IDAT 7211 Innovation and R&D Principle Group Project

Beyond Hands

Assistive photography product designed for disabled without hands

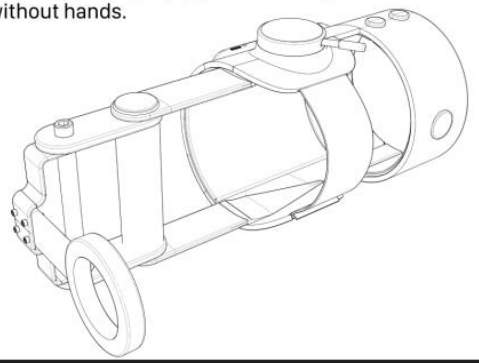
#Wu Yitao **#Huang Xuehan** #Xu Wenxuan #Huang Wenxia #Ding Bohao

 # Individual Contribution: Ideation, Structuring, Rendering, and Animating

Beyond Hands

BH
V1.0

Assistive photography product designed for disabled without hands.



Product User Manual

Product Overview

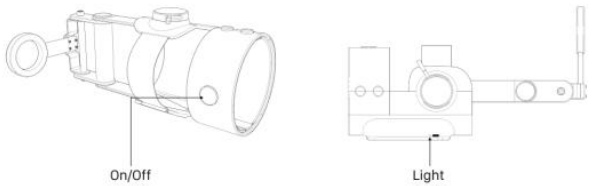
This product is an Assistive photography product designed for disabled without hands. It aims to assistant disabled people without hands shooting outdoor scenes more simply.

Safety Information

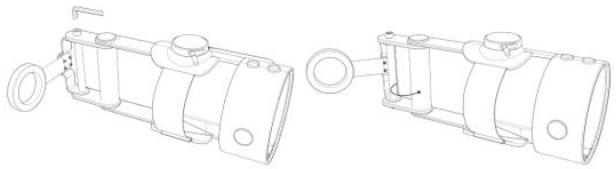
1. **Do Not Disassemble**: Do not disassemble or repair the device without professional assistance to avoid damage or personal injury.
2. **Keep Dry**: Do not expose the device to rain or other liquids to prevent electric shock or damage.
3. **Use Correct Power Supply**: Use the specified power adapter and avoid using incompatible power devices.
4. **Avoid High Temperatures**: Do not place the device in high-temperature environments, such as direct sunlight, to prevent overheating or explosion.
5. **Regular Inspections**: Regularly inspect all parts of the device to ensure proper functioning and prevent accidents due to equipment failure.
6. **Safe Storage**: When not in use, store the device in a safe, dry place out of reach of children.
7. **Follow Instructions**: Operate the device strictly according to the user manual to ensure safety and optimal performance.

Operation Guide

- Pressing the power button to turn on/off the product, and the indicator light will remain on continuously.

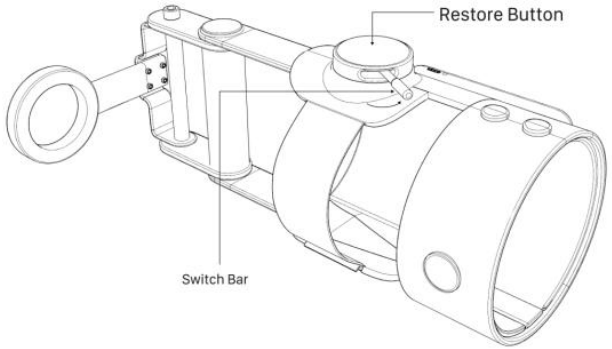


- Using tools to adjust the pivot of the front end to obtain the angle you need

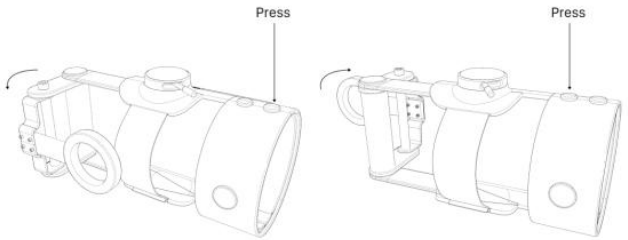


Adjustment

- Every time you toggle the switch bar, the arm strap will slightly tighten, and when you press the restore button above, the arm strap will completely relax.



- Using two buttons to control the steering of the second axis



Technical Specifications

1. Dimensions and Weight:
   - Dimensions: 290mm x 165mm x 120mm
   - Weight: 315 grams
2. Battery:
   - Type: Rechargeable lithium battery
   - Charging port type: USB Type-C
   - Capacity: 2400mAh

Maintenance And Cleaning

1. Regular Inspections:
   - Regularly check all parts of the device to ensure there are no loose or damaged components.
   - Inspect the battery to ensure it is not leaking or swollen.
2. Cleaning the Device:
   - Use a soft, dry cloth to wipe the surface of the device. Avoid using alcohol or corrosive chemical cleaners.
   - For hard-to-clean areas, use a slightly damp cloth to gently wipe, then dry with a dry cloth.
3. Storage Environment:
   - Store the device in a dry, cool place, away from direct sunlight and high temperatures.
4. Battery Maintenance:
   - Avoid deep discharging the battery; it is recommended to charge when the battery level is below 20%.
   - If the device will not be used for an extended period, charge the battery to about 50% and check its condition periodically.

Hotline

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Lead-In

Normal people take out the phone or camera, capturing the beautiful scenery, which is a series simple motions.

However， how could they access this?

A Real Case

We interviewed a powerful and beautiful lady who shared her life on the Bilibili.

Disabled People Want To Do We-Media Why?

In the interview, it is found that disabled people want to participate in we-media.

Not only for these reasons:

Work ?

Social Connection?

Living Needs?

- **A non-physical income approach:**
  A new way for these people making money independently.
- **A connection to world:**
  Reduce the feeling of isolated, provide mental support.
- **A way of arising attention:**
  Improve the influence through social media to arise more social attention to this group of people.

What's more

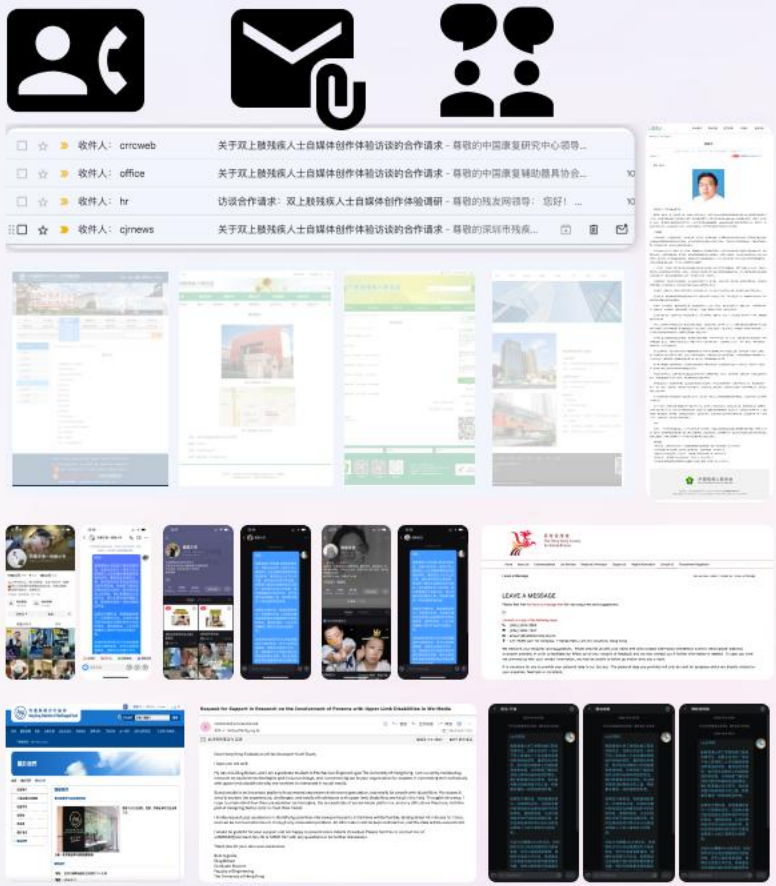
- **Everyone has the freedom to share the life.**

So...What are the obstacles to outdoor photography?

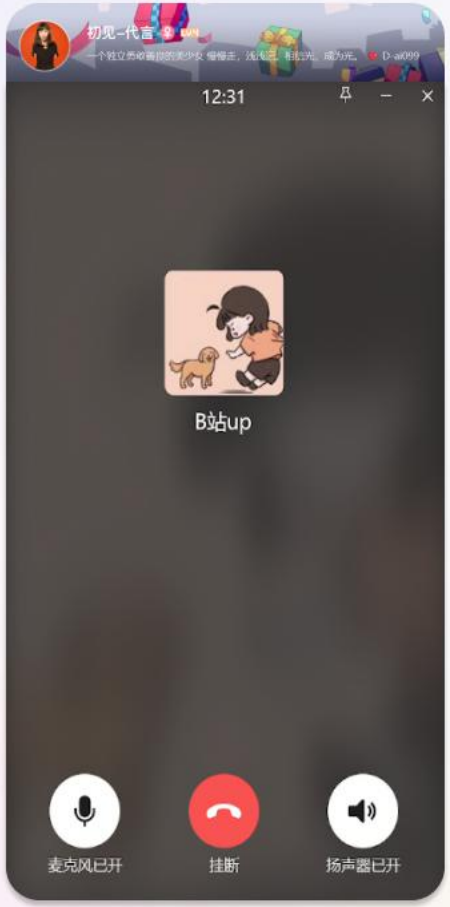
Questionnare & Interview

Territory Map

- Connect disabled people without hands through various platforms.



- One-on-one in-depth interview

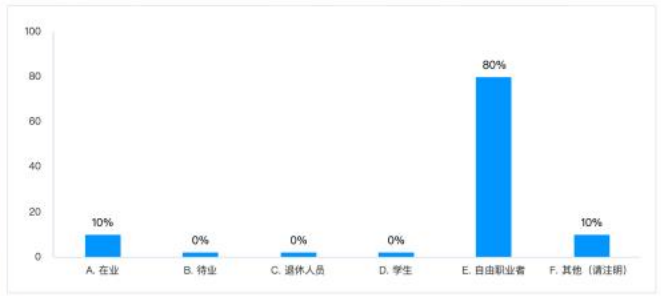


Questionnaire

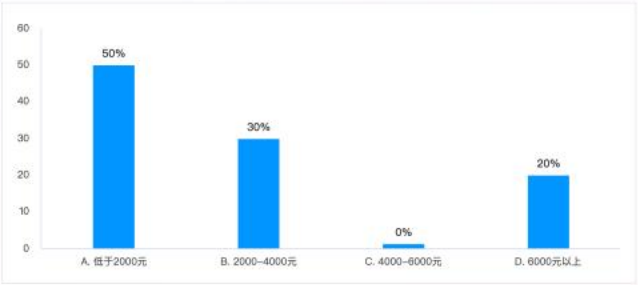
General Background

- The population is concentrated in the middle-aged and above.
- Most are freelancers.
- The monthly income is generally less than 4,000, and most are dissatisfied with their income.
- The hardships of life are concentrated in personal care, daily housework, and outdoor travel.
- Most often use other parts of the body (feet, mouth, etc.) to overcome difficulties in life.

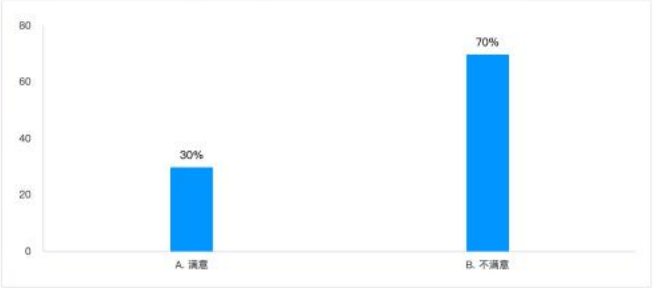
Occupational Status



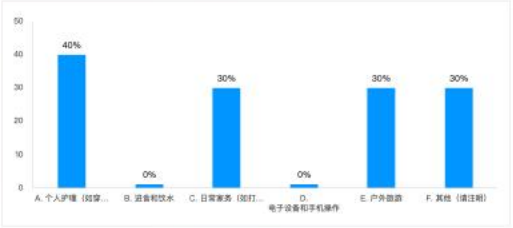
Income



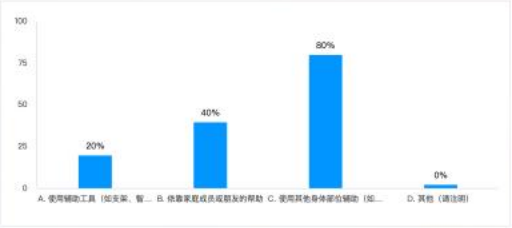
Satisfaction With Income



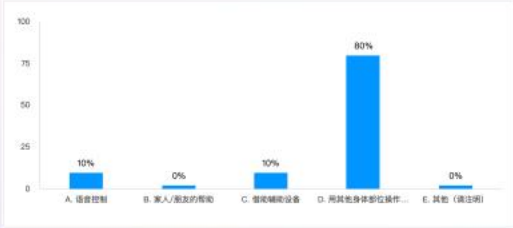
Difficulties in Daily Life



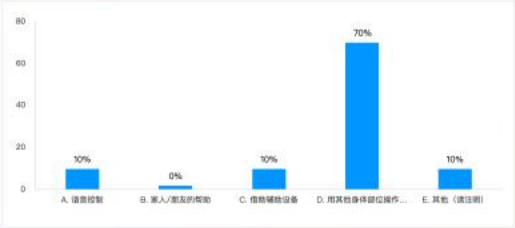
Overcome Difficulties in Life



Use Mobile Phones(Indoor)



Use Mobile Phones(outdoor)



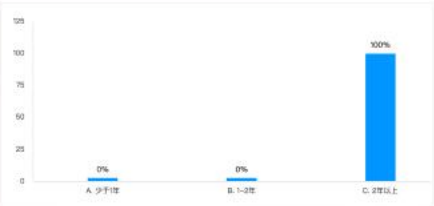
Questionnaire Report

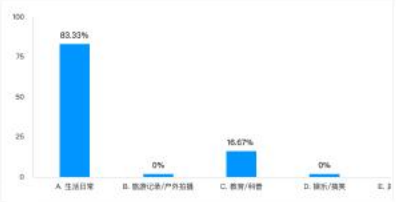
People who have started We-Media(Accounts for 60%)

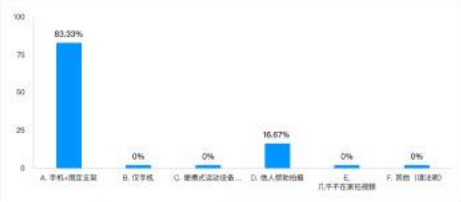
- Engaged in we-media for a long time(more than two years).
- Concentrated in daily life, but most of them have shooting needs for outdoor scenes and sports scenes.
- Mainly use mobile phones and fixed brackets or sports cameras to shoot, but generally rely on the help of others.
- The difficulties: continuous shooting, inability to adjust angles and fix shooting equipment
- Need equipment that is easy to place and easy to use.

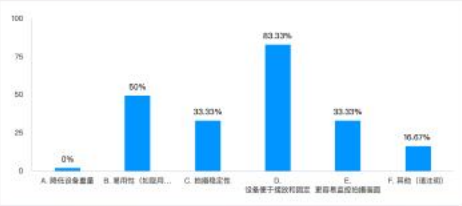
People who have not started We-Media(Accounts for 40%)

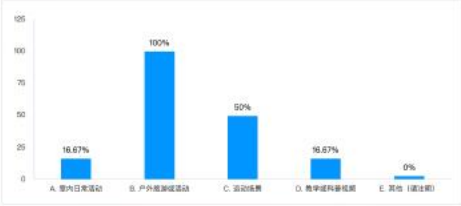
- lack of help from others
- lack of relevant skills.

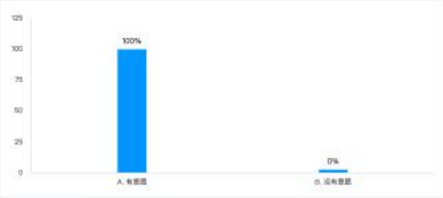


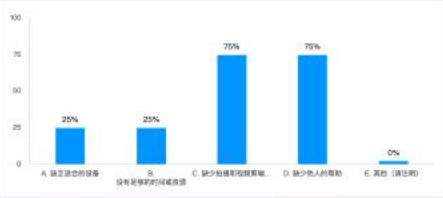


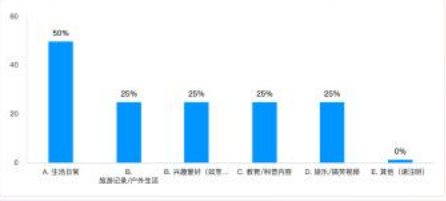












Redefine the Problem

Difficulty in shooting outdoor scenes

Inability to adjust shooting angles

Inability to fix shooting equipment

Can not do We-media independently

That's why we want to **make a new product** that helps people without hands to do we-media

For 【disabled people without hands】

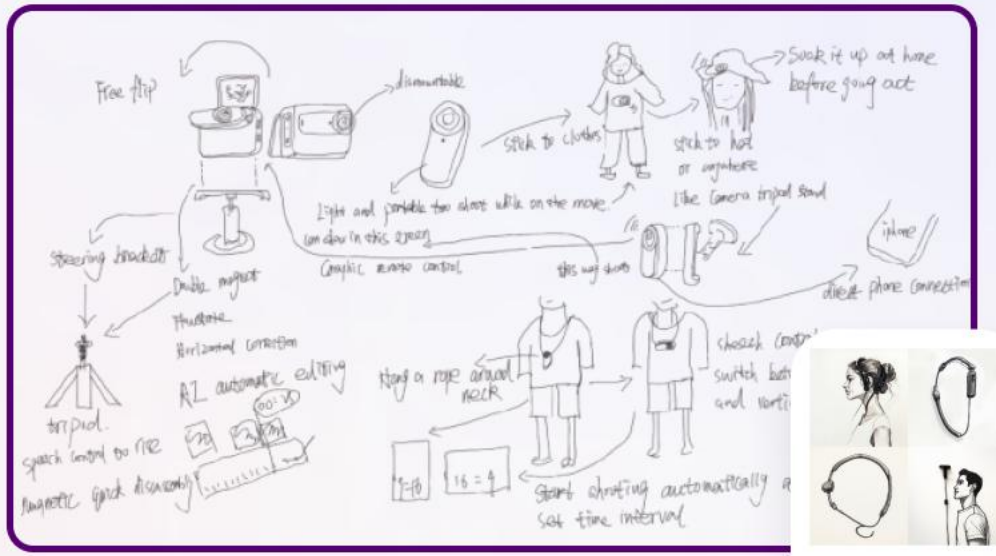
Their 【the needs of being a creator on social platform】

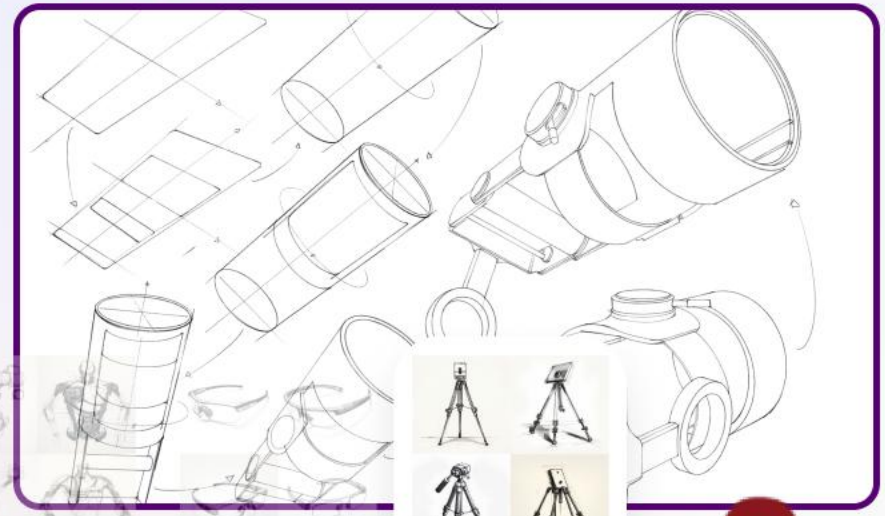
Our 【BeyondHands】

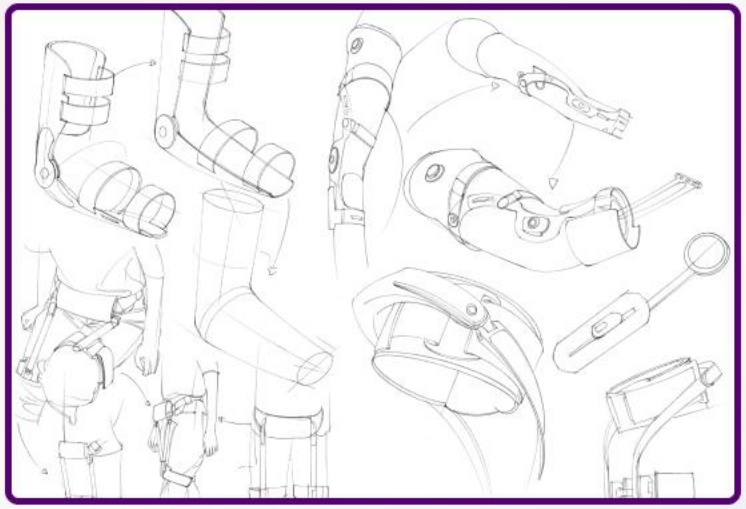
Is 【accessibility equipment】

It can 【help disabled people without hands shooting outdoor scenes more simply】

Design Step Brainstorming and generated various ideas







Wearable Neck-Mounted Stabilizer with Voice Control

Voice-activated tilt, pan, and zoom
Built-in gyroscope for stable footage
Magnetic quick-release mechanism for easy mounting and removal

Modular Backpack with Extendable Camera Arm

Adjustable arm with 360° rotation and tilt functions
Voice control or foot pedal to adjust the arm's position
Camera auto-tracking to follow head or body movements

Body-Mounted Pivoting Camera Frame

Lightweight, flexible frame for comfort
Pivoting joint for smooth panning and tilting based on slight body movements
Sensor-based stabilization for steady shots

Smart Glasses with Built-in Camera and Voice Commands

Built-in high-definition camera with stabilization
Voice control for start/stop recording and settings
Lightweight, durable design that is easy to wear all day

Foot-Operated Tripod with Bluetooth Controls

Pedals for tilting, panning, and recording control
Bluetooth connection to pair with phones or cameras
Lightweight, foldable design for easy portability

Voice-Controlled Drone Camera

Voice control for hovering, following, and recording
Auto-stabilization for smooth, professional-looking footage
Compact and easy to carry, fits into a small carrying case

Waist-Mounted Gimbal with Remote Control

Compact, foldable gimbal design
Remote or voice-activated controls for movement and zoom
Stabilization technology for smooth footage

Magnetic Clip-On Phone Mount with Foot or Voice Controls

Magnetized base for easy attachment to clothing or accessories
Foot-operated pedal or voice command for camera adjustments
Lightweight and detachable for on-the-go use

Ring-Style Camera Holder with Gyroscope Stabilization

Gyroscope for stable footage despite movement
Adjustable camera mount with tilt and rotation options
Compact, circular design for easy portability and storage

Voice-Activated Compact Chest-Mounted Rig with Auto-Tracking

Auto-tracking camera that follows the user's face
Voice-controlled recording and focus
Lightweight chest mount with quick-release strap

Disabled People without Arms

Design Step

A mobile phone holder fixed outdoors

Confliction

?

Or

A sports camera

However,After intense discussion, we found that both of these schemes had points that could not be advanced.

A mobile phone holder fixed outdoors：**It is not convenient to take it out and put it back, still need mouth or feet.**

A sports camera：**With similar products on the market, can we be more competitive in terms of innovation and price?**

Final Product Design Orientation

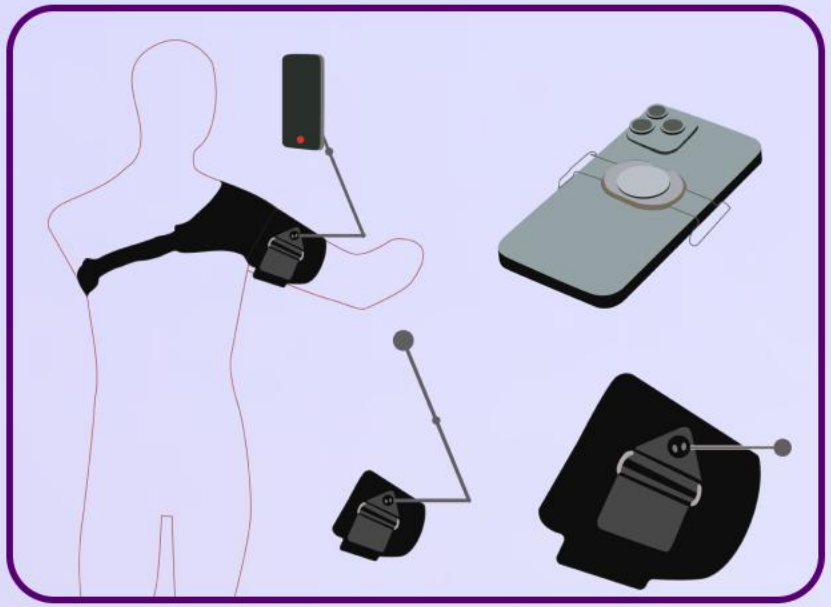
For professional teams/experienced people, they can organize the shoot or purchase professional equipment. While for beginners, trying to take the first step is key. **The conditions of going out are usually sports**.

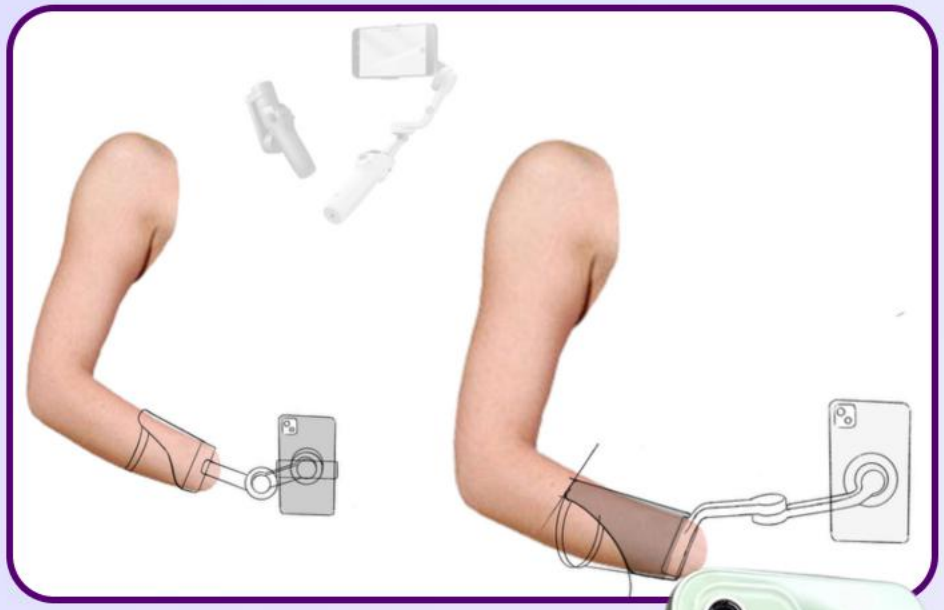
So

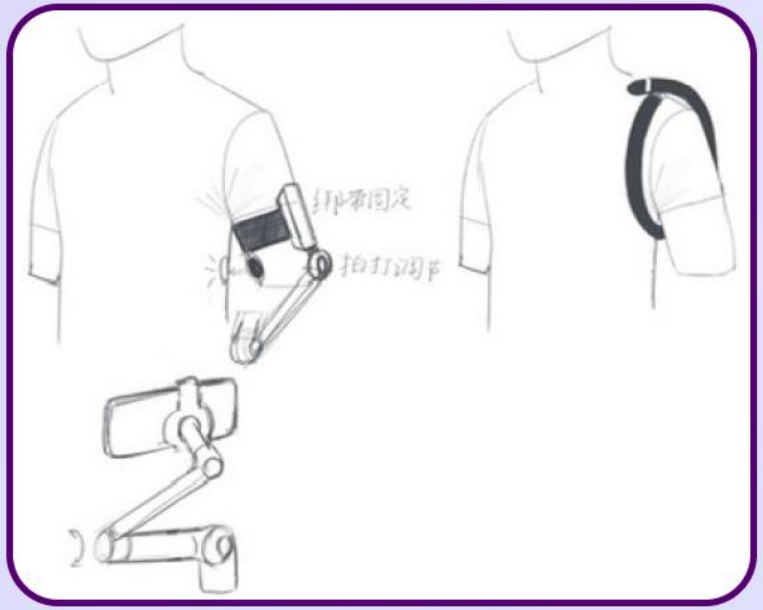
Assistive photography product designed for disabled without hands

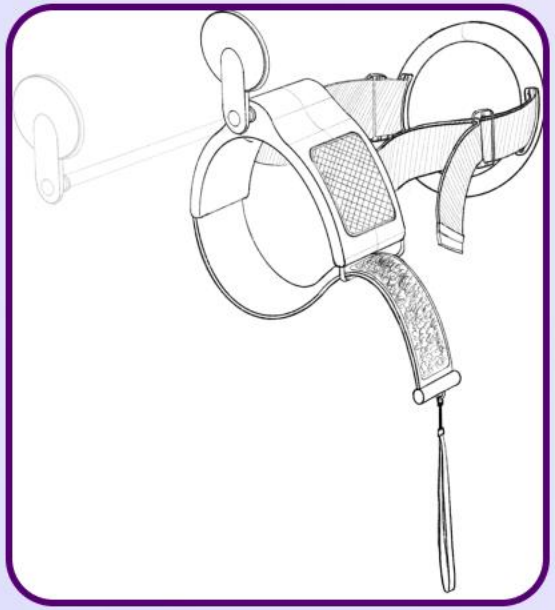
For	【disabled people without hands】
Their	【the needs of being a creator on social platform】
Our	【BeyondHands】
Is	【accessibility equipment】
It can	【Easy to wear, convenient to shoot outdoor scenes 】 【Convenient to adjust shooting angles】 【easy to take it out and put it back , can shoot independently】

For The Next Sketch & Generated Ideas



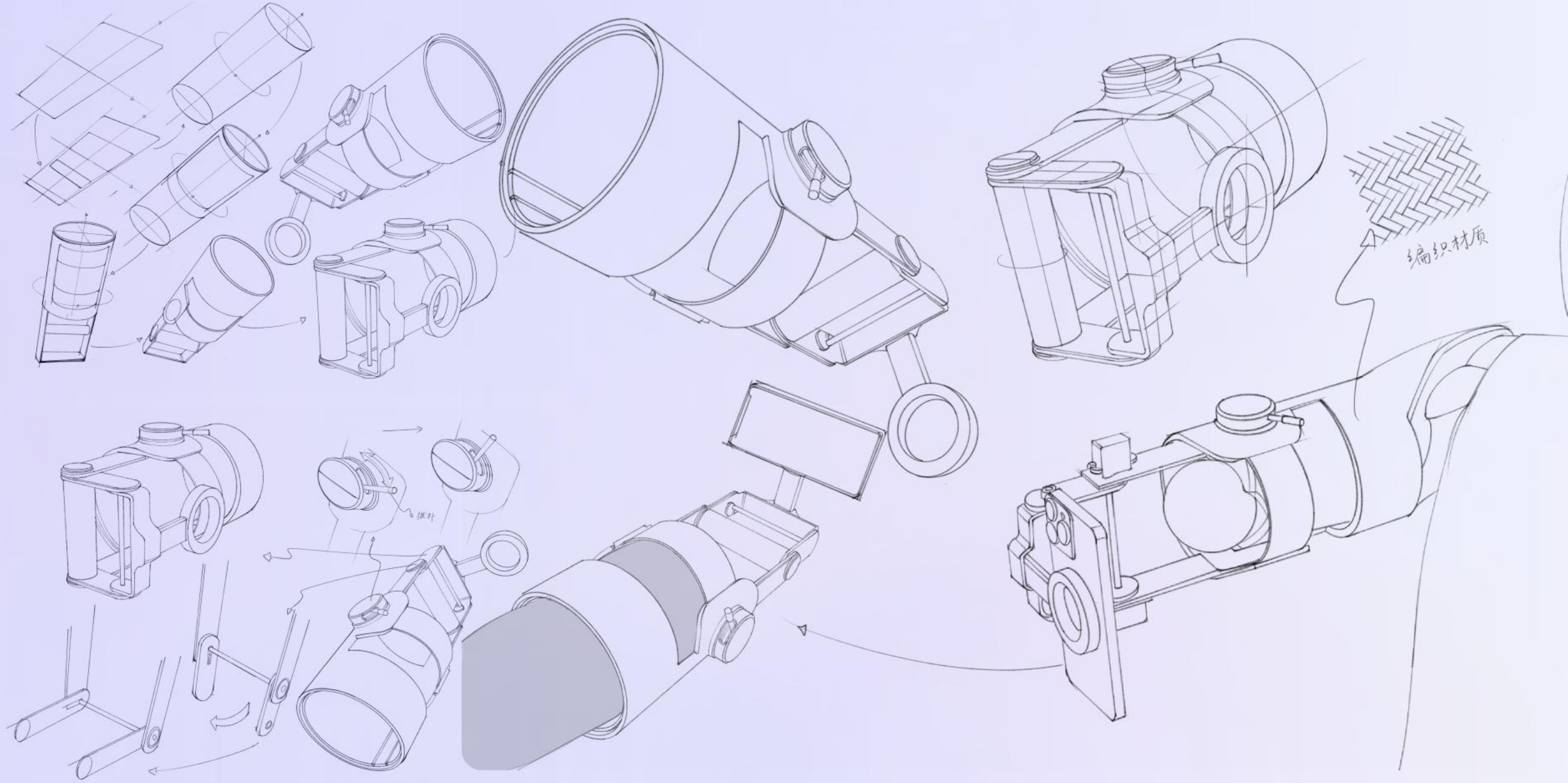




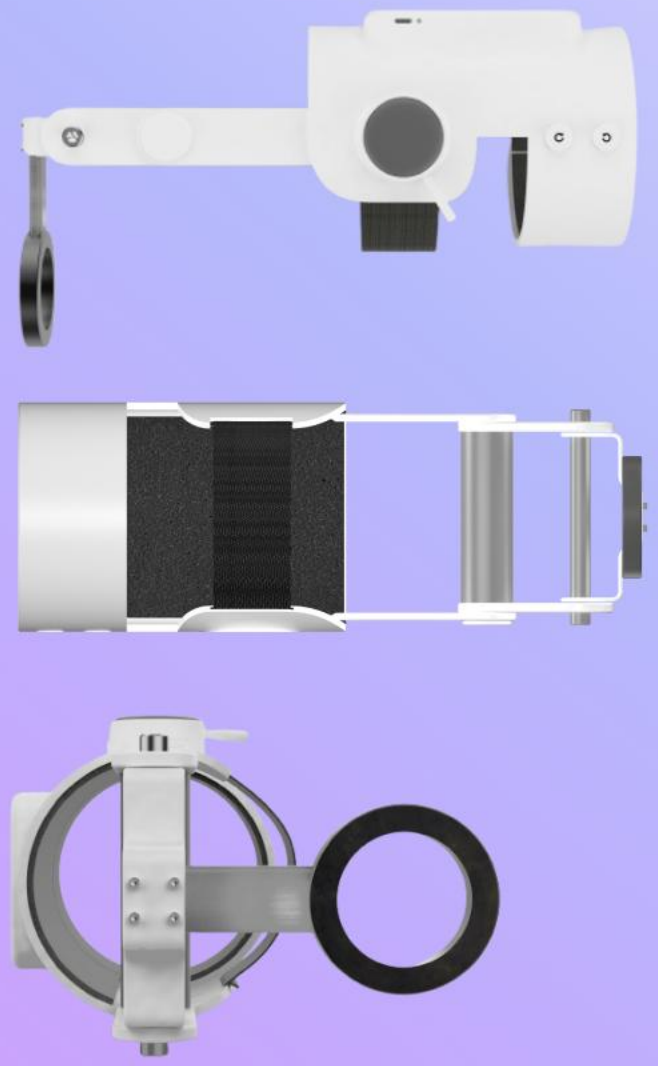


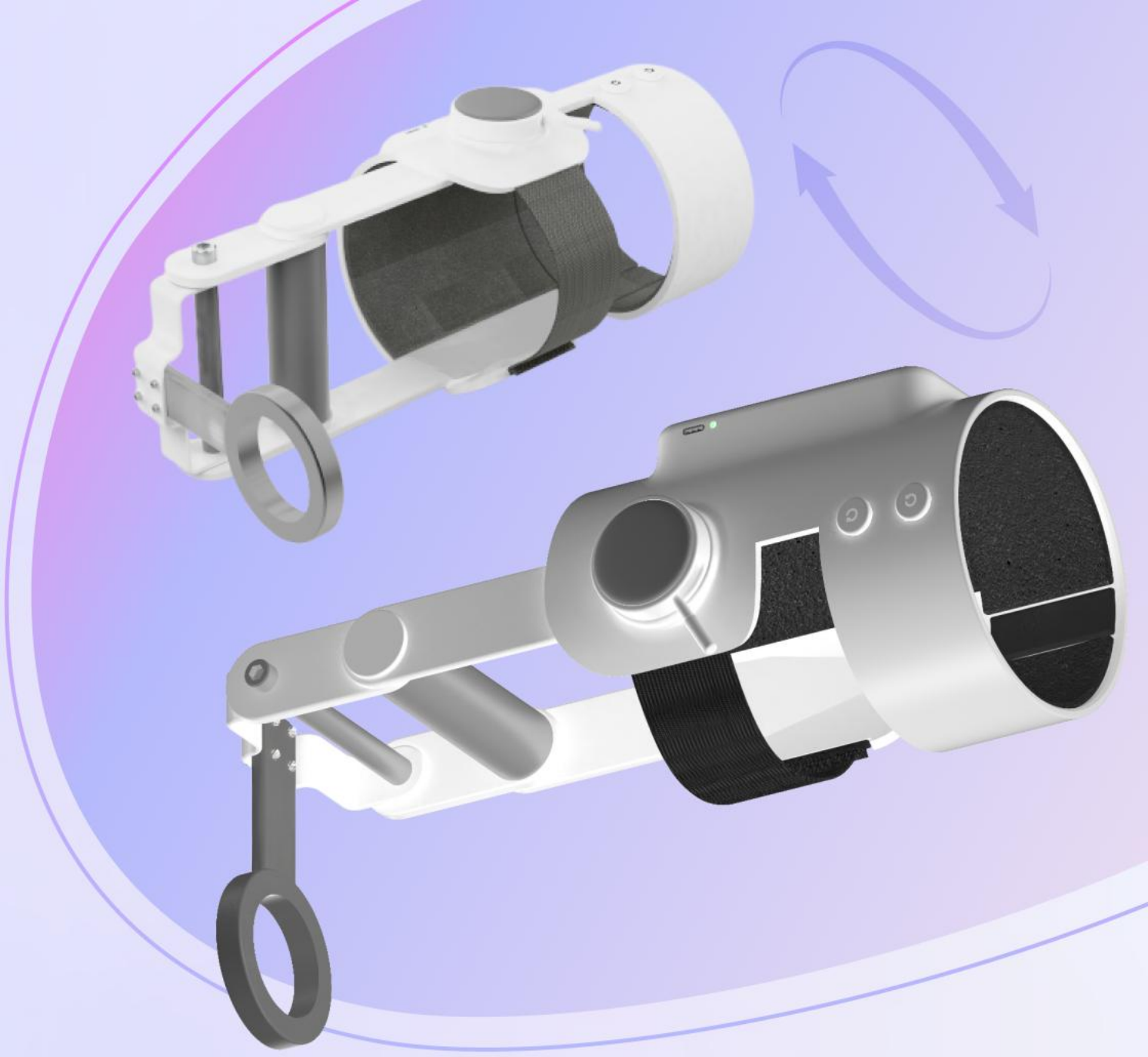
Gradually lock the design orientation

Sketch & Generated Ideas

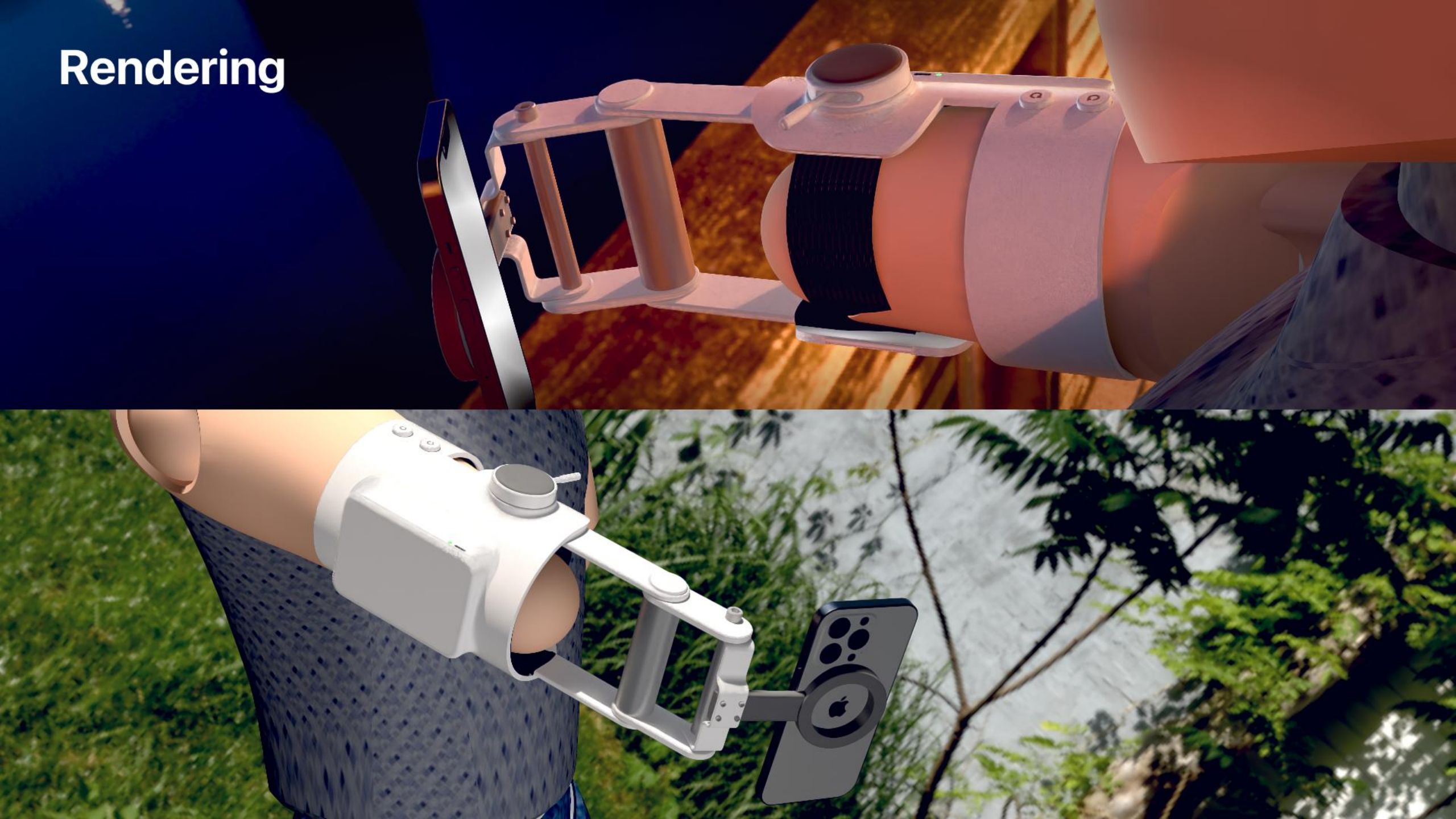


Rendering

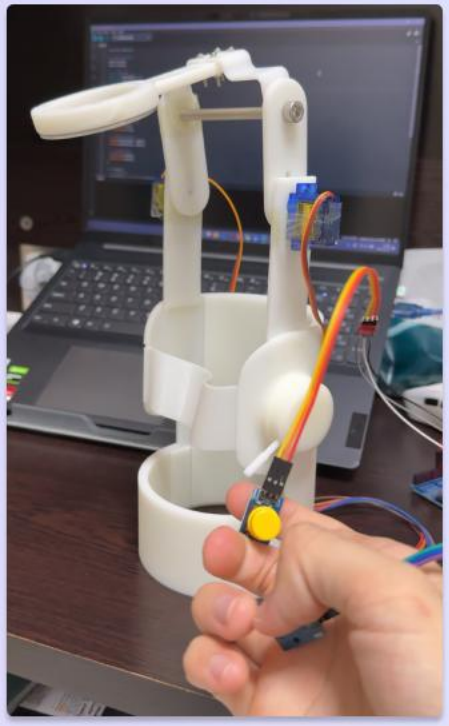


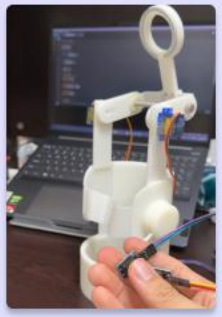


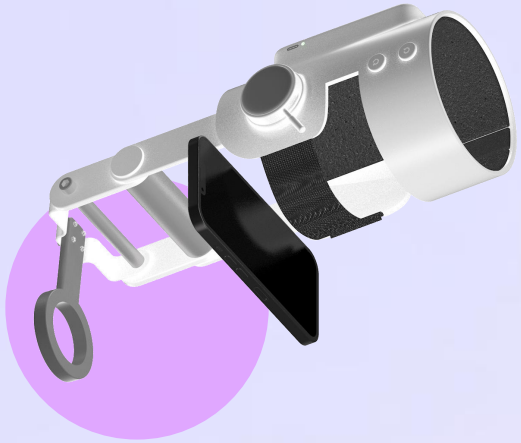
Rendering



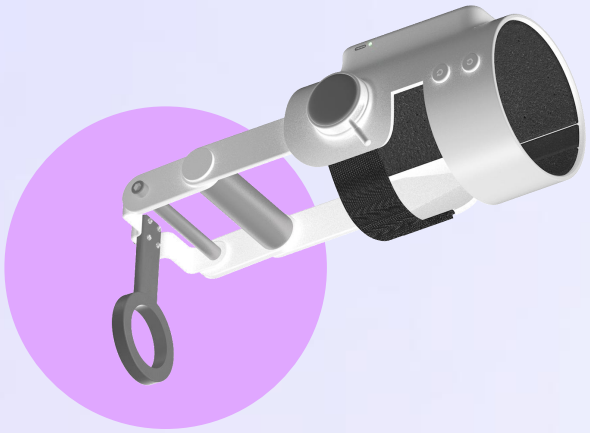
Prototype



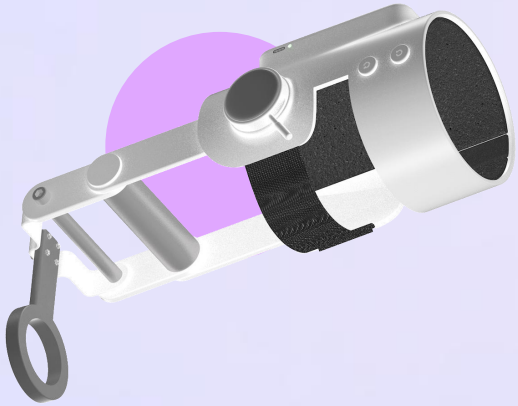




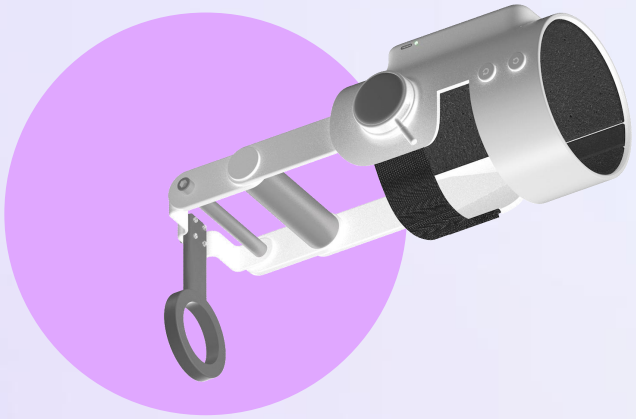
Magnetically
fasten



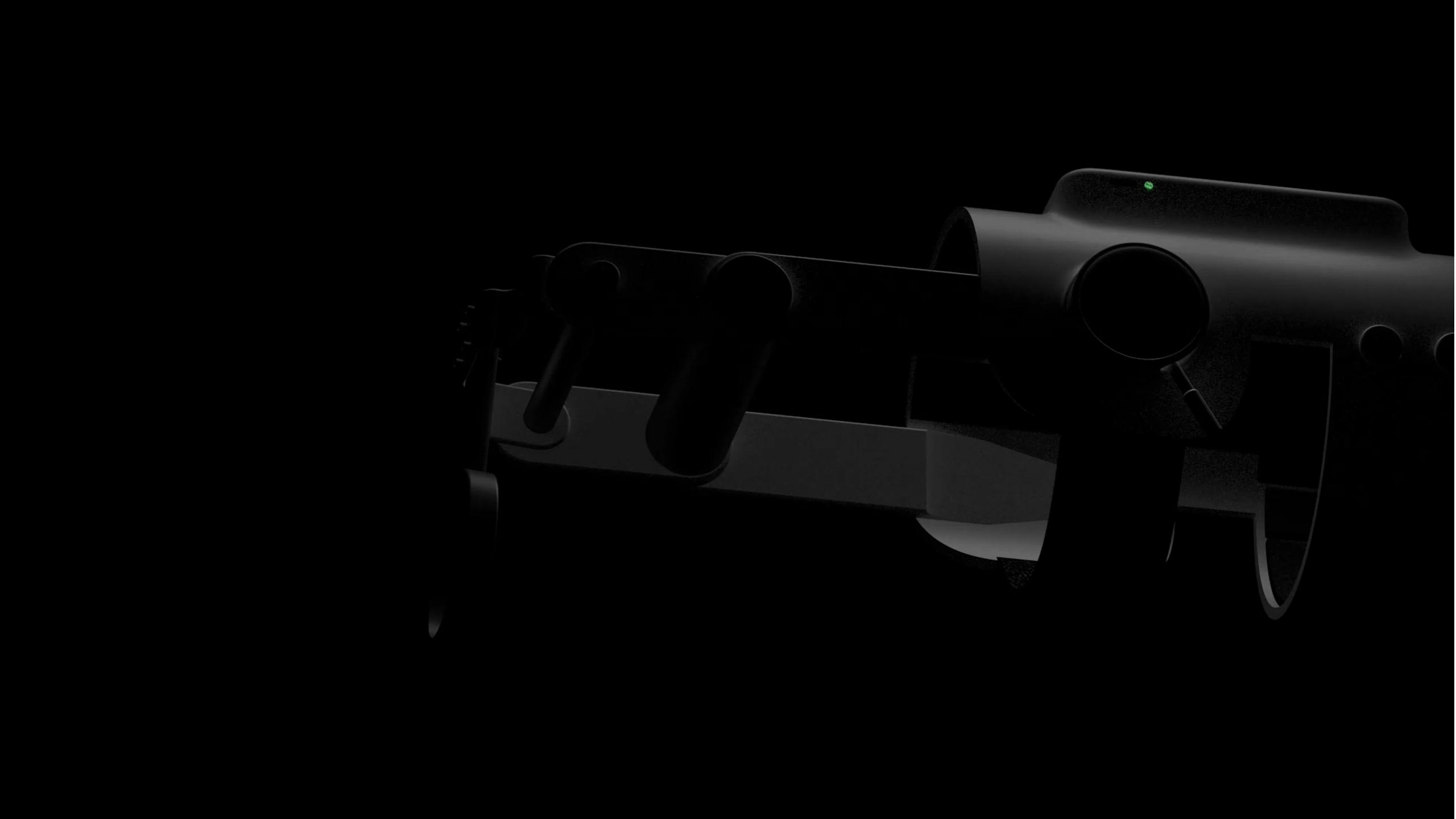
Rotation
(1 axis)



Rotate to
Tighten up



Rotation
(2 axises)



Cost Assessment

假设					产品定价=(1+利润率)*[每件产品制造成本+(当期回收研发成本+期间成本)/生产件数]	单件净利润	当期净利润
	生产件数（每月）	1500	利润率	15%	111.4427145	14.5360062	17443.2075
	销售件数（每月）	1200	退换货率	5%			
	供应商最大折扣率k	0.7	维修率	4%			
	最低折扣采购件数要求	500	当期初代研发成本回收率	60%			
	最高折扣采购件数	10000	公司运营员工数	5			
	供应商平均折扣率	97%					

产品制造成本（每件）

零部件	材料	重量 (g)	材料价格（每公斤）	
				25
				30
				250
				4000
				3750
				180
				400

假设					产品定价=(1+利润率)*[每件产品制造成本+(当期回收研发成本+期间成本)/生产件数]	单件净利润	当期净利润
	生产件数（每月）	3000	利润率	15%	95.00594633	12.39208	29740.9919
	销售件数（每月）	2400	退换货率	5%			
	供应商最大折扣率k	0.7	维修率	4%			
	最低折扣采购件数要求	500	当期初代研发成本回收率	60%			
	最高折扣采购件数	10000	公司运营员工数	5			
	供应商平均折扣率	92%					

产品制造成本（每件）

零部件	材料	重量 (g)	材料价格（每公斤）	材料损耗系数	供应商平均折扣率	材料成本 (RMB)	加工工艺	加工机型	机器价格（RMB）	机器预计运行寿命（年）	机加工费用（每小时）	平均机加工时长（min）	能源成本（系数10%）	机加工成本 (RMB)	组装时长（min）	组装人力费用（每小时）	组装成本 (RMB)	总成本 (RMB)
O型磁吸臂 转动臂 支撑臂 手臂套筒主体 复位装置 按钮*2 转轴	PLA	150	79	10%	92%	12.00592105	3D打印	拓竹p1s	3699	2	0.770625	1200	1.54125	16.95375	3	23	1.15	67.31596308
套筒内衬	硅胶	15	25	8%		0.373026316	积压成型	硅胶挤出机	30000	5	2.5	0.6	0.0025	0.0275				
绑带	尼龙	15	30	10%		0.455921053	织带工艺	织带切割机	25000	6	1.736111111	0.9	0.002604167	0.028645833				
磁铁	钕铁硼磁铁	25	250	8%		6.217105263	切割	磁铁切割	80000	10	3.333333333	7	0.038888889	0.427777778				
8mm指示灯（采购）	电子元件	2							0.921052632									
充电模块（采购）	可充放锂电池5V	50							9.210526316									
4*螺栓螺母M3*25（采购）	304不锈钢	8.8							0.552631579									
螺栓螺母M6*80（采购）	304不锈钢	10							0.571052632									总质量（g）
驱动电机及控制单元（采购）	舵机	40							18.42105263									315.8

研发成本（初代）

研发成本项	时长（人日）	人力资源费用（每人日）	成本	总成本
需求调研	20	200	4000	8330
产品设计	15	250	3750	
原型材料	/	/	180	
原型制作及测试	2	200	400	

期间成本（当月）

期间成本项	子项	成本说明	假设数值	单位	成本	总成本
销售费用	营销推广	每购买者营销预算（线上付费投流&线下推广）	4	元/购买者	9600	40895.70987
	运输物流	物流服务商每千克价格*售出产品总重	5	元/kg	1263.2	
管理费用	人力资源	人数*工作时间*人力费用	200	元/人日	14000	
	库存管理	仓库租金	200	元/日	6000	
售后服务	退换货物流	售出产品总重*退换率*物流服务商每千克价格	5	元/kg	63.16	
	产品维修及更换	产品维修率*每件维修费	15%	单个产品修费占制造成本	969.3498684	
经营场地租金	/	/	300	元/日	9000	

Competitors

...Automatic Tripod,Auto-Open Phone Tripod Stand with Magnetic...

For iPhone/Android

4.7 ★★★★☆ (883)

2K+ bought in past month

$27.99 List Price: ~~$35.99~~

FREE delivery **Wed, Dec 4** to Hong Kong on $49 of eligible

Sponsored

ULANZI MA26 Foldable Phone Tripod - Pocket Cell Phone Vlog Video Tripod Handle Aluminiu...

Mainstream smartphones

4.7 ★★★★☆ (126)

200+ bought in past month

$35.95

FREE delivery **Wed, Dec 4** to Hong Kong on $49 of eligible

Sponsored

GoPro HERO11 Black – E-Commerce Packaging - Waterproof Action Camera with 5.3K60 Ultra HD...

5.7K

4.3 ★★★★☆ (679)

3K+ bought in past month

$203.99 Typical: ~~$249.00~~

FREE delivery to Hong Kong

Add to cart

Product Price = (1 + Margin)*[Manufacturing Cost per Product + (Current Recovery R&D Costs + Period Costs)/Number of Product Produced]

Conclusion

Pre-product Design Stage

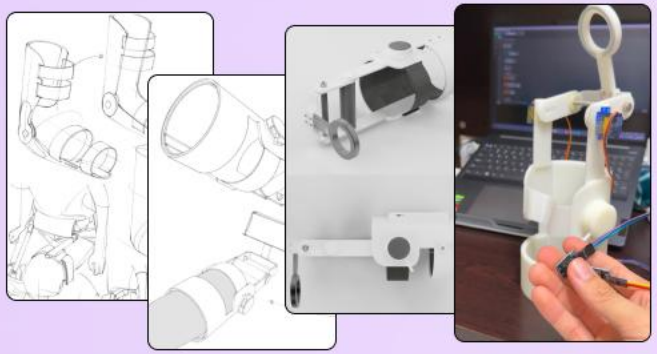
- Connect disabled people without hands through various platforms
- Investigate the real needs of target users
- Find out the pain points of their life and doing we-media
- Empathetic
- Find design opportunities

Product Design Process

- Product design based on survey feedback and data
- Generate countless ideas and sketches
- Evaluate and verify the feasibility and usability of the product
- If it does not meet the user's usage scenario, re-optimize the iteration

Product Design Landing

- A relatively perfect product output after repeated deliberation
- The product fulfilled our original design goals
- It's easy to wear, usability, affordable and universality.
- Help the target user solve the real need.



Project Review

Inadequacy	• In the final prototype output, the materials used in the product did not show a good landing effect. • Time is limited, and we have not test the final physical object for our target users to use.
Future Iteration	• Investigate the material of the product, design materials that meet the human body's touch and allow users to wear with comfort. • We plan to invite target users to use our product, conduct usability testing, and give more iterative ideas.