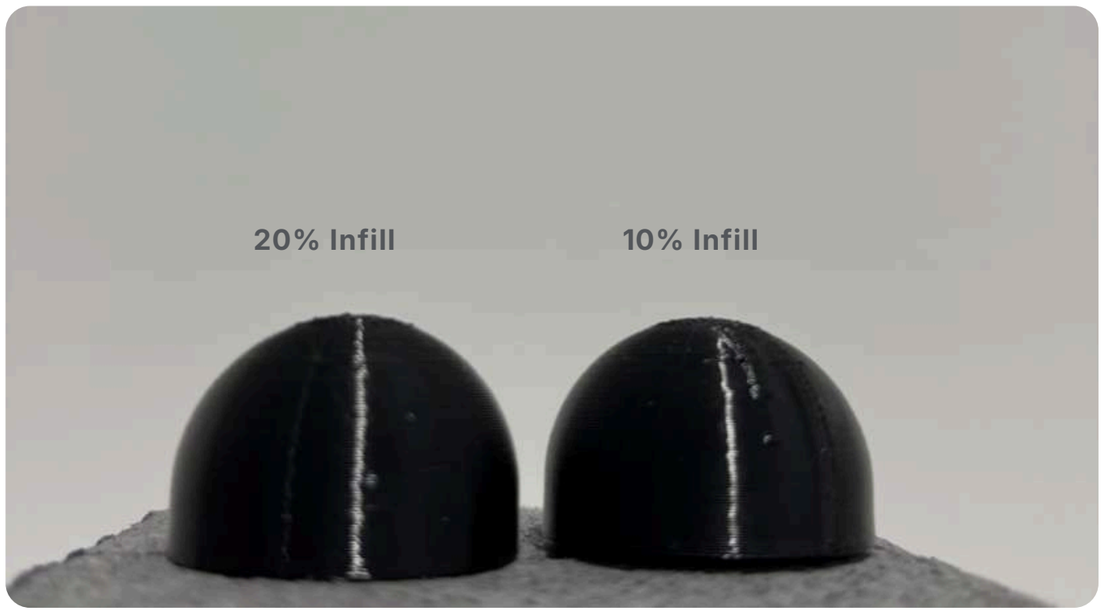




Comparing 100mm length / 150mm length

The base dimensions were compared to balance stability and portability

BASE METERIAL TEST



TPU FOOT _ COMPRESSION TEST

Two TPU feet were tested with 20% and 10% infill, both using two wall perimeters. The 20% version showed no noticeable compression under the applied load. The 10% version compressed by a suitable amount and appeared more promising for the intended function. It was selected for further testing