A person wearing a light-colored sweater is shown from the waist down, holding a dark water bottle. The background is a natural, outdoor setting with hills and trees, all in a muted, monochromatic color palette.

P A X E S S

Accessible Outdoor Bag Design for
Nature Enthusiasts

GAZAL MALEKITABRIZ

Background

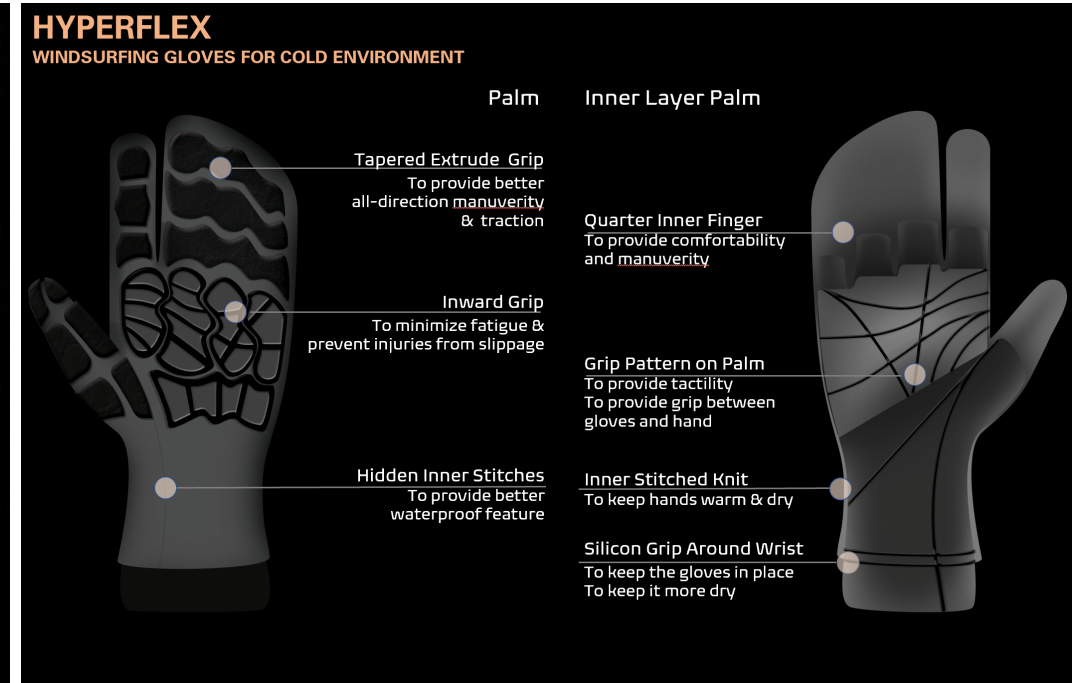
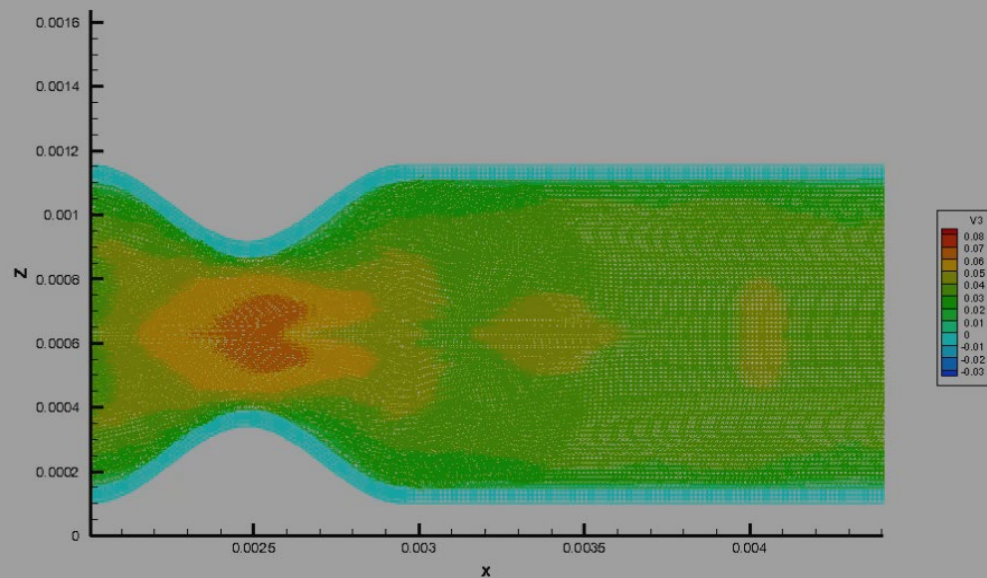
Master of Science/Sports Product Design,
University of Oregon, Portland, OR
Thesis Accessible Outdoor Bag Design for Nature Enthusiasts

Master of Science/Mechanical Engineering
Shiraz University, Shiraz, Iran
Thesis Fluid Structure Interaction
Industry Two years as an engineer

This project is part of my master thesis at Sports Product Design program with the purpose to improve aesthetic and efficiency through performance testing & implementing technology

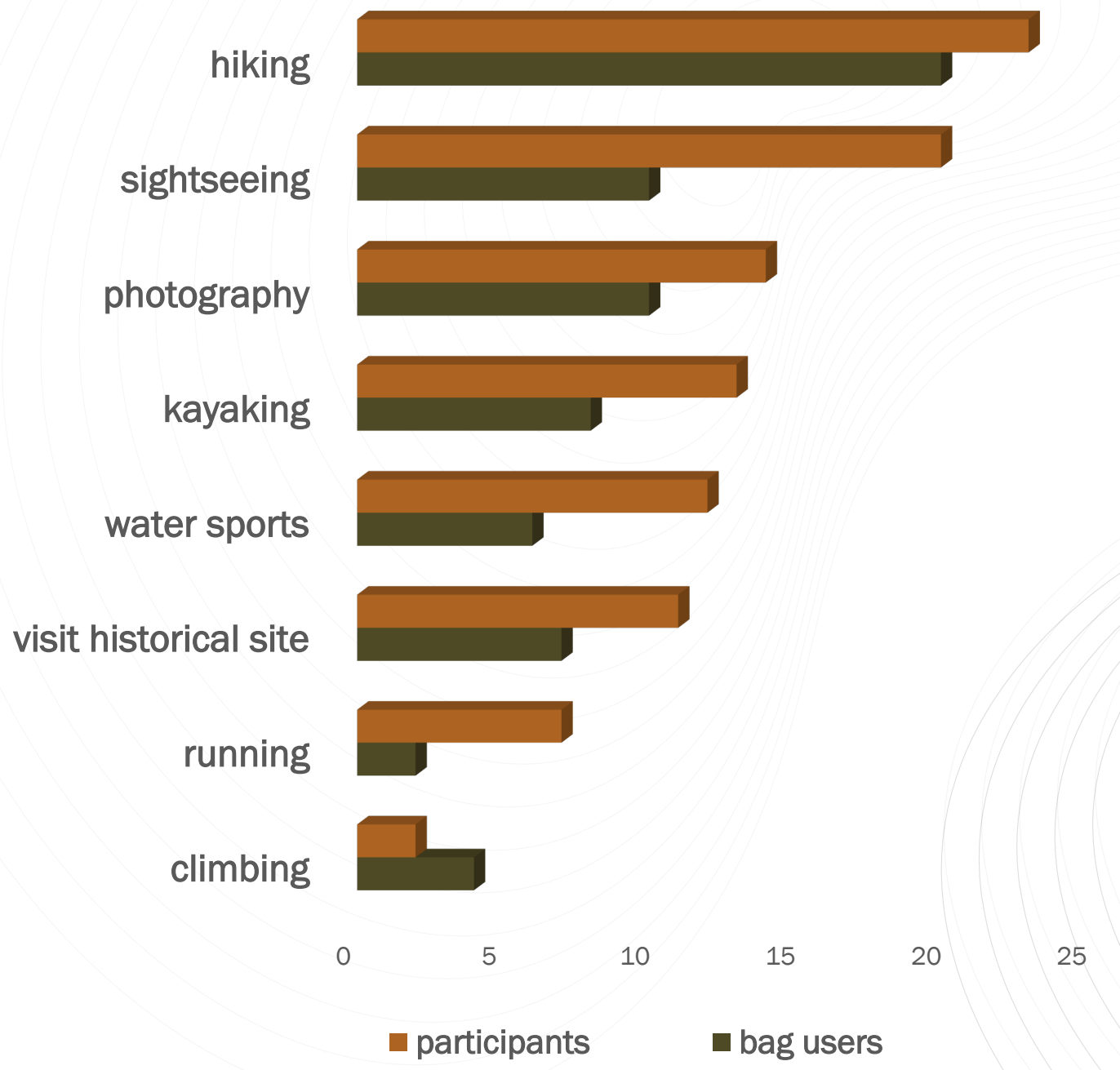


Fluid Structure Interaction

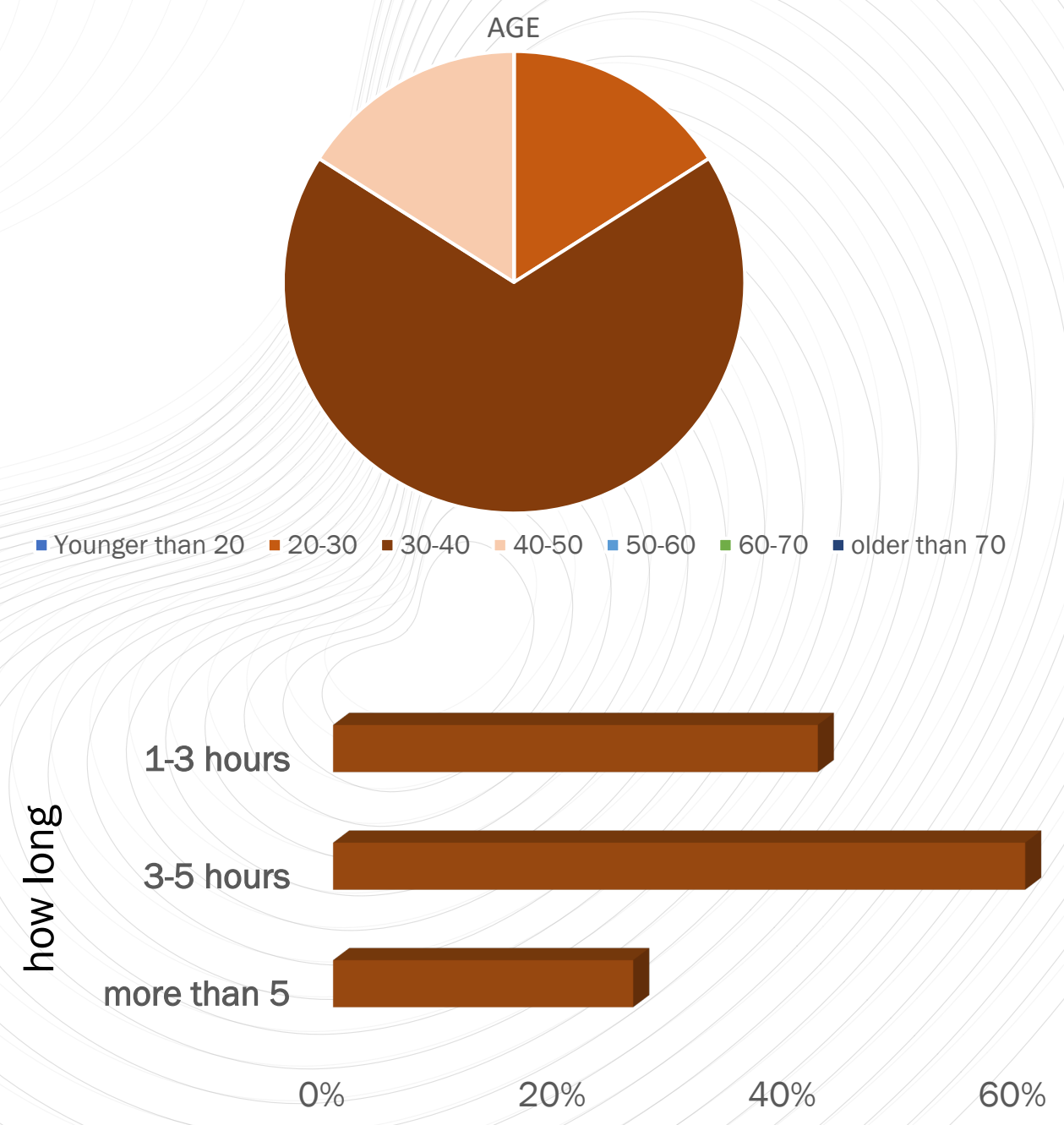


CONSUMER RESEARCH

30 Campers & Glampers Surveyed on activities using bags & packs



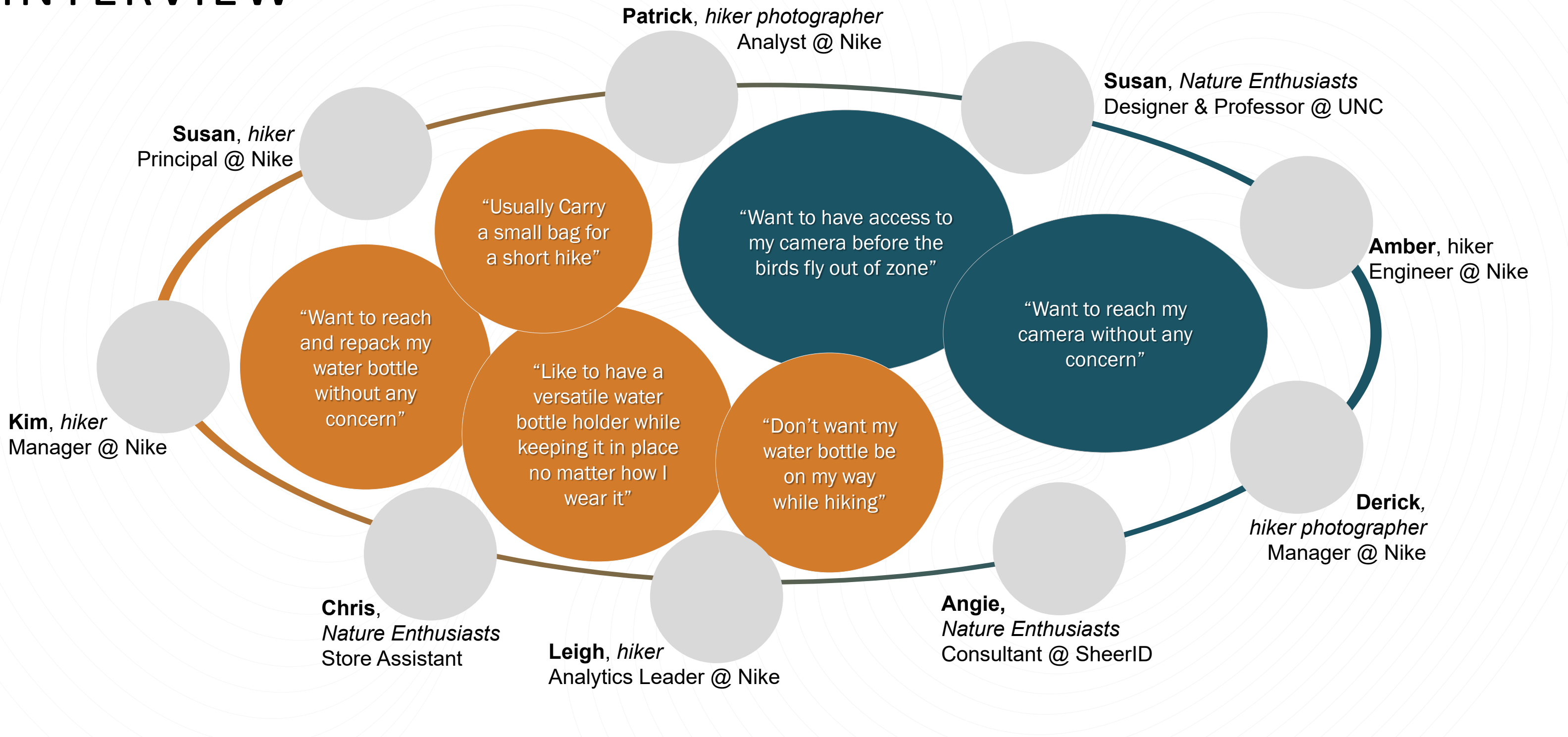
50 Campers & Glampers Surveyed,
9 Personal Interviews & 3 Benchmark Demos



USER INTERVIEW

9 INTERVIEWEES

20-60-YEAR-OLD



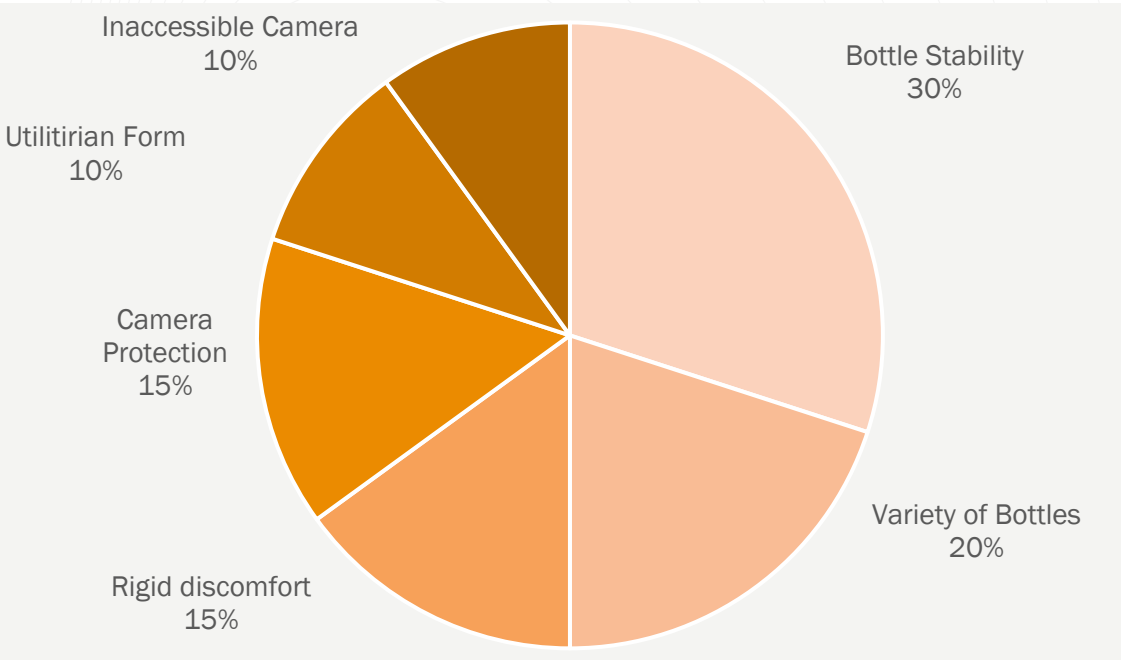
PROBLEM STATEMENT

How can we design **bag solutions** to empower 30-to-45-year-old nature & photographer enthusiasts to **efficiently pack and access items** while **hiking and photographing**

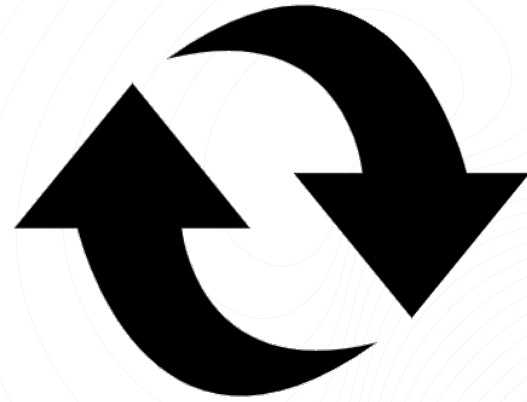
PROBLEMS TO SOLVE

Issues with the current products	Pains
Bottle Stability	Wobbles while moving
Variety of Bottles	Larger is tight, smaller moves
Rigid Discomfort	Box-like shapes, no body ergonomic
Utilitarian form	Visible functions, dull colors
Inaccessible camera	Hard to reach, miss shots, hard closures
Camera protection	Impacts confidence

50 Glampers Surveyed, 10 Personal Interviews, 3 Benchmark Demos



GOALS



Performance

Ease of access/repack

Provide easily accessible storage by considering elbow/wrist movement, while protecting valuable and/or heavy items

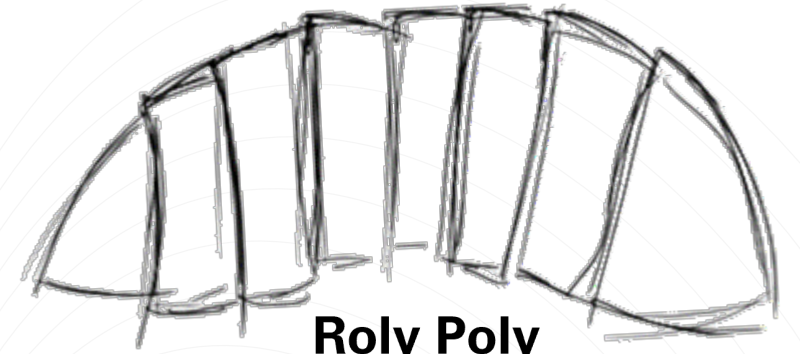
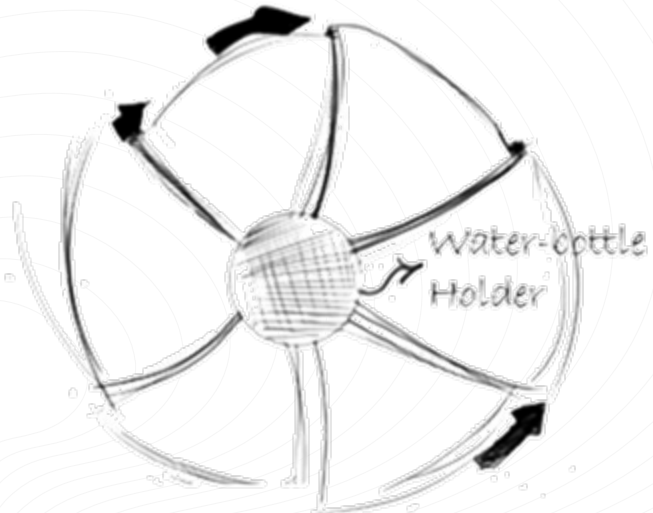
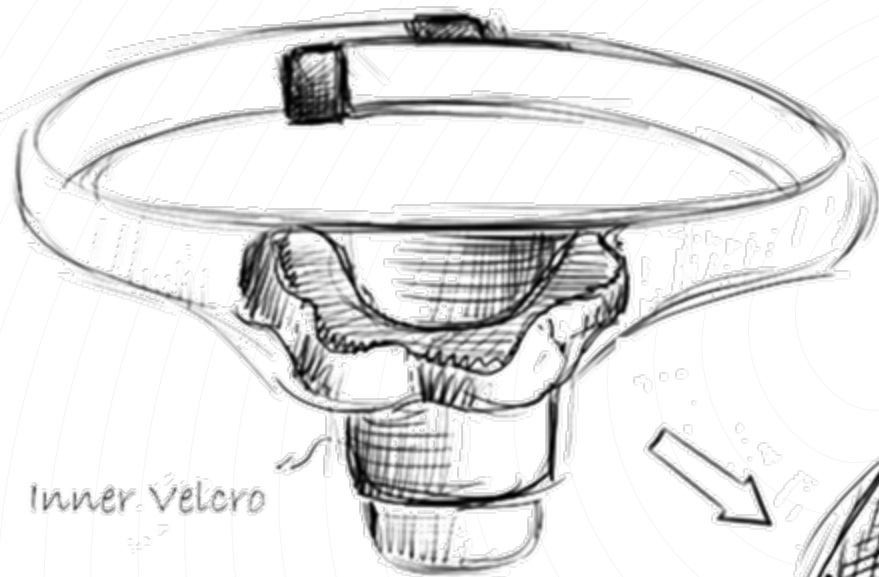


Form

Versatility

Provide universal carry by considering weight distribution and storage placement, while creating a safe space for common items

IDEATION

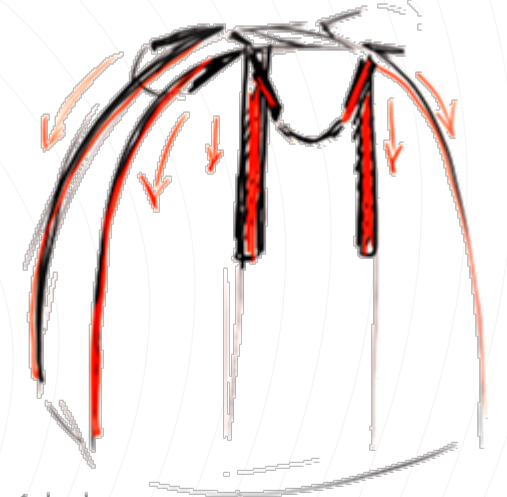


Roly Poly

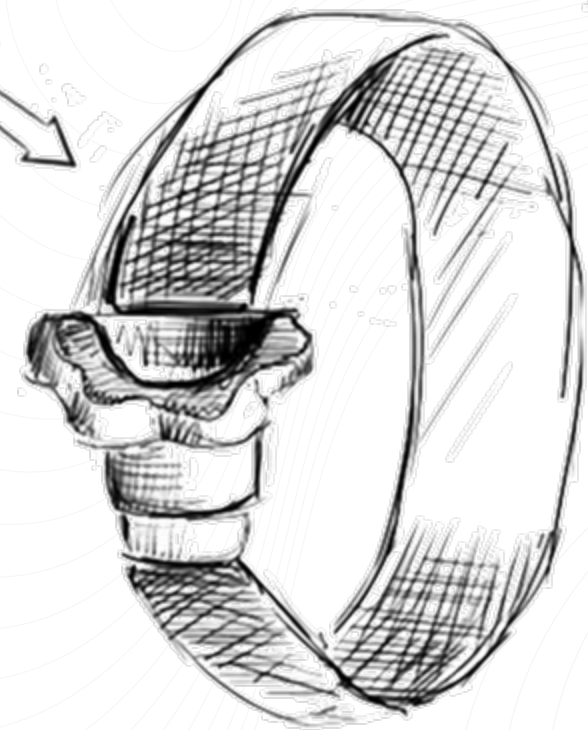
It gets its popular name for its ability to roll back into a ball when something disturbs it. They have an exoskeleton with plates. They may not be able to bite or sting, but many are able to roll up into a ball for protection. But when they are not rolled up, they can be as long as 0.71 inches (18 millimeters).

Expandable + Accessible through sections

Vertically Expandable



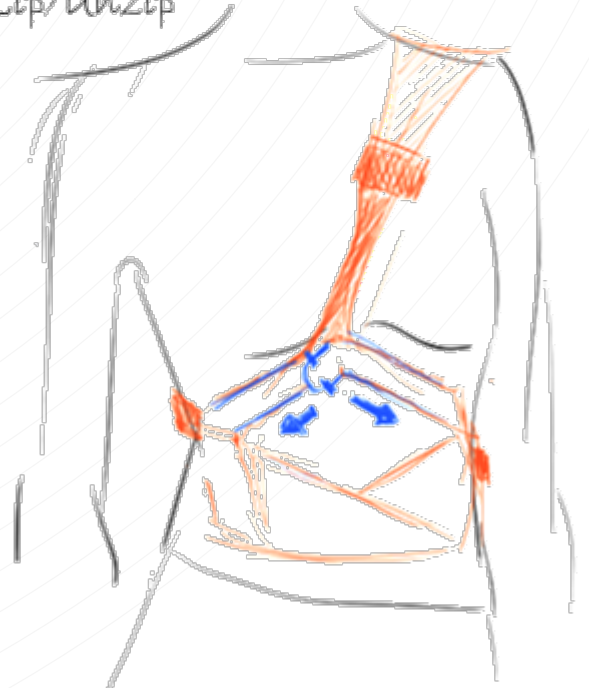
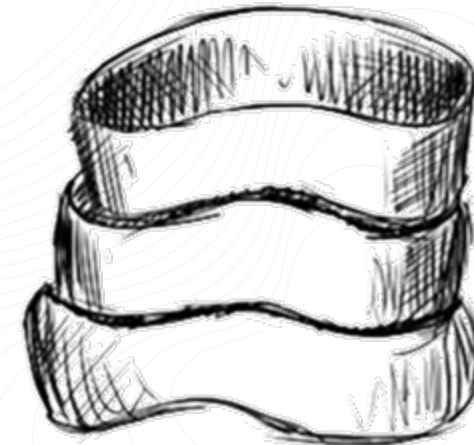
TOP view



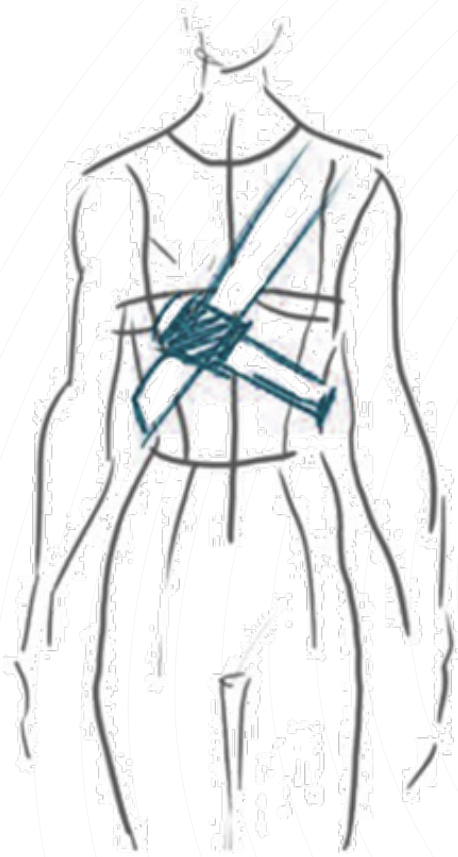
Vertically Expandable with Flexible Coverage



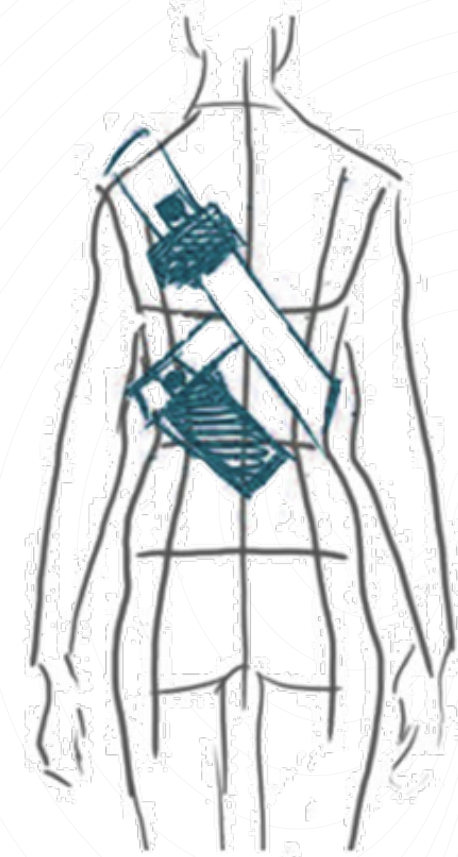
Vertically Expandable + Angled Opening Section to improve accessibility



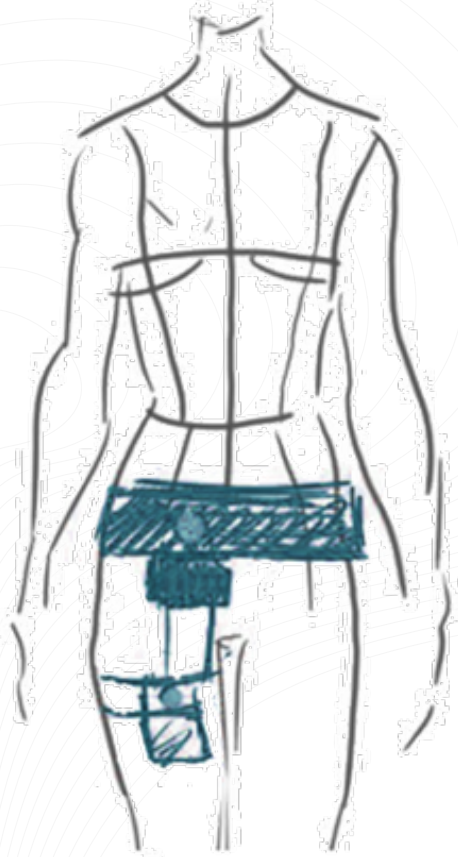
IDEATION



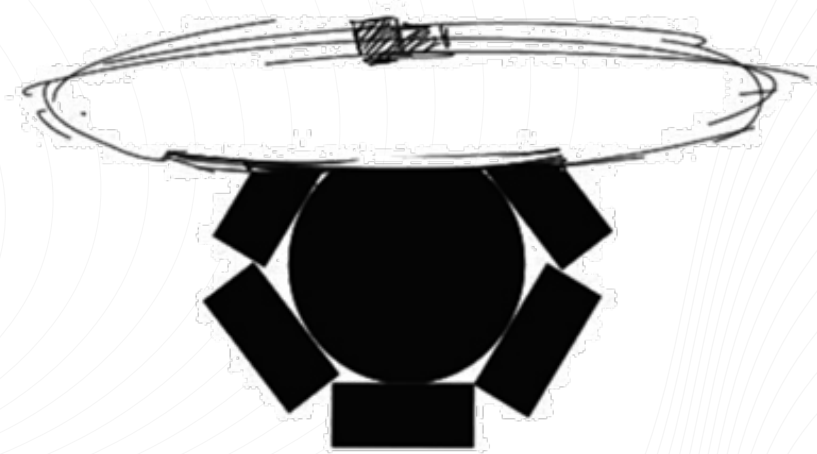
Crossbody Front



Crossbody Back



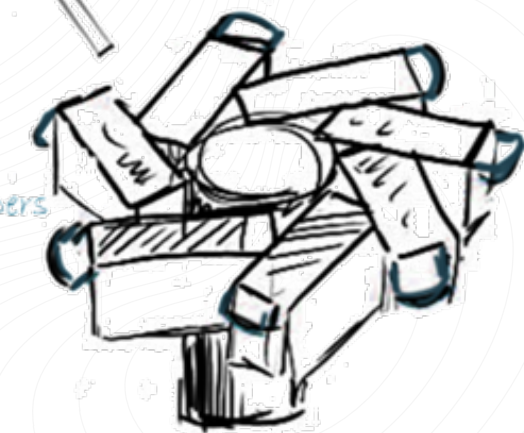
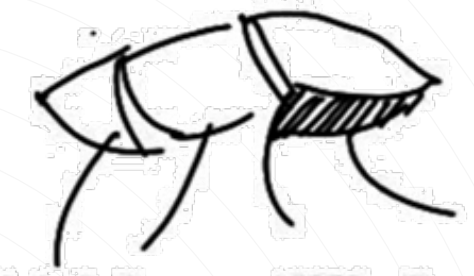
Hip Back



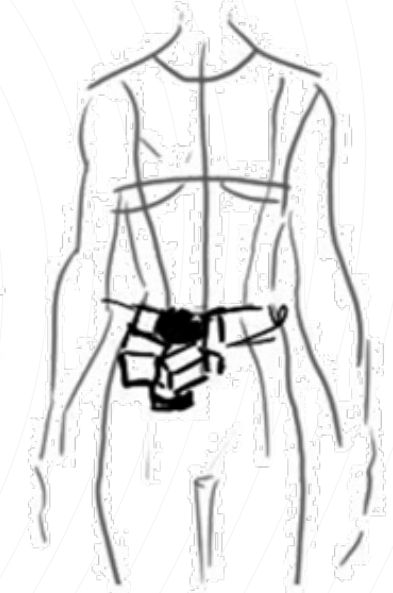
Top View

Dung Beetles

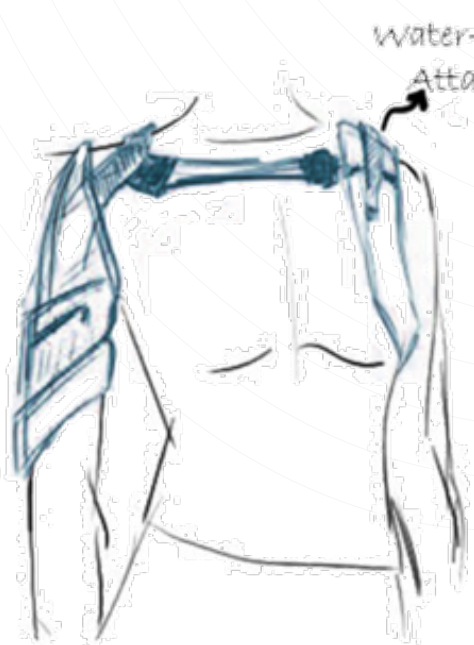
They save the US cattle industry around \$359 million annually by supporting the processing and removal of livestock waste.



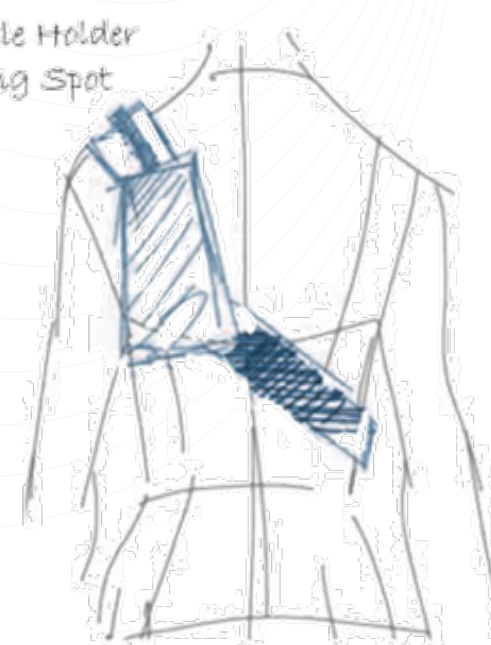
Double-sided Zippers with Loops



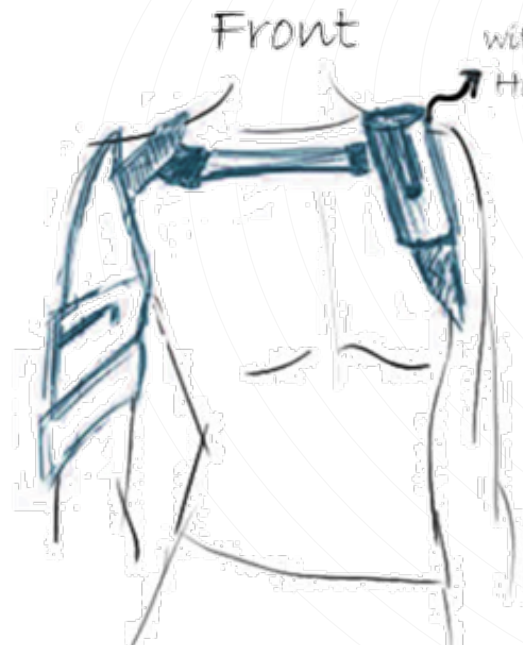
Hip Belt



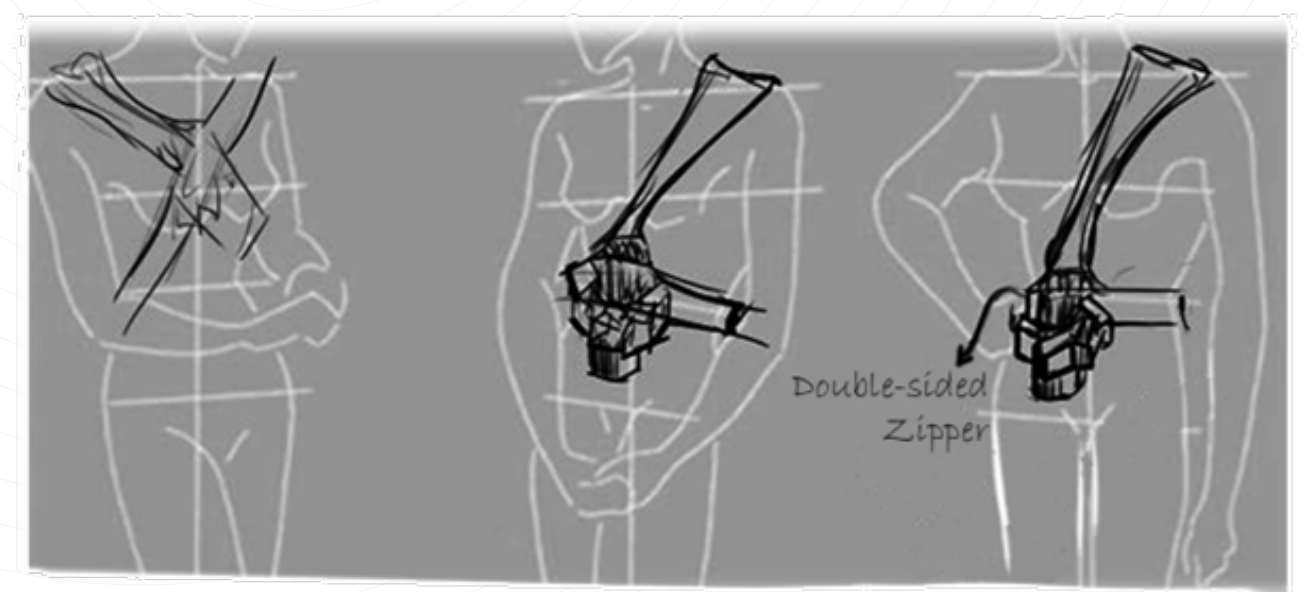
Water-bottle Holder Attaching Spot



with Water-bottle Holder Attached

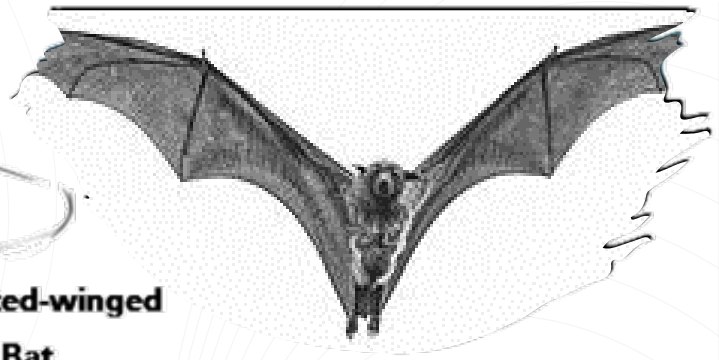
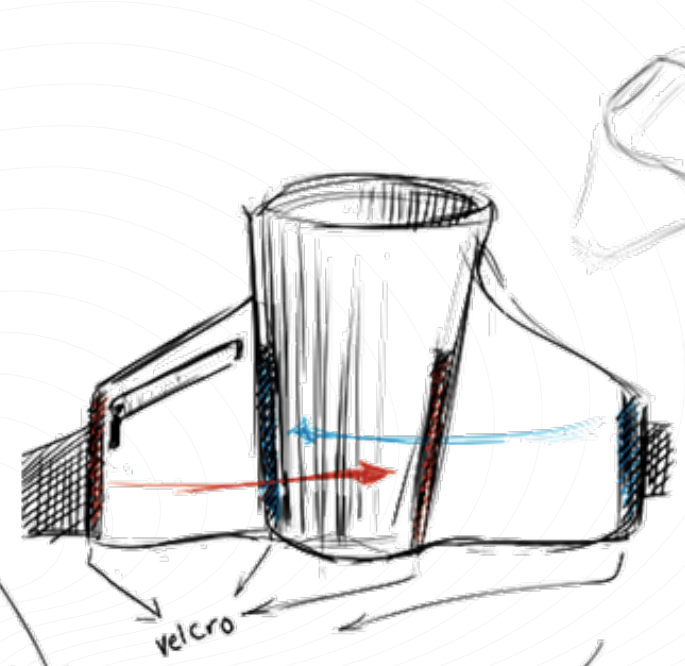
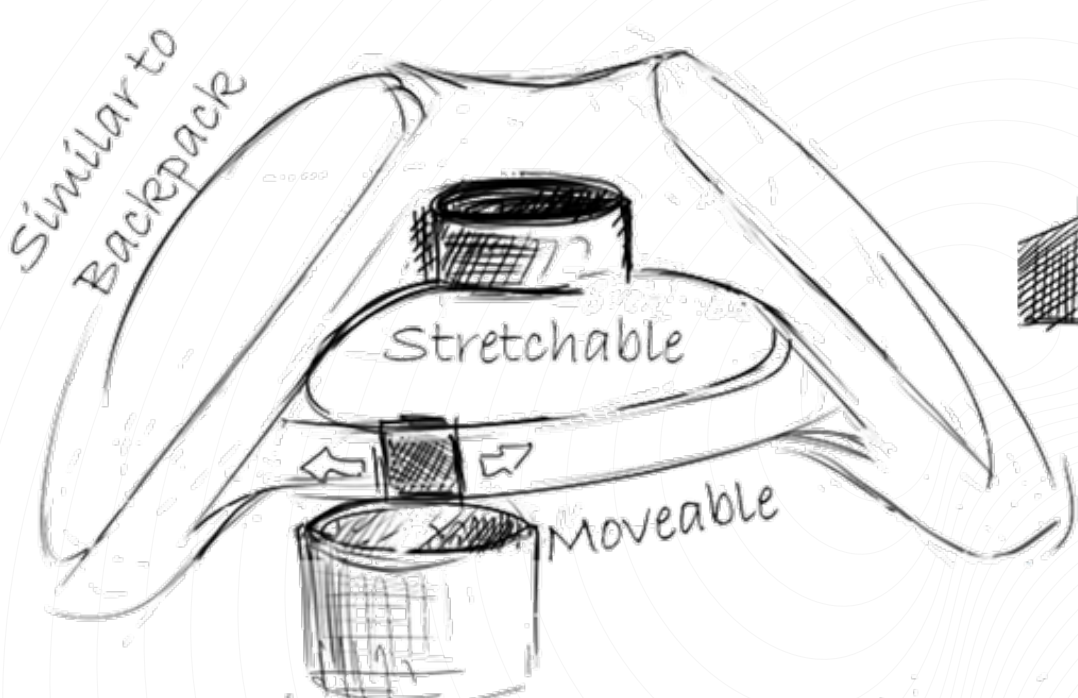


Crossbody Front

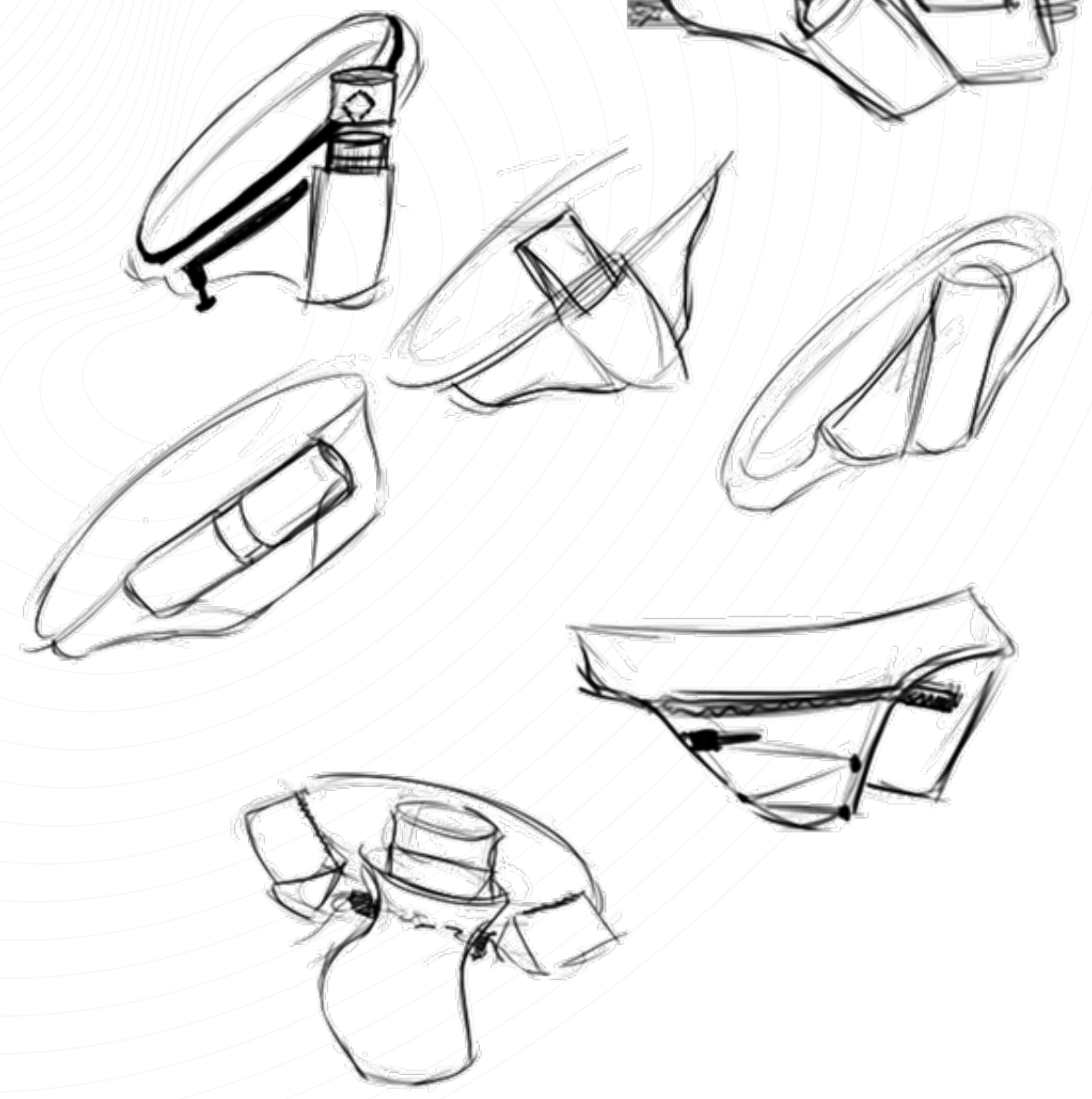
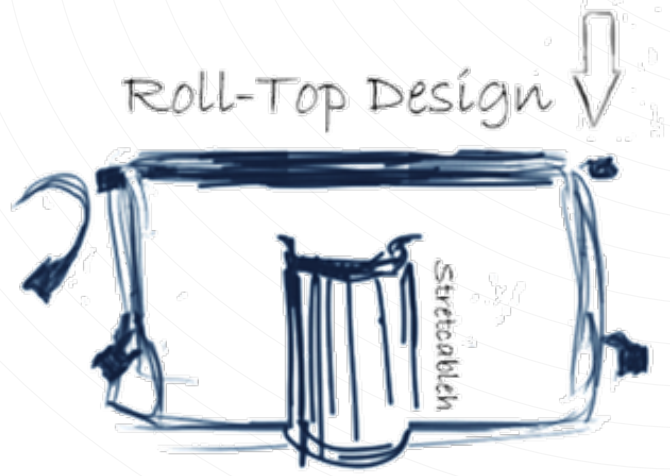
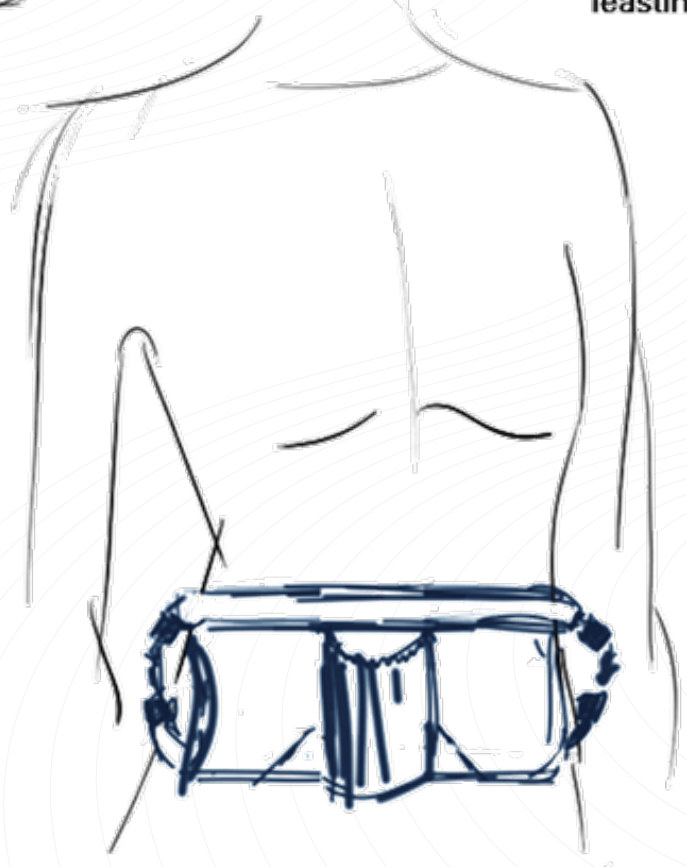
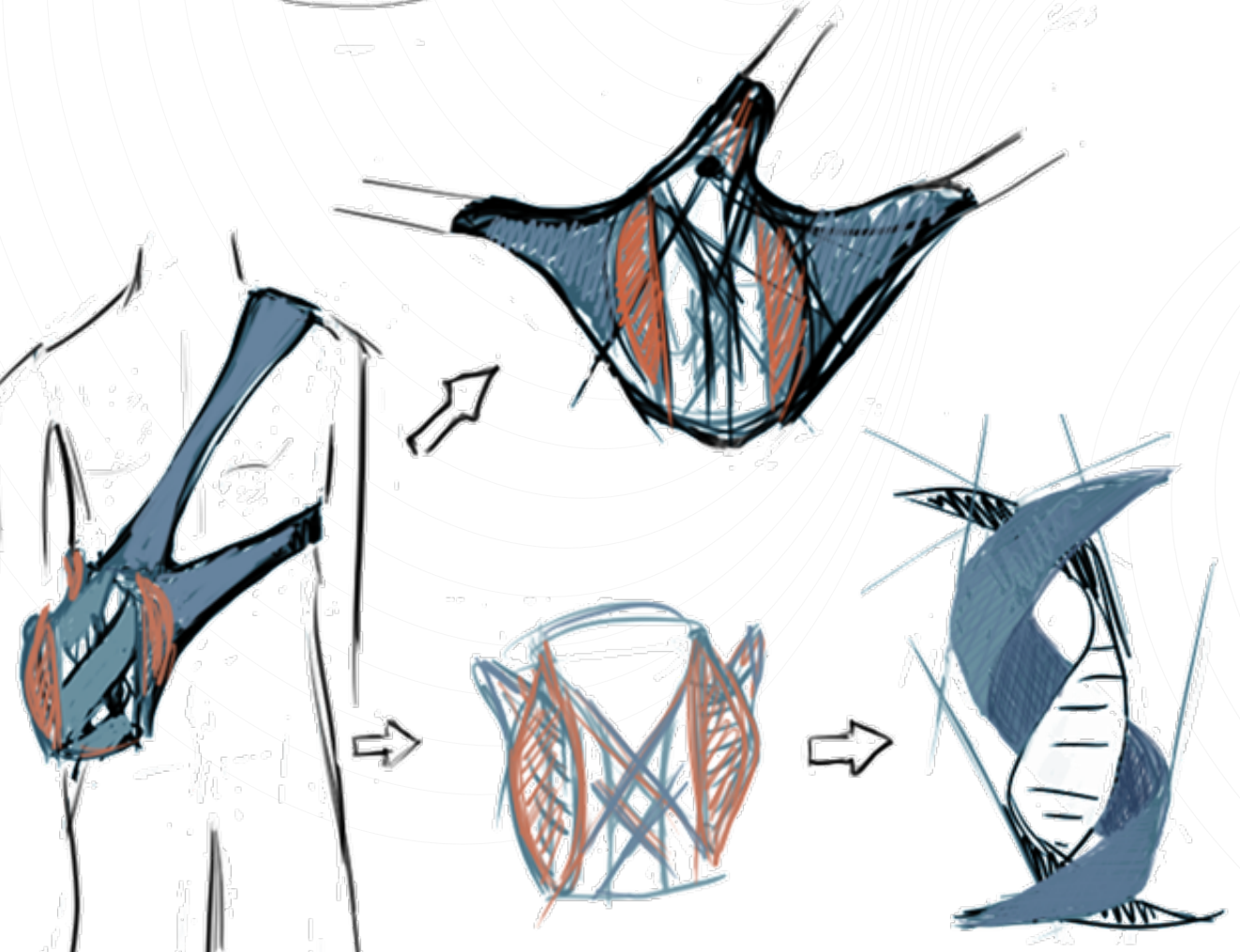


Double-sided Zipper

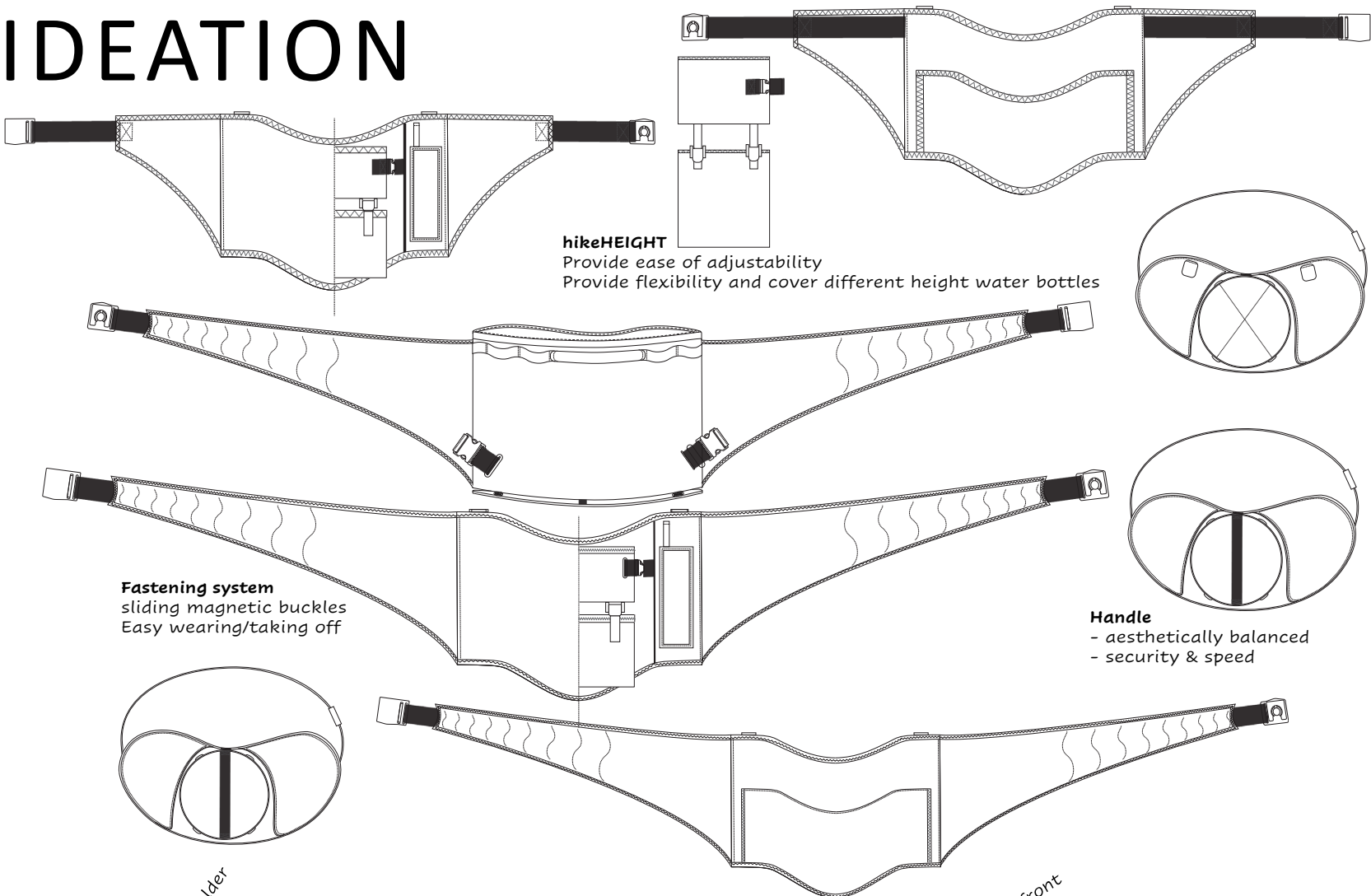
IDEATION



A megabat, weighs only 14.2 g (0.50 oz).^[34] The fruit bat spends much of its time hanging **upside down in trees or caves with other members of the same species**. They are aptly named for their habit of feasting exclusively on fruits and plant parts.



IDEATION



Water bottle holder

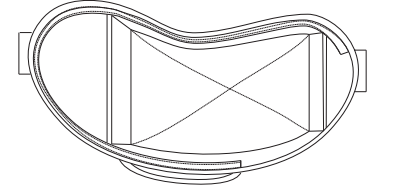
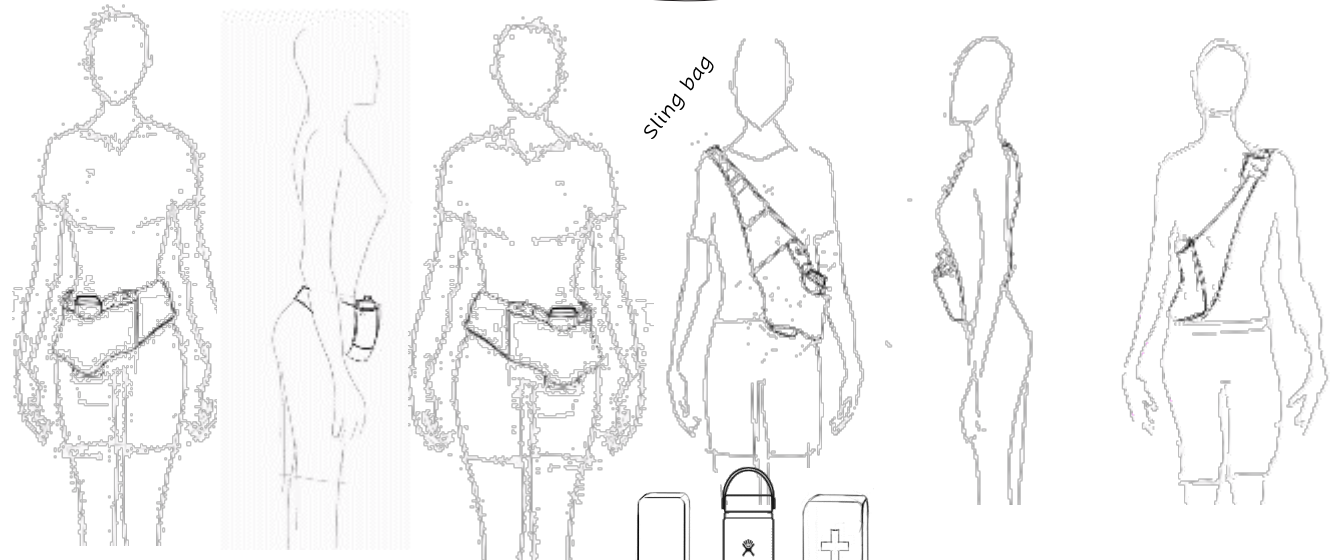
Dual waist strap/ front webbing



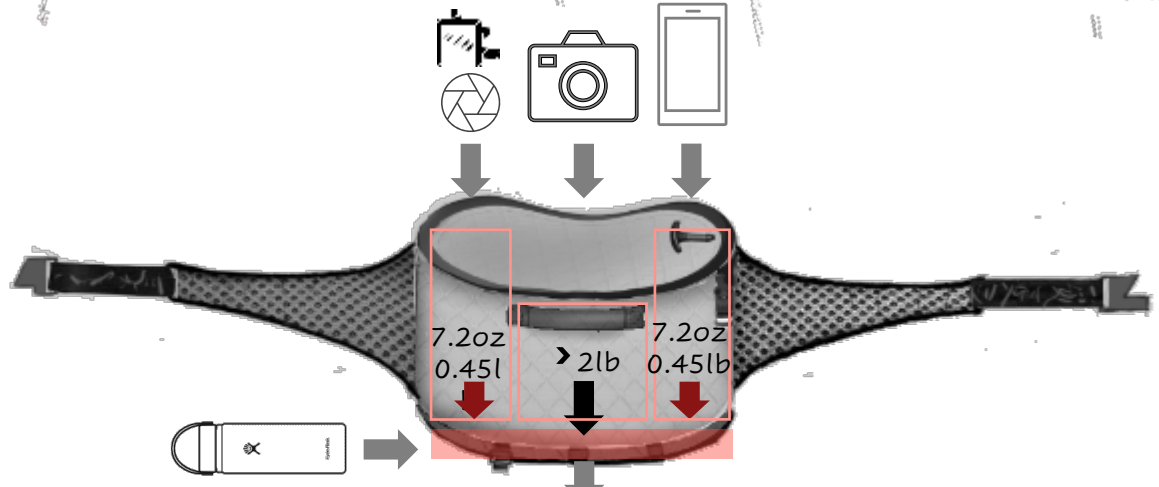
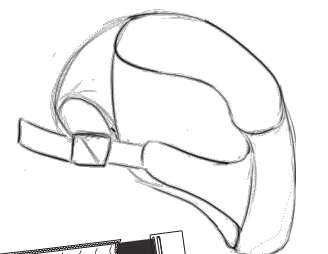
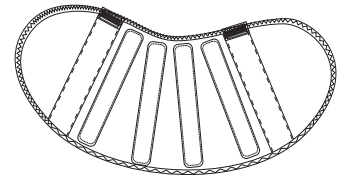
Gel & Memory Foam
Molded camera customizable
Adaptive memory foam with refreshing gel layer all around camera to provide support, comfort and cool

Body Form Straps
Align around body
Provide comfortability

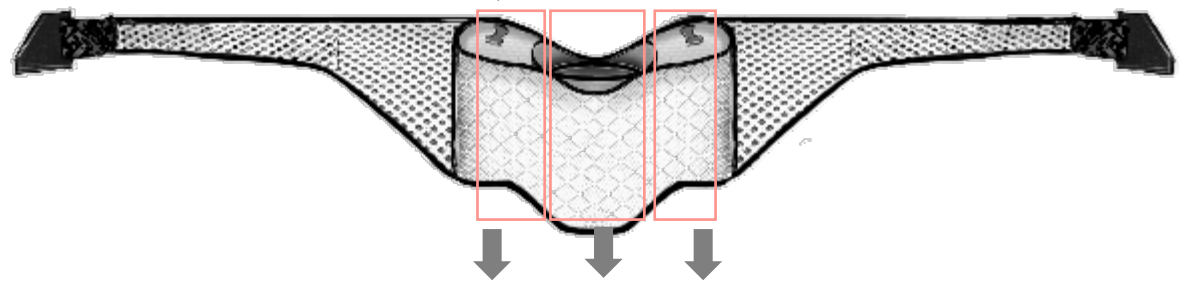
Dual waist/front webbing
- interchangeable sewed buckles
- support by better weight distribution
- optional closure as a waist strap



5-sided cushioning Protection



(15.2+32)oz
2.95lb



7.2oz (15.2+32)oz 7.2oz
0.45lb 2.95lb 0.45lb

Technologies

paxWRAP



Mechanisms

channel wrapping bottle holder
compressible Straps

Benefits

comfort
impact absorbing

paxLASTIC



Mechanisms

spring push assist
while repacking

Benefits

impact absorption
while hiking

paxBALANCE



Mechanisms

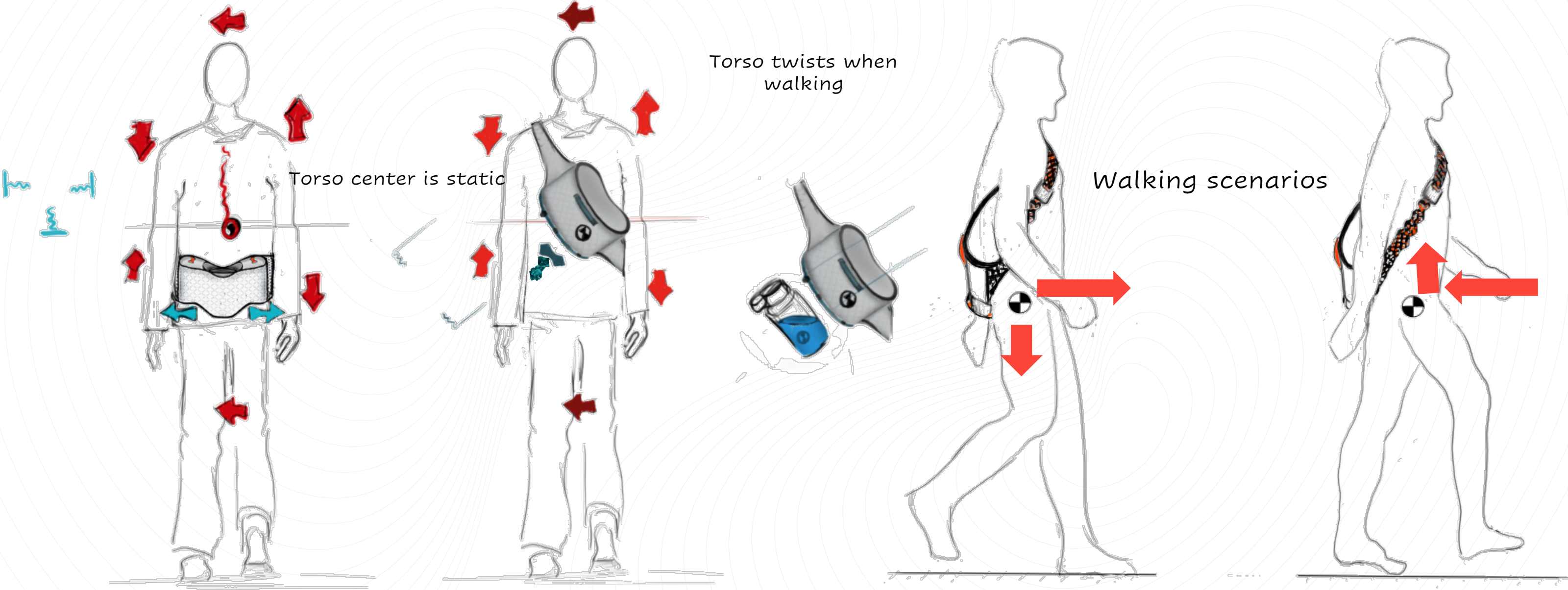
self adjusting movement
mounting internal

Benefits

stability & balance
vertical position & reduce jarring

Technologies

Technologies in the bottle holder and the camera cage



Torso center is static

Torso twists when walking

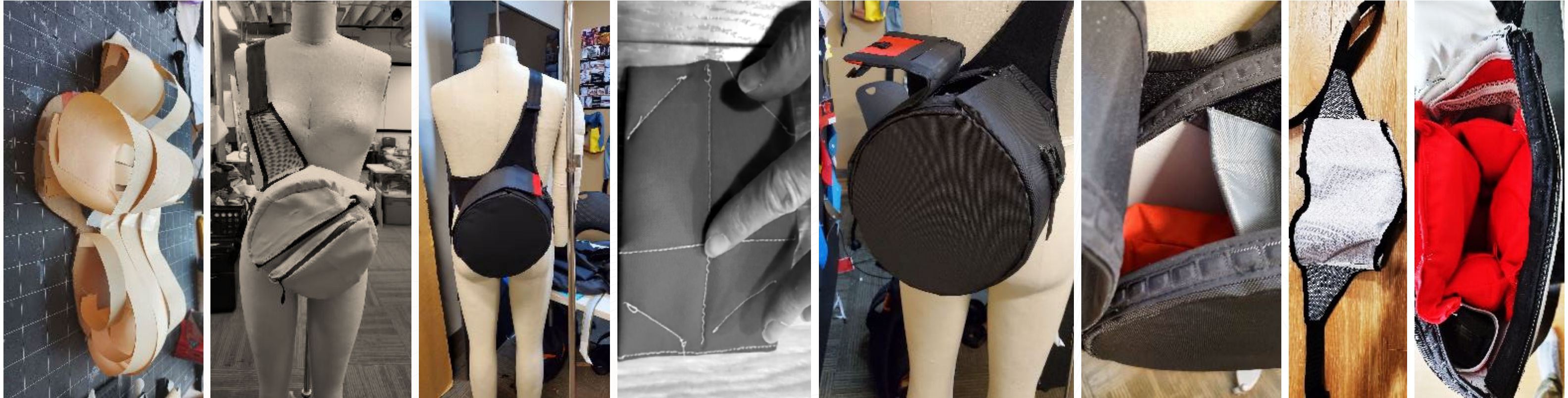
Walking scenarios

as a shock control
By considering center of mass

Process



Process



Model Consent Agreement

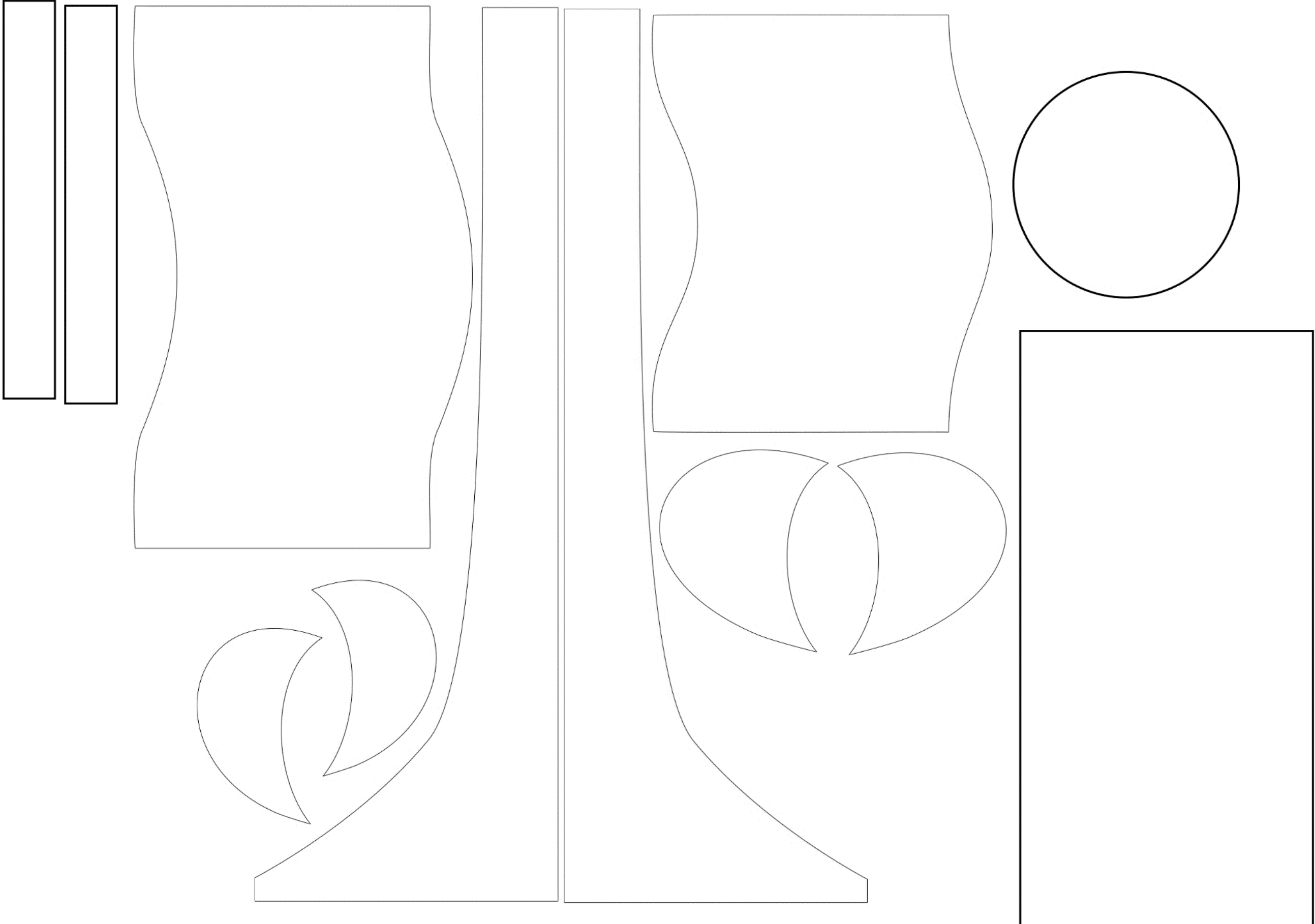
Model Consent Agreement available upon request due to desire to
keep identity private by model.



Performance/Fit



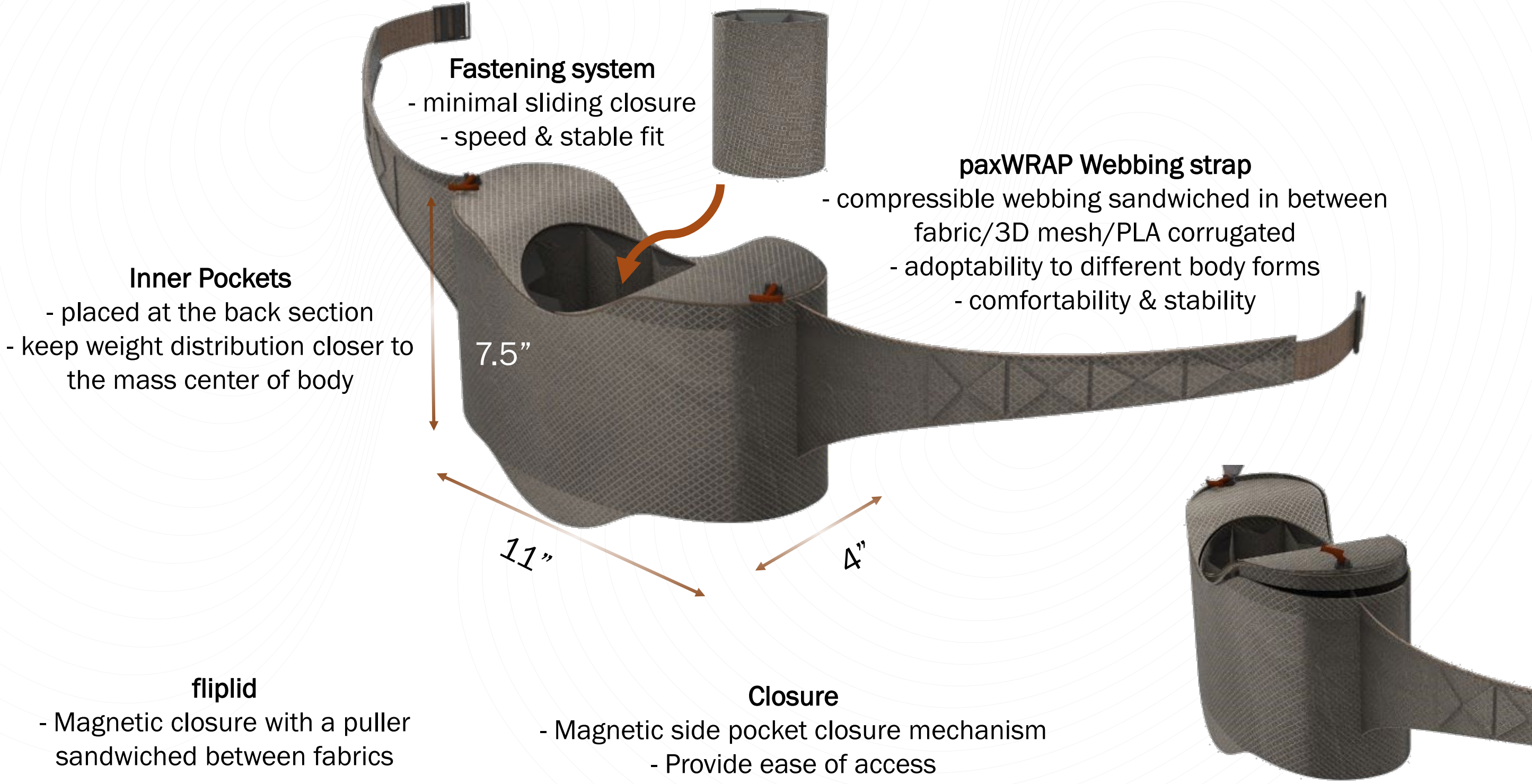
Pattern



Features & Benefits

Two side pockets, one-size-all bottle holder

- Provides left-handed/right-handed usability with utility functions hidden



Fastening system

- minimal sliding closure
- speed & stable fit

paxWRAP Webbing strap

- compressible webbing sandwiched in between fabric/3D mesh/PLA corrugated
- adoptability to different body forms
- comfortability & stability

Inner Pockets

- placed at the back section
- keep weight distribution closer to the mass center of body

7.5"

11"

4"

fliplid

- Magnetic closure with a puller sandwiched between fabrics

Closure

- Magnetic side pocket closure mechanism
- Provide ease of access

Features & Benefits



paxLASTIC

- store kinetic energy
- auto assist & protection



paxLASTIC

- Attached to each other
- Provide body shock reduction



paxLASTIC

- Attached to the inner section
- Hold gears while reducing body shock



Top view

paxBALANCE

- sandwiched between bottle holder & back section
- limited pivot bottle mount
- Stability

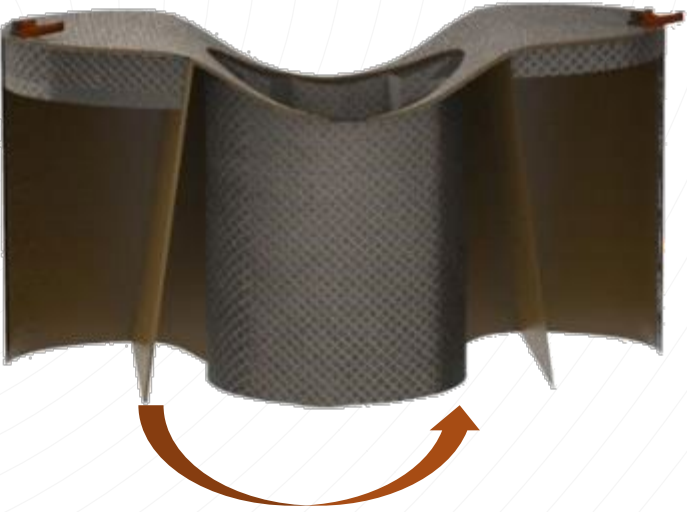
Front Inner view



divider

- flexible rigid structure
- separates phone/snack/other
- water bottle leakage protection

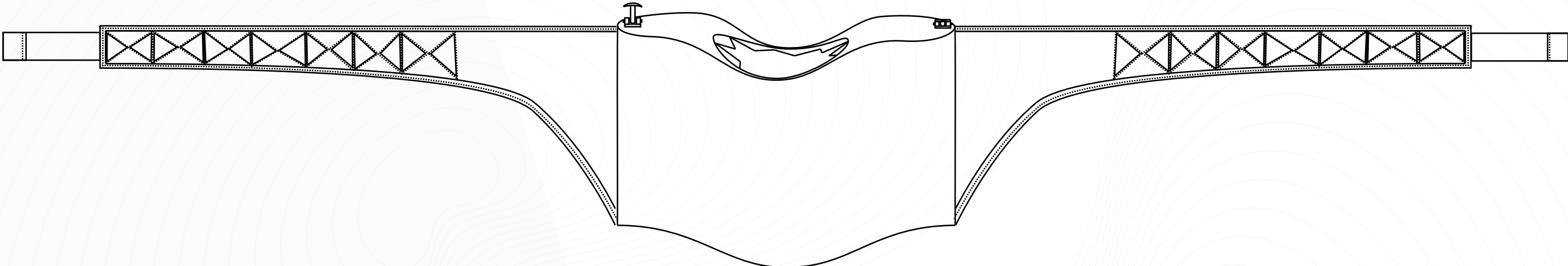
Front Inner view



paxBALANCE

- two inclined divider provide space for bottle holder to move freely by weight

Features & Benefits



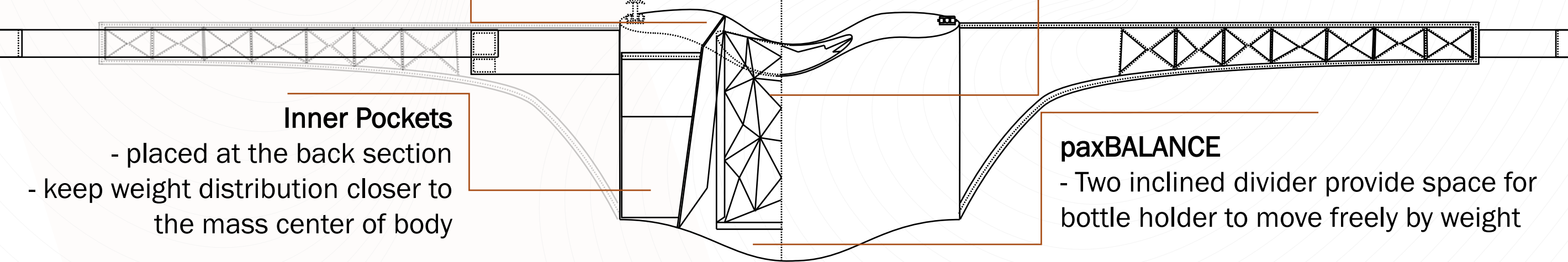
Front View

divider

- flexible rigid structure
- separates phone/snack/other
- water bottle leakage protection

paxLASTIC

- store kinetic energy
- auto assist & protection
- body shock reduction



Inner Pockets

- placed at the back section
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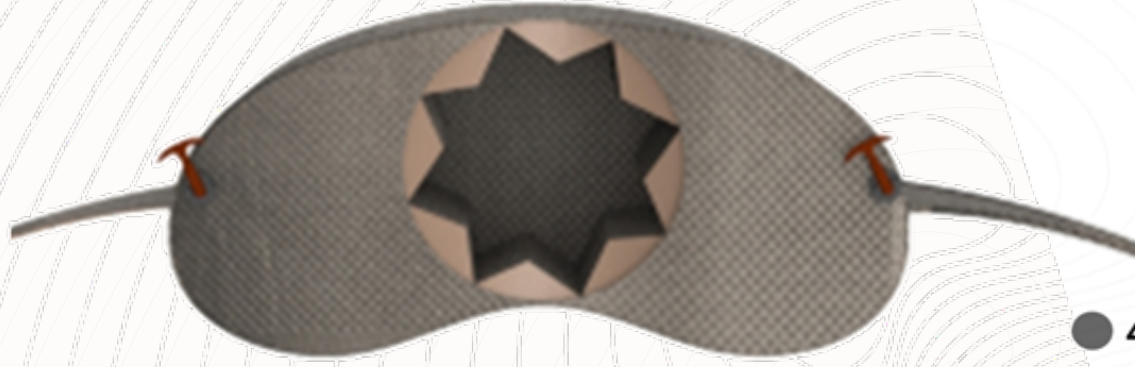
paxBALANCE

- Two inclined divider provide space for bottle holder to move freely by weight

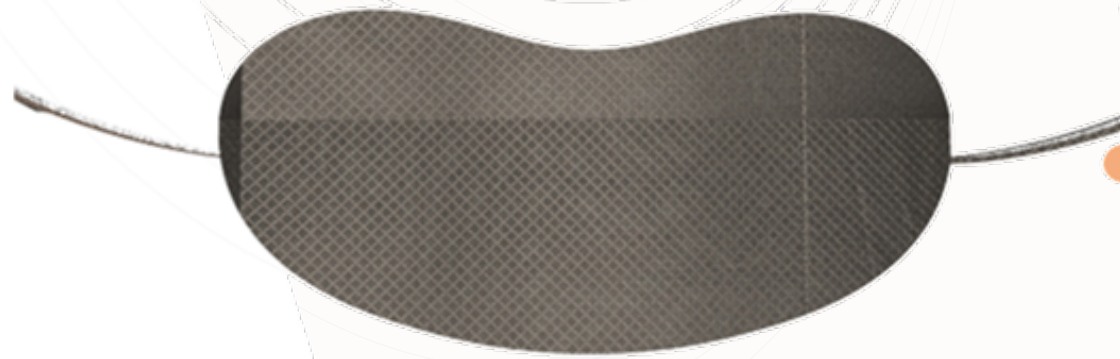
Inner View + Front View

Materials

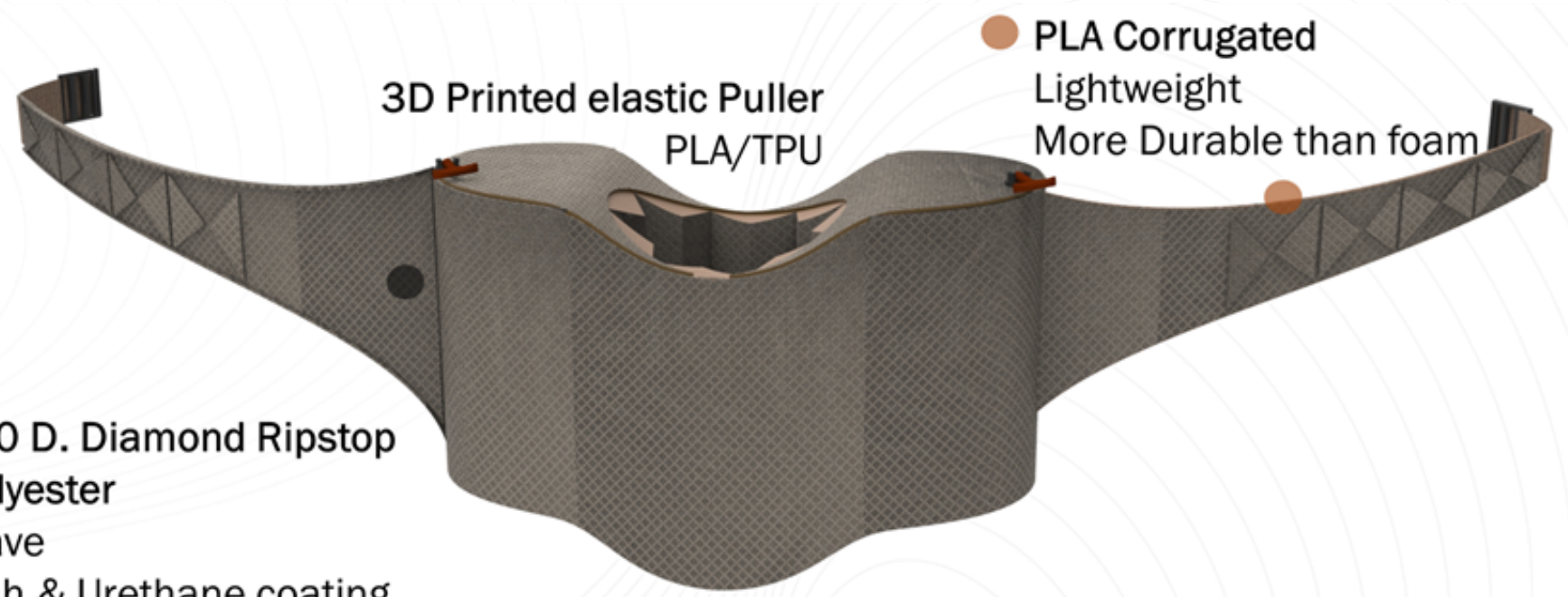
PAXESS-HIKE



Top View



Bottom View



Front View

- 400 x 300 D. Diamond Ripstop Nylon/Polyester
Tight Weave
DWR finish & Urethane coating
Lightweight

3D Printed elastic Puller
PLA/TPU

- PLA Corrugated
Lightweight
More Durable than foam

- Webbing
100% Nylon
Consistent durable weave

Back View

- 350g air mesh-Double
100% Polyester
Breathable & Comfortable knit

- Stiffener:
350g air mesh
100% Polyester
Breathable & Comfortable knit
Pellon 70 Peltex
Ultra-Firm Sew non-woven stabilizer
100% Polyester

- Liner:
Soft shell & Laminated Nylon
100% polyester face
100% polyester micro light black fleece lining
Woven Soft DWR

Athlete Quotes



Lauren H., Athlete

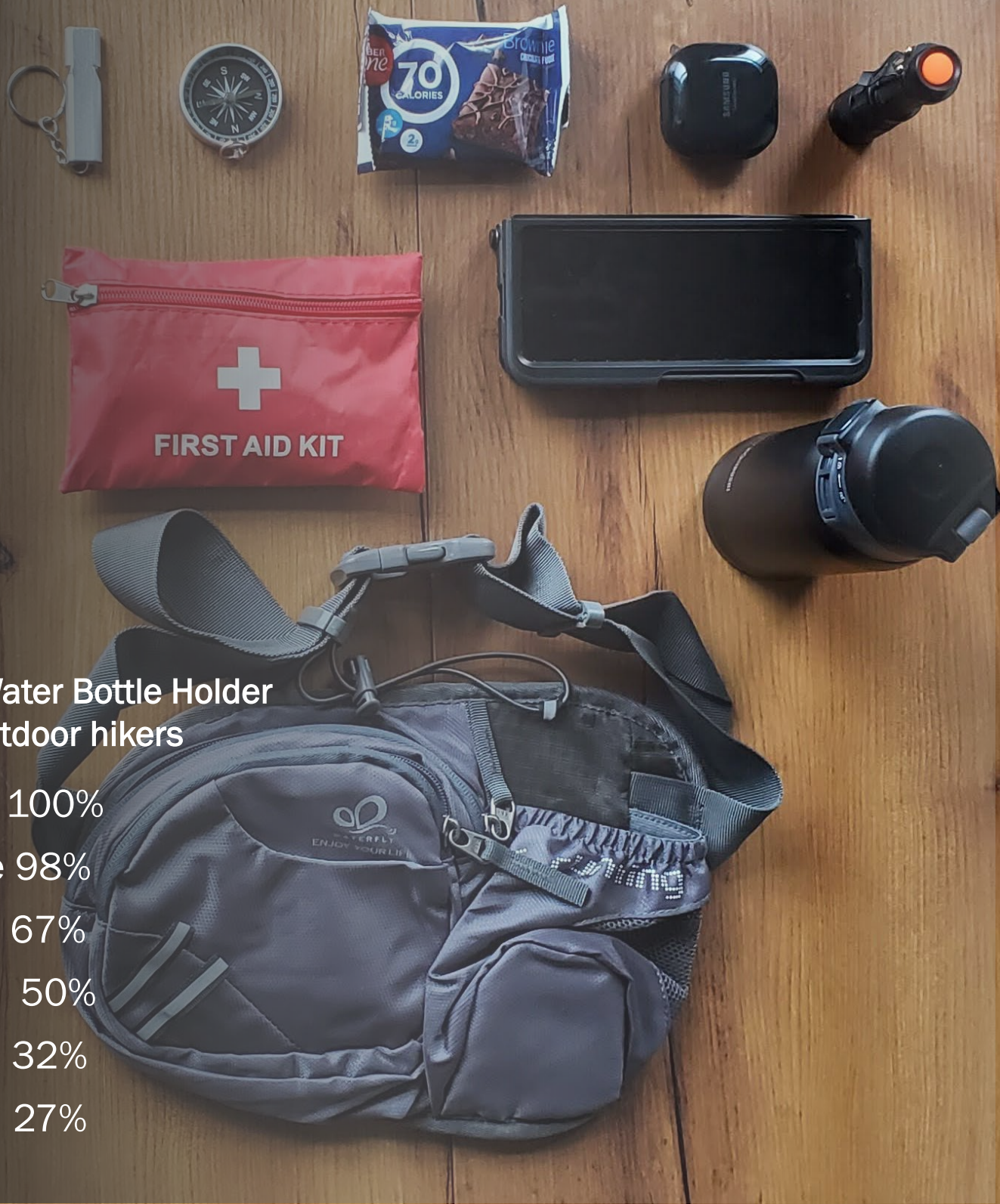
“The straps are very comfortable giving me confidence and desire to hike more, especially since the water bottle isn’t swaying with movement.”

Delaney, Athlete

“I love the water bottle as such is stored in a secure, but accessible place without messy bungee cords.”
“The bean shape contouring, and structure of the bag feels good against the back and more so hips.”

Benchmark Research

Common items to carry



Fanny Pack + Water Bottle Holder
 Surveyed 50 outdoor hikers

- 1 Cellphone 100%
- 2 Water Bottle 98%
- 3 First Aid Kit 67%
- 4 Snacks 50%
- 5 Whistle 32%
- 6 Compass 27%

❖ Anti-fall elastic strings
 Keep water bottle stable

❖ Anti-fall elastic strings
 Keep water bottle stable



FEATURES OF BENCHMARK PRODUCT

❖ Mesh pad
 Provide breathability

❖ Two compartments
 Phone not being scratched

❖ Mesh pad
 Provide breathability



Performance testing

PAXESS vs BENCHMARK



Average timing

To access, carry and repack common items being carried by hikers & nature enthusiast during outdoor hiking



▶▶▶ 33% to 40% faster than benchmark

▶▶ 17% faster w paxLASTIC vs w/o paxLASTIC



Gazal Malekitabriz | Paxess Outdoor Hiking bag



Posture comparison

Before carrying the pack and after 45 min. hike



Around 20% improvement



Marks

on body after 45 min. hike


after carrying hiking benchmark product

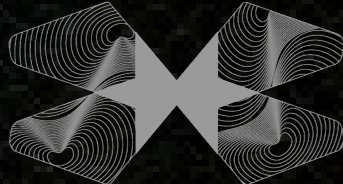


Marks for benchmark product
No marks for paxess-hike around waist

after carrying PAXESS-HIKE





P A  E S S

Accessible Outdoor Bag Design for
Nature Enthusiasts