Training Equipment For Endurance Running

Project I

Summer Internship Report

Internship Location - Futuring Design Pvt. Ltd (Pune)

IDC School Of Design

Indian Institute Of Technology, Bombay

2017-19

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Date: 20th June 2018

INTERNSHIP REPORT

Archana Sonanave completed her design Internship with us at Futuring Design Pvt.Ltd, Pune, India from **04th May 2018 till 20th June 2018.**
Archana is an intelligent and motivated individual. As a design Intern, with the help of the core design team, she produced quality work.

She worked on
Concept Generation

Projects
Fitness training Equipment

We found her sincere, talented and hardworking, and result oriented during her tenure.
She showed team spirit and focused on developing innovative ideas. In the project she worked self-contained, creatively and credibly.

She comes across as a nice person to work with.

We take this opportunity to wish her success in her future endeavors.

With Best Regards

Chandrashekhar Wavahare
Director
Futuring Design Pvt. Ltd

PROJECT KIPCHOGE

ARCHANA S | 176130010

Internship – Futuring Design Pvt Ltd,

Pune.

Introduction

Endurance running is a form of continuous running over distances of at least eight kilometers (5 miles).

Eliud Kipchoge

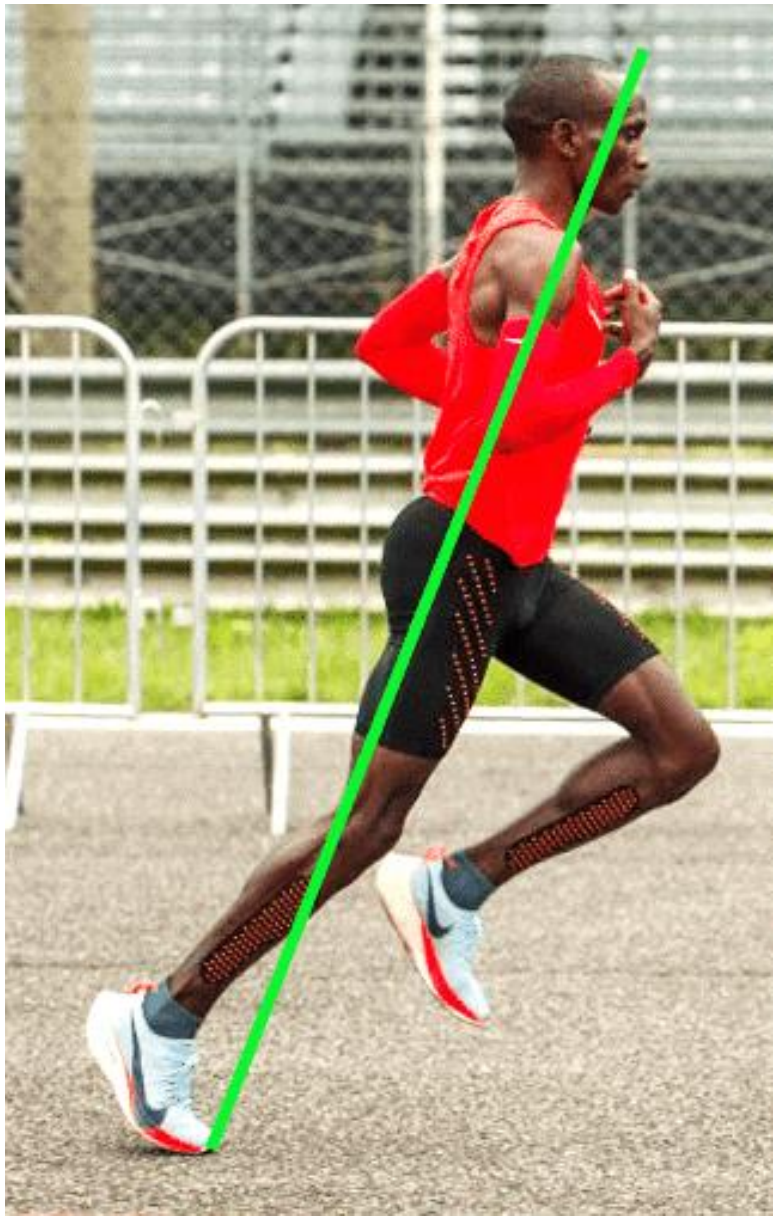
- Kenyan long distance runner.
- 2016 Olympic Marathon gold medalist.
- Described as “the greatest marathoner of the modern era”.
- Has won 9 out of 10 marathons he raced.

Project Kipchoge

Was about designing training equipment for endurance runners to help improve their running form.

This involved two types of products –

- Treadmill attachment to improve running angle
- Arm Sleeve



Arm Sleeve

Role of Arms

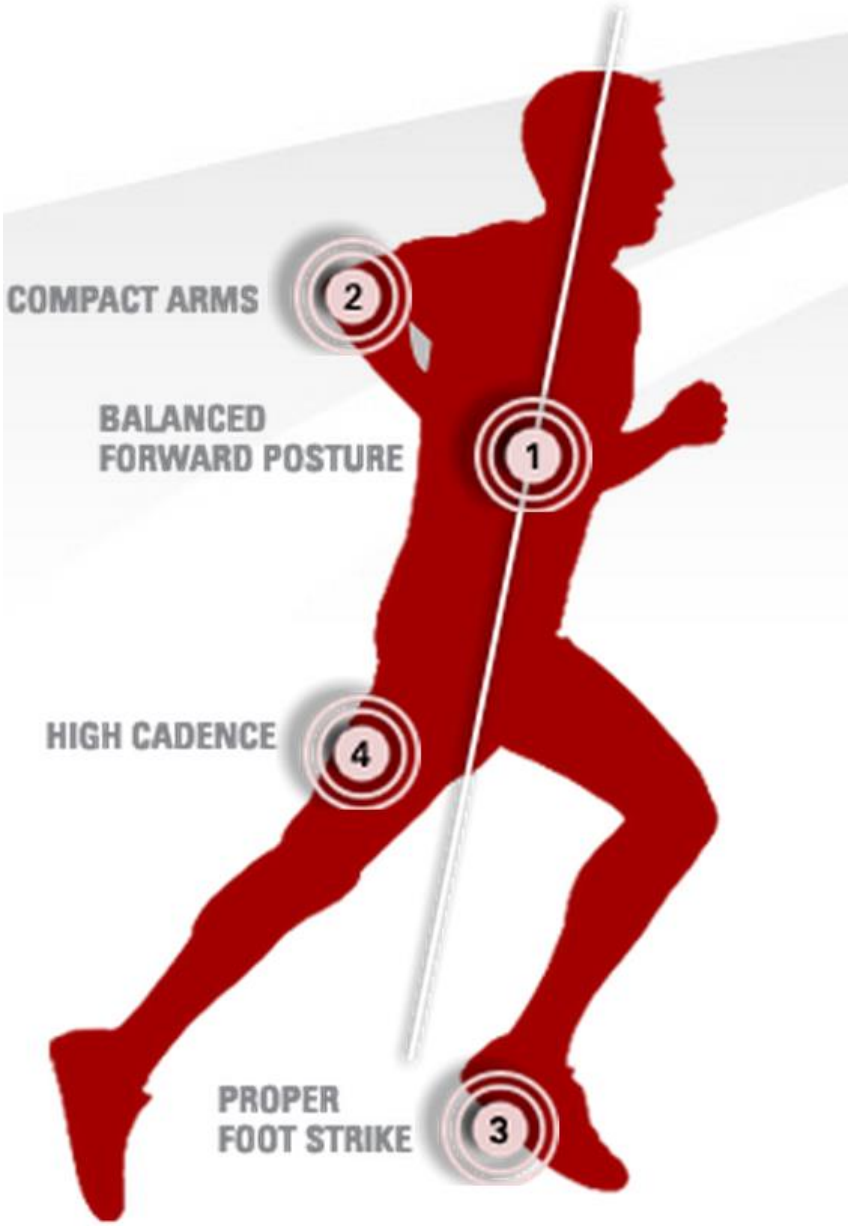
The arm swing is critically important for stabilizing the body when running.
It is an area where runners can often make major efficiency improvements.

DO’s

- elbows at 90 degrees or less
- relaxed rearward drive of elbow
- arms reflexively come forward
- knuckles close to sternum- foot always lands under hand

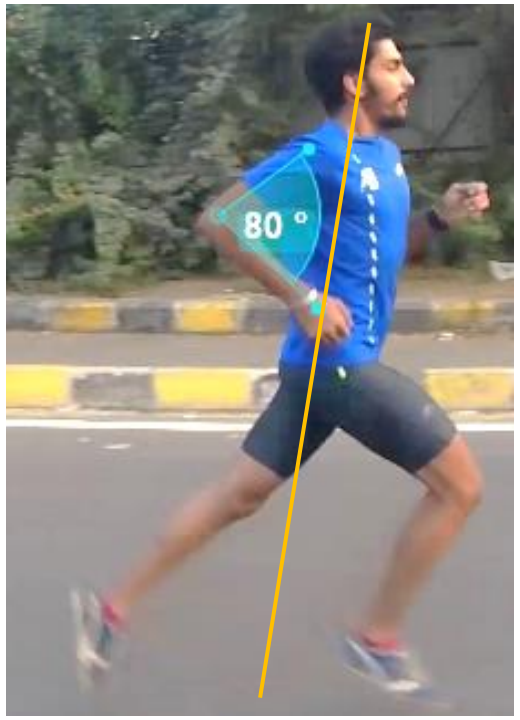
DON’T’s

- hands should not cross center
- do not pump arms
- arm out in front and overstride

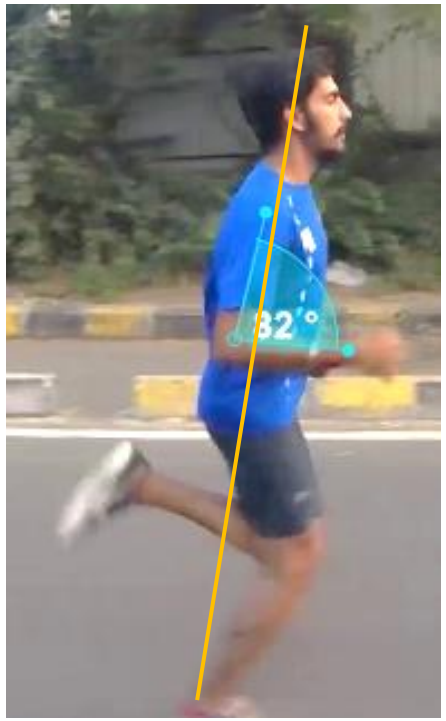


Arm Study Analysis

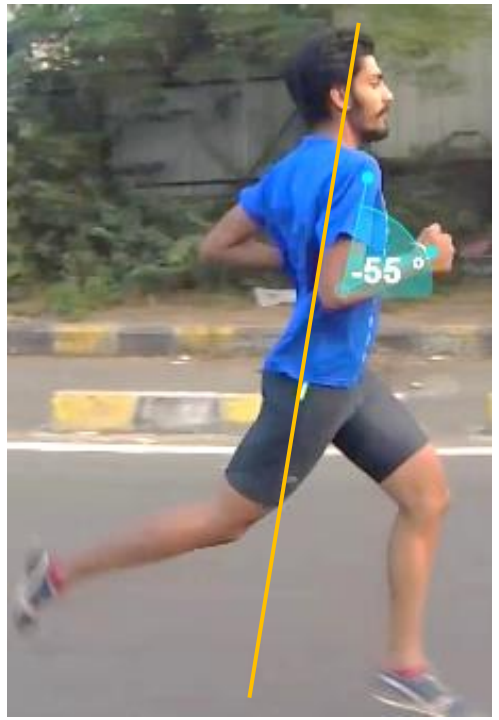
Behind Median



Back Farthest



Arm angle at Median



Ahead Median Acute Angle

Return From Median

Median

Arm Angle

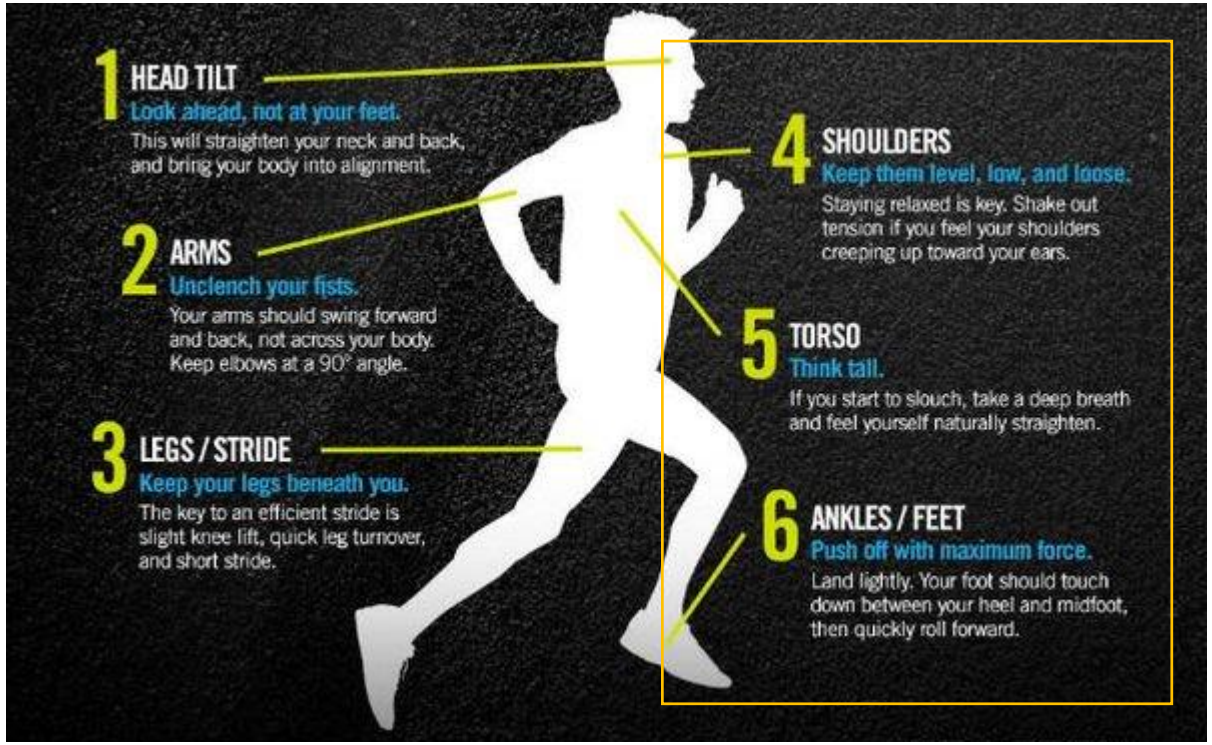
Inferences

It is important that the arms to move a certain way for improved trunk stability.

And,

- Trunk Stability
- Relaxed Shoulders
- Reduced Torso Flexion

Are vital for an economic running form.



Design Statement

To design an innovative solution that helps develop neuro - muscular patterning of arms to improve running form.

Design Considerations

- The arm should remain at 90 when behind the median.
- The arm should collapse when in front near the chest.
- One should be able to easily release their arm from 90 deg in case of emergency.

Keywords

After a brainstorming session we narrowed down to the following keywords to begin ideating –

Ease of Use

- Comfort
- Snug – Fit
- Anti – Chafing
- Washable

Technology

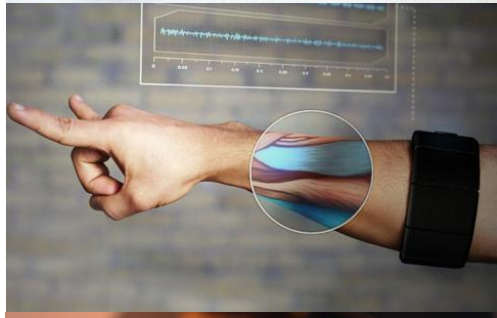
- Motion Sensing
- Gesture Control
- GPS
- Body Temperature
- Weather Proof
- Rechargeable
- Night Visibility
- A.I.
- Feedback

Material

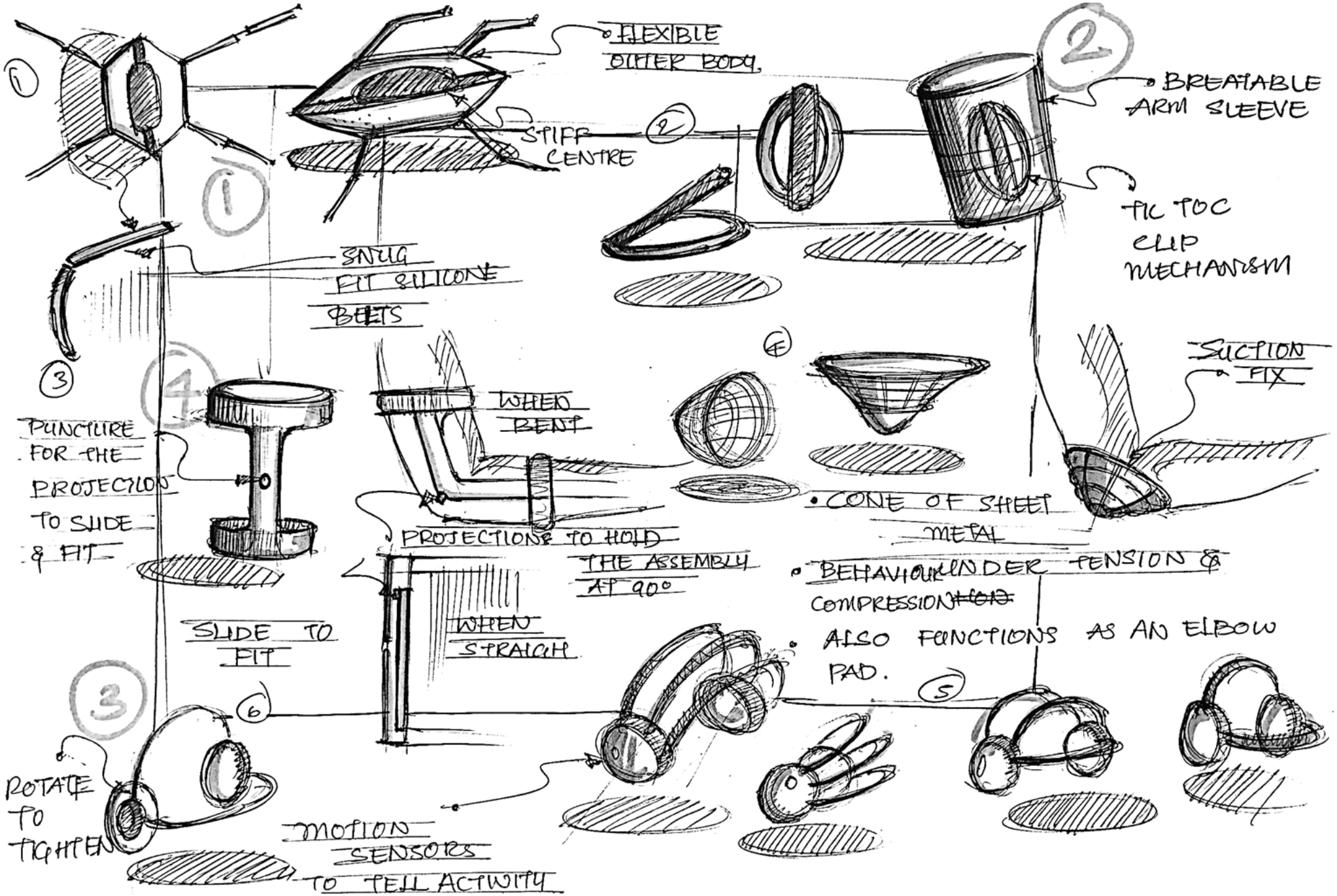
- Technical Fabrics
- Magnetic
- Lightweight
- Velcro
- Belts
- Fabric Welding
- Foam

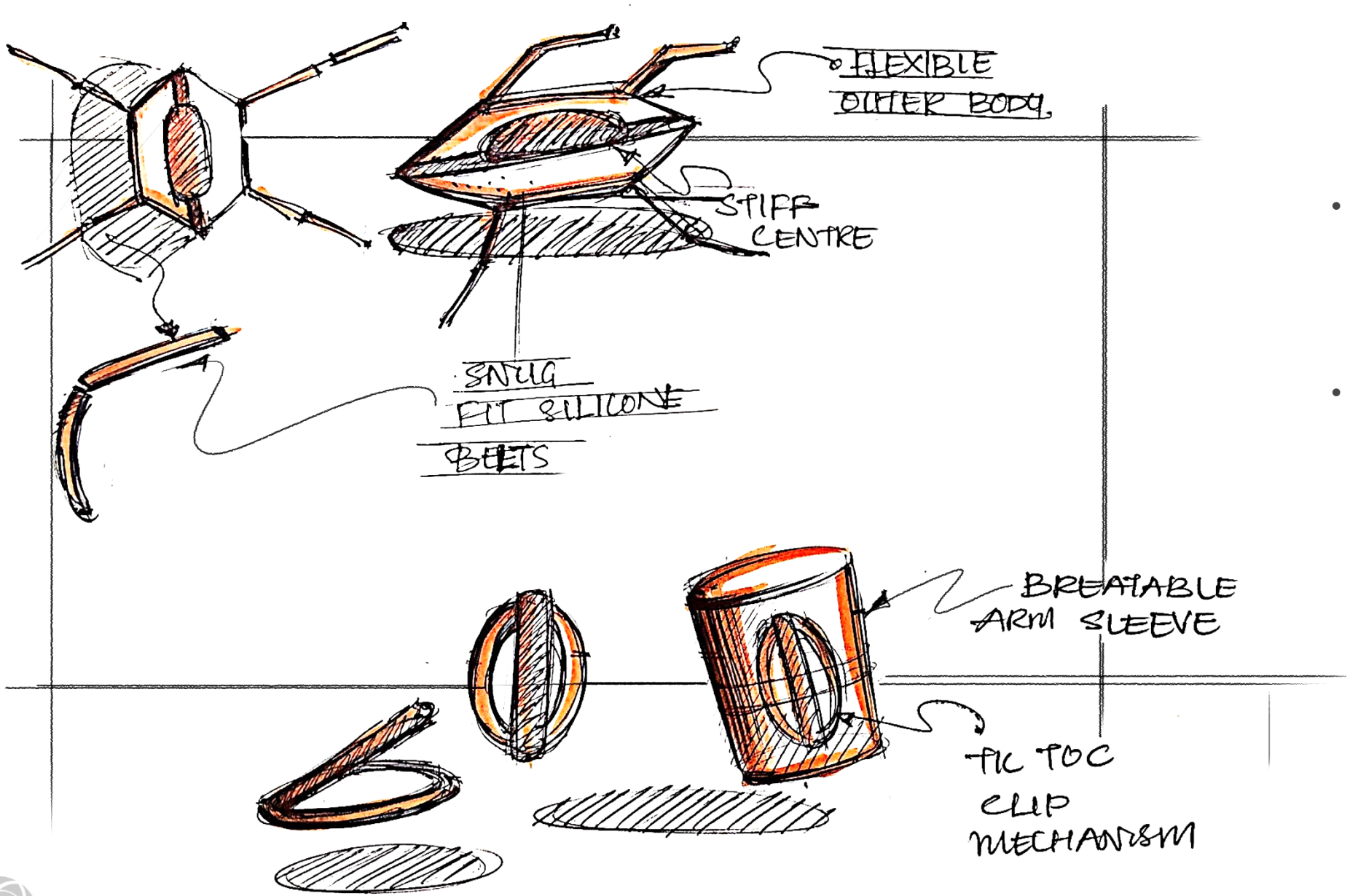
Operation

- Snap On
- Velcro Fastening
- Rotation
- Press

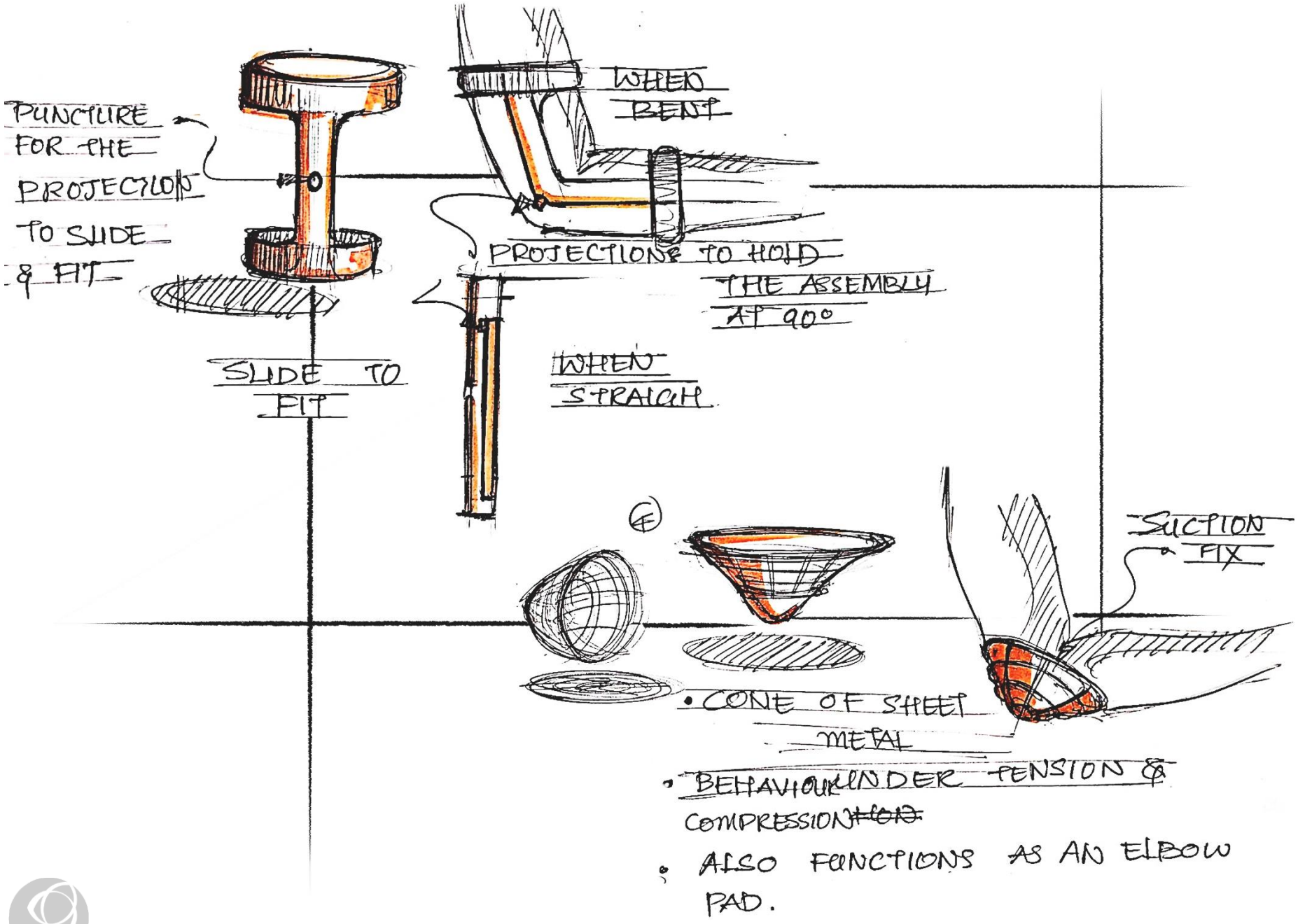


IDEATION

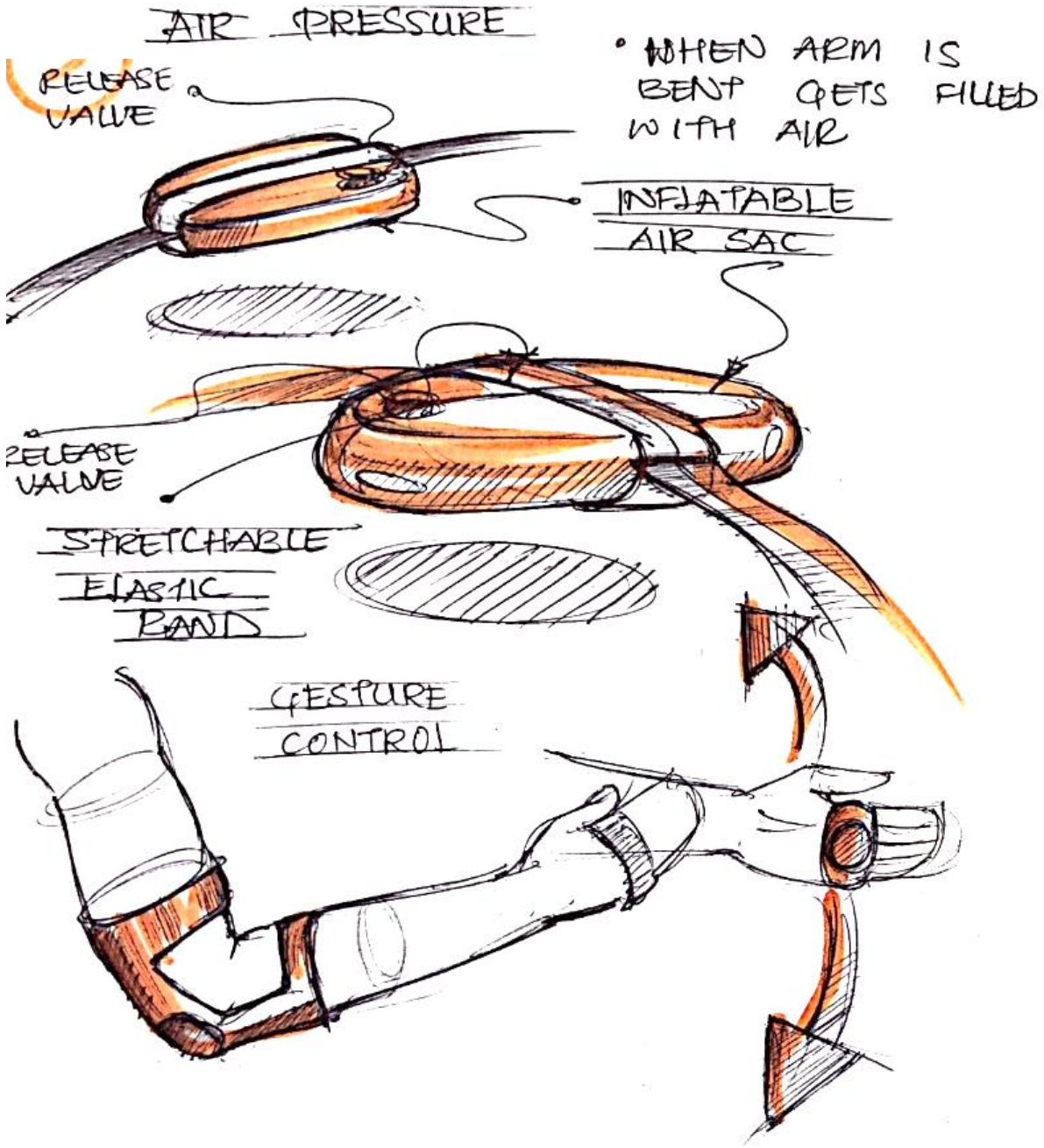

FLEXIBLE OUTER BODY.
STIFF CENTRE
BREATABLE ARM SLEEVE
TIC TOC CLIP MECHANISM
SNUG FIT SILICONE BELTS
PUNCTURE FOR THE PROJECTION TO SLIDE & FIT
WHEN BENT
SUCTION FIX
CONE OF SHEET METAL
PROJECTIONS TO HOLD THE ASSEMBLY AT 90°
BEHAVIOUR UNDER TENSION & COMPRESSION
ALSO FUNCTIONS AS AN ELBOW PAD.
SLIDE TO FIT
WHEN STRAIGH
ROTATE TO TIGHTEN
MOTION SENSORS TO TELL ACTIVITY



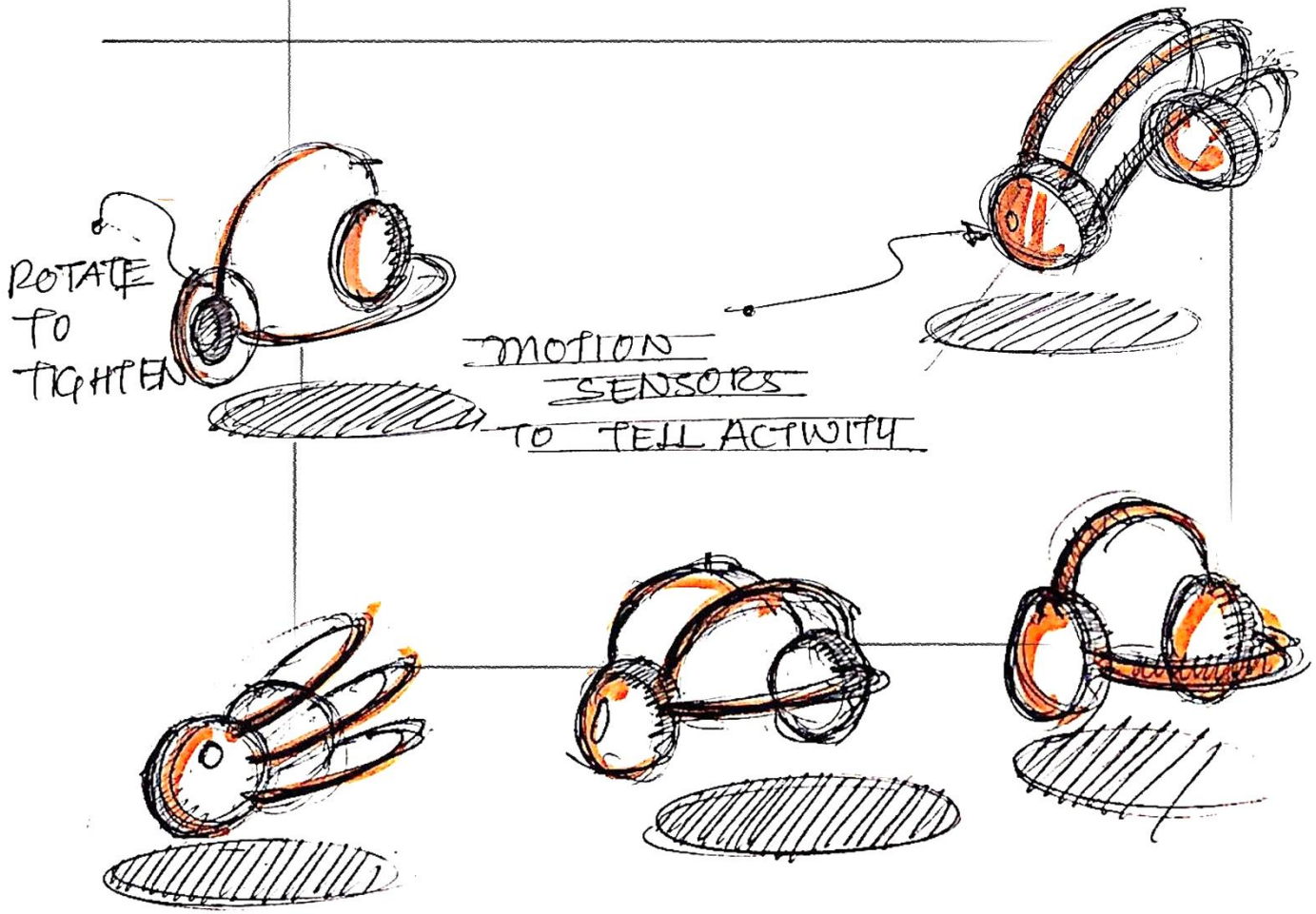
- **Using the flexibility of sheet metal and its property to bend under tension.**
- **Eg – Metal hair clips**

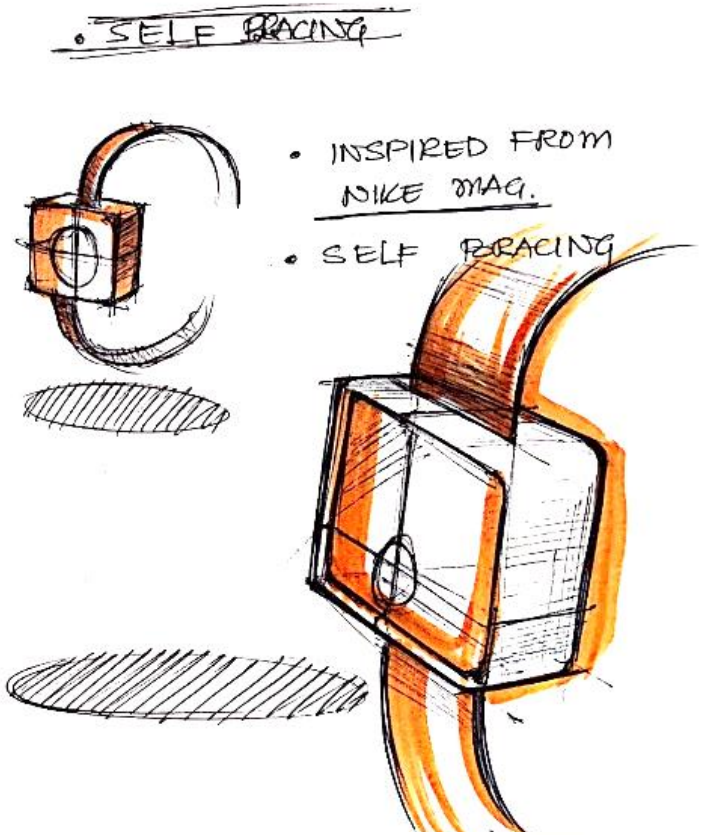


- **Using suction for retaining the arm at 90 deg.**

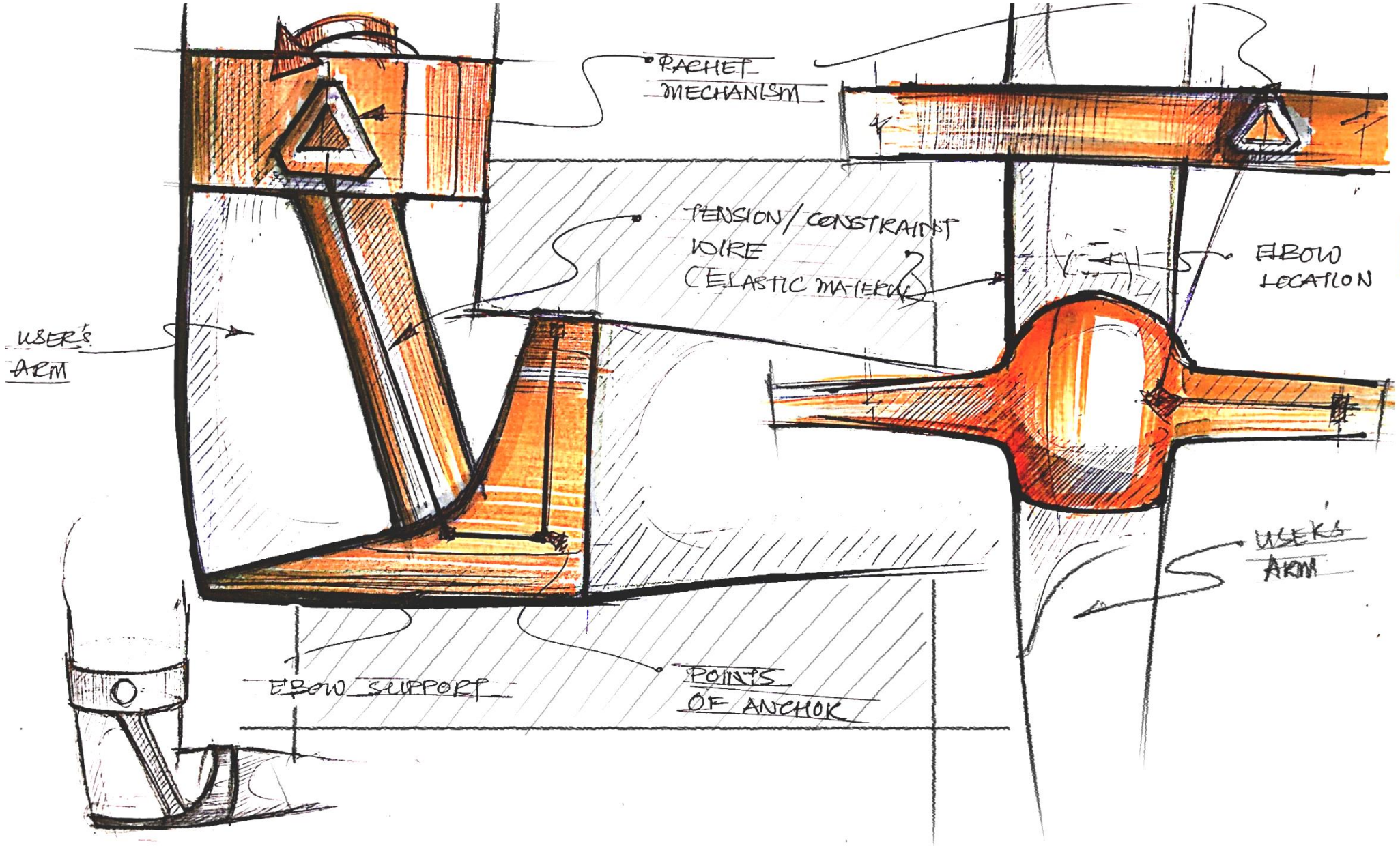


- **Using air pressure to keep the arm at 90 deg.**
- **Gesture Control**

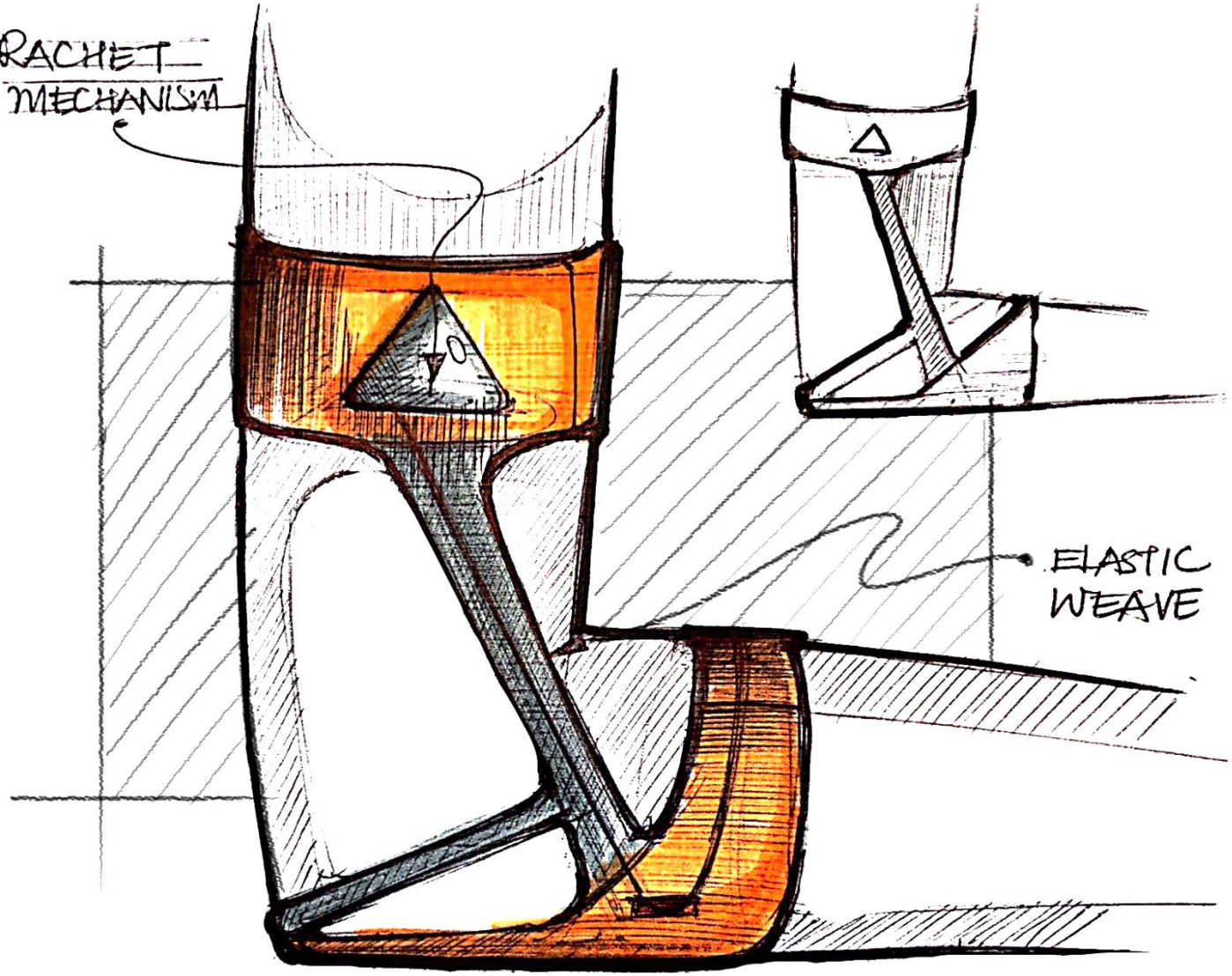




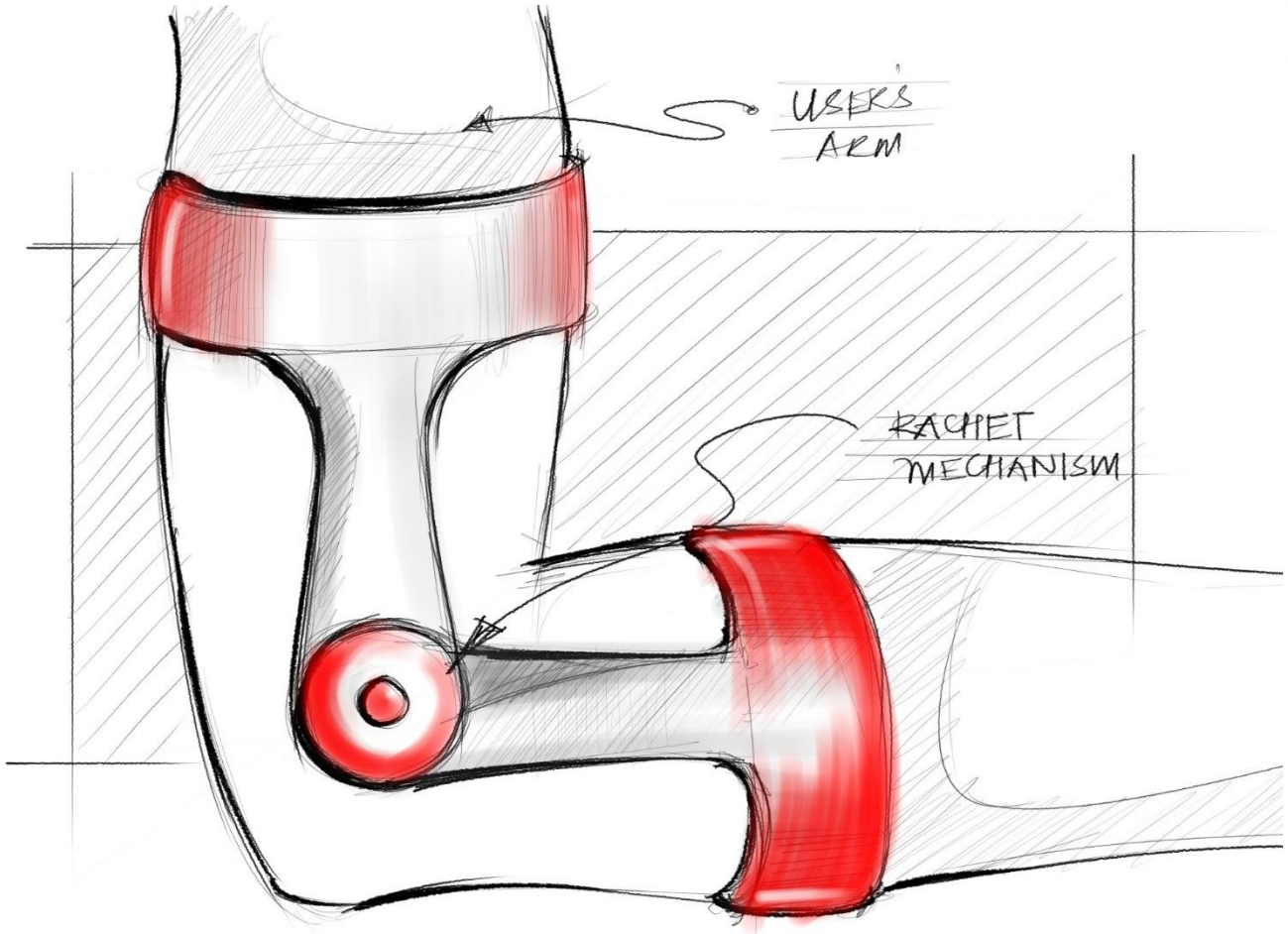
- **Using BOA Mechanism for fastening and pulling the arm at 90 Deg**
- **Concept of Self Lacing for fastening the product on the arm.**

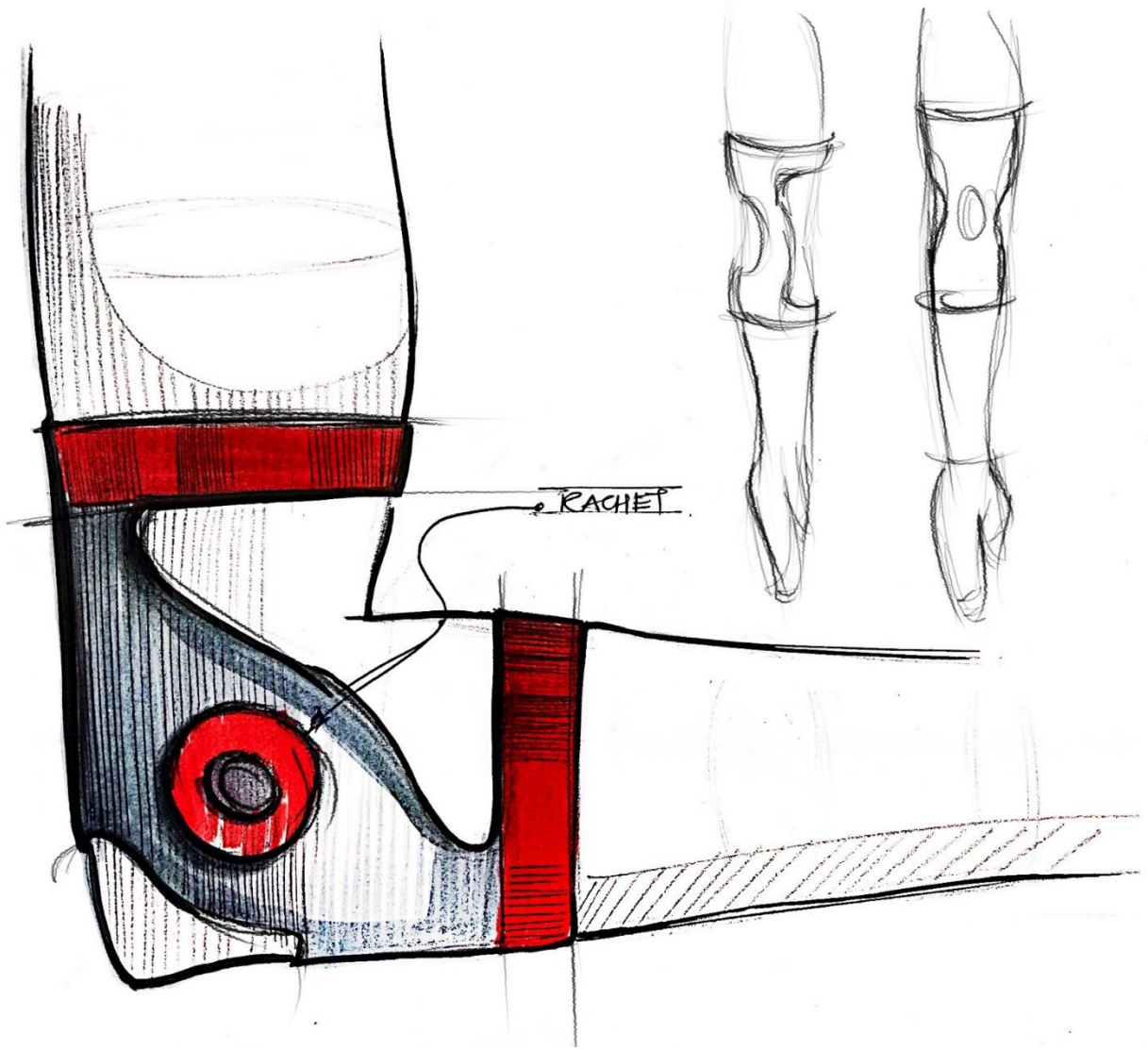


- **Further development of BOA mechanism concept**



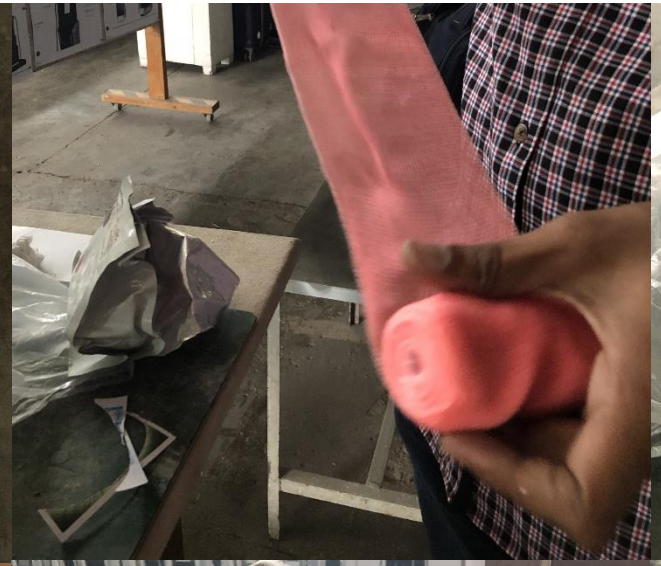
- **Thread guiding to pull arm at 90 Deg.**
- **Quick Prototype to understand function.**

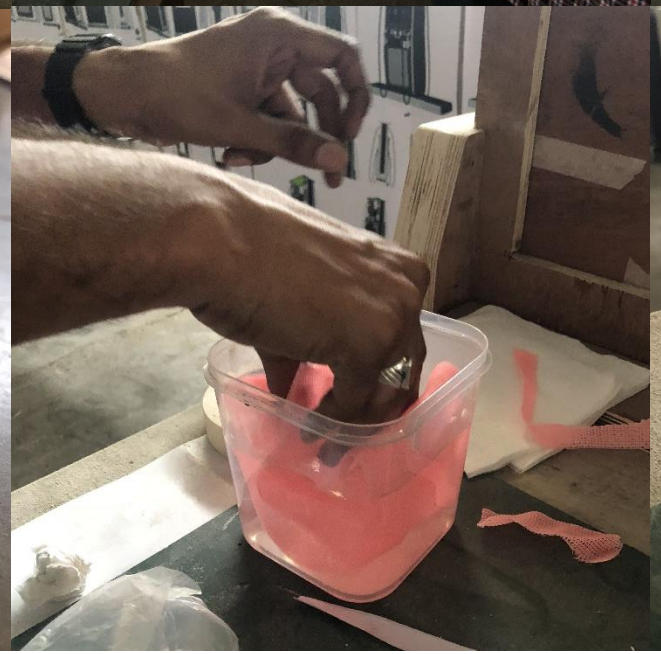




- **Concept using spring loaded ratchet and ball catch.**

PROTOTYPING





- **POP Bandage**

- **FRP Bandage coated with Resin.**

MATERIALS

- Knit Fabric and Viscoelastic materials
- Hypoallergenic Fabrics

PARALLEL PRODUCTS

- Locating the sleeve on arm

Location of the mono or poly centric hinge is critical to the functioning of the concept.

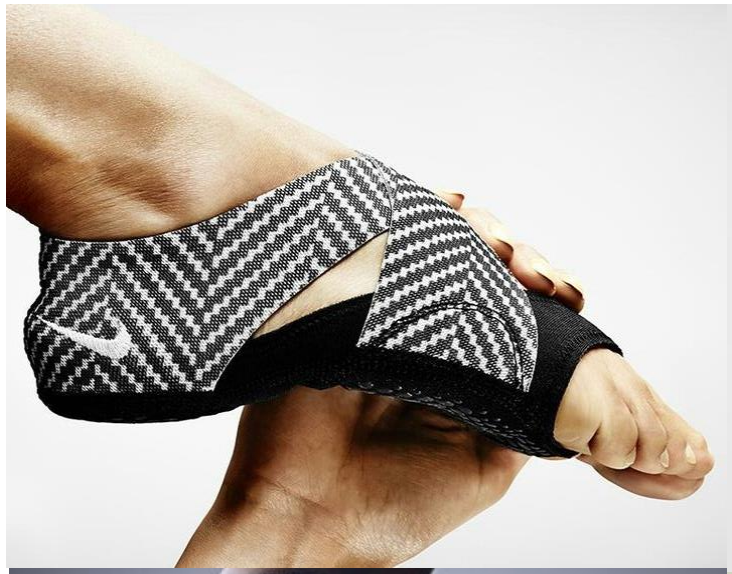
- Rigid support for upper arm.

Location of the mono or poly centric hinge is critical to the functioning of the concept.

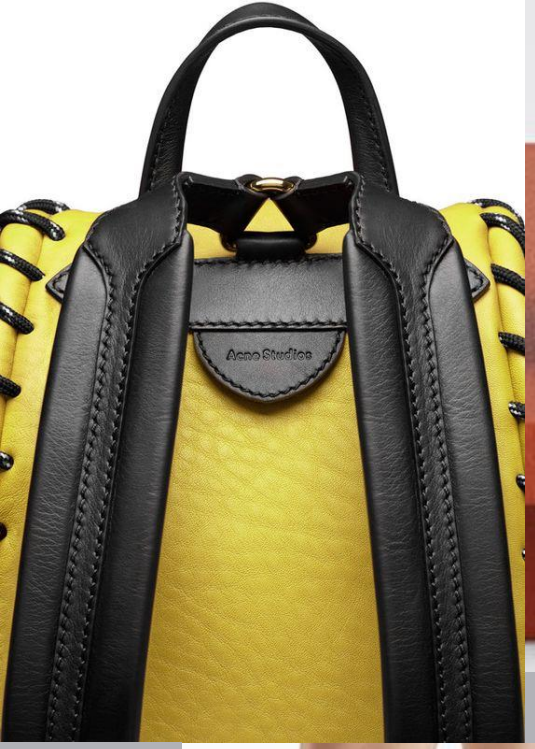
To improve the load bearing capacity of the ratchet and provide a snug fit.

- Thread guiding

- Use of multifunction fabric wear



- Use of Multiple materials in the product.



COLOUR INSPIRATIONS

CONSIDERATIONS

- Technology
- Cost
- Foot Print
- Life Cycle
- Technical Fabrics
- Comparison
- User Acceptability

TECHNOLOGY

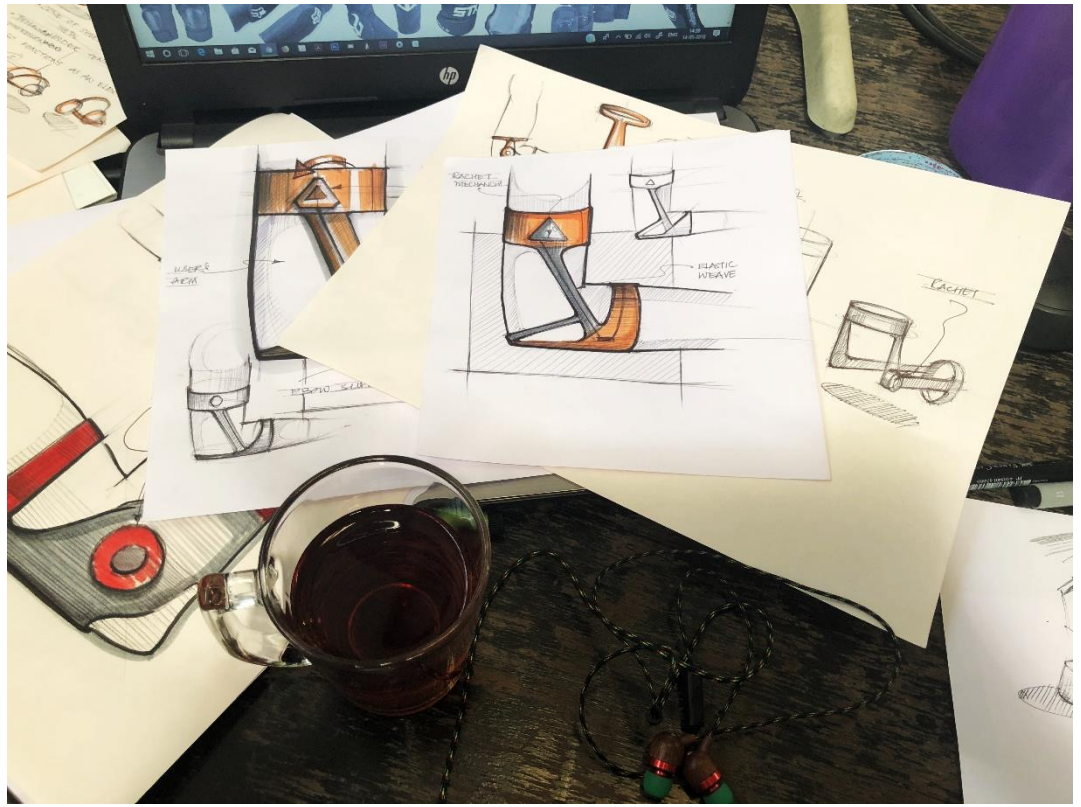
	Feasibility	Cost	Energy Source	Affordability
Mechanical Constraints	High	Dependent on numbers	-	High
Electronic Systems	Depends on function	Depends on function and technology	Dependent on function	Depends on cost
Actuation	Low	Increases with function	Dependency increases with function	Decreases with function - Low
Activity Monitoring	High	Low to medium based on function	Small	Medium to High

COST COMPARISION

	Reduction in cost with increase in Nos.	Cost of Adjoining Components	Developmental Stages	Value Addition
Mechanical Constraints	Cost reduction possible	High dependency on fabric technology	Less stages to develop and test	Value addition can be done using addition electronics based on function.
Electronic Systems	Cost reduction possible	Depends on function	Need more testing and debugging	Value addition by integrating different Mechanical /Electromechanical components
Actuation	Cost reduction possible but depends on technology	Cost may increase depending on usage scenario	Less stages required, integration with other components needs to be tested	Value addition possible
Activity Monitoring	Cost reduction is possible	Depends on components and their integration	Need more time to develop and test	Less scope for value addition

TAKE AWAY

- Experience of Client Meeting.
- Understanding client requirements.
- Research on Endurance Running as an activity and biomechanics.
- Study of long term effects of training equipment on human body and ergonomics.
- Prototyping along with testing.
- Team work.
- Technical understanding of prototyping and product building.
- Concept Building and Ideation.



- As a fun activity I also made my own huaraches.
- A type of footwear used for barefoot running.

THANK YOU

ARCHANA S | 176130010

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Pune.