

DES602

Design for the Differently Abled

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Rahul Kothari

Introduction

According to *Persons with Disabilities Act, 1995*

Person with disability means

a person suffering from **not** less than *forty percent* of any disability as certified by a medical authority.

Disability means

Blindness

Low-vision

Leprosy cured

Hearing impairment

Loco-motor
disability

Mental retardation

Mental illness

DESIGN FOR DIFFERENTLY ABLED



- give a problem
 - Identify problem step
 - list of reference step
 - break down problem step further
 - design strategies to bring out solution
 - Next step?
 - solution achieved?

- extract
 - one/multiple
 - can often be used
 - multiple reference
 - new reference
 - technological step
 - ease of use
 - public places
 - accessibility
 - mobility
 - fun
 - entertainment
 - games
 - space management
 - specialized tools
 - medical facilities
 - technical & numerical mobility

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Daily Activities

- wearing the clothes
- Having Breakfast may be making it
- Boarding the vehicle
- Driving the vehicle
- Entering the building
 - Cards
 - Elevators
 - Stairs
 - Signatures
- Performing the office duties
- Working / Moving out in the middle of work for screen

Physical Disability

Mental Disability

Daily activities

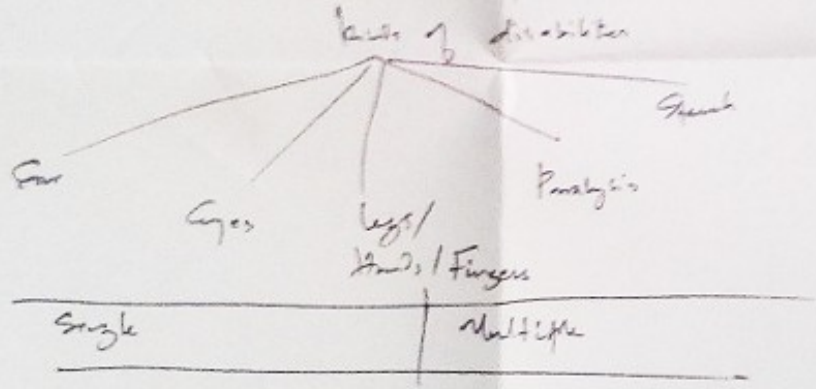
- Having lunch may be buying it
- Some persons to get back to house
- Talk to the family
- Operate a phone
- Use the key to open the apartment door.

Daily Activities

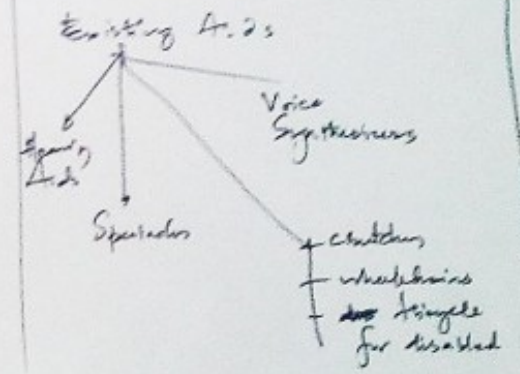
- Having / Cooking Dinner
- Going back to bed.

Point on a mobile phone

Differently Abled



Designer
Welfare / A.D.s



Design Elements

- Color Pattern
- Ramps
- Handles
- Contrast
- Primary color
- Size of
- Human font
- Icons
- Directional Signs

Daily activities

- Getting up from bed
- Going to the toilet
 - Urinating
 - Defecating
 - Washing
 - Brushing etc.
- Getting Dressed | (may be ironing the clothes)

Other miscellaneous tasks.

- Banks
- Bakeries
- Shopping - Buying & Trying

Classroom Exercise 4.

DES 602. Design Thinking & Methods

B. v. Raghav.
14119266.

21.08.24/24

Census 2011

Total no. of disabled
2.7 Crore / 121 Crore
= 2.23% (approx.)

Mobility Impairment
54.4 Lakhs
= 20.3% (approx.)

One of every five disabled
suffers from mobility
impairment

Category

Structural

unable to bear load

eg. leg
hand
wrist
neck

Joints

+ PERIOD

STRENGTH
STIFFNESS

Functional

performance

issues

Specialized parts eg. FINGERS.

Eg of Structural Support

Customized for my body!

Light weight

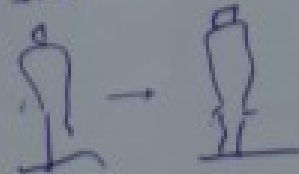
acts like External Bones/Muscles



Helpful Joint

Issue in Available Products

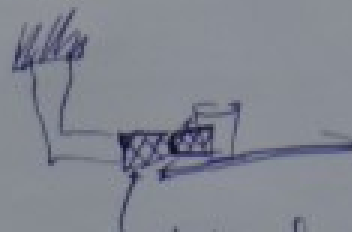
Eg of Functional Support



- ①. Weight
- ②. Painful Interface
- ③. Helps only Structure [Designed so] but distributed to all.

SKEPTICS

- Controls.
- feedback
- fine tuning & calibration



External hand for the amputee

Reads neuro electronic signals & responds accordingly.

Types of mobility impairment

(Initial Observations based on BRAIN DUMP)

- Arthritis
 - Bone fracture
 - Muscle fracture
 - Ligament injury
 - Patella injury
 - Ankle problem
 - Achilles tendon
 - Muscular sprain
 - Joint dislocation
 - Nerve pinch
 - Heart stroke
 - Paralysis
 - Sclerosis
 - Rheumatoid arthritis
 - Osteo arthritis
 - Joint over wear
 - Disuse atrophy
- ... and many more

Interview

Subject Matter Expert

The names of the doctors and other subject matter experts have been deliberately removed for the sake of anonymity.



Causes of mobility impairment

- i. Road Accidents/ Injury/ broken limbs.
- ii. Improper treatment/ wrong medication of a disease.
- iii. Brain fever/ stroke.
- iv. Weakness of muscles, damaged muscles
- v. Length loss due to earlier injury
- vi. Wrong medication or mishap during pregnancy.
- vii. Impairment by birth.

Available Solutions

Literature Study

TRANSPORTABLE

HOLDABLE

WEARABLE

- Leg Braces
- Canes
- Walkers
- Crutches
- Wheelchairs
- Scooters



Ankle Foot Orthosis



Knee Ankle Foot Orthosis



Detailed Ankle Joint

Leg Braces

User Interviews



EXISTING SOLUTION
PROBLEM

NO PARTICIPATION
IN HEALING

HOLDABLE ↔ WEARABLE

Extra Space
Requirement

HOLDING

GRIPPING

WEIGHT

SURGERY

KNEE SUPPORT

LESS
AGILE

Implants

SPACE FOR KEEPING

Sticks

Repair

Crutches

BAISAKHI

EXISTING
SOLUTION

HYGIENE
ISSUE

LAATHI

CALIPERS

ENGAGED
HANDS

WALKERS

BRACES

LESS
MANUEVERABILITY

Attachment
Problems

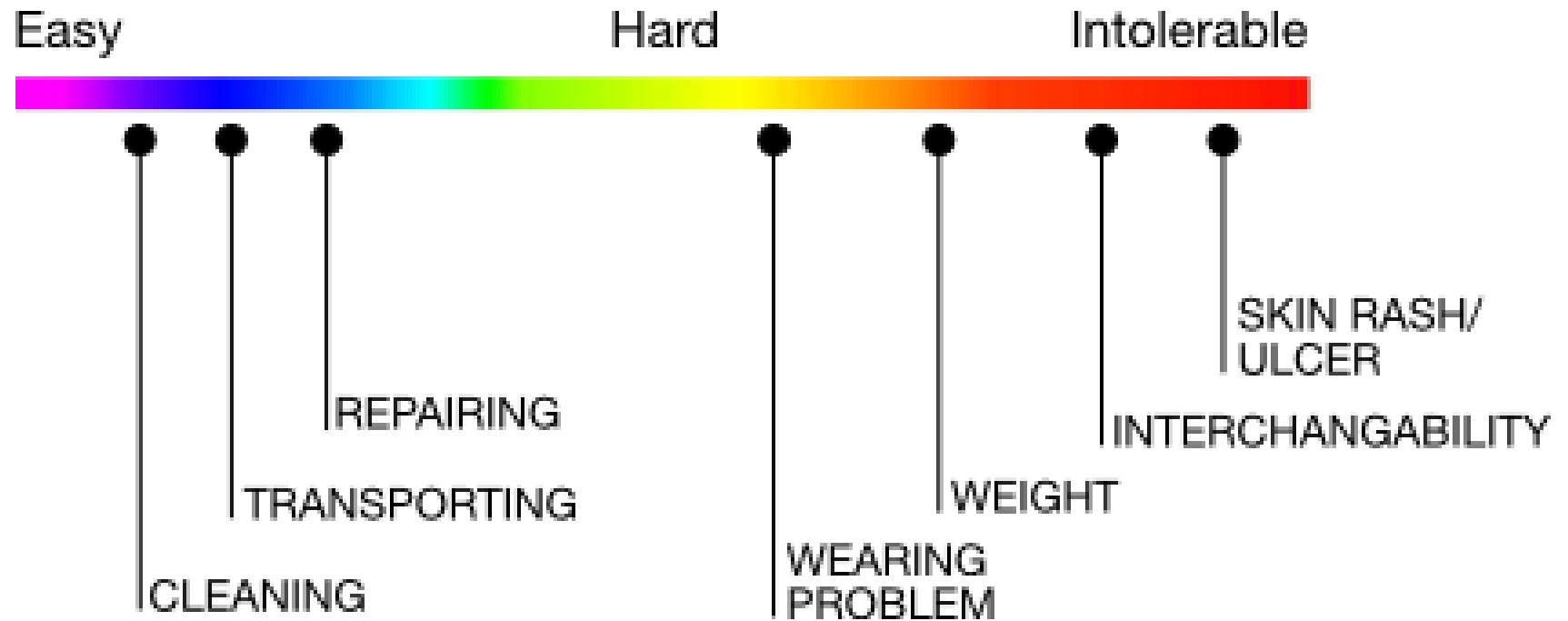
Problem while
Boarding on Public
Transport

STORAGE

WEARING
PROBLEM

Inadeptability
of instrument

Usability



Competitor Analysis





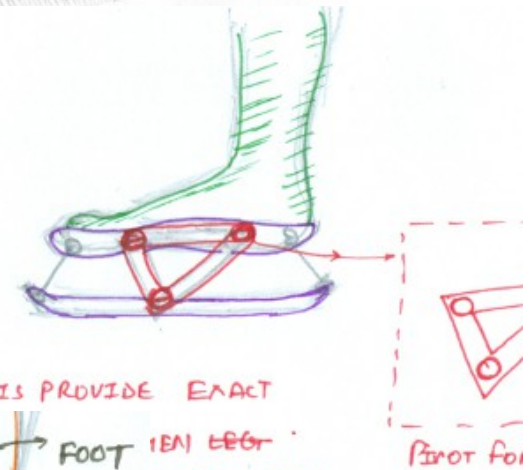
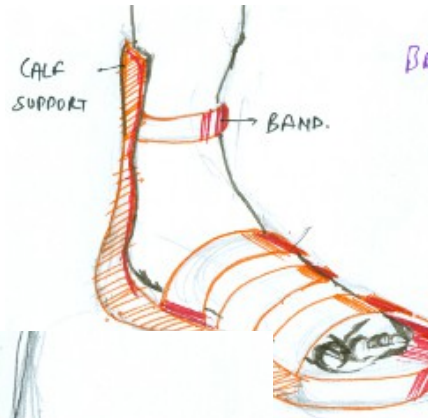
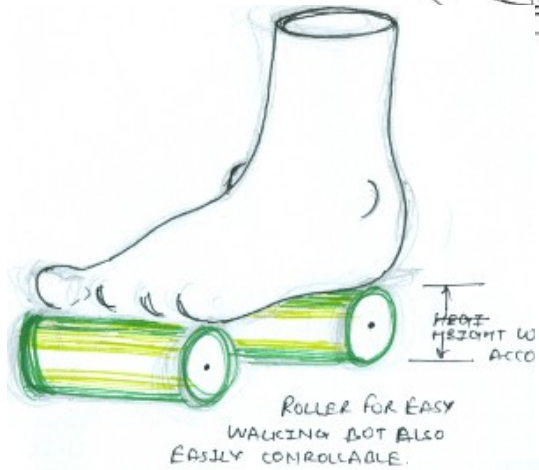
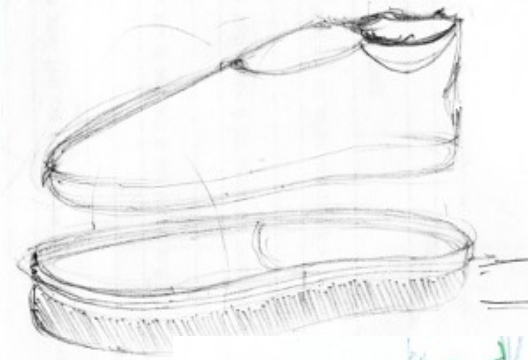
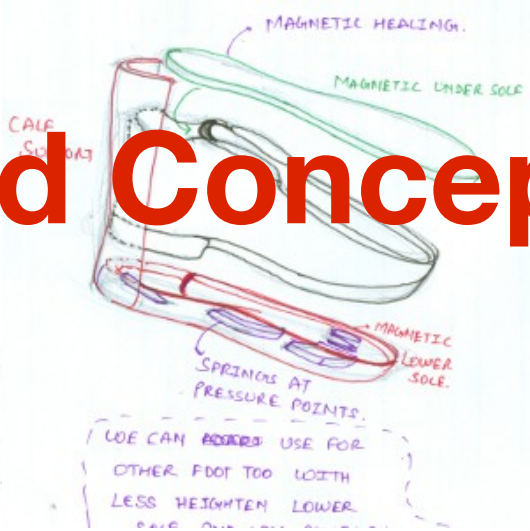
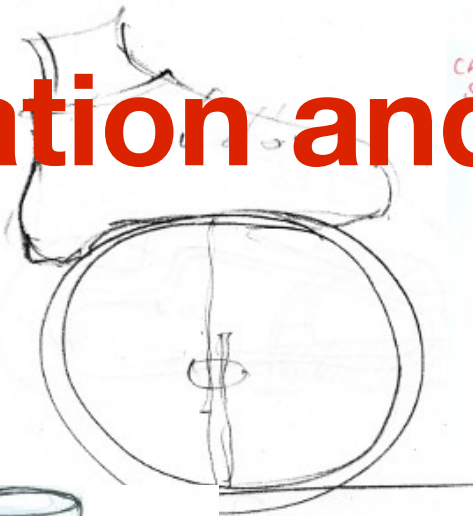
Actionable Brief

To design an ankle foot orthotic that

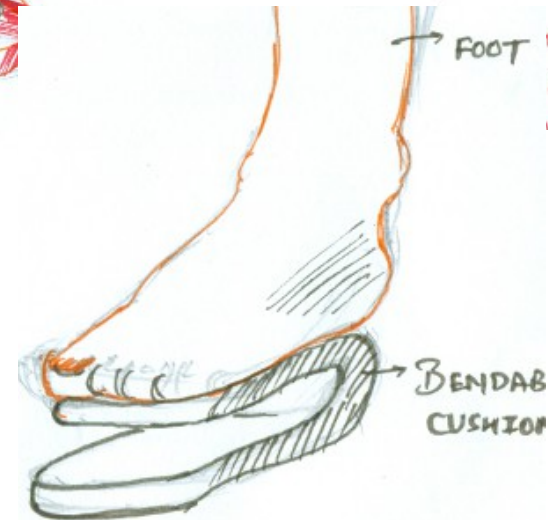
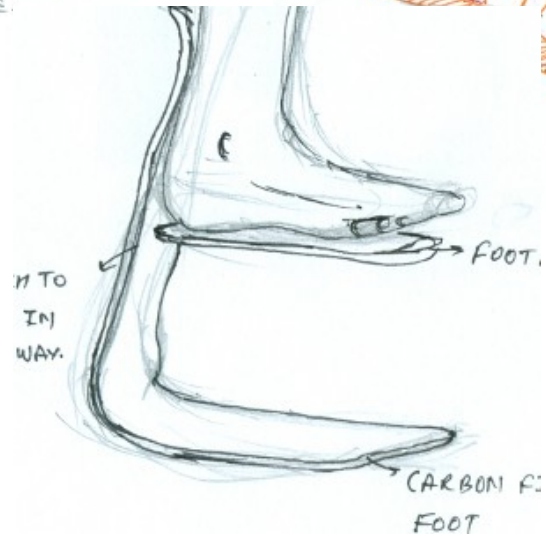
- balances the posture (or leg length inequality)
- supports the ankle
- is lightweight (exclusive weight $\leq 500\text{g}$)
- integrates with the daily attire & apparel

to aid the mobility impaired.

Ideation and Conceptualization

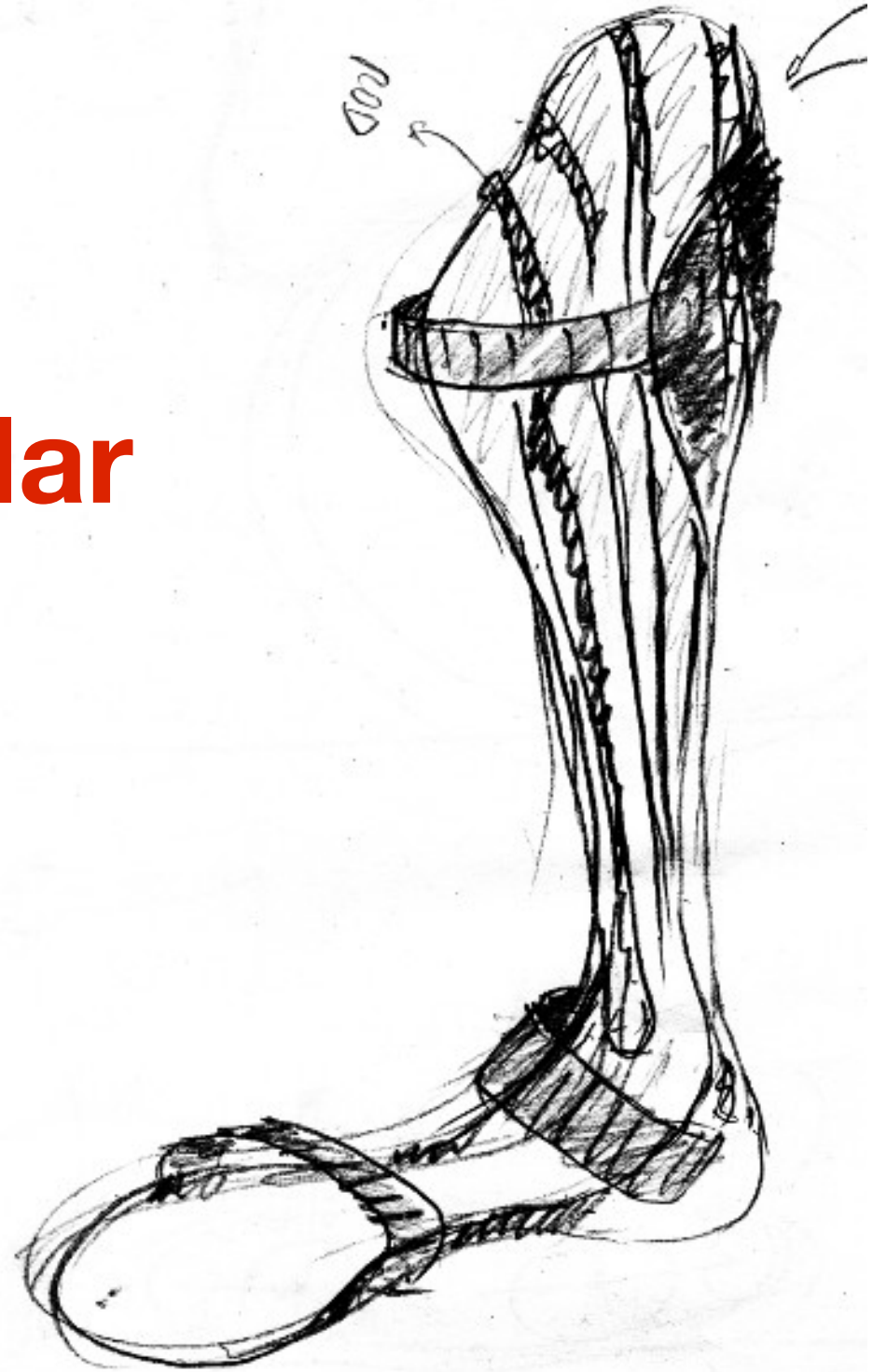
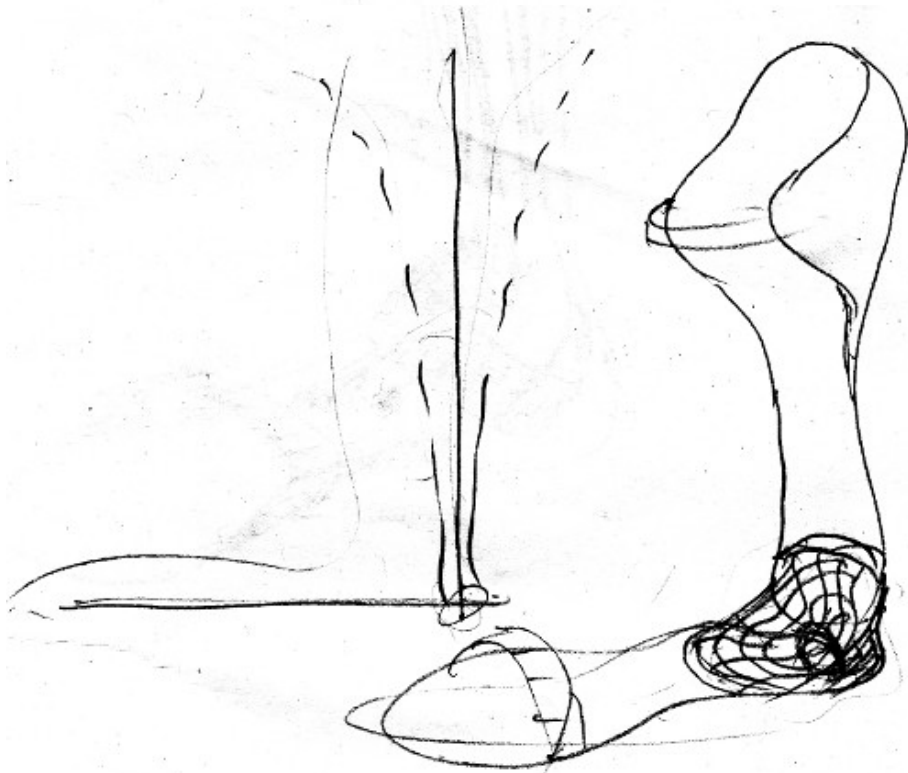


IS PROVIDE EXACT
FOOT 1EN LEG
DOWN THE
USE REFINISH

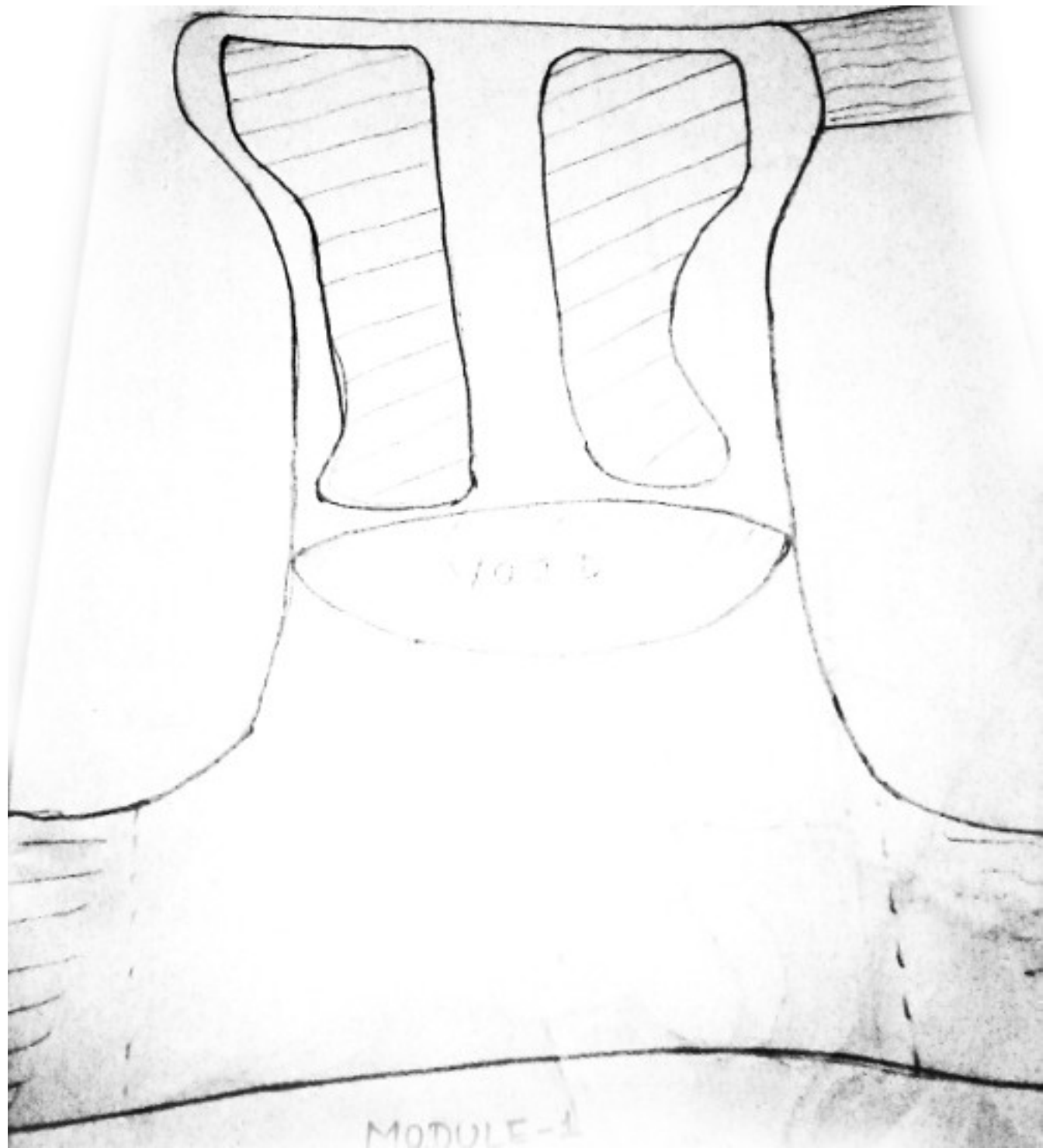




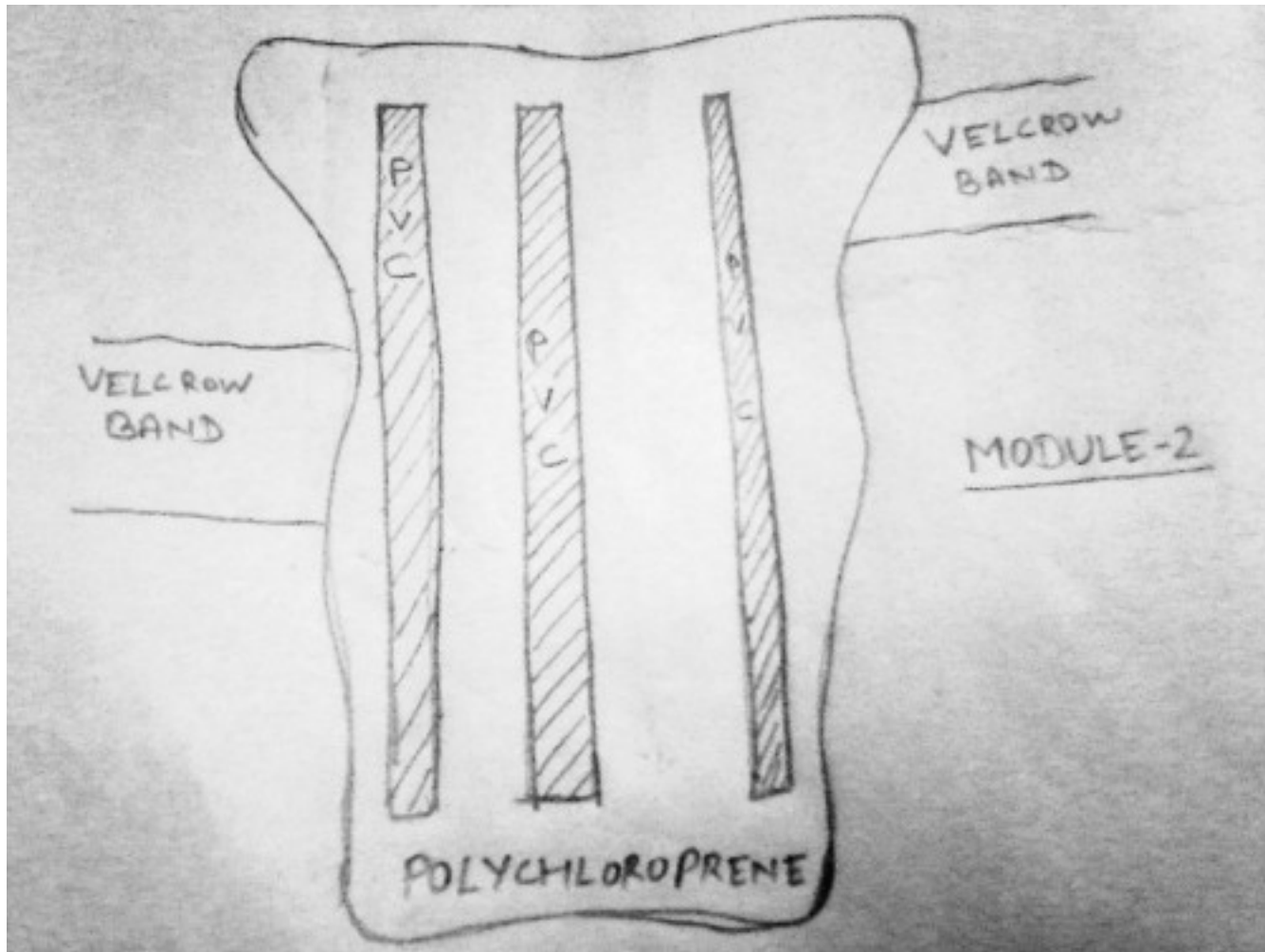
Modular





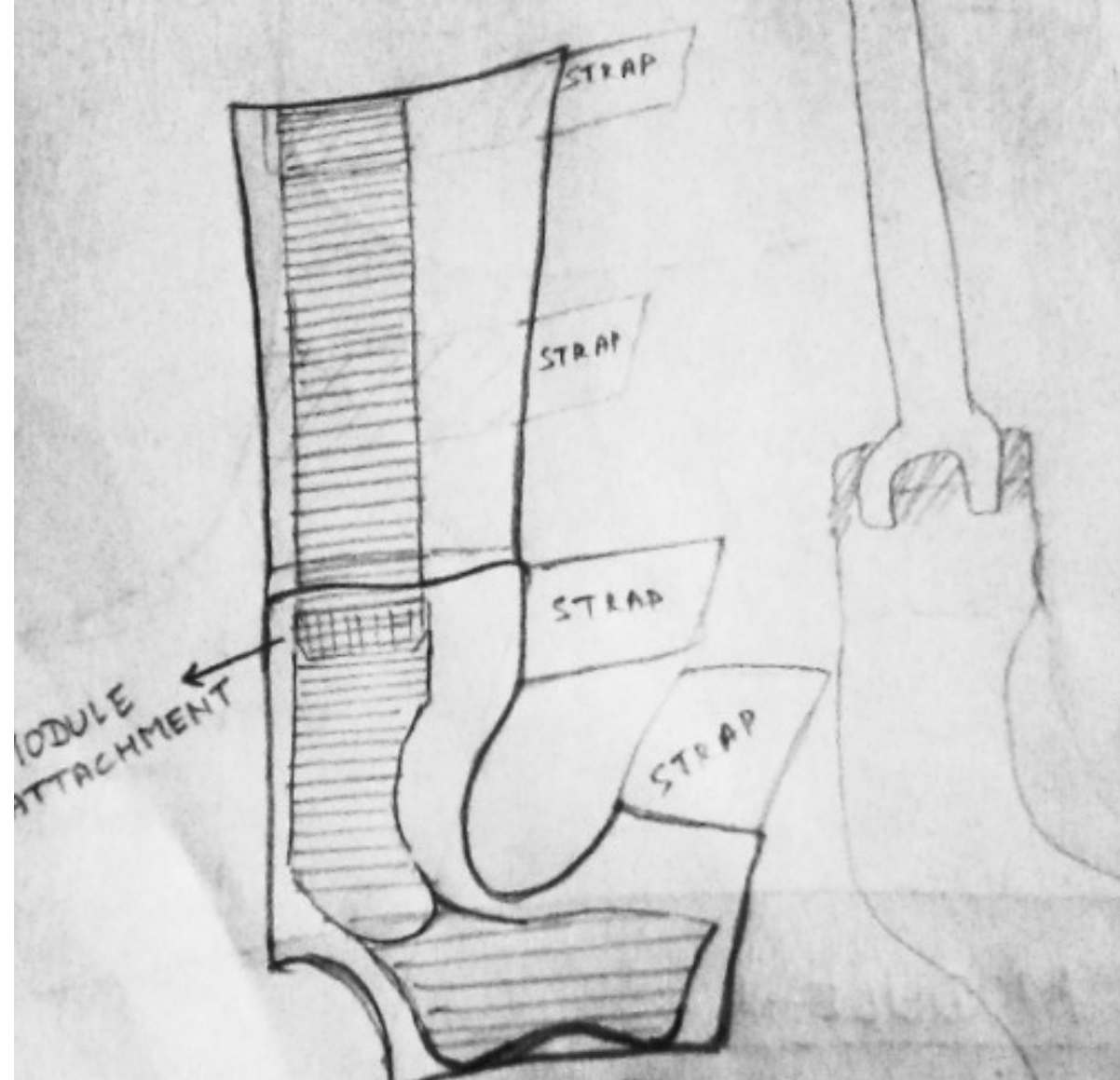


MODULE-1





MODULE-3



MODULE ①
+
MODULE ②
+
MODULE ③ (OPTIONAL)

Prototype



What next?

- Material refinement
- Cost engineering
- User testing and refinement

Thank you