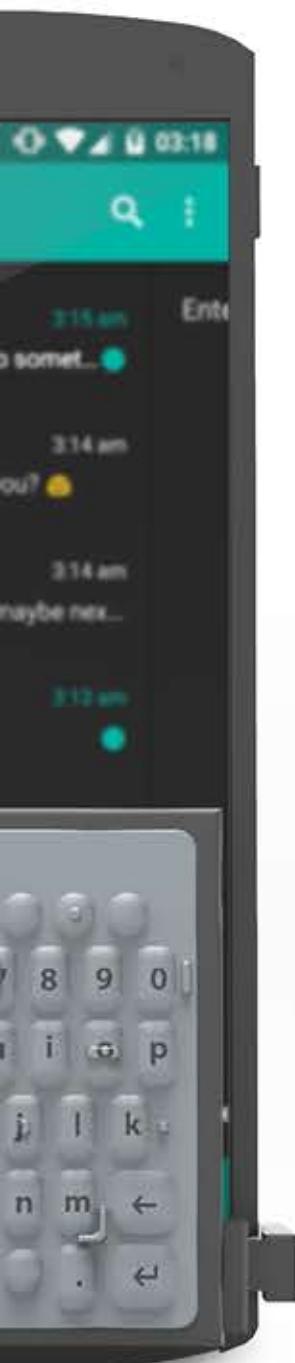


PRIYANK RANGPARIA

PORTFOLIO

1**VKEE**

Assistive device for visually impaired

**2****TCP**

Improve efficiency and ergonomics of the machine

**3****CHARGO**

A smart portable battery backup

**4****SIT**

Urban metro seating solution

**5****CRABIT**

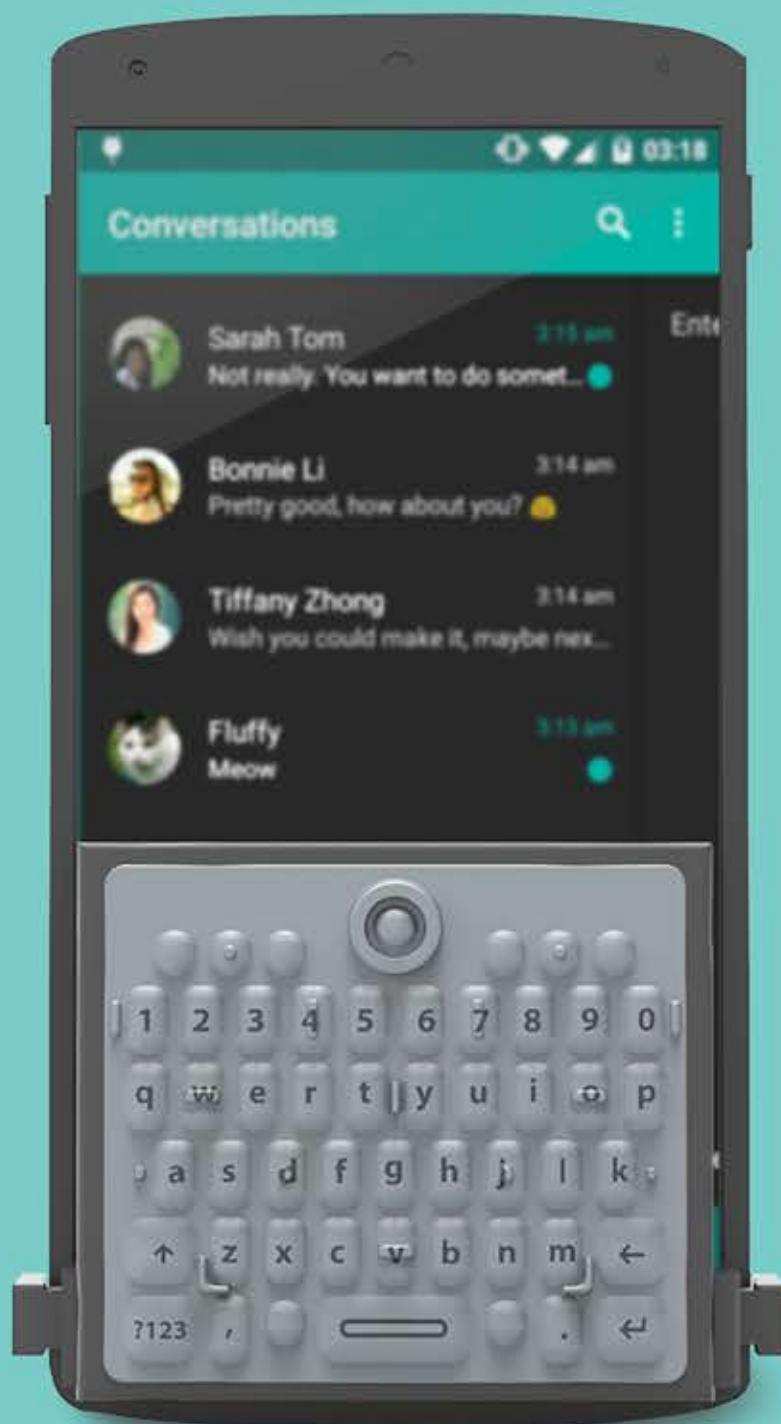
Whole crab packaging for Gadre

**6****TWISTER**

Improve efficiency and ergonomics of the machine



Assistive device for visually impaired



Introduction

This was an intensive project for a company called Eye-D in Bangalore. Eye-D works for the disabled audience of the society. This device was a breakthrough in the visually impaired sector and has also been awarded a patent.

Initial Project Brief

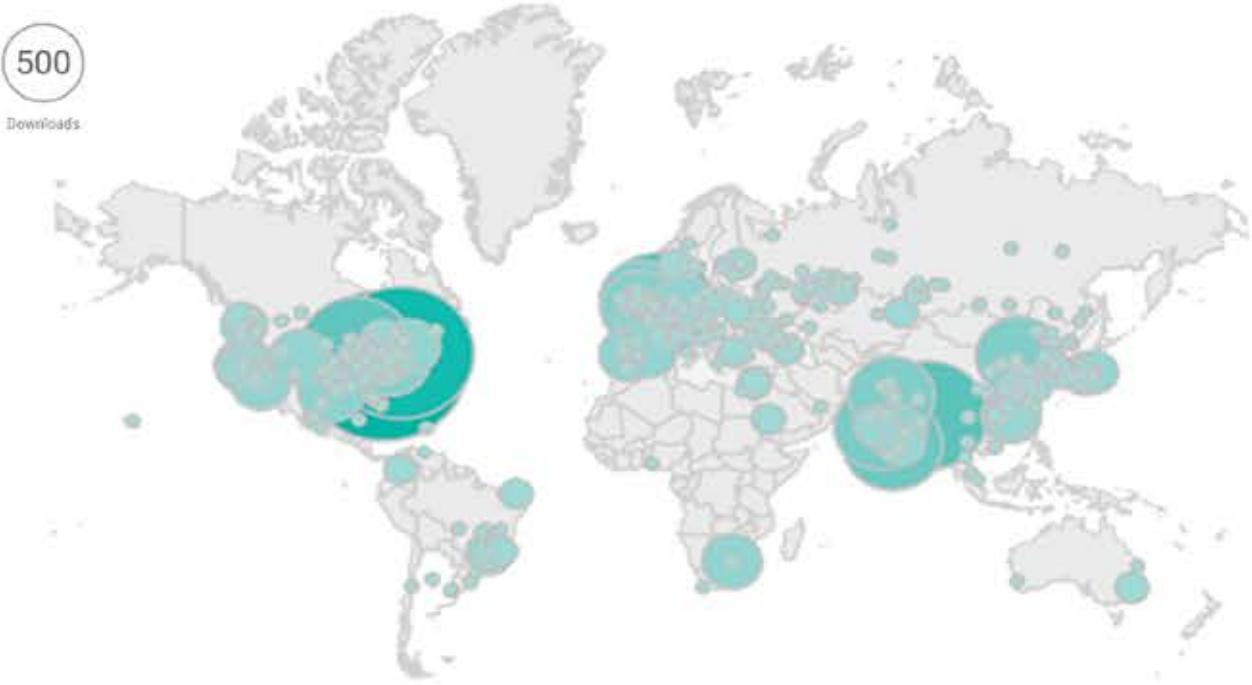
To Create a support system/device that makes the user experience of the smartphone easy for Visually impaired people and preferable it should be connected with Eye-D mobile application.

Eye-D wanted to attain innovation in the field of user experience for the visually impaired

About Eye-D application

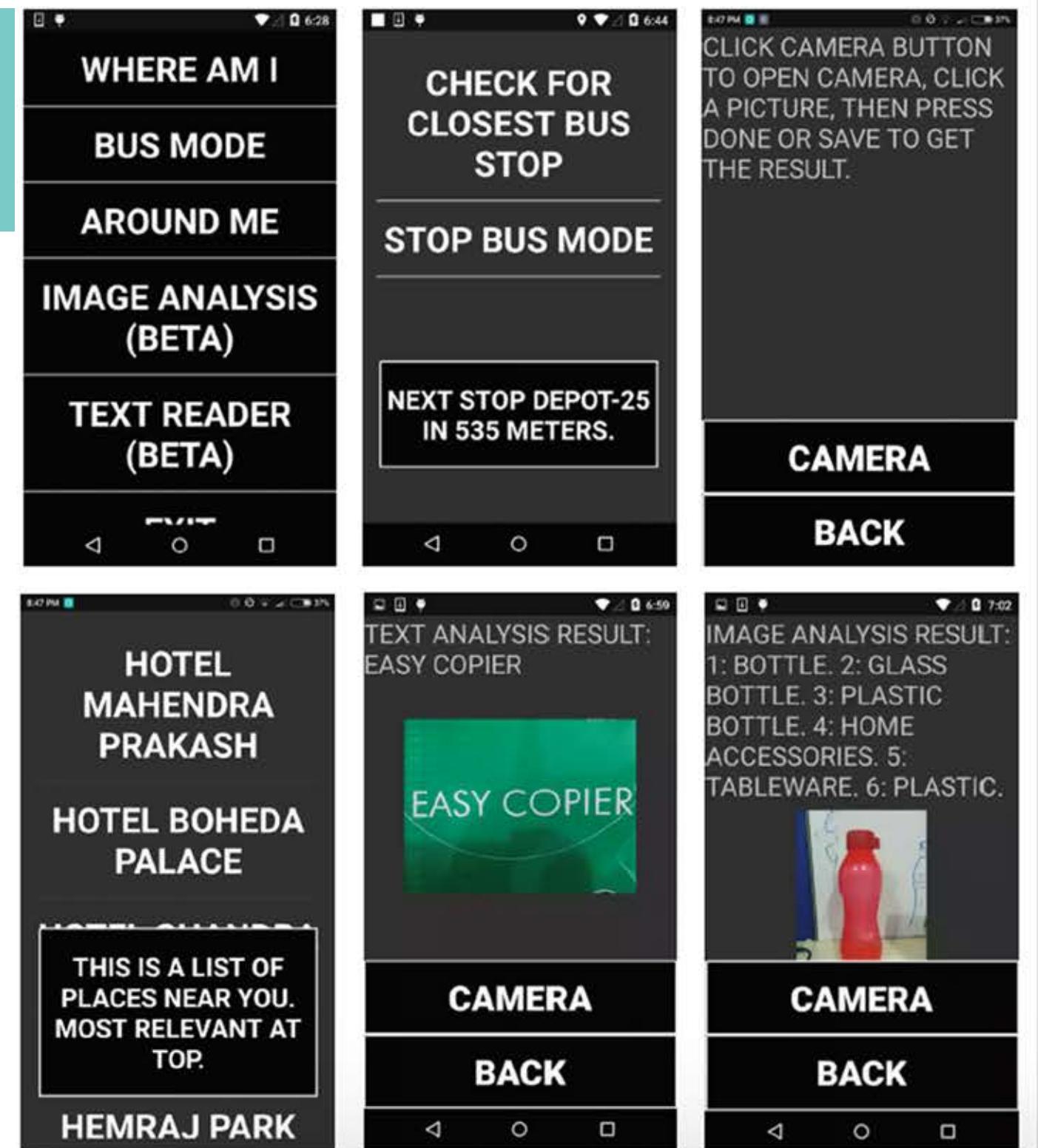
for visually impaired

Eye-D is an assistive Smartphone application for Visually impaired for outdoor navigation, it is available for free and supports android platform



500
Downloads

Screens



4.7

15 ▾

Low vision and blindness

Partial or complete loss of vision



Out in the world...

285 million people are estimated to be visually impaired worldwide:

39 million are blind and **246 million** have low vision.

80% of all visual impairment can be prevented or cured.

Approximately **90%** of visually impaired people live in developing countries.

About **65 %** of all people who are visually impaired are aged **50** and older, while this age group comprises about 20 % of the world's population.

An estimated **19 million** children below age 15 are visually impaired. Of these, **12 million** children are visually impaired due to refractive errors, a condition that could be easily diagnosed and corrected. **1.4 million** are irreversibly blind for the rest of their lives.

Types :

There are 4 levels of visual function, according to the International Classification of Diseases -10 (Update and Revision 2006):

- Normal vision
- Moderate visual impairment
- Severe visual impairment
- Blindness

Moderate visual impairment combined with severe visual impairment are grouped under the term "low vision"

WHO definition of low vision :

"A person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception, or a visual field of less than 10 degree from the point of fixation, but who uses, or is potentially able to use, vision for planning and/or execution of a task."

After long conversations with the VI's , following insights were deducted.



Mr Mahantesh Kivadasannavar | 45 yrs male | M.fill

Founder and managing trustee of
Samarthanam Trust for the Disabled
low vision since age: 6 months

Insights

1. The Blind school laid a ground and taught Mr Mahantesh how to interact with the surroundings.
2. He is eager to learn new things and very fond of technology.
3. He always had a mentor (his close friend) to teach him new devices.
4. He purchased all his phones by getting influenced with other VI's.
5. He did not like to be treated as a disabled or special person and wanted to enjoy all the benefits that a person with vision does.
6. He always preferred phones with keypad and was hesitant to buy a smartphone as it is differently operated.
7. He has a mindset that Iphone is easier to operate than android phone (this is because of influence from other VI's).



Mr Chandrashekhar K N | 36 yrs male | B.A

Project Head in Samarthanam Trust for the Disabled
low vision since birth

Insights

1. Strong goal oriented person, doesn't like to be treated as a disabled person.
2. For anything new, involving learning curve his parents helped him.
3. Prefers to do most of the things by himself and avoids dependencies.
4. Always explores new mediums developed for VI's
5. Faces a problem while typing and browsing in smartphones
6. Doesn't realise when his smartphone hangs.



Miss Harshita C | 20 yrs male | B.com

Student
low vision since birth

Insights

1. Eager to discover new things and collaborate with people to implement assistive ways for VI's
2. Doesn't want to use any 'Special equipment' for her visual impairment
3. Dependent on family and friends for every important decision
4. Not efficient in typing on a smartphone, also doesn't realise when the smartphone hangs.
5. Talkback lags while operating the smartphone due to which unnecessary operations take place.



Mr Jackie | 27 yrs male |

Student
Blind since birth

Insights

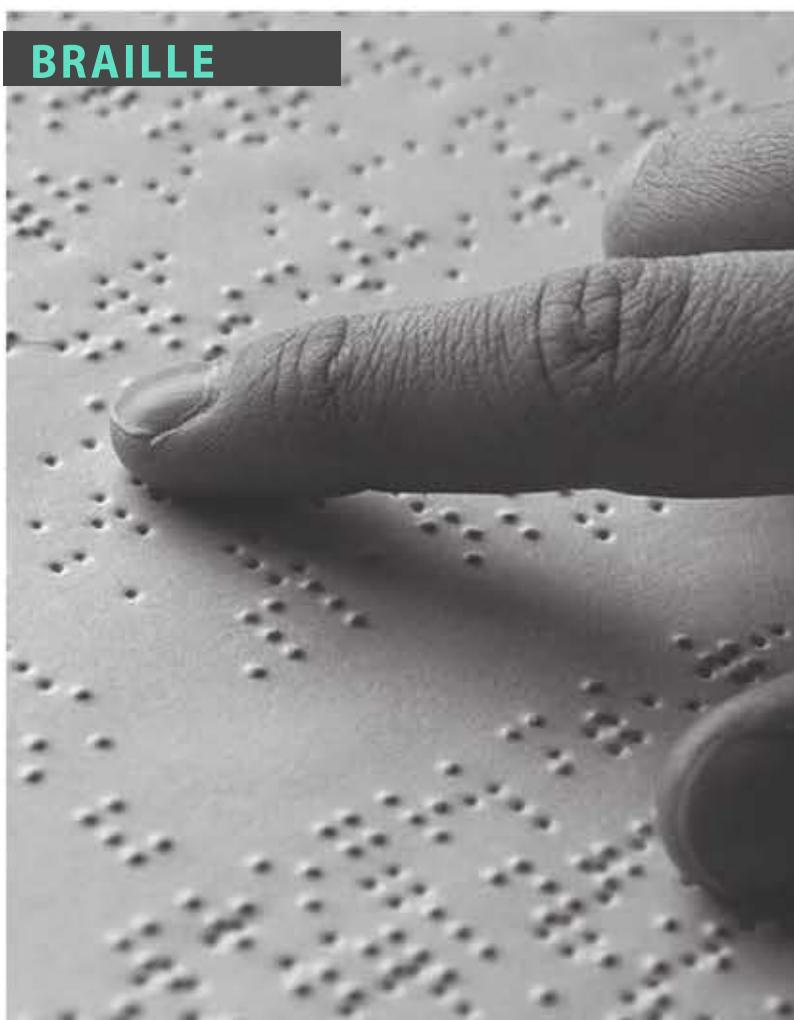
1. Dependent on others to learn new gadgets and things
2. Prefers to buy easy to learn devices
3. Uses JAWS to learn operations of a computer

Alternative techniques for VI

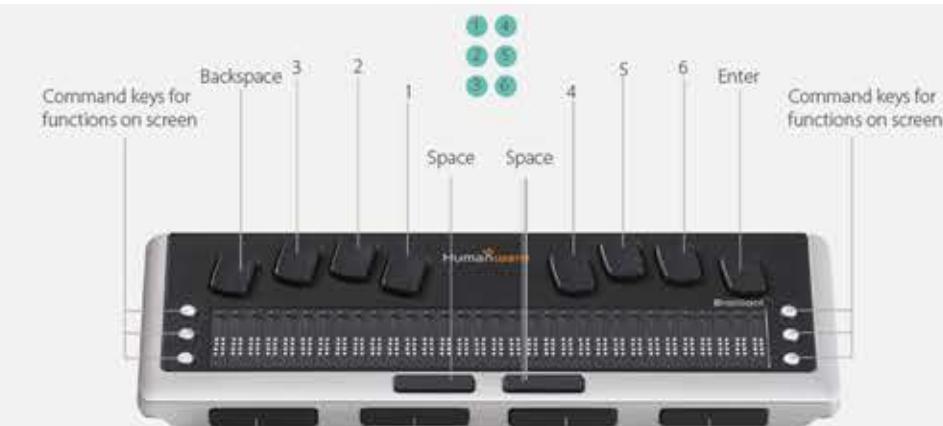
Alternative methods were studied to understand the adaptiveness and methods that VI's follow



WHITE CANE



BRAILLE



Braille Keyboard (similar to Brailler)

Measurement Range	Dimension in mm
Dot Base Diameter	1.44
Distance between two dots in the same cell	2.340
Distance between corresponding dots in adjacent cells	6.2
Dot height	0.48
Distance between corresponding dots from one cell directly below	10

How VI's read Braille :

- Point-to-point method -In this method the VI's are taught to go from one point to another in a calculated manner
 - Structured Discovery -After extensive solo practise using cane the person can go anywhere without individualised instructions
- Use both forefingers for reading
 - Read Braille with the tips of fingers, fingers should be bent slightly and wrist should be slightly elevated
 - Fingers should be slightly curved and resting lightly on reading material
 - Dots should be touched lightly and not presses hard
 - Read from Left to Right
 - Most people read with right index finger, using left index finger to read part of braille line or as a marker at left margin to help find the next line

Insights

- VI's follow 'reference oriented approach' where in they need a physical or haptic indication to detect and reach any adjoining location
- Their finger tips are very sensitive to detection of texture ,bump or irregularities on the surface.
- For VI's Physical reference is more efficient in judging , than sound reference.

Alternative techniques for VI

Alternative methods were studied to understand the adaptiveness and methods that VI's follow

Indian Currency Identification pattern (provided by Government)

"These embossed graphics fade away within a few weeks after the note is in the market"

No embossing and smaller length indicates Rs. 5 note



No embossing and greater length indicates Rs. 10 note



is embossed on Rs 20 note



is embossed on Rs 50 note



is embossed on Rs 100 note



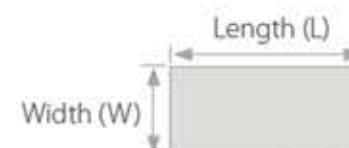
is embossed on Rs 500 note



is embossed on a Rs 1000 note



Alternative technique used by the VI's in judging the notes



Same Width but increasing length



Length same but width different

Accessibility option in devices

The collage shows the following components:

- Windows Control Panel:** Displays settings for Start Magnifier, Start Narrator, and Set up High Contrast.
- Mac OS X Accessibility pane:** Shows options for using the computer without a display, cursor size, and increase contrast.
- iOS Accessibility screen:** Shows various accessibility features like Larger Text, Bold Text, and Button Shapes.
- Android Accessibility screen:** Shows the 'Talkback' feature with a hand holding a phone and a callout bubble indicating a gesture.
- Android Accessibility screen:** Shows the 'Ease of access' settings on an Android device.
- Android Accessibility screen:** Shows the 'Key Combo for NEXT' configuration.
- Android Accessibility screen:** Shows the 'Global Context Menu' and 'Local Context Menu' options.
- Android Accessibility screen:** Shows a list of items with 'List item 1' through 'List item 7' and a 'NEXT >' button.

The client wanted to target the android platform of users, so Talk back was further explored as it is the primary assistive software currently for android.



Settings available in Talkback :

1. Adjust speech volume
2. Use pitch changes (Change the voice pitch for keyboard feedback.)
3. Keyboard echo (Hear typed keys.)
4. Use proximity sensor (Proximity sensor silences speech; Proximity sensor does not control speech)
5. Shake to start continuous reading (Speak phonetic letters)
6. Speak phonetic letters (Hear phonetic letters (such as "F, foxtrot" or "S, sierra")
7. Vibration feedback (Get vibration feedback for your actions, such as when you select an object or navigate on your device.)
8. Focus speech audio (Make other audio volume decrease when TalkBack is speaking.)
9. Single-tap selection (Touch currently focused item only once to select, instead of double-tapping.)
10. Manage gestures
11. TalkBack suspend and resume shortcut

Talkback gestures

Action	Gestures
Move to next item on screen	Swipe right
Move to previous item on screen	Swipe left
Cycle through navigation settings	Swipe up or down
Select focused item	Double-tap
Move to first item on screen	Up then down
Move to last item on screen	Down then up
Scroll forward	Right then left
Scroll back	Left then right
Move slider up	Right then left
Move slider down	Left then right
Home button	Up then left
Back button	Down then left
Recent apps	Left then up
Notifications	Right then down

Text Editing with Talkback

When Talkback is On, Text selection is a time consuming task as shown in the below steps : Selecting text is a 8 step process as exemplified below.

1. Invoke Local Context Menu.
2. Select Cursor Control Menu.
3. Select Start Selection Mode.
4. Change Navigation Setting to words.
5. Navigate to next item.
6. Invoke Local Context Menu.
7. Select Cursor Control Menu.
8. Select End Selection Mode.

Insights from user research

Usability Insights

1. They are always dependent on sighted people to learn anything new at the beginning (they do not hesitate to ask for help)
2. They need a reference/ guidance for knowing the things around.
3. They prefer senses feel or smell much more than sound because of environment sound disturbances.
4. They do not realise when the phone software hangs
5. Different smartphone apps demand a separate learning curve to be adapted which is difficult for the visually impaired
6. People with keypad phones hesitate to switch to smartphones because the tactile references are lost which demands a difficult learning curve.

Behavioural Insights

1. Visually impaired people do not accept drastic (difficult) changes in their life style involving high learning curve.
2. They (basic users) adopt new products or ways by being influenced from other VI's (Power users)
3. They do not like to appear or to be treated as disabled people
4. They prefer to know in what surrounding they are and things around them at all times
5. They want something with which they can connect emotionally and trust on.
6. VI's resist to accept assistive wearables (because it will make them look different from people with vision)

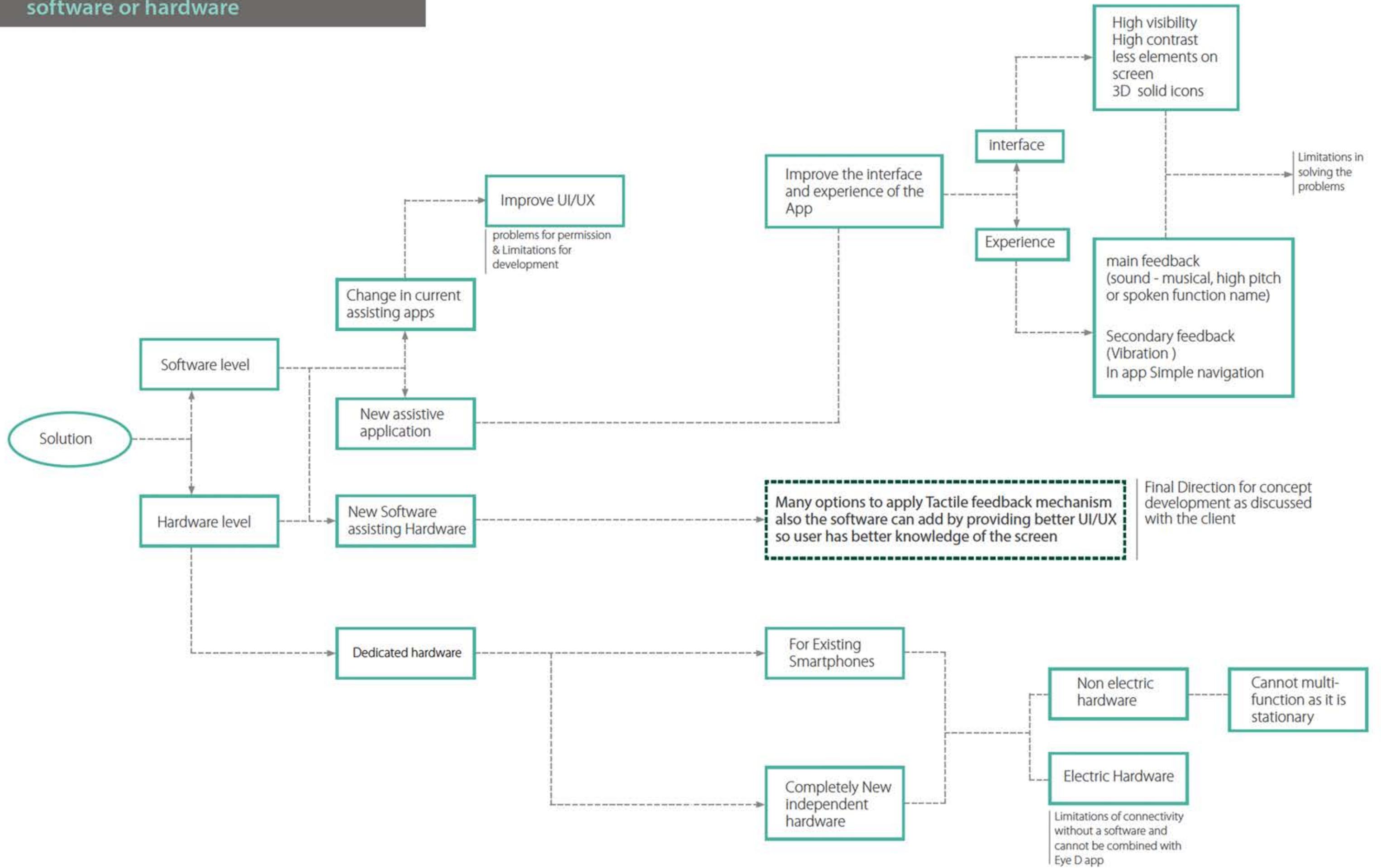
Problem Identification

1. When the phone is taken out from the pocket, it is difficult to know the orientation i.e power button
1. Main feedback system works on sound which is slow for the action and reaction mechanism
2. Typing is the most time consuming and difficult task when sound is the main feedback system
3. In smartphones the sound feedback system is inefficient as its format is inappropriate at times. eg for reading a phone number it starts with 9 million 8 lacs...
4. Navigating through the elements of the phone is difficult as well as time consuming
5. Call answer/reject is an difficult action due to talkback cursor faults
6. Unlocking the phone is difficult.
7. The user has to browse through various element on screen to know a particular element on screen

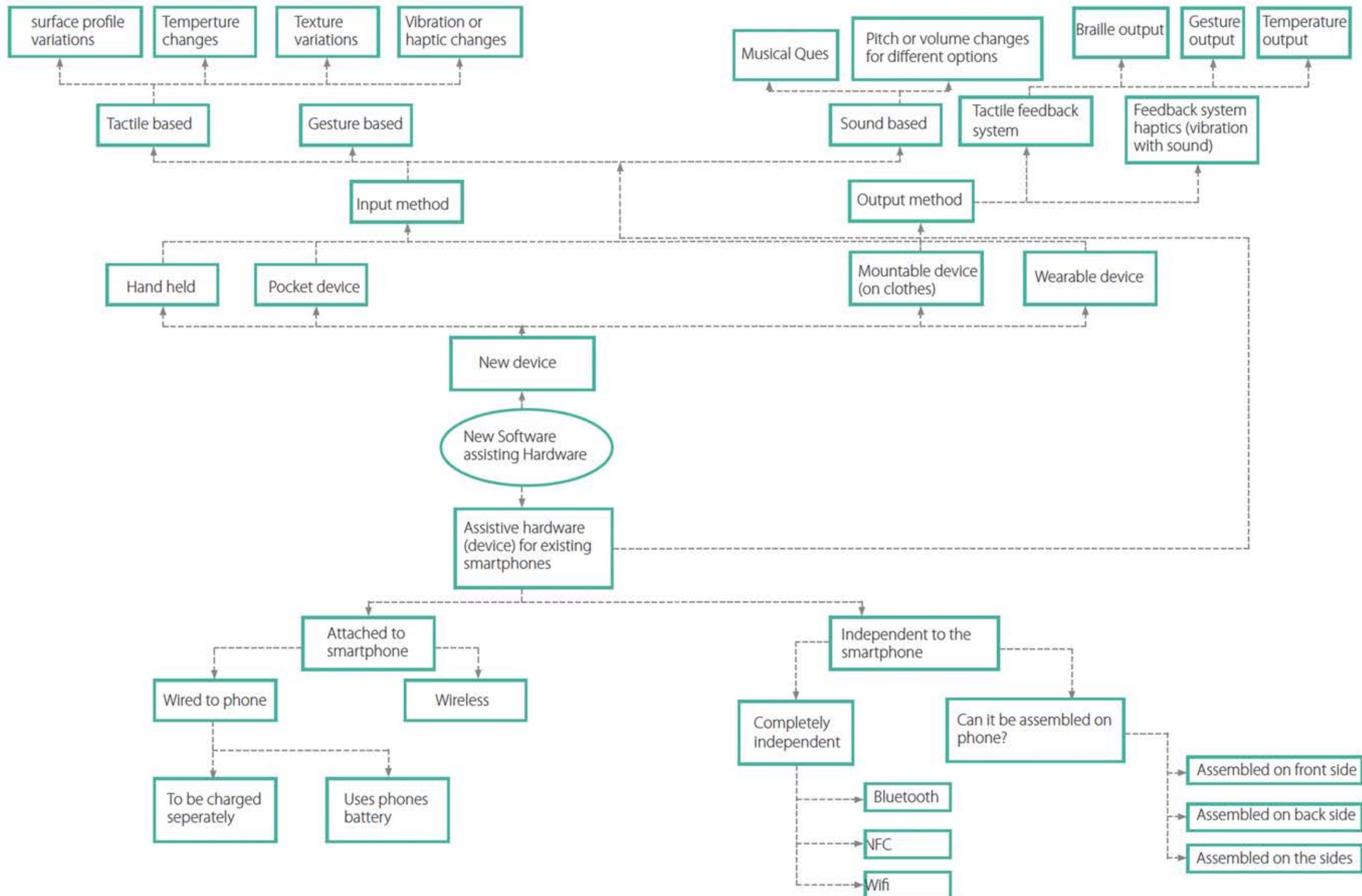
Design Parameters

1. Solution should be basic and simple
2. Should have minimal learning curve
3. Should have a quick feedback system
4. Should involve minimum set up (installation) time for the solution.
5. Should not look as a product for special needs.
6. Should not be costly (For marketing purpose)
7. Should have an emotional connect to the user
8. Should give the surety of the output with a particular input
9. Should be robust and not have any glitch in functioning
10. Should not have any dependencies (charging, updating, etc)

Decide solution required at what level software or hardware

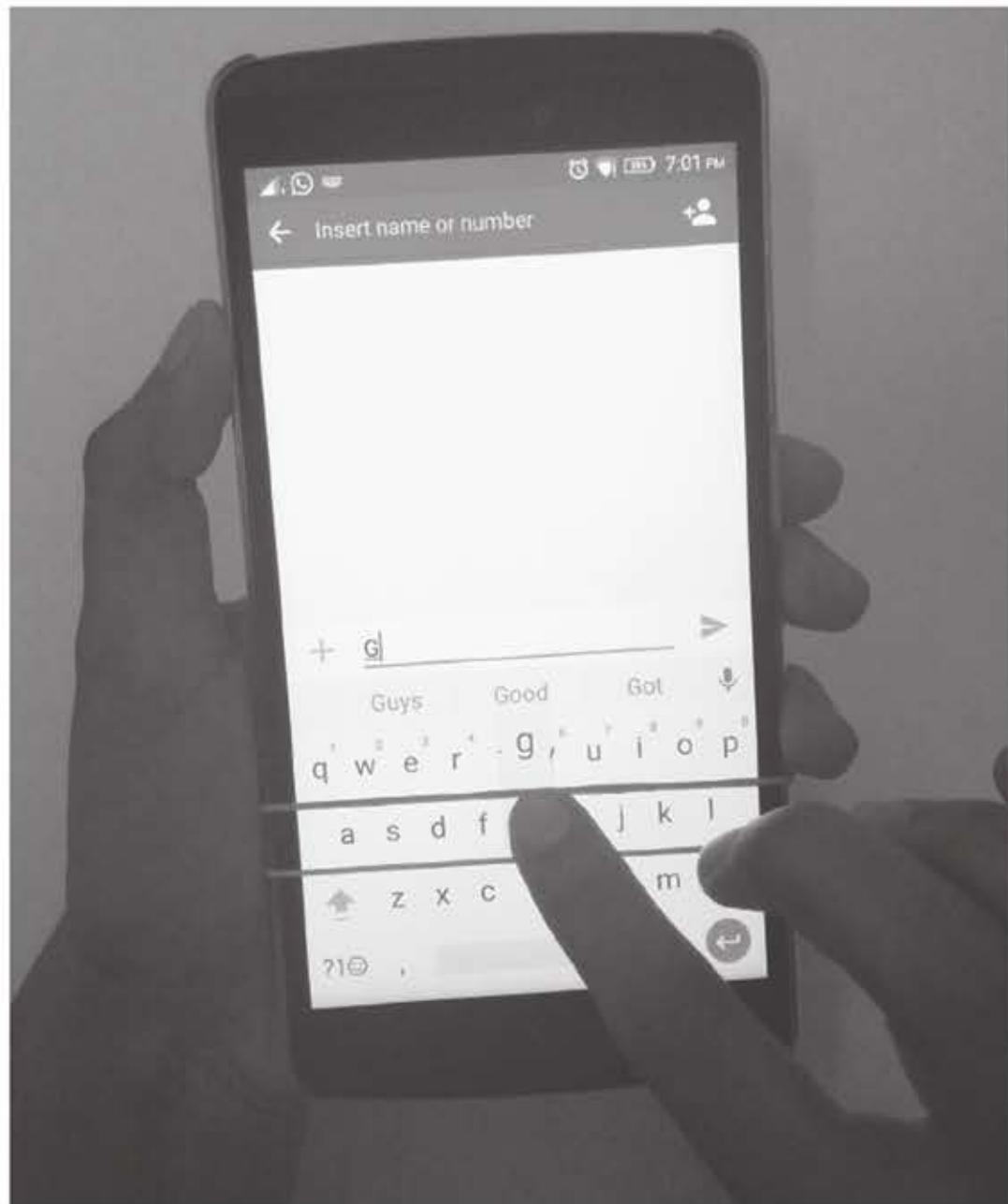


Possible directions for solution



Concept development:

EXPERIMENT



Aim :

To see if 2 physical guides i.e 2 rubber bands are enough for the VI's to know the layout of onscreen keyboard for typing in smartphones

Procedure :

Two rubber bands (which act as physical references) are put onto the phone and have been aligned in between the rows as shown in above figure

Case 1. VI's were asked to type on the above phone configuration with **Talkback in off state**

Case 2. VI's were asked to type with **Talkback switched on.**

Insights :

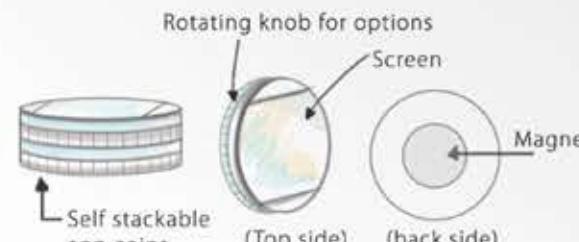
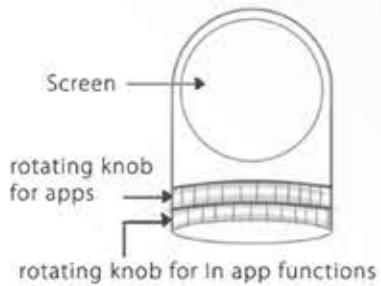
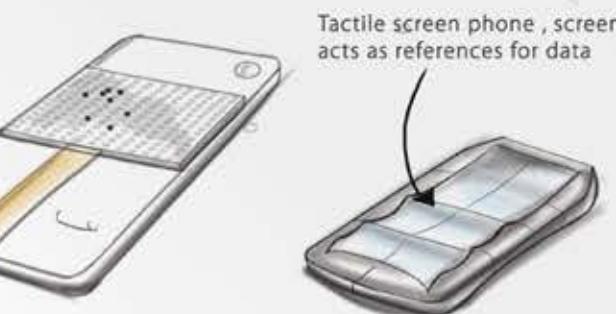
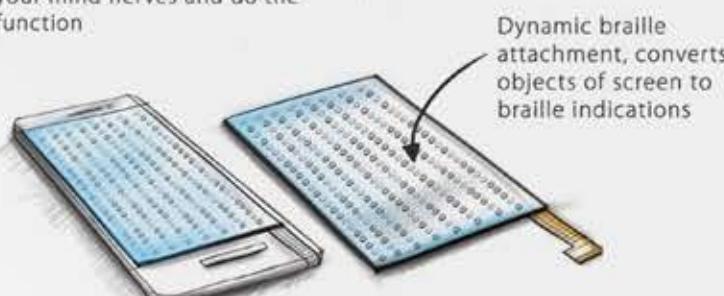
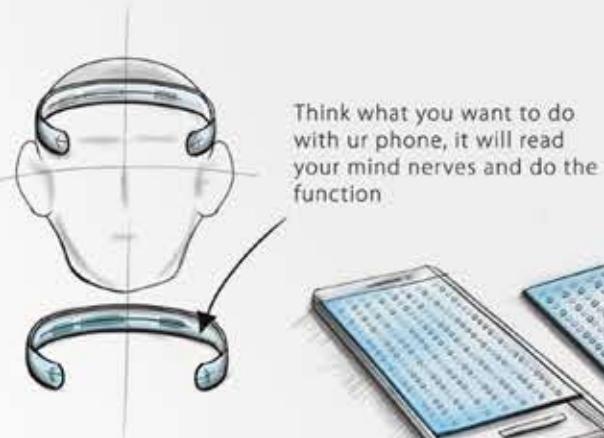
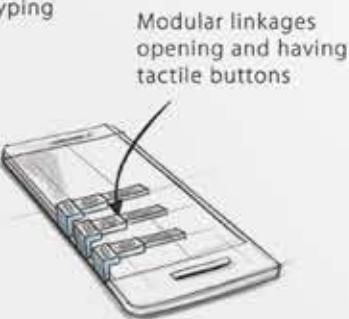
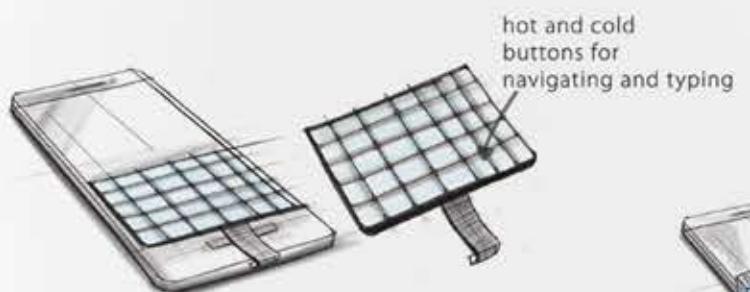
1. With Talkback Off :

- a. The VI's were able to distinguish between the rows perfectly, but they were not able to distinguish between the two alphabets in the same row.
- b. The VI's were triggering the alphabet that they wanted to type, but they weren't sure about it.
- c. The VI's found it difficult to operate smartphone of other sizes than the size of their own phone.

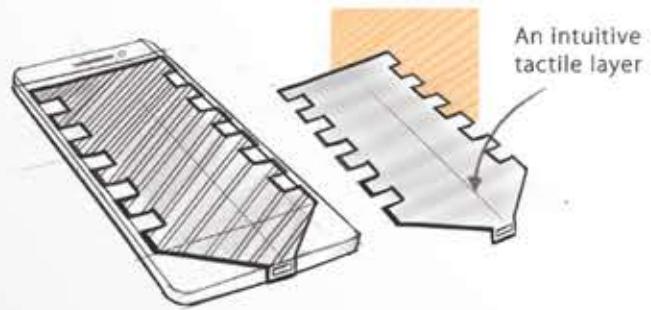
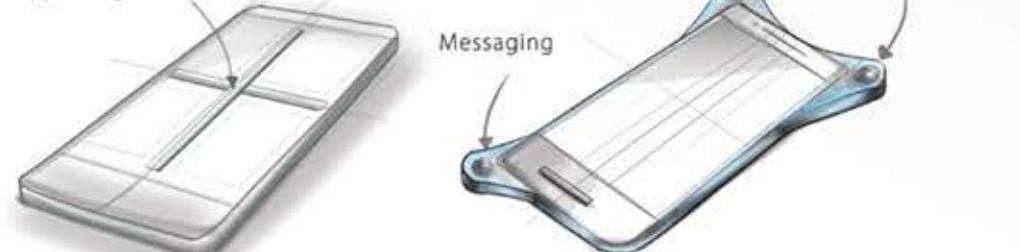
2. With Talkback On :

- a. The VI's were confident to move about the existing QWERTY layout of the phone for typing
- b. They were able to distinguish between the two alphabets of the same row with the help of sound feedback, which made the sound feedback as the primary feedback for them and the physical guide as the secondary feedback.

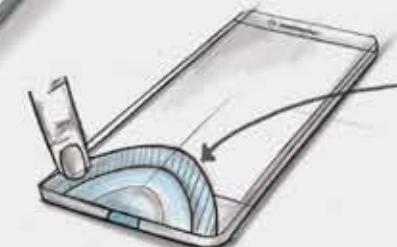
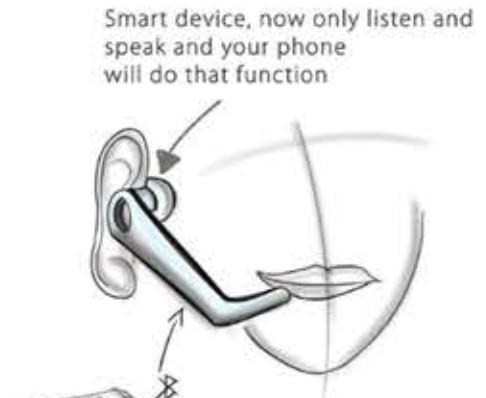
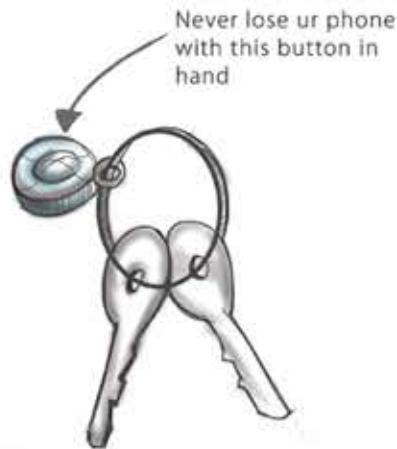
Ideations



Tactile screen that divides the main screen in 4 small screens with supporting software



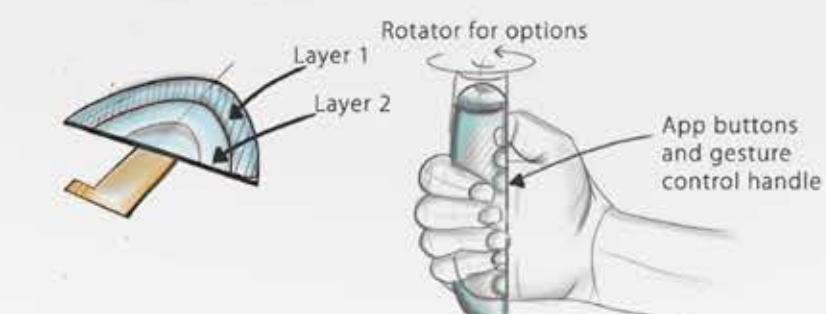
A physical keypad which can connect to any smartphone



Direction 1

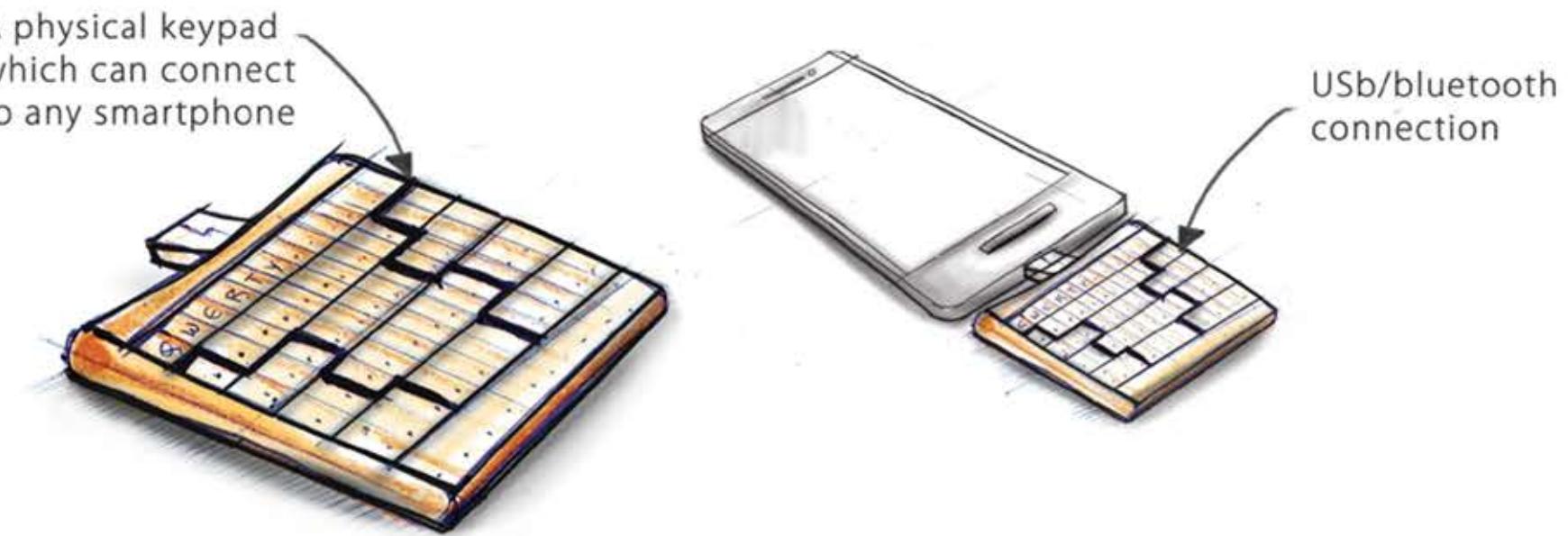


Direction 3



*In the ideations minimalist approach for wearables was followed so that VI's accept the solution

An assistive keypad which can be attached to any smartphone and can provide a tactile reference for all the functions.



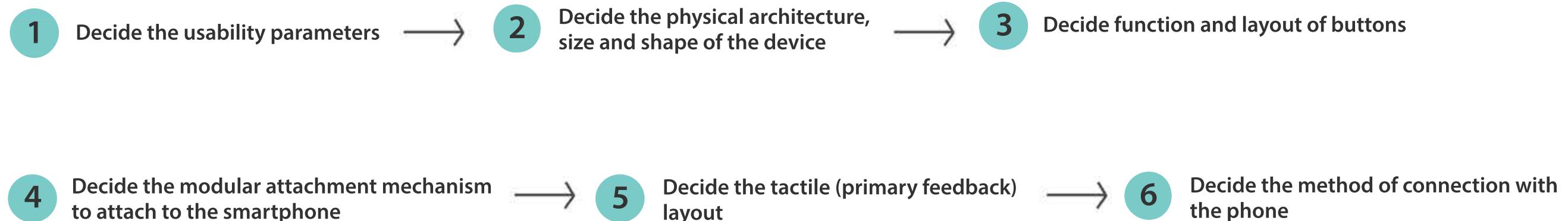
*Direction 2 was selected based on its advantage of being simple and easily acceptable by the Visully impaired people and also on thea feasibility of its development and marketing strategies

Primary level Functions of the device

Since day by day many third party applications having different interfaces are being introduced in the google app store, so the aim of this device is:

1. To make the basic navigation through the phone easier.
2. To make the typing process easier
3. Introduce shortcuts

Concept development process

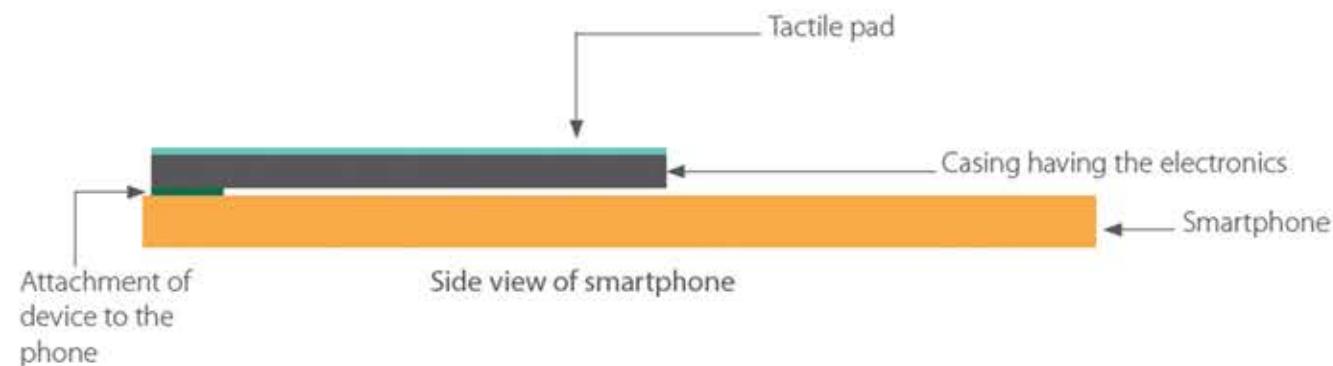


Usability Parameters

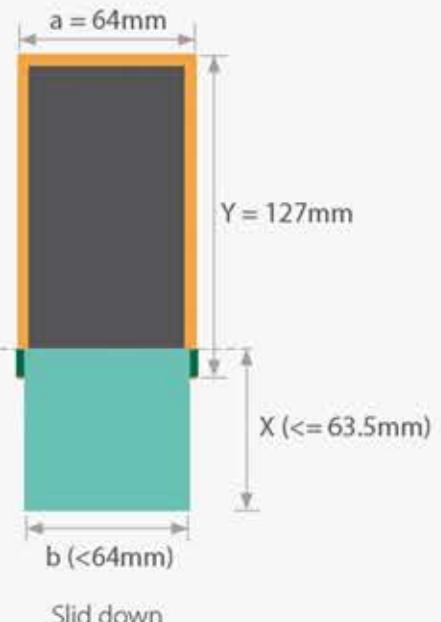
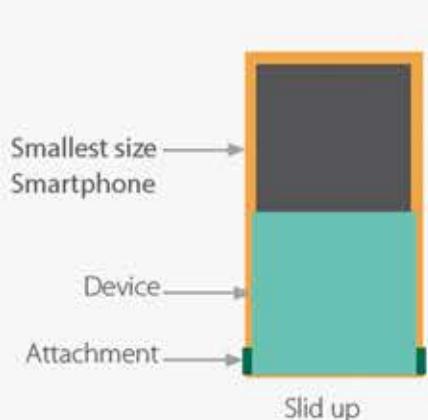
The device (attachment) should be such that :

1. It can be attached on the phone ,not blocking the screen of the smartphone (So that at all time VI's can operate the touch screen)
2. The device **can be operated only when on the phone** and not when off the phone
3. If possible, then the device must be powered by smartphone's battery else it can have its own battery that lasts for a long time (compromise between battery life and battery dimensions for least overall thickness of the product)
4. All the smartphone buttons should be accessible while the device is on the smartphone.
5. The device should be such that it can be handled while travelling, walking

Physical architecture (layers) of the device



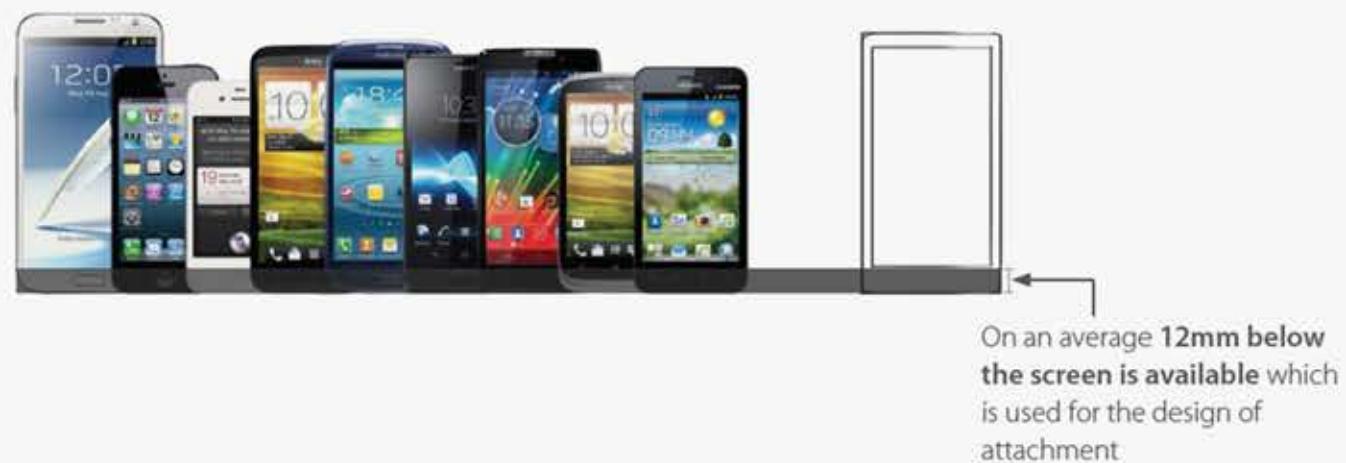
② Handling of the device (usability)



* dimensions decided w.r.t 4 inches screen smartphones available in the market

Dimensional boundaries :

① Area available for the design of attachment.

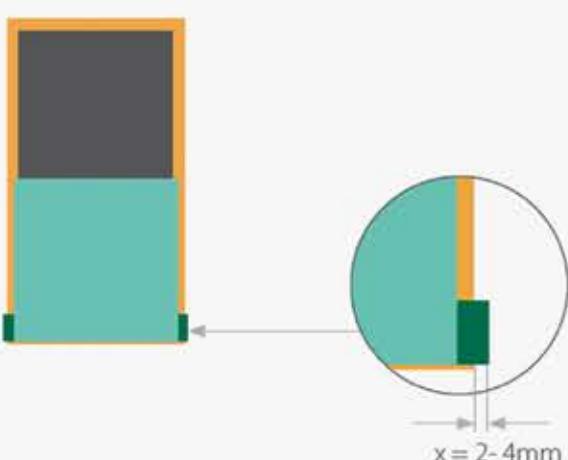


③ Thickness of the device



Thickness max - $x=y$

④ Thickness of the attachment

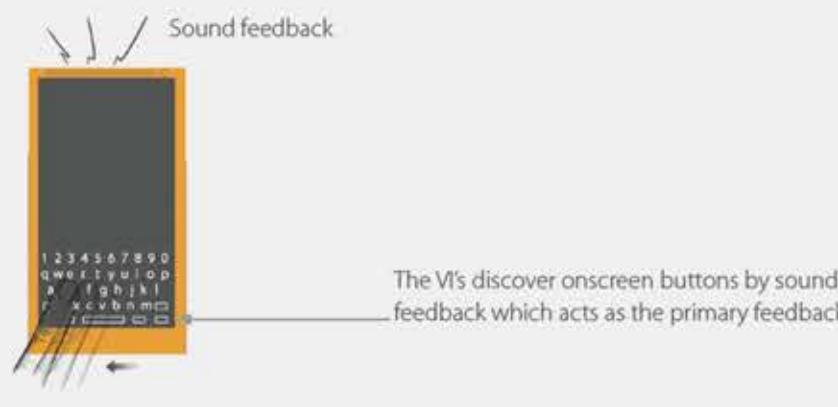


Physical buttons, their function and layout

Physical buttons of 3 types to be incorporated :

1. Introduce the required generic shortcuts
2. To make typing (input) method easier
3. To make the navigation throughout the phone easier.

Current input process : Talkback leads to selection



New input process to be tested : Tactile feedback leads to orientation with talkback and selection



Shortcuts :

Talkback has many inbuilt shortcuts as discussed in research, but there are some basic functions which are difficult to trigger by gestures and have frequent usage.

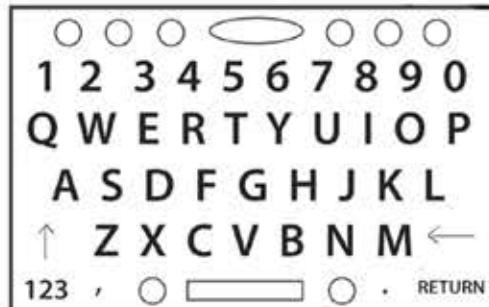
Our team had to shortlist 8 shortcuts from the below options, the **bold marked shortcuts** are the selected :

List of shortcuts

Function	
1. Home button	Triggers the home screen when selected
2. Back button	Triggers the previous screen when in in-app functions
3. Recents	Shows recent apps
4. Call answer	Answers calls
5. Call reject	Rejects calls
6. first element on screen	Takes the cursor to the first element on the screen
7. Enter button	Selects a particular function when the cursor is on it
8. Inscript language button	Toggle between different languages as many VI's use inscript languages to type
9. Alt button	Required in many keystrokes eg. Alt + Shift + 'n' = navigation bar
10. Shift button	Required in many keystrokes
11. control/command button	Requires in many keystrokes and used for text editing eg. Control + 'c' = copy
12. Talkback setting button	Triggers Talkback setting screen
13. Where Am I (current location) button	Shows ur current location
14. Navigation mode/granularity	Toggles between Navigation control mode and navigation text mode
15. Context Menu	Triggers more options depending on the screen
16. Selection mode	Triggers the selection mode

To make Typing easier

The layout of alphanumeric keys are same as in the current smartphones, as shown below :

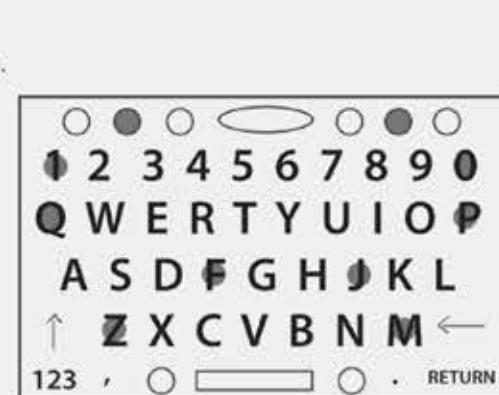


Shortcuts button
Joystick area

Design parameters to decide the tactile layout :

1. Every row and element should be easily distinguishable
2. Should be easily manufacturable.
3. There should be least number of Ques to avoid confusion

Various tactile layouts were tested as shown below to get the ideal layout

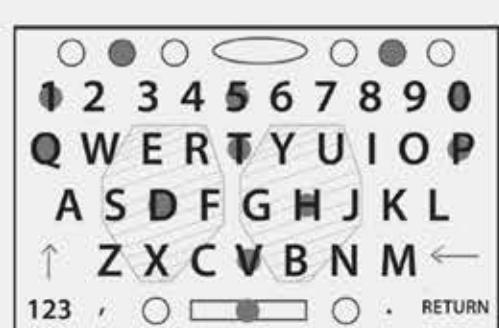


Tactile Ques :
Can be bumps, notches, rough or smooth surface, texture

Rows differentiation can be done only at the start of the rows
Difficult to judge elements while navigating from the 1st to the second row.
Difficult to judge elements in a particular row



Easy row detection
Difficult to judge elements in the first row when coming from the second row
Difficult to detect elements in the last row



It had been assumed that, tactile feedback at one button can judge the rest of adjacent buttons.
But it does not cover the far of elements so the layout is nt efficient.



3D printed prototype of an intermediate layout

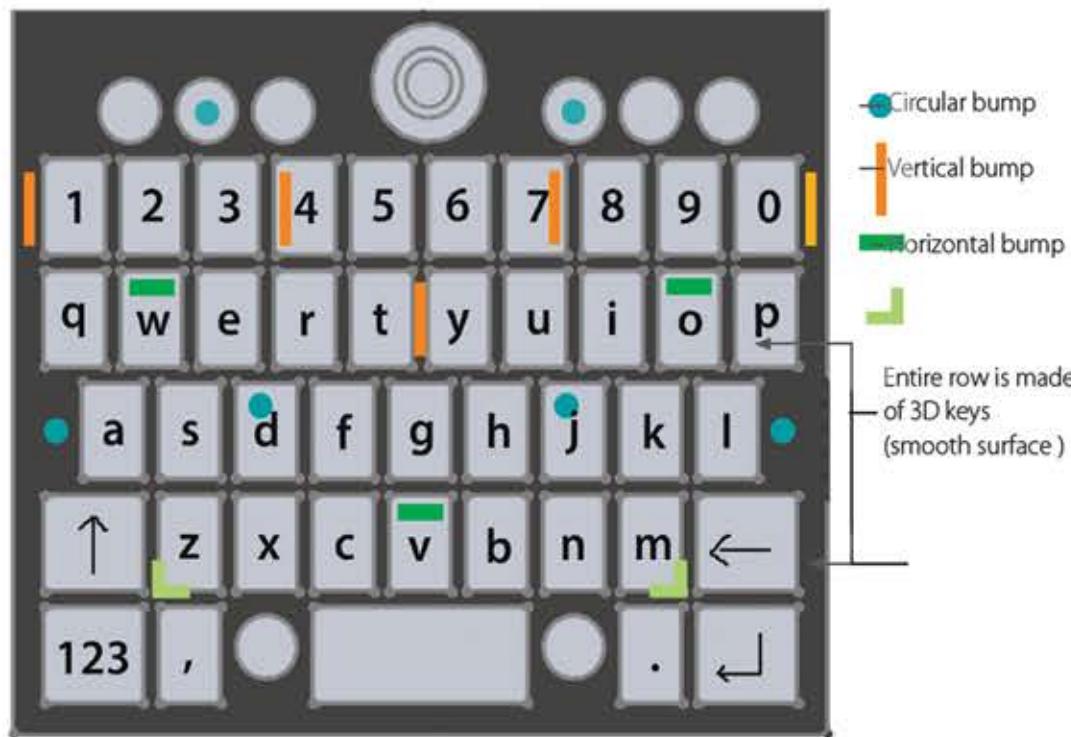
Selecting type of tactile reference to be used :

VI's have very good touch/feel sense and to avoid confusion it was decided to use max 2 types of tactile references from the below options :

1. Bumps
2. Knotches
3. Texture
4. Rough surface
5. Smooth surface
6. Material property change

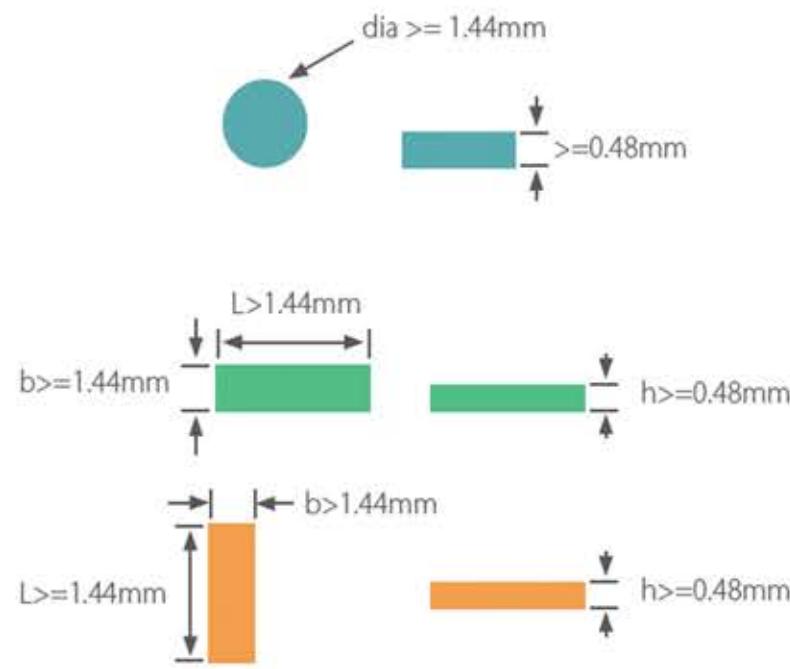
Selected type of tactile reference to be used is : Bumps and smooth surface. This was decided based on the reference keypad samples provided by keetronics as shown in the above image.

Final Tactile layout

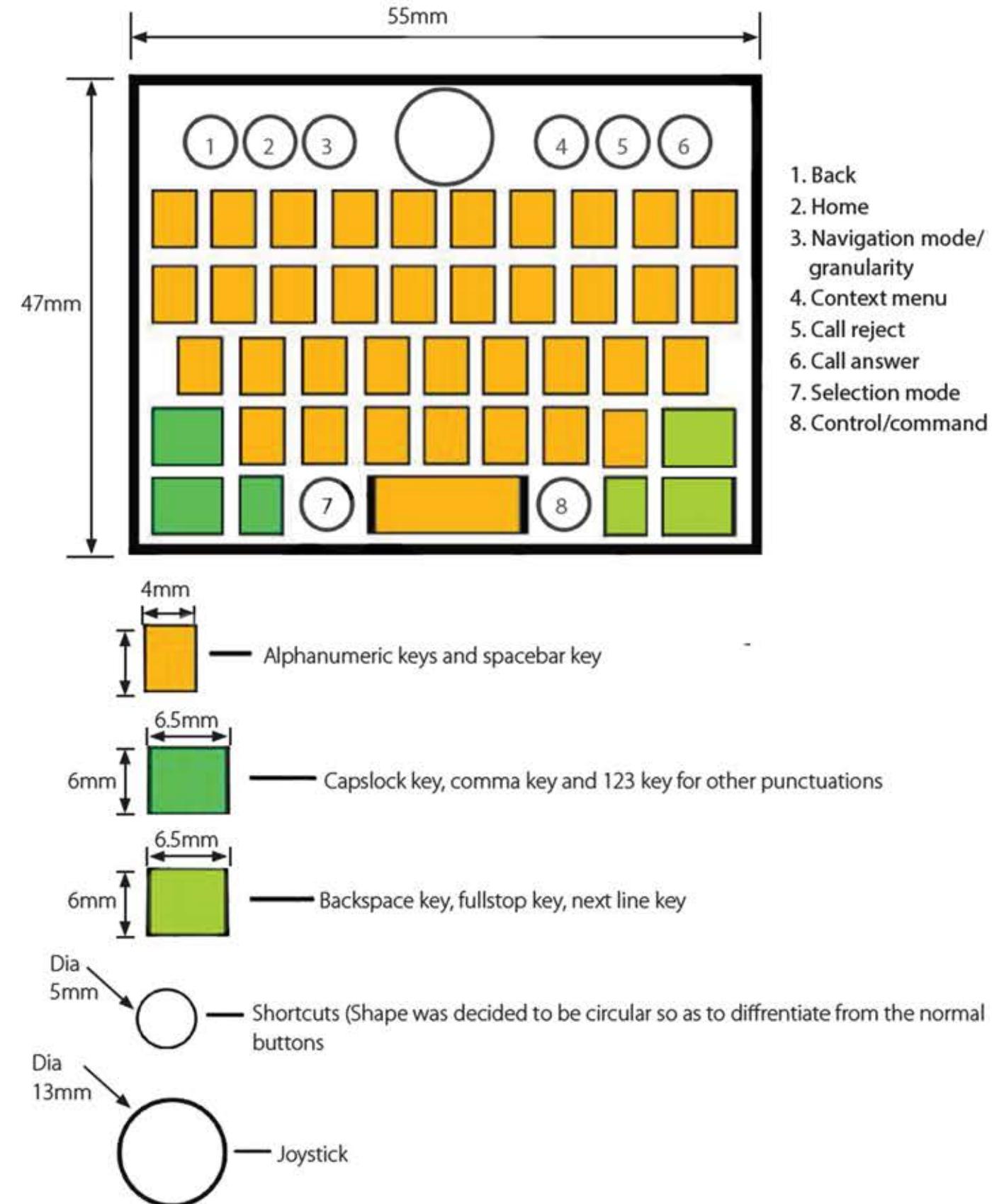


This layout was tested with the visually impaired people and all the elements could be easily detected by them.

Dimension of tactile Ques : (based on braille concept)



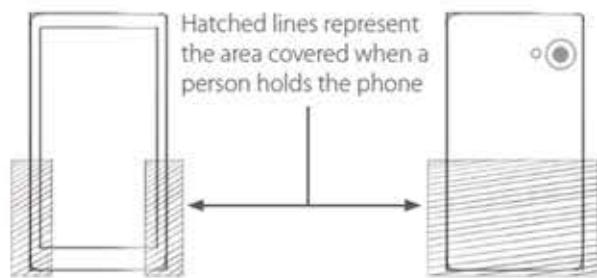
Dimension and shortcuts details of the pad



*Note : The dimensions of keys are decided on the basis of size of onscreen keys for a 4 inch smartphone, also the size of the joystick was decided on the basis of a small Mp3 player (refer images next page)

Architecture

(way of attachment with the phone- ideations)



Ideations : (Only for the way of attachment not for the mechanism of attachment)

Direction 1



Direction 2

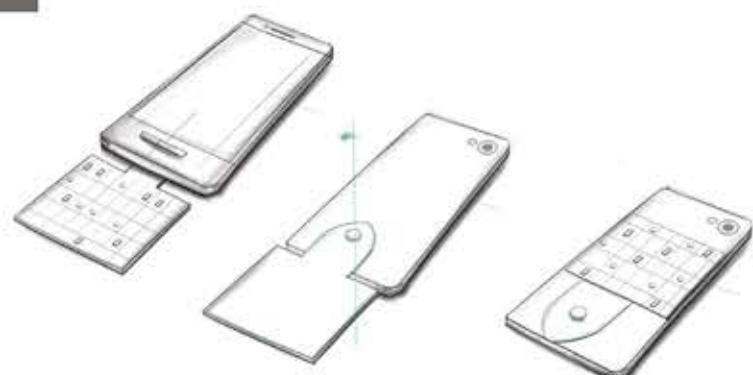


Direction 3



FINAL

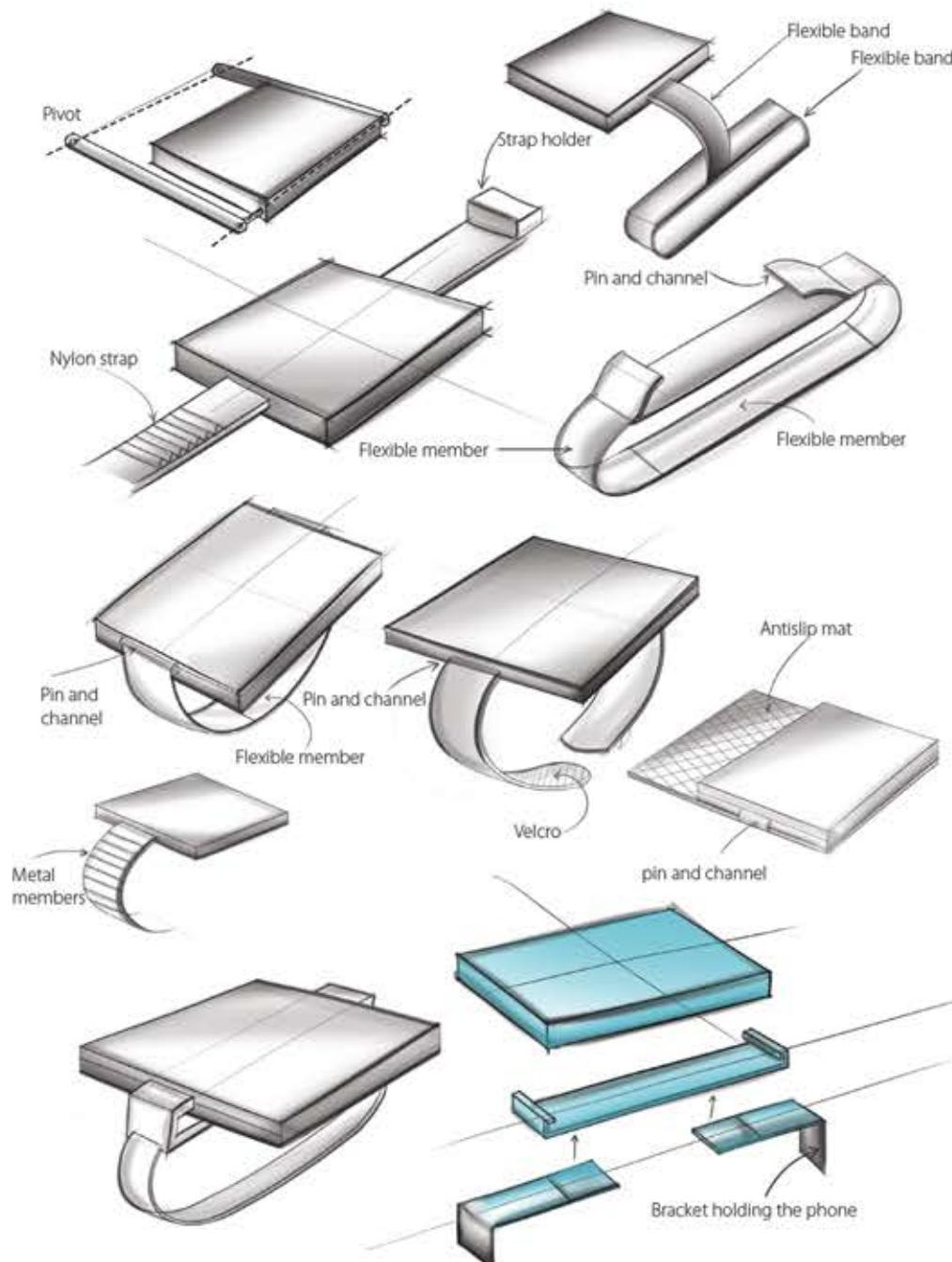
Direction 4



Mockup of final attachment tried to understand usability and ergonomics



Ideations : (For mechanism of attachment)

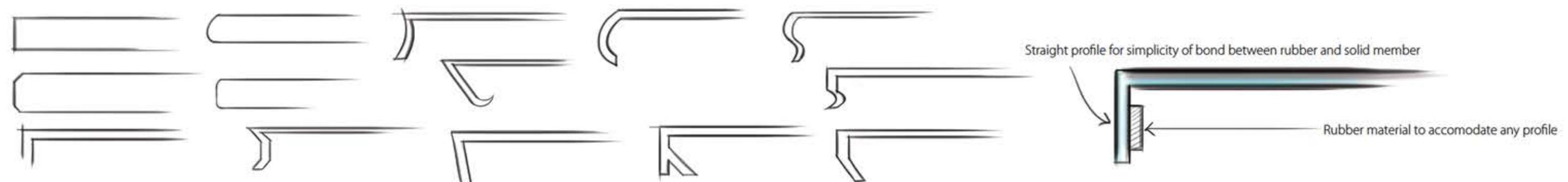


Intermediate direction



Faults : The Flexible member causes the entire assembly to rotate in Y axis and causes problems in usage of the device

Ideations : (Of profile of bracket holding the phone)

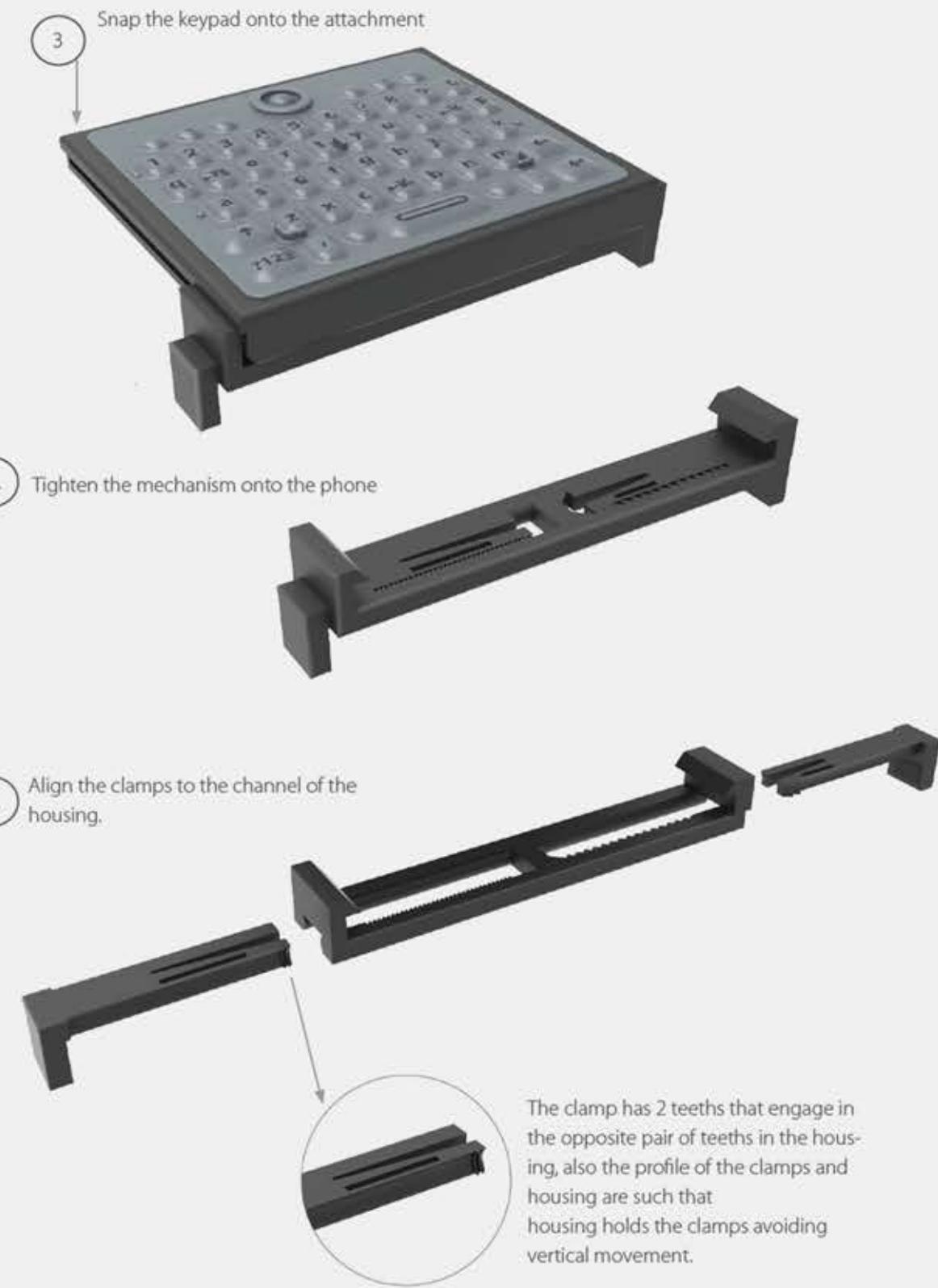


First final mechanism

(The below image depicts the first concrete mechanism of attachment and the first tactile pad layout)



Working of the first mechanism

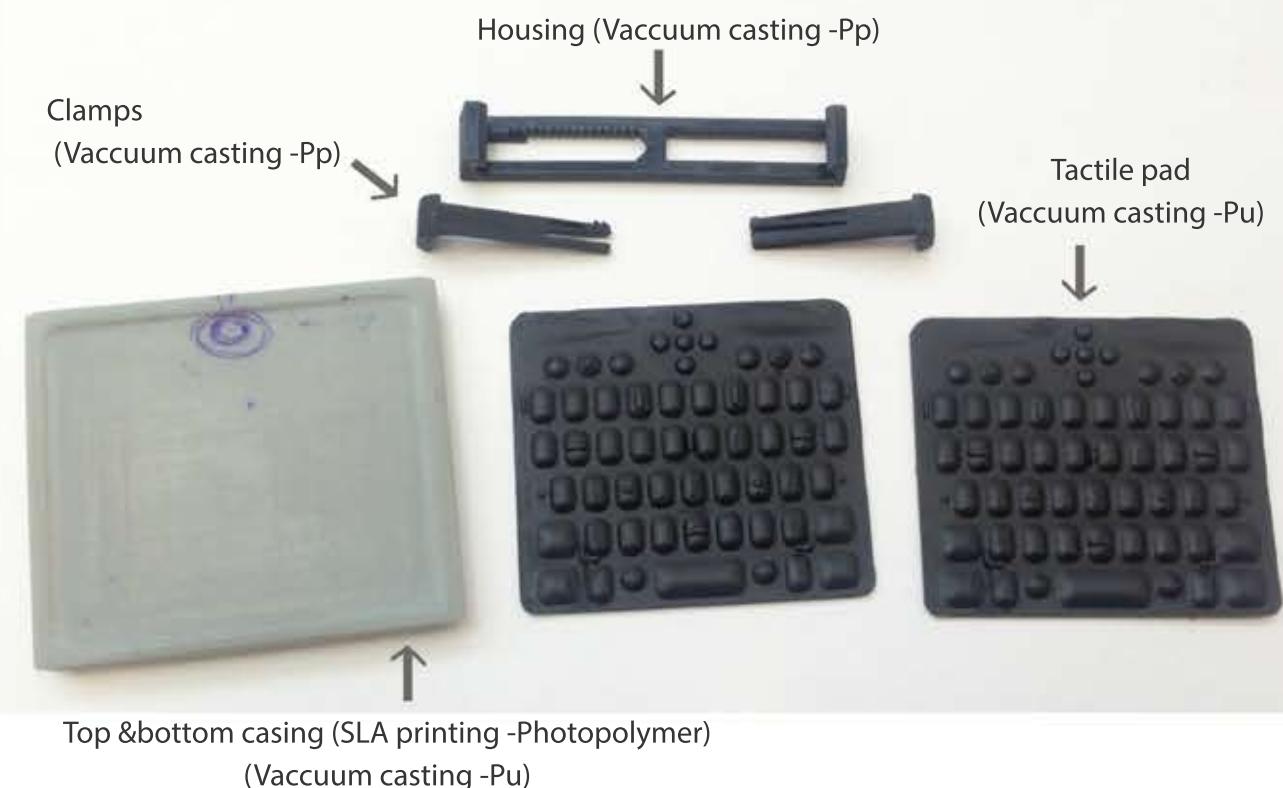
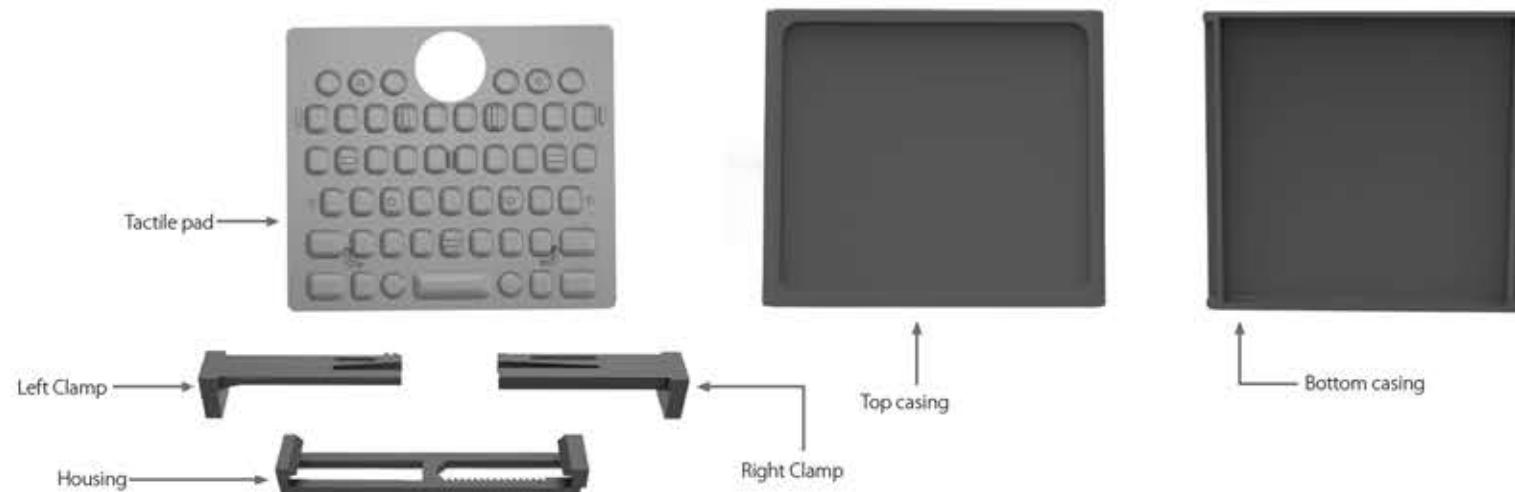


* The Mechanism attaches to the phone because of Spring back action

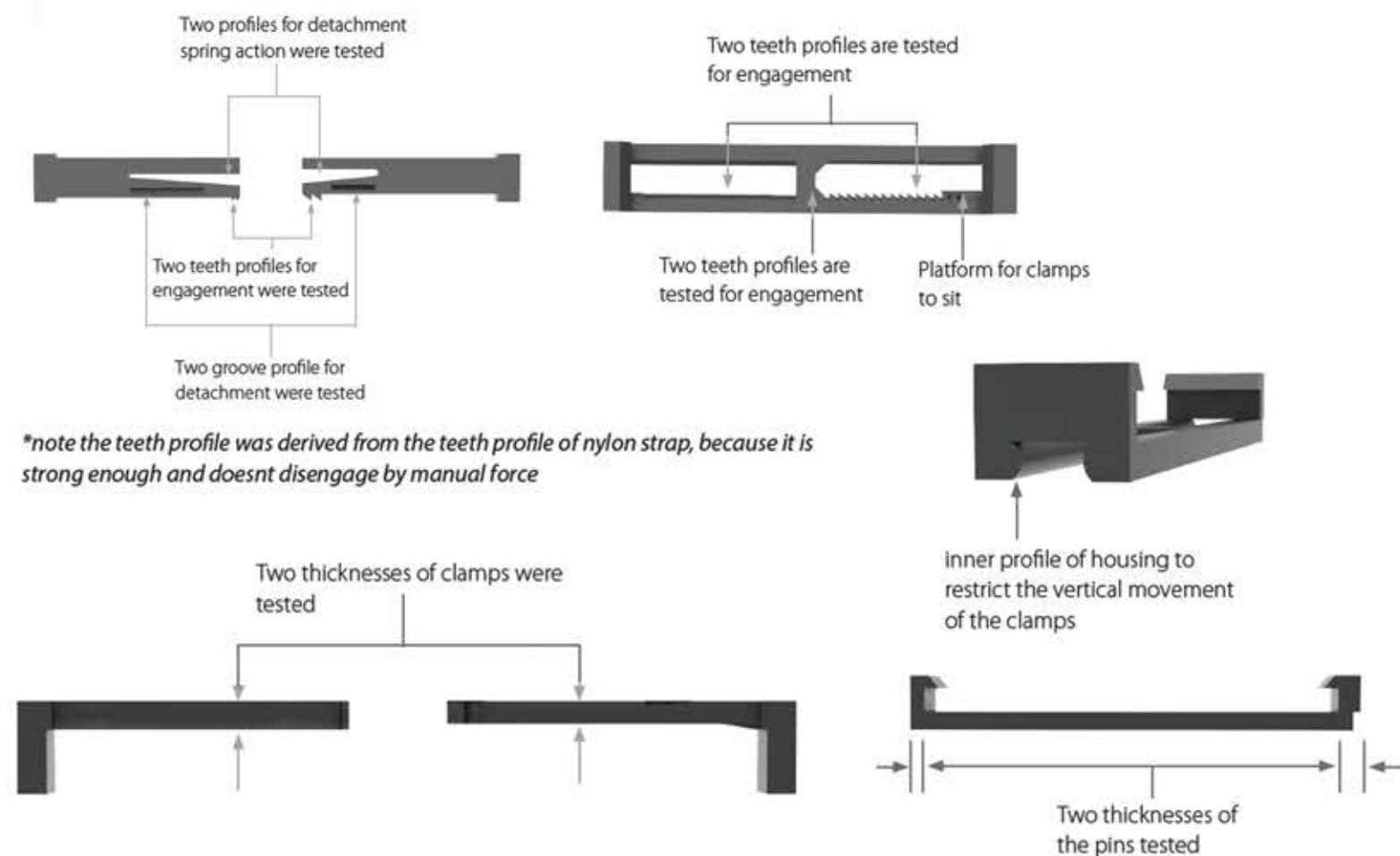
Prototyping

As the internal electronics was not ready, in the first prototype the attachment mechanism usability, and ergonomics was tested (Electronics team required a volume of 4mm*50mm*42mm and the first prototype was built accordingly)

Prototype of the Below parts was developed :



Parameters for testing :



Testing and Observations

After the prototype was received, it was tested by the design and the engineering team. The positives, problems and feedbacks were as below :

Positives :

1. The mechanism accommodated every size phone
2. The bigger teeth profile on the clamps are perfect for engagement
3. The mechanism is quite sturdy
4. Easy Installation process

Problems

Clamps :

1. The 'nail' disengagement method fails and not ergonomic
2. The small teeth profile not useful as the clamp and housing do not engage efficiently
3. Because of the 'disengagement groove' the clamps get weaker.

Housing :

1. The housing has not major problems but the undercuts need to be removed.

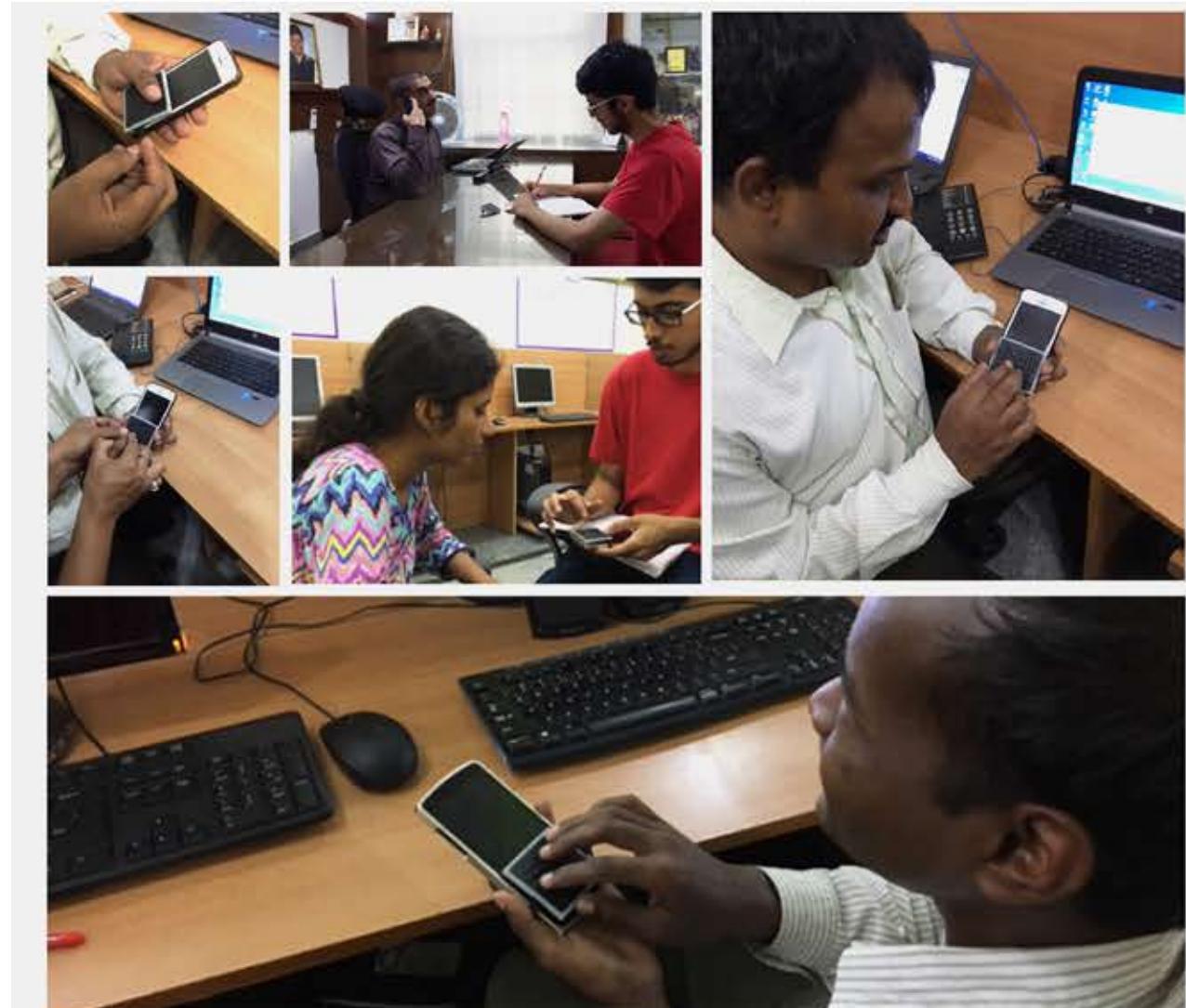
Casing :

1. The overall Wall thickness is less

Failure

The mechanism failed to hold onto the phone, the rubber pad and the teeth engagement did not provide the required Spring back action.

The layout and feedback of the tactile pad was perfect and can be finalised.
Feedback by Design and engineering team was to tweak the mechanism.



User testing insights :

1. The Keypad keeps sliding and doesn't stop at the extreme positions
2. The overall surface transition is very good
3. Due to the attachment not being tight, the usability testing could not be done correctly.
4. VI's found it difficult to install the mechanism on the phone
5. Due to very hard tactile pad the VI's were unable to press the button and get feedback.
6. According to the VI's this product will induce two finger typing.

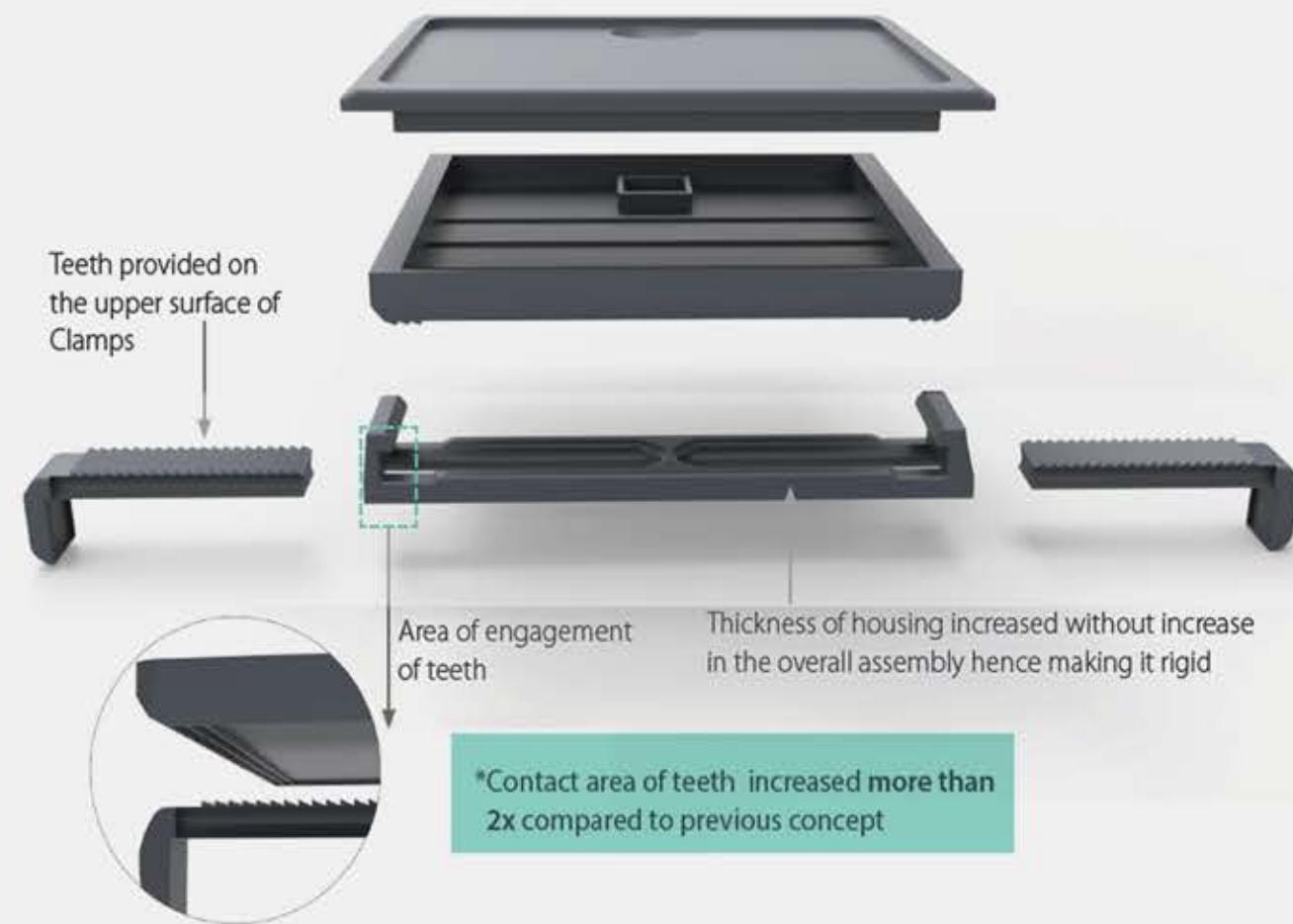
Scope of improvement :

1. The mechanism of attachment has to be reworked by design and engineering team
2. The feedback from the tactile layer i.e the main layer of input can be improved
3. The product should become more rigid and sturdy.

Tweaking of attachment mechanism

After a detailed brainstorming session of the design team and the engineering team, it was concluded that the area of support/engagement holding the entire mechanism together (Teeth mating) must be increased such that the entire assembly is sturdy, once mounted on the smartphone. Also a greater Spring back action needs to be there.

Further ideations and tweaks led to the below concepts of mechanism :

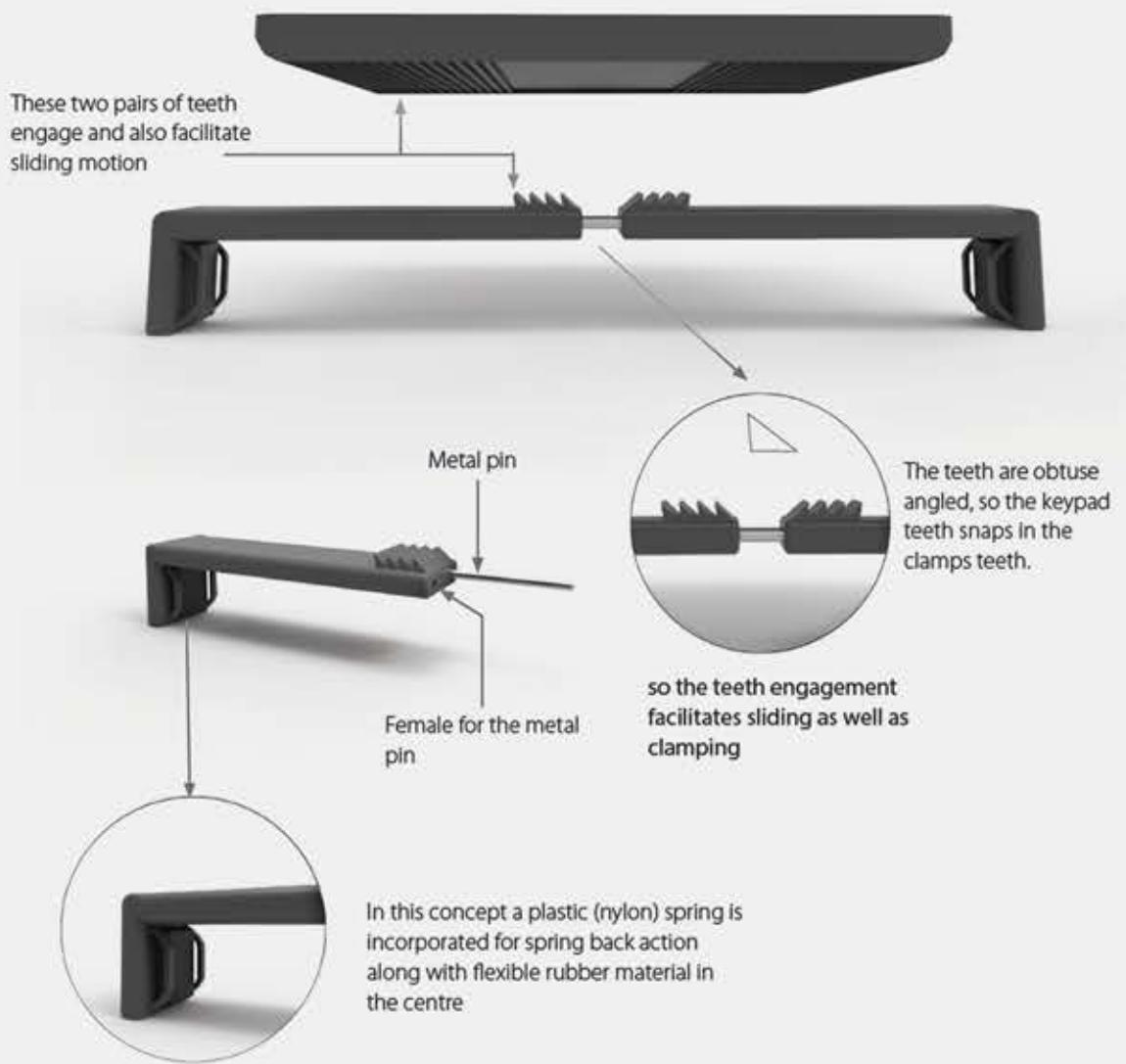


This concept was further tweaked to reduce manufacturing cost as below.

It was observed that the 'housing' in the previous concept was serving only 2 purposes viz.

1. Holding the 2 clamps in place
2. Providing pins for sliding

Below concept is a further simplified version of all the previous concepts.



Working :

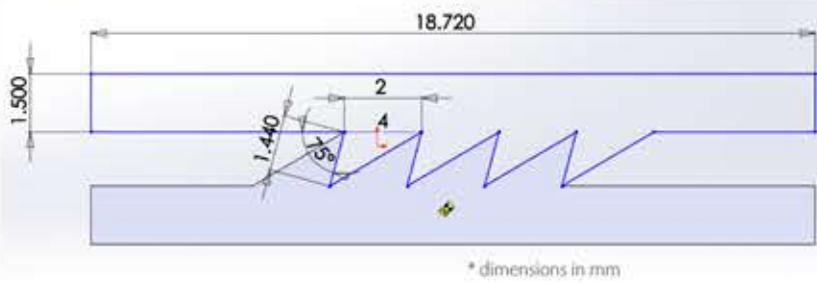


This design went under Finite element analysis for stress and strain as shown below

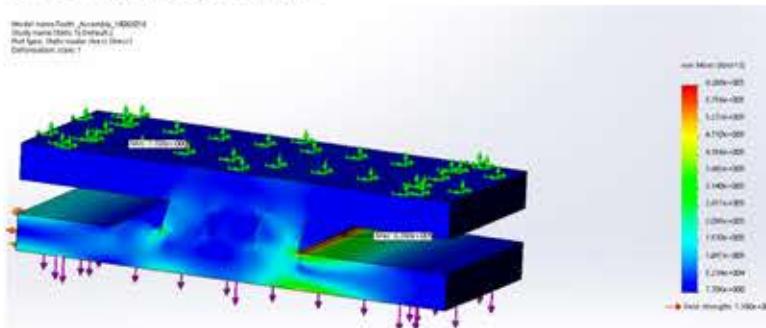
Material details of every part

Part Name	Material	Notes
Top Casing	Nylon	Fixed Boundary Conditions
Bottom Casing	Nylon	Bonded to top casing
Clamps	Nylon	Load 250 gm acting downwards to simulate the keypad being lifted with a mobile phone attached.
Pins	Steel	Bonded to clamps

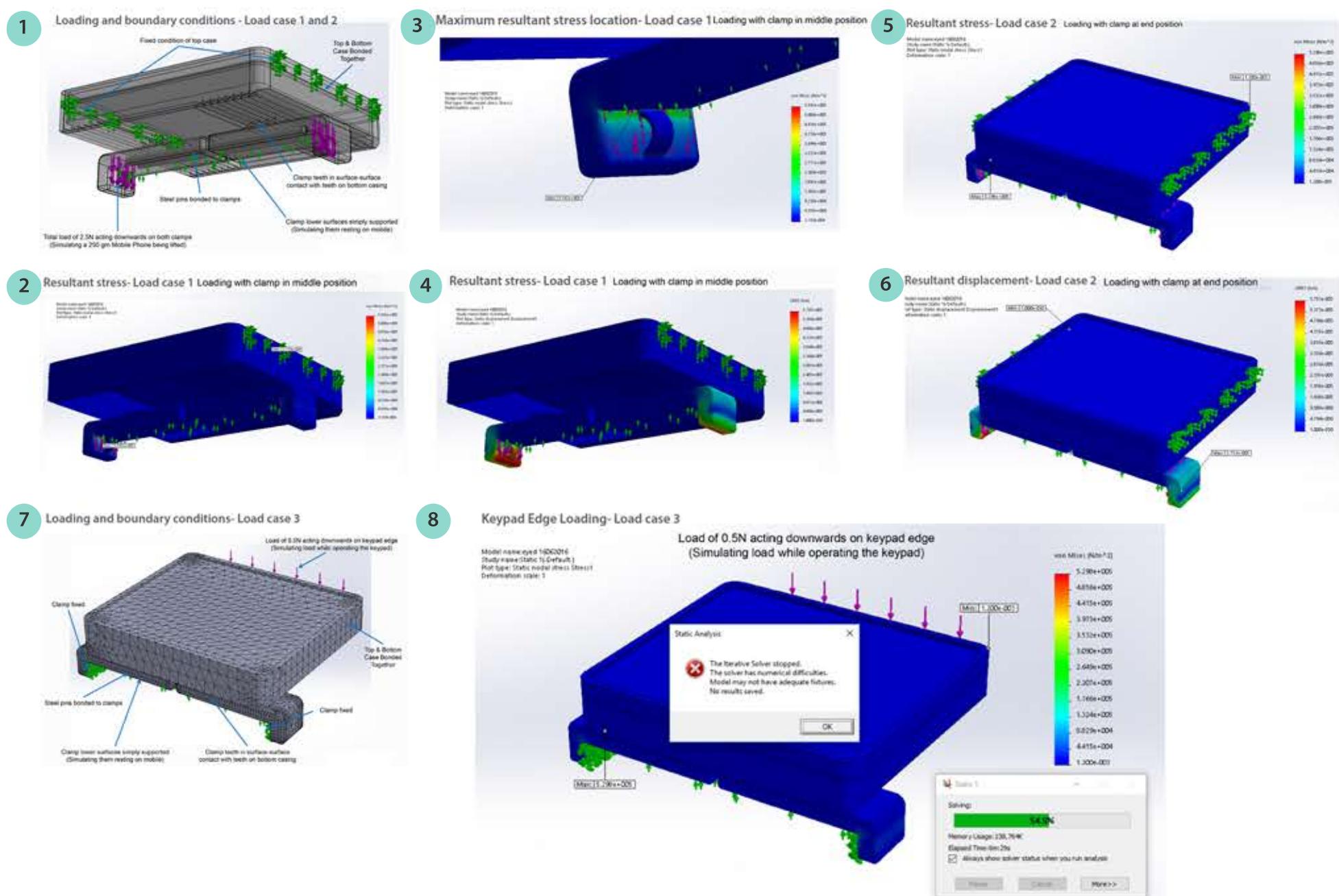
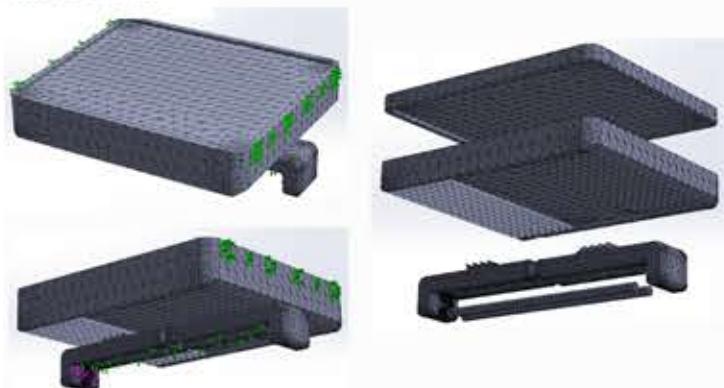
Final profile and pitch of teeth decided by the engineering team



Teeth - Static analysis results



Meshed model



Result and conclusion of the engineering team

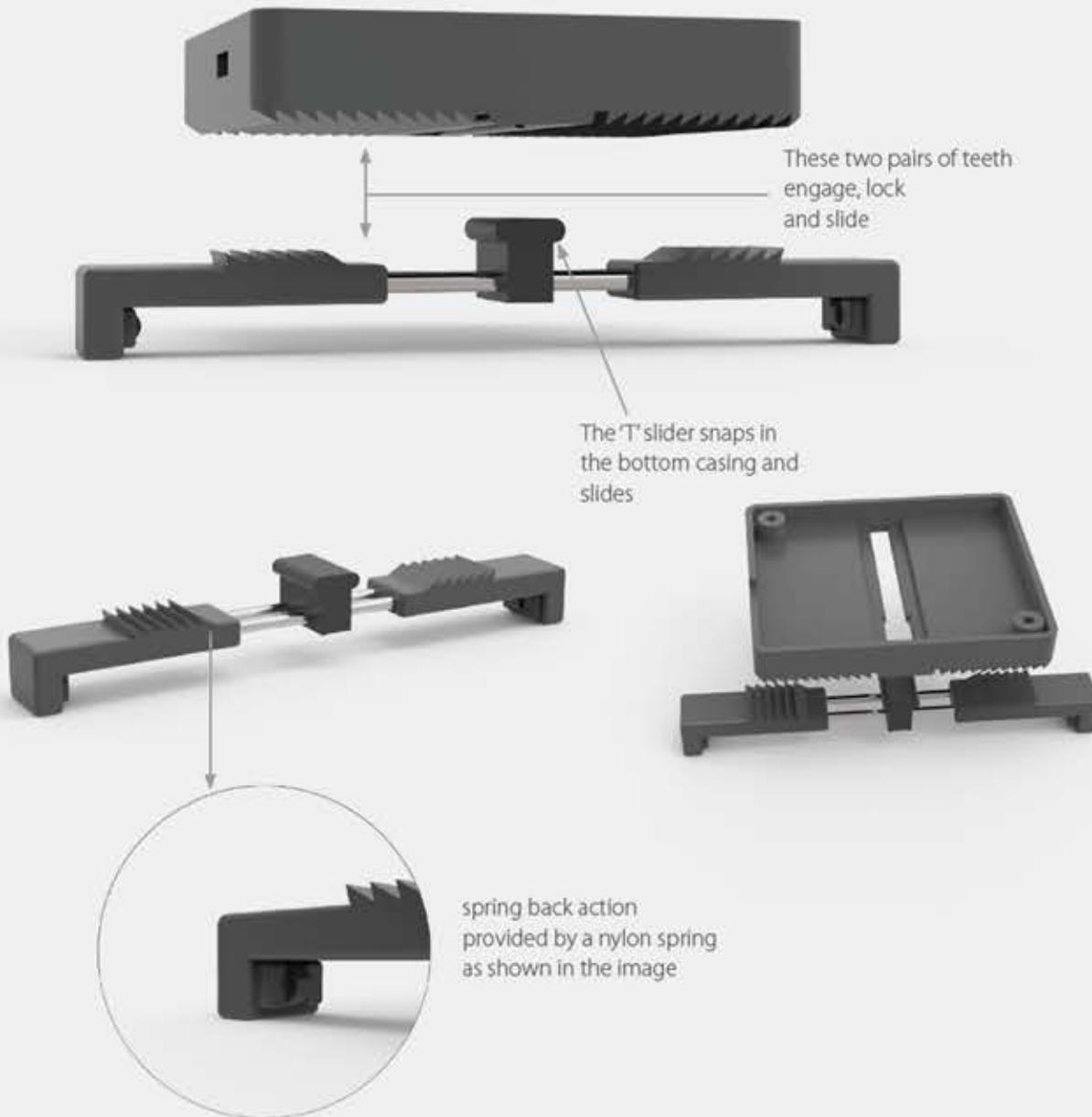
1. The peak resultant displacement of $1.3\text{e-}003$ at the end of top enclosure is acceptable
2. The highest resultant stress of $5.54\text{e+}005 \text{ N/m}^2$ is much less than the Yield strength of Nylon $1.39 \text{ e+}008 \text{ N/m}^2$
3. Study fails when a small edge loading 0.5N is applied to keypad.
4. Possible solution : Provide keypad overhang support to prevent disengagement of teeth while operating the keypad.

The new attachment also FAILS in loading conditions

Final Successful attachment

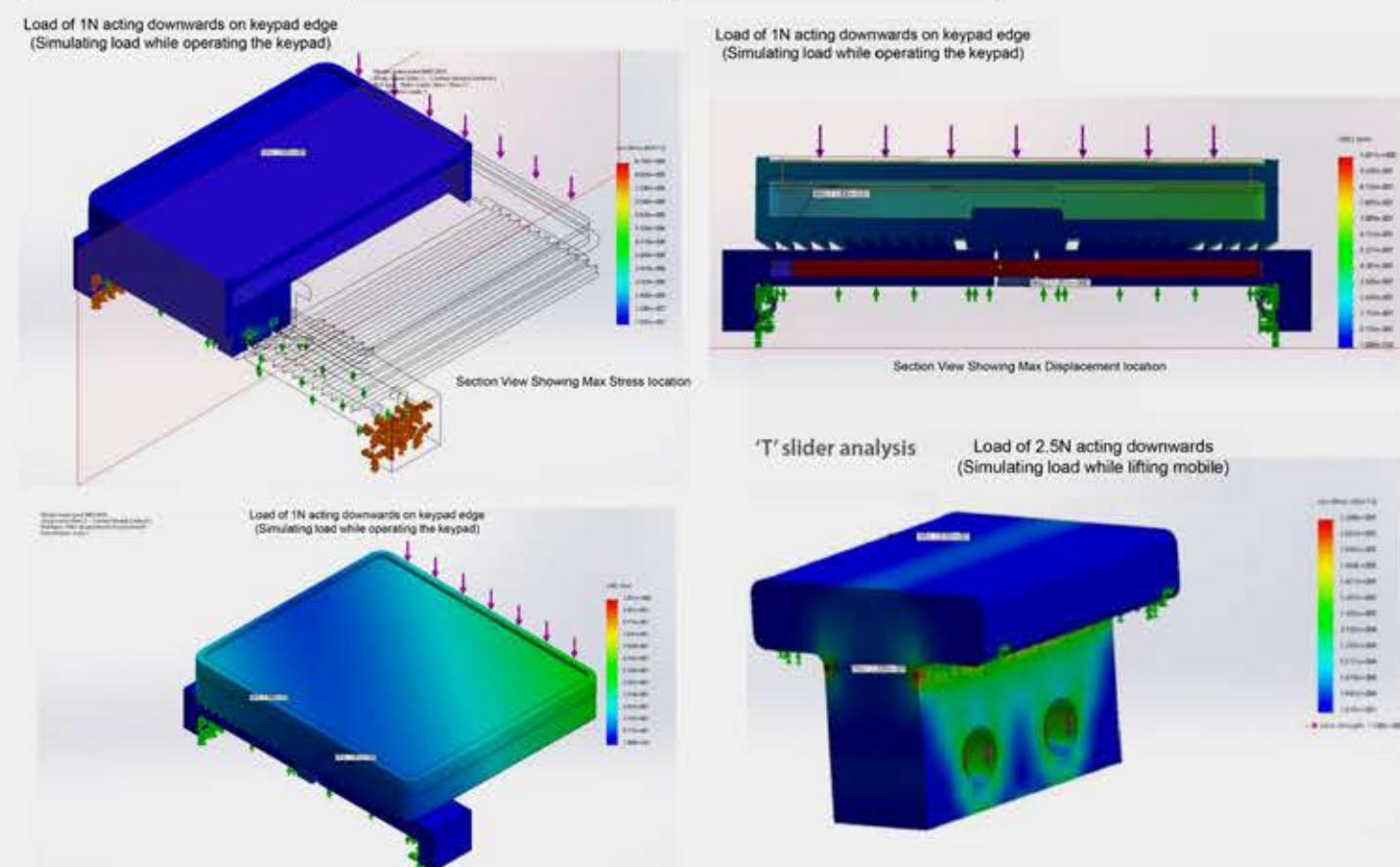
As per the suggestions of engineering team, it was decided by the design team to change the mechanism to avoid failure when the keypad is used in the slid down position.

After further ideations the below final concept was achieved.



After the development of this mechanism, the finite element analysis was performed by the engineering team as shown below:

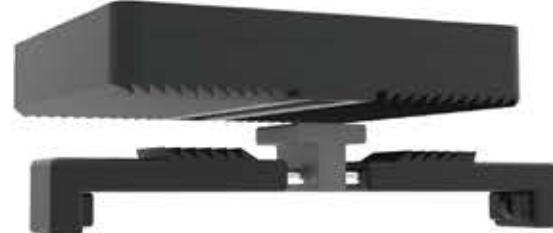
Part Name	Material	Notes
Top Casing	Nylon	Fixed Boundary Conditions
Bottom Casing	Nylon	Bonded to top casing
Clamps	Nylon	Load 250 gm acting downwards to simulate the keypad being lifted with a mobile phone attached.
T Slider	Nylon	Contact with bottom casing
Pins	Steel	Bonded to clamps



Results and conclusion

1. The highest resultant stress of 8.58 e+008 N/m^2 experienced during edge loading of 1N (100 gram force) is in the steel pins. Yield strength of steel is 2.11e+011 N/m^2
2. The peak resultant displacement of 1.05 mm of the steel pins with edge loading of 1N (100 gram force). This may cause disengagement of T Section.
3. Stresses & displacements in Nylon parts are in acceptable ranges.
4. Stresses & displacements in teeth are in acceptable ranges.
5. Model behaviour is much better when compared to the earlier design.

Details of attachment



Joystick head (will be overmoulded with the tactile pad)

Working :

1. Align



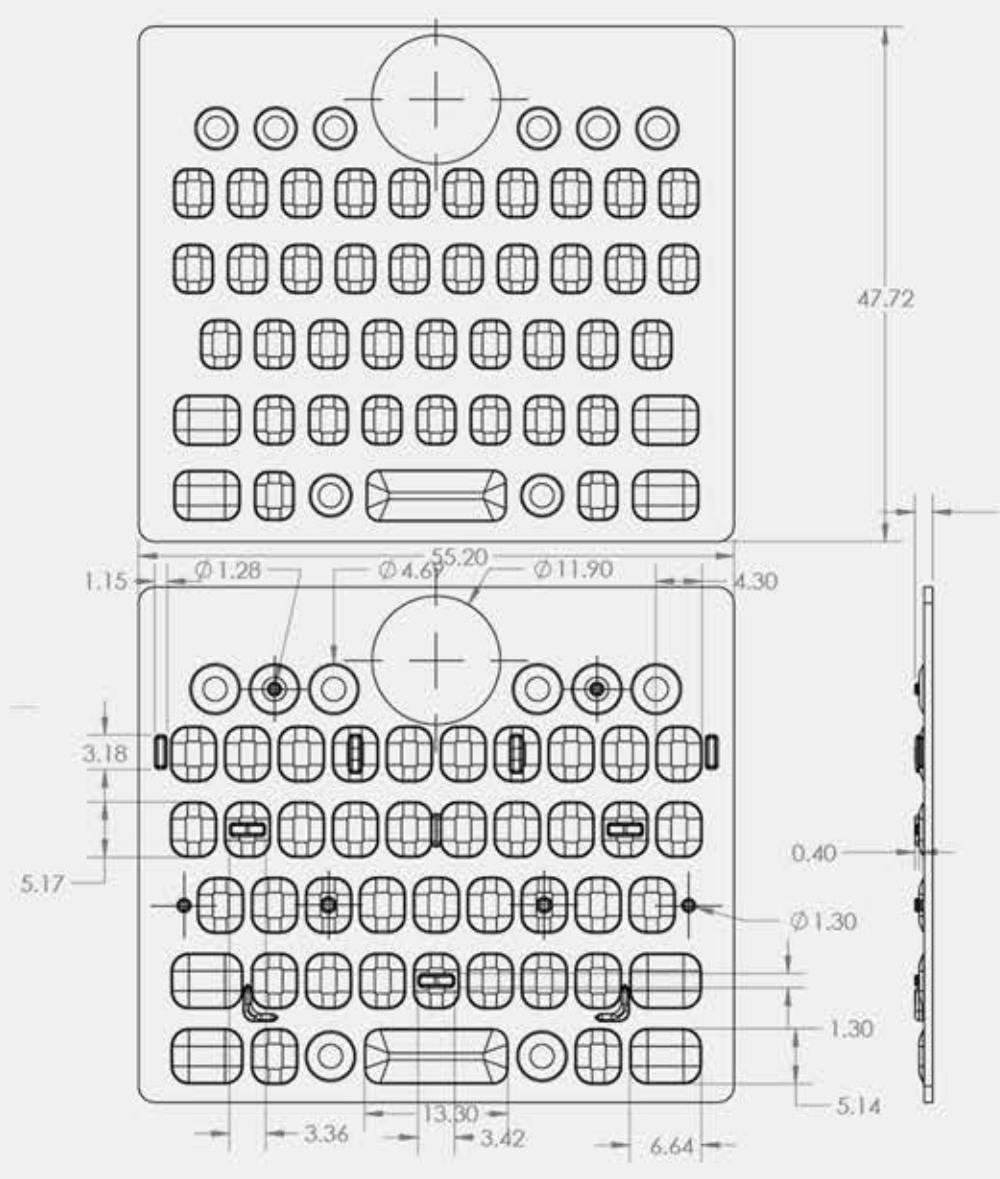
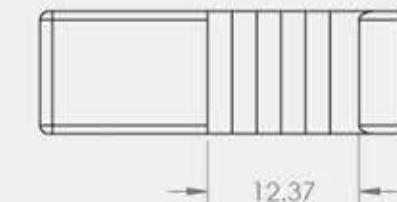
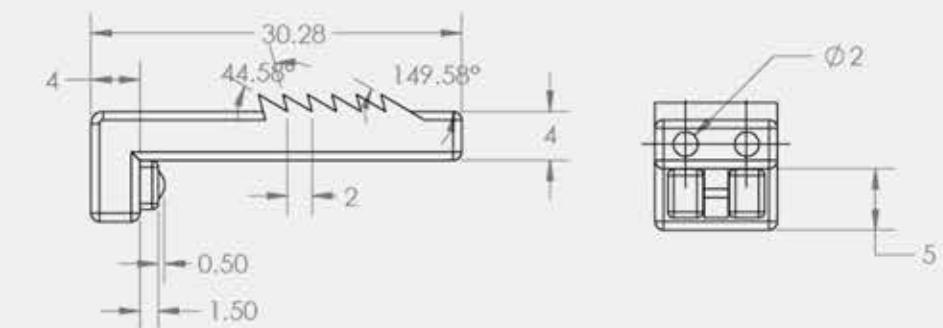
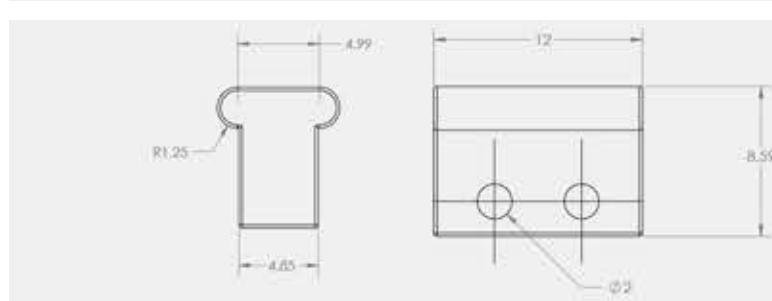
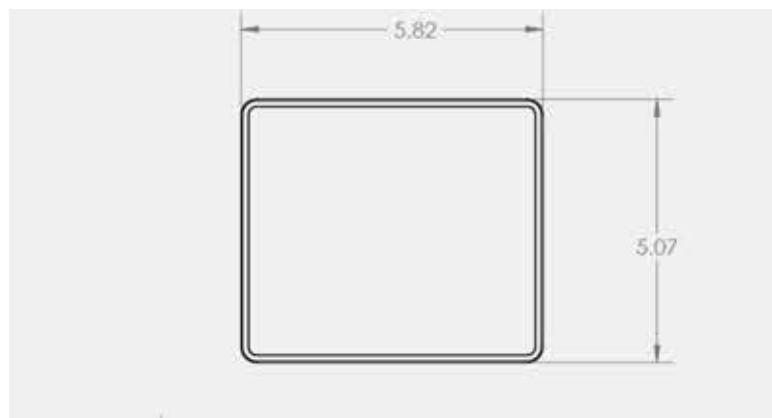
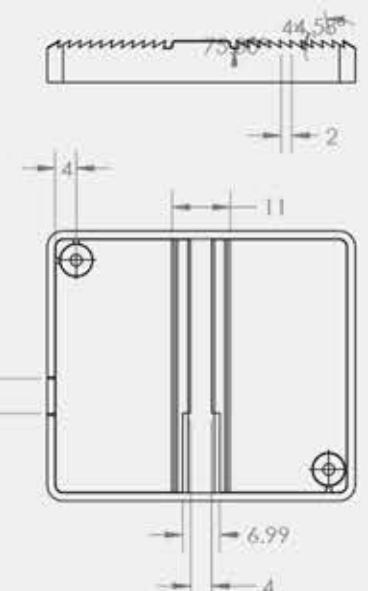
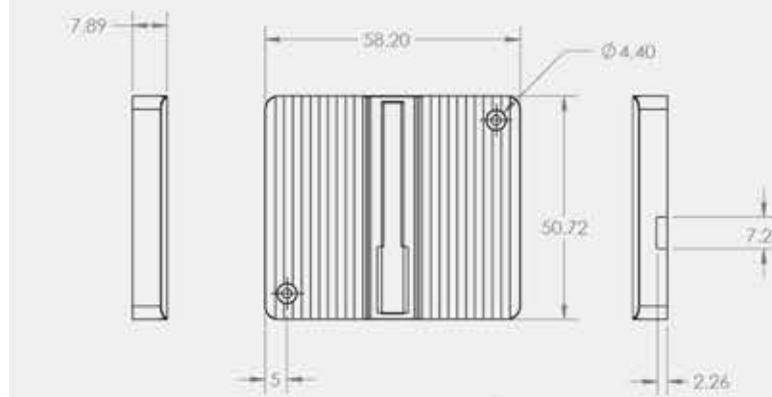
2. Tighten



3. Snap the pad

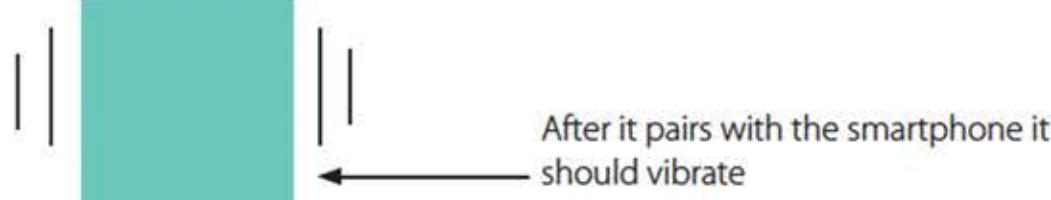
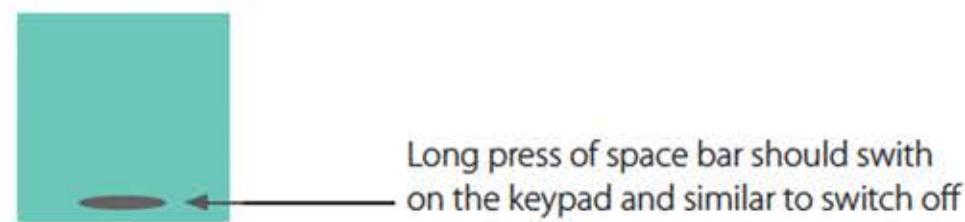
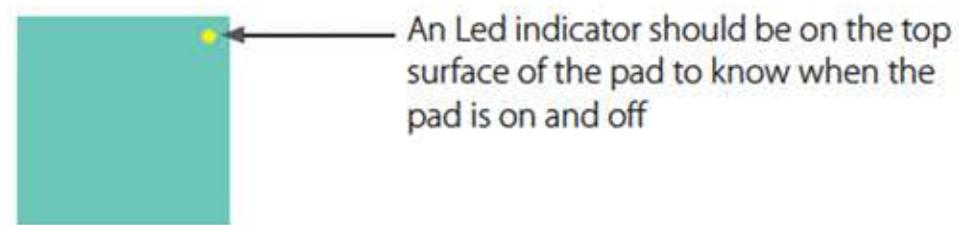
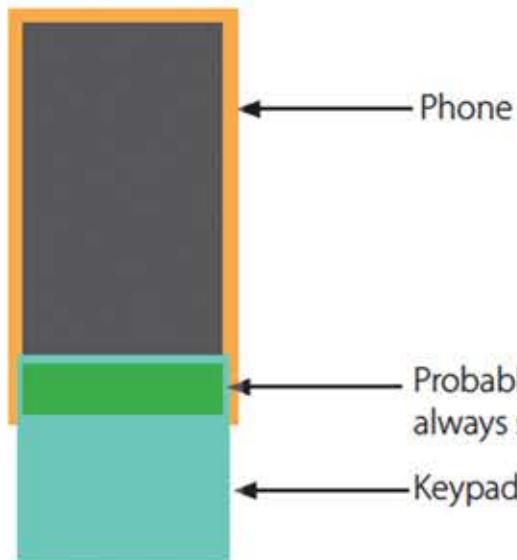


Engineering drawings



Design inputs for electronics

Weight balance (centre of gravity)



Installation of the device

User

open device packaging box

long press space bar on the device (biggest button) for power on

switch on bluetooth of the phone

switch on bluetooth of the phone

Accept pair request

Device connected

Device connection will trigger eye d app automatic download

eye d app will sync with the device and they will assist the user.



Special Purpose Heat Stacking machine for TATA company.

Live project of SP Engineers

OBJECTIVE-

To develop a solution that reduces the cycle time, increasing efficiency of the machine and to improvise user interface and aesthetics.

Details of the machine



For front right door of a TATA car

Dimensions

Length 1350mm
Breadth 1800mm
Height 2100mm



Arrangement of the machine on the shop floor

Cycle Time

Load the component- 15sec
Start the push button- 2 sec
Heating element downward- 3sec
Heat stake hold time- 8sec
Air cooling time- 8sec
Heating assembly upward- 4sec
Component fixture reverse- 6sec

Weight of the machine

1700kg

Production rate

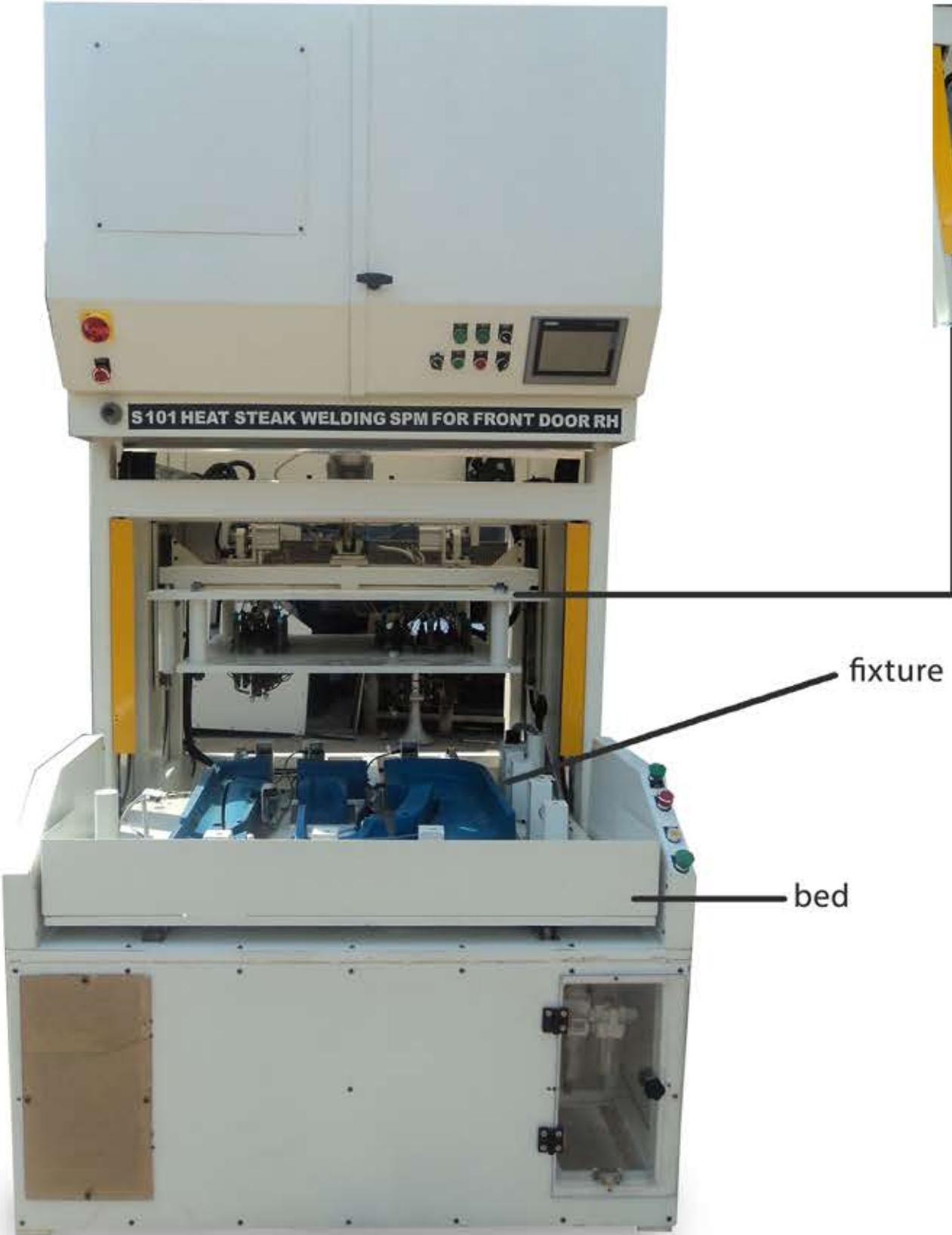
250 parts/day

Total weight of the component

1 kg Main part child parts



Working



heating assembly

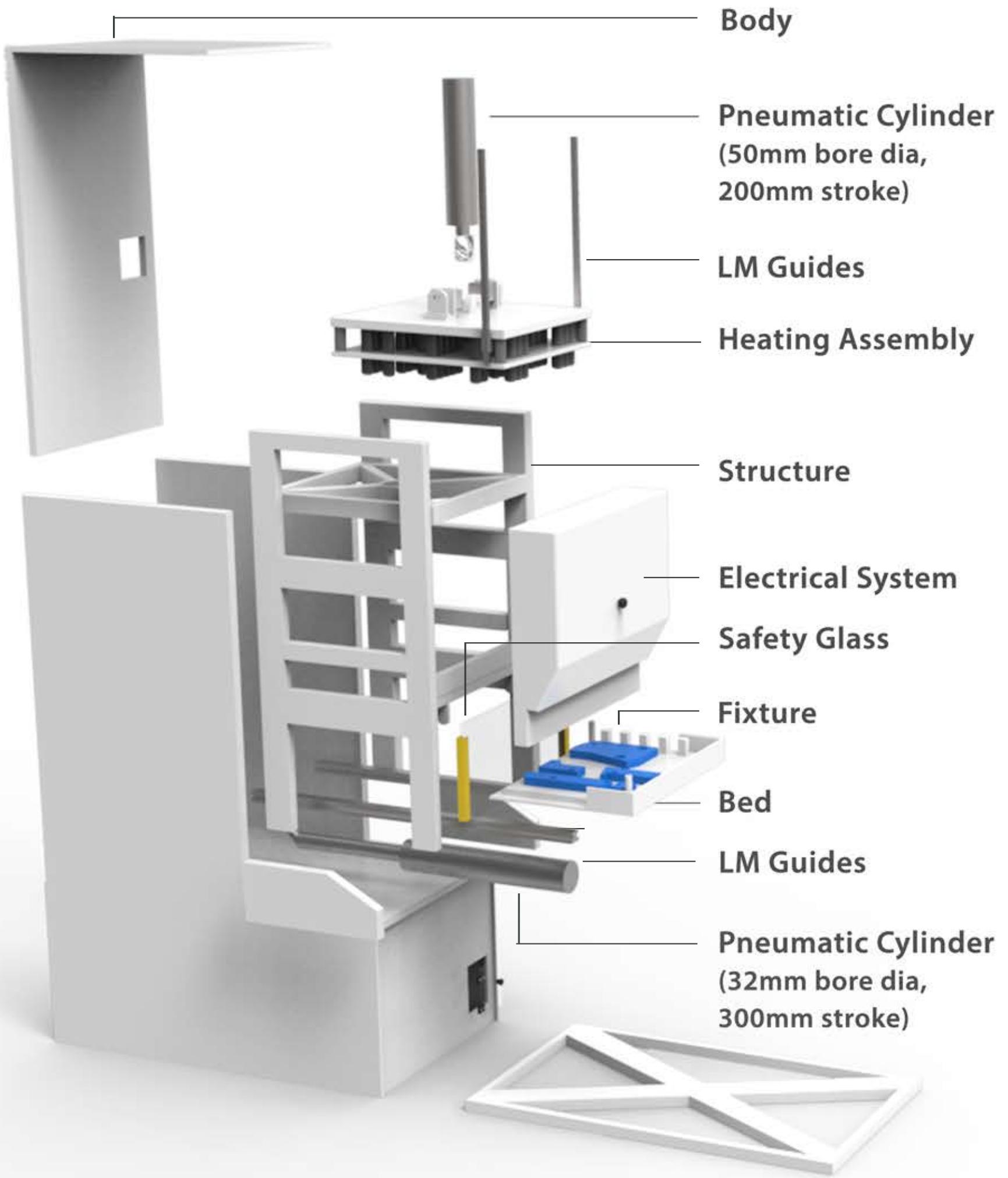


component is the front right door of tata s101 car it has one main part and 3 child parts

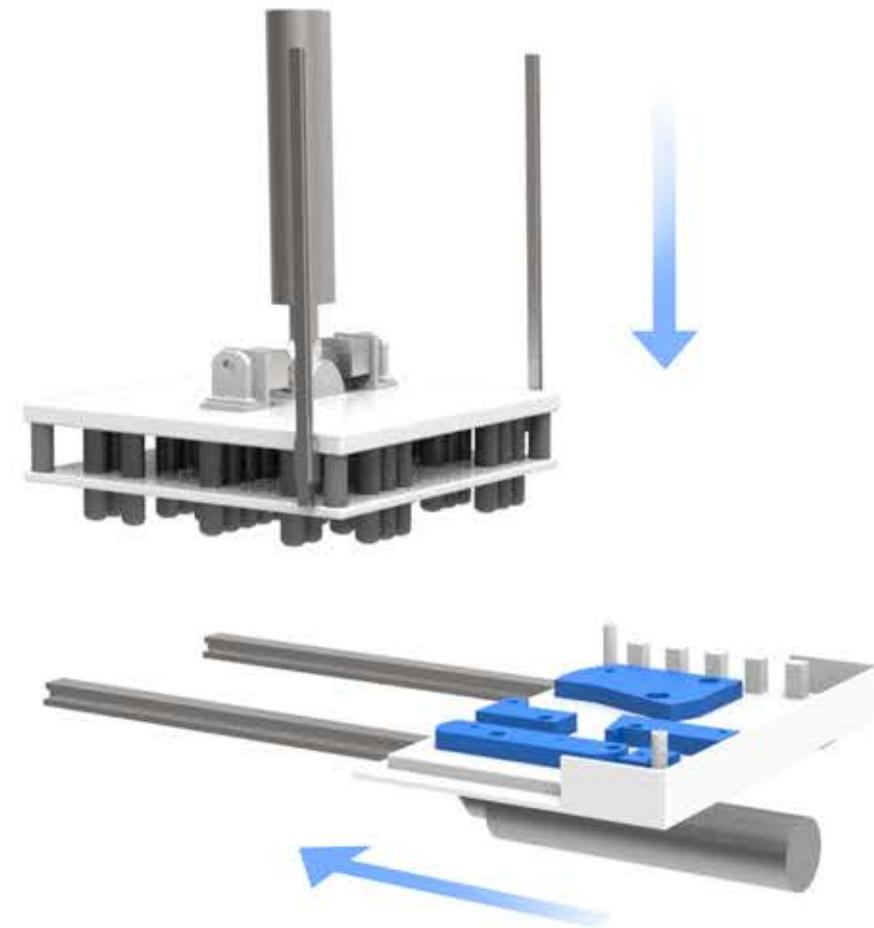
Working of the current machine-

The component is loaded manually then manual or auto functions are performed. The bed slides in with the help of pneumatic cylinder and linear motion guides. The bed aligns itself with the heating assembly and then the heating assembly comes down with the help of the vertical pneumatic cylinder then the heat stacking operation is performed. After that there is cooling stage and once the component is cooled the bed slides out and the component is ejected

Existing Machine Exploded



Working



SP engineers problem scenario and requirements

In the current machine, it takes 5mins for the machine to start as the pressure for pneumatics doesn't build up till then, also its a risky system in the case of compressor or any other component failure the machine working will stop. Also as the component is complex it takes high time to load it manually and also the machine looks too high visually and too boxy.

Requirements

- ① Alternate mechanism (hybrid or electrical)
- ② Increase efficiency
- ③ Decrease cycle time
- ④ Improve aesthetics

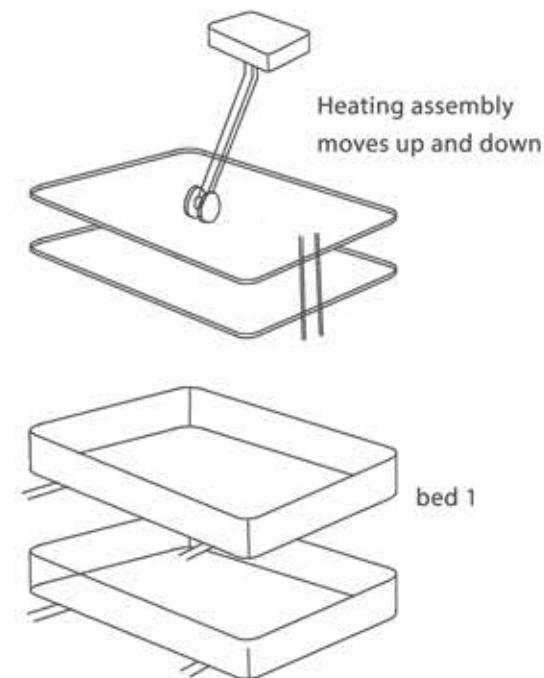
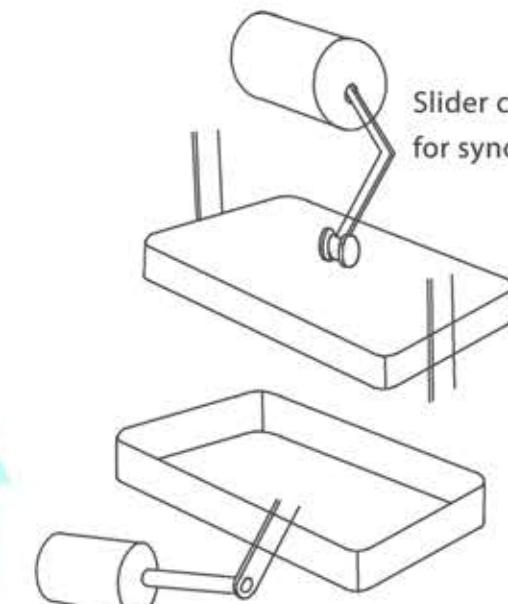
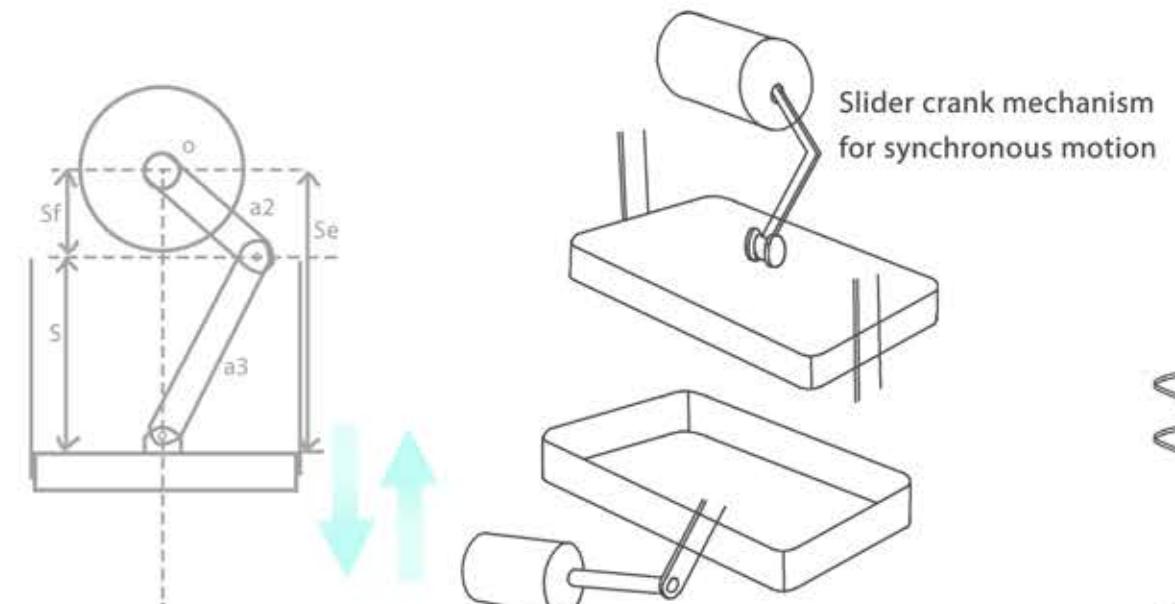
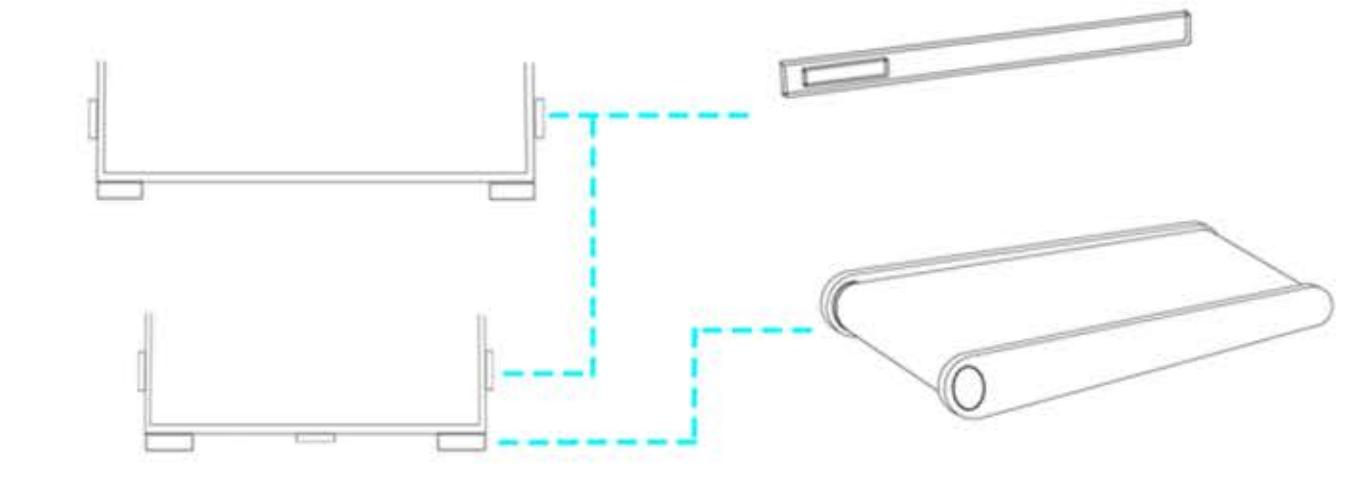


SP engineers clients requirements

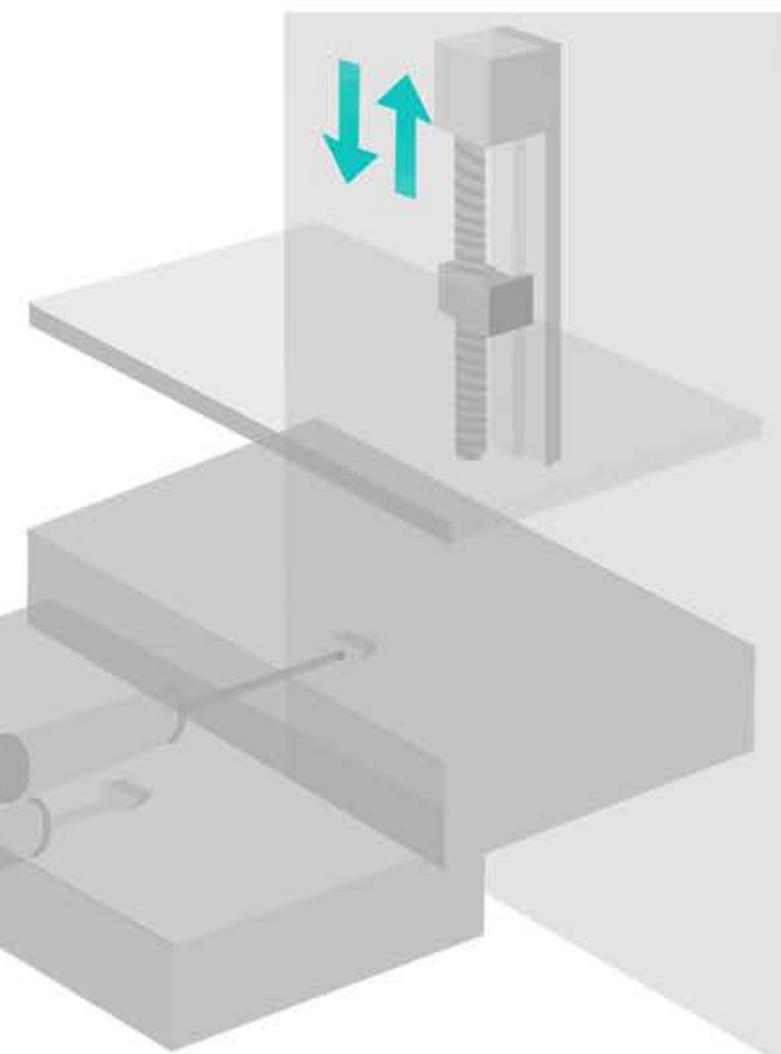
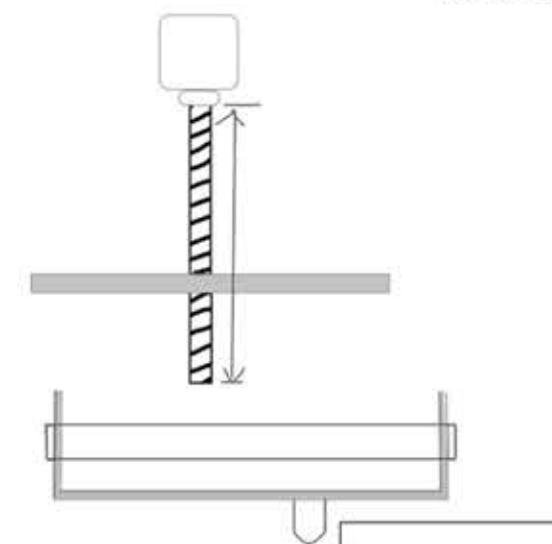
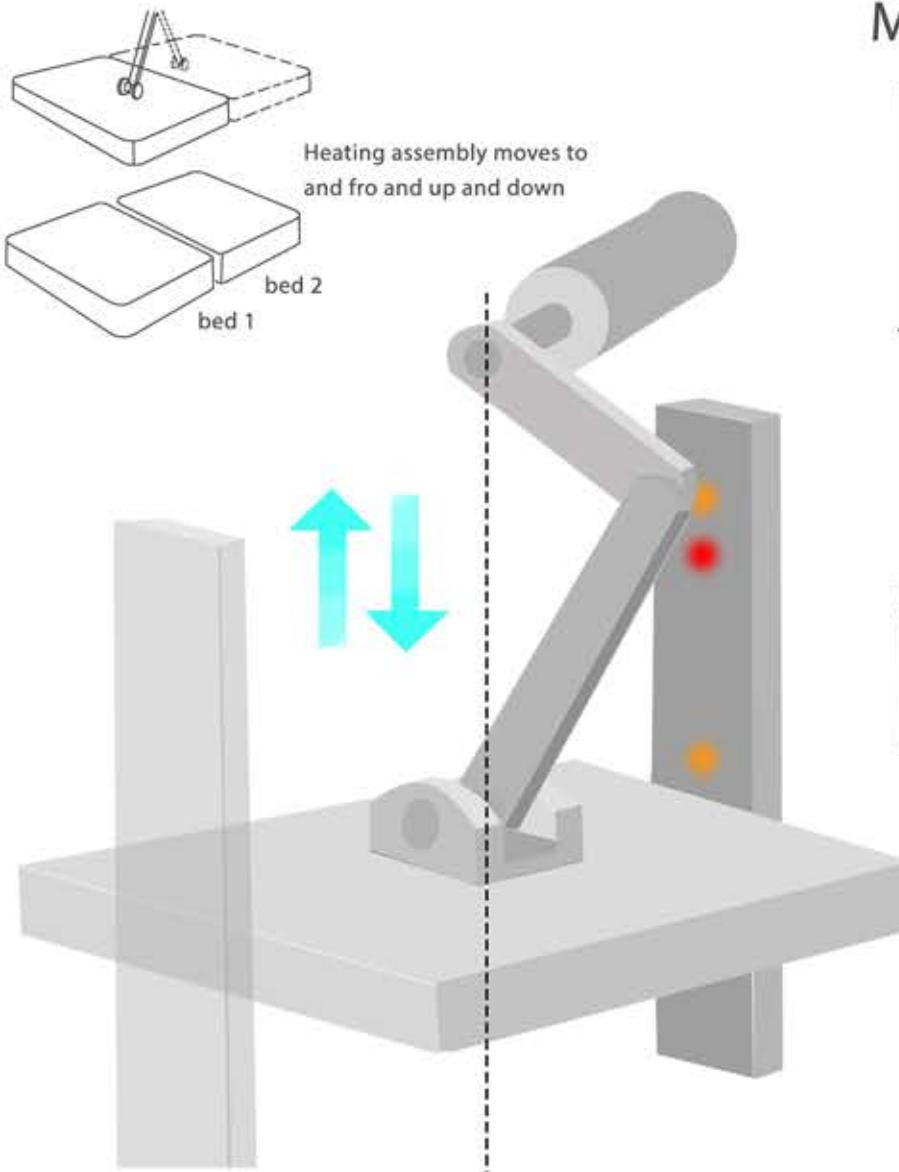
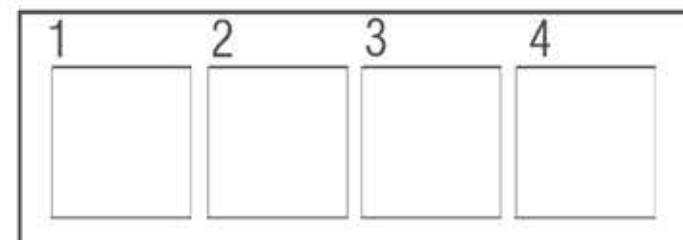
- ① Improve the User Interface
- ② Improve ergonomics
- ③ Increase the rate of production



Ideations



Machines arrangement on floor



MAIN CONCEPT

Machine with two beds which will add cost but it is affordable as it will increase the production rate drastically

There are two sub concepts as follows

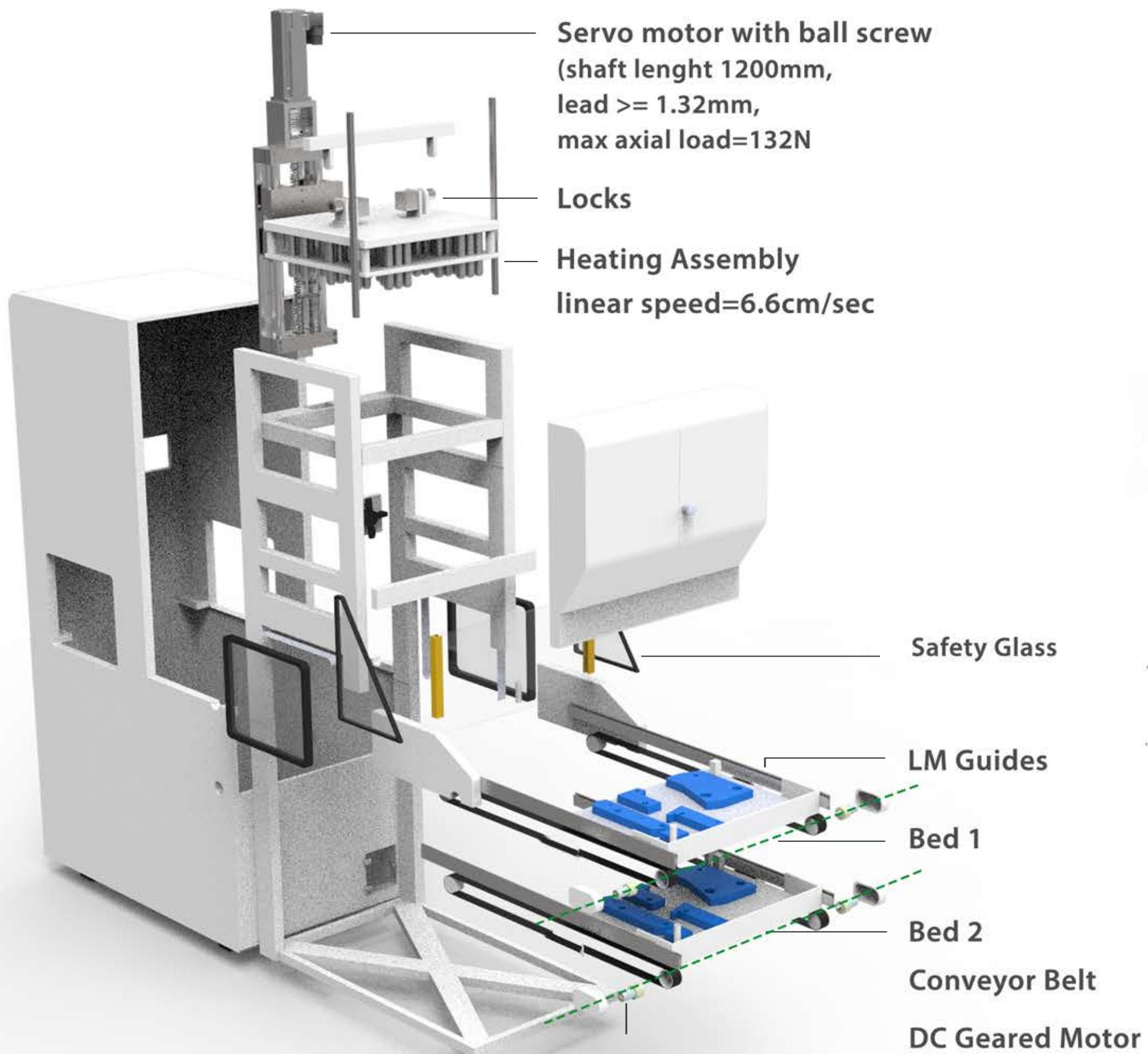
Sub Concept 1 (Electric)

In this concept the heating assembly is moved by servo motor with ball screw to increase precision and efficiency of operation and there are two beds controlled by conveyor belts. The operator loads the component on the upper bed first, then the cycle of operation starts and till the operation on the first bed continues in the meantime the operator loads the component on the second bed. Both the beds move in their respective axes and the heating assembly comes downwards until the height of both the beds.

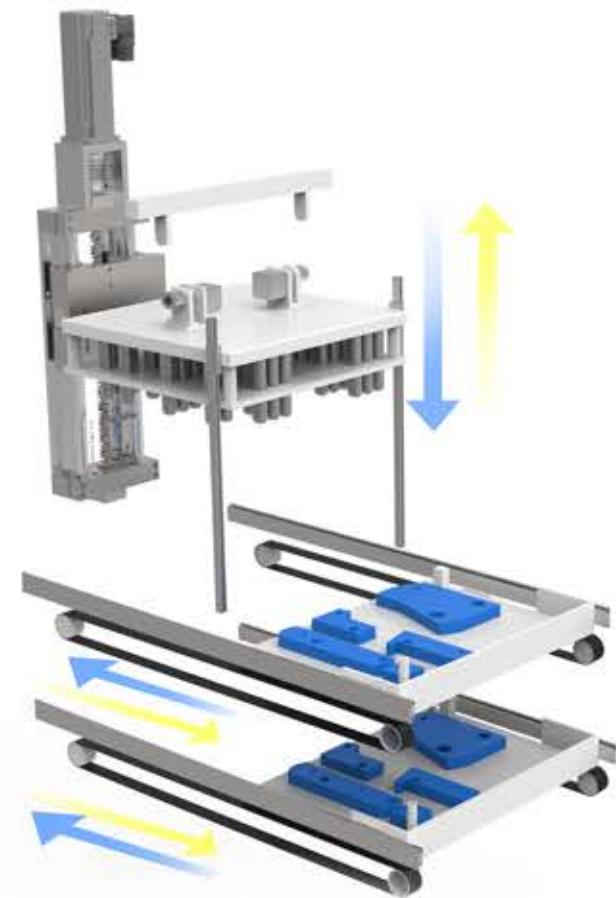
Sub concept 2 (Hybrid - pneumatic + electric)

In this concept the heating assembly is moved by pneumatic cylinder. Both the beds are moved by conveyor belt. The operator loads the component on the upper bed first, then the cycle of operation starts. Upper bed completes the cycle in its respective axis but the lower bed moves in its respective axis till the end point and gets lifted up at the height of upper bed by the pneumatic cylinder which is on its base.

CONCEPT 1 EXPLODED VIEW



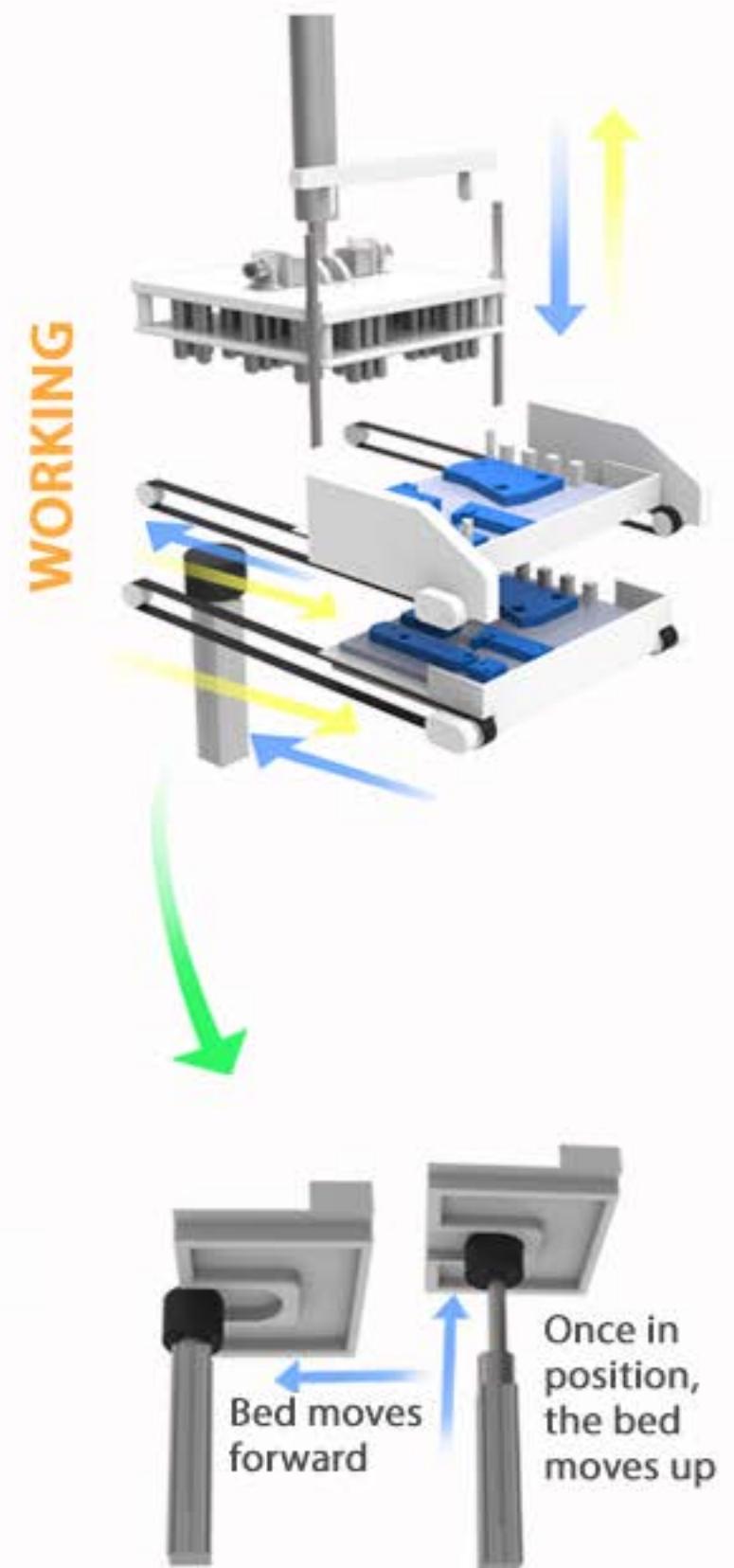
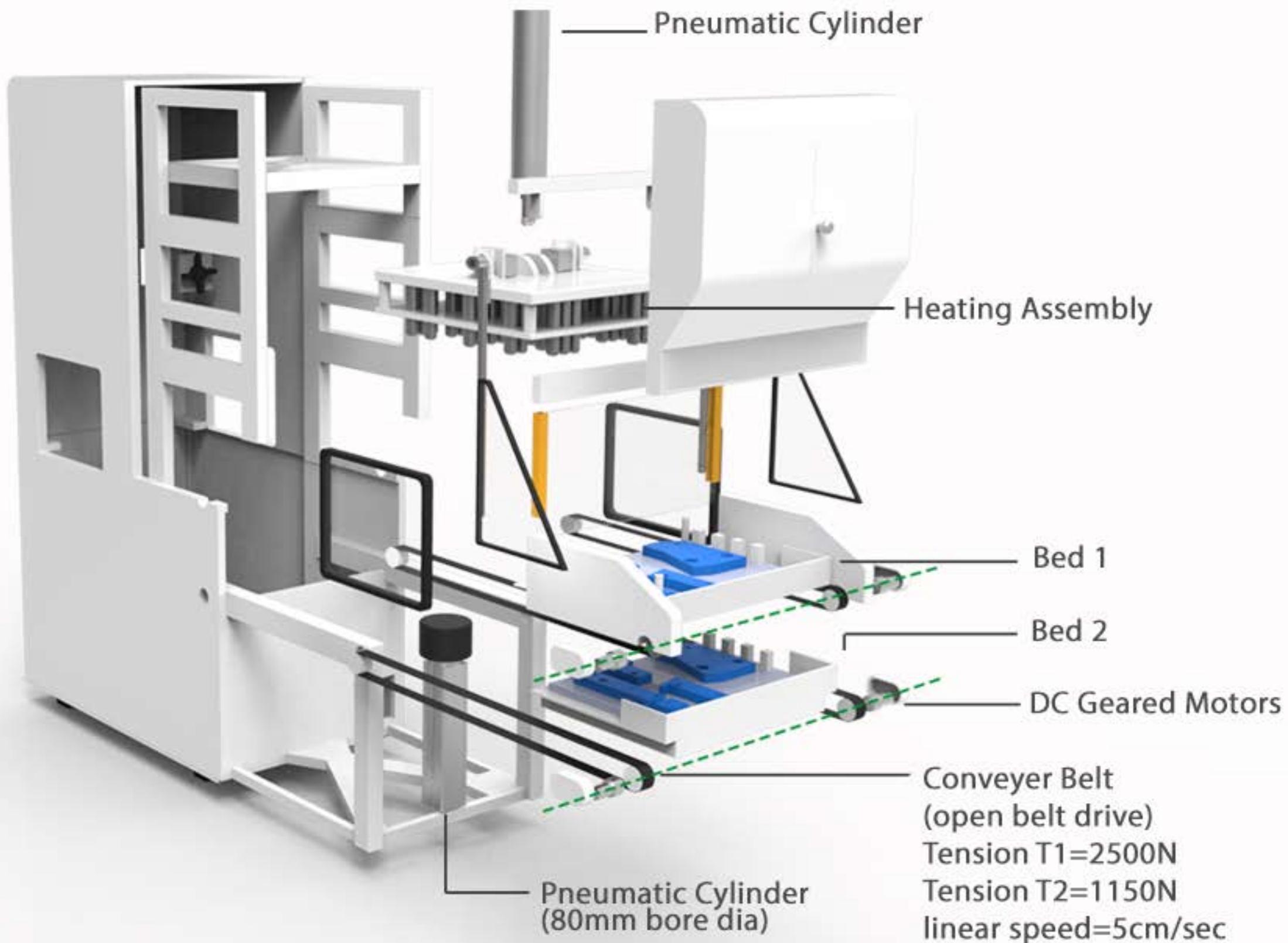
WORKING



BALL SCREW



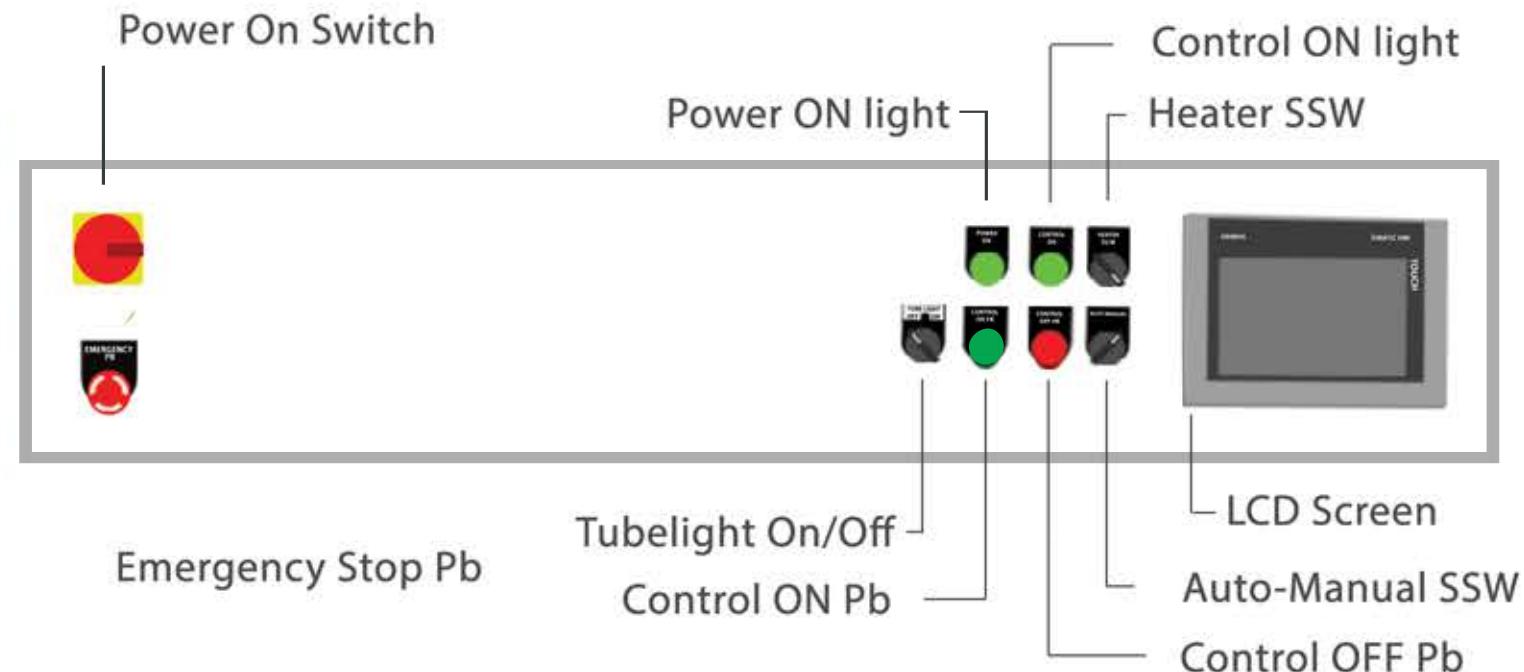
CONCEPT 2 EXPLODED VIEW



HMI



Old Interface



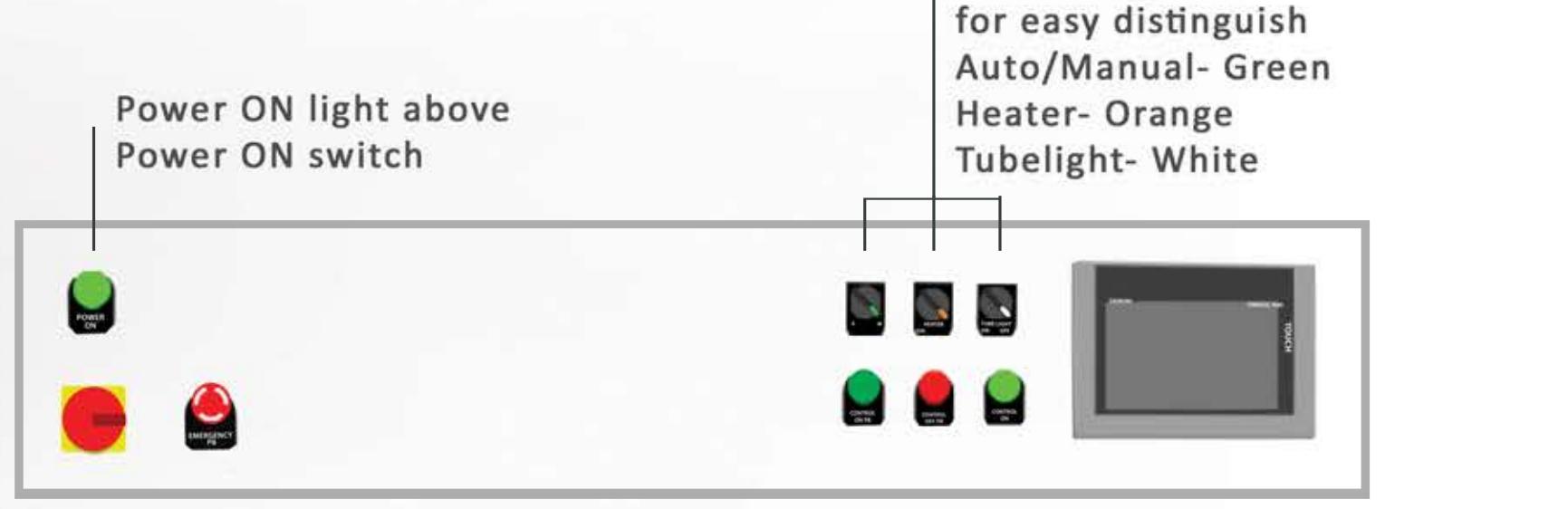
Flaws

Power On switch is on left and its indicator on right

The text above the buttons cannot be seen

Random placing of all switches and buttons

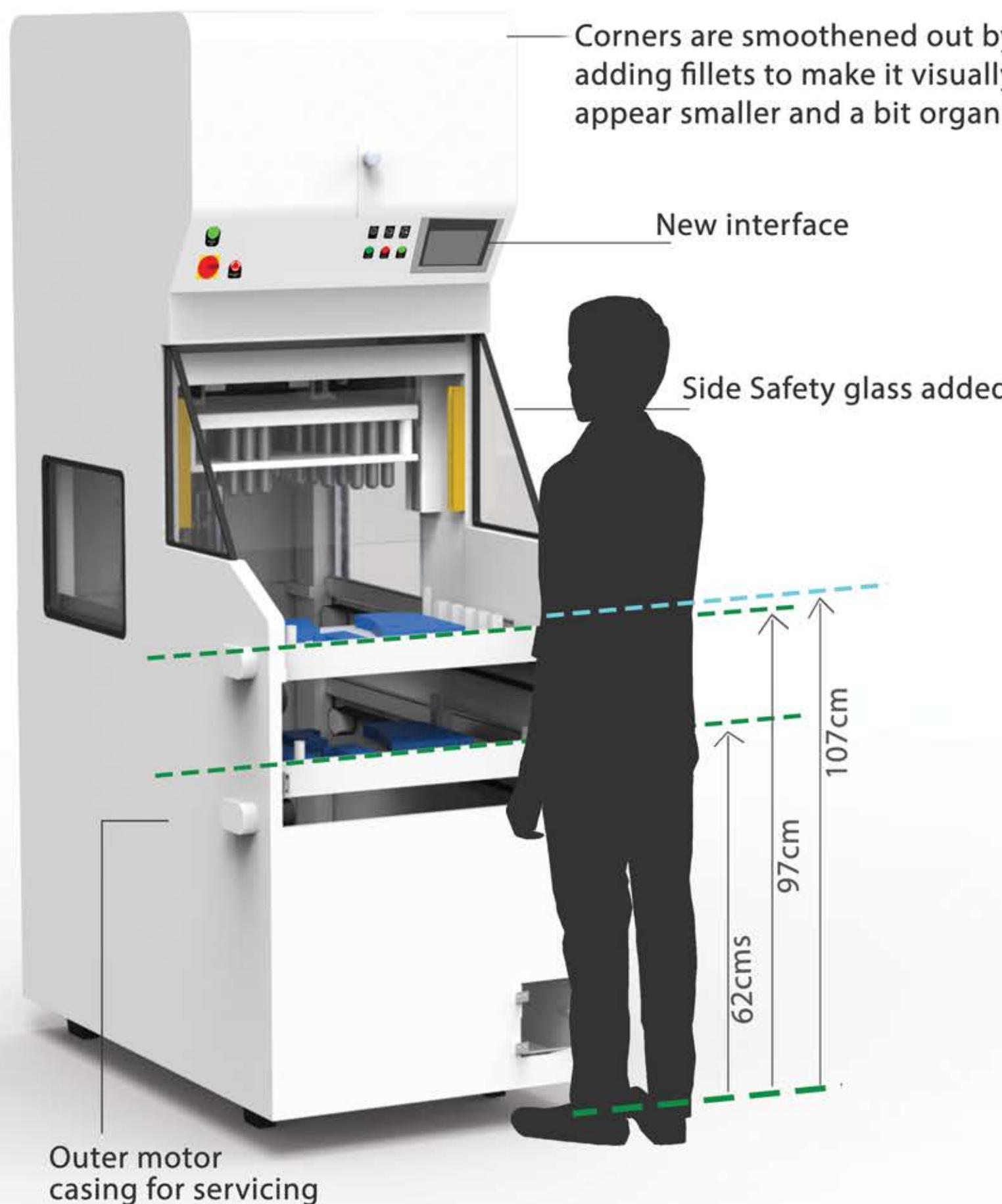
New Interface



SSWs are arranged alphabetically and each given a different color for easy distinguish
Auto/Manual- Green
Heater- Orange
Tubelight- White

Control on/ off pushbuttons and feedback light are arranged together

Main concept model



Advantages

In existing machine :

Time to load the component - 15 sec

Total cycle time in present machine - 46 sec

In this concept :

Total time for first cycle of the day - 46 sec

Time for all the remaining 249 cycles - 31 sec/cycle

Time and energy saved per day - **62.25 mins**

Ergonomics

For light weight load the workbench can be from **10cm to 45cm** below the elbow

*Since light load component therefore no problem in loading the component.

CHARGO

Charge anytime
anywhere



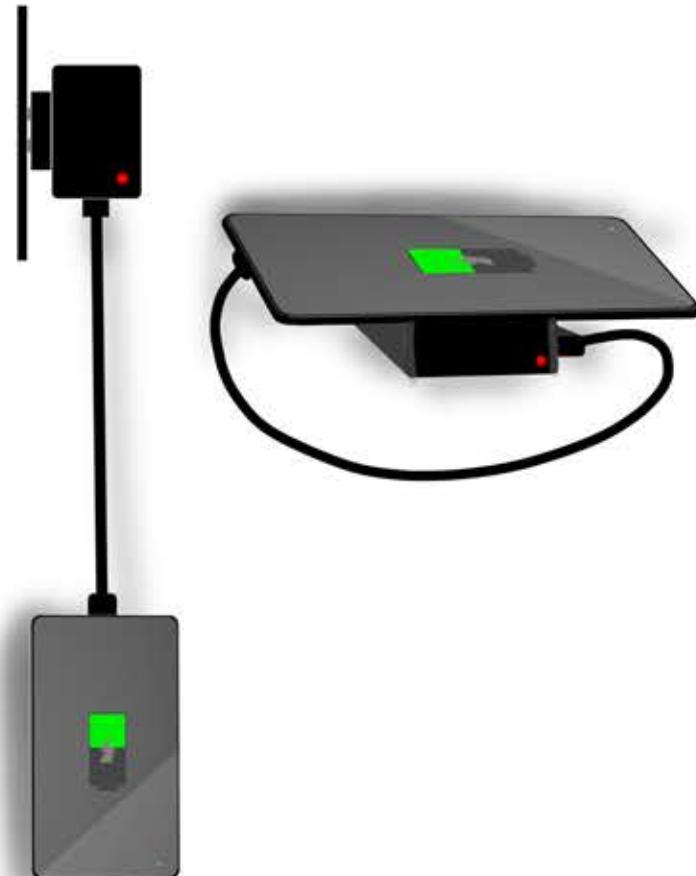
Objective

To Derive a phone charger, combining all the existing technologies and to incorporate an ergonomic support for the phone while charging

PROBLEM SCENARIO

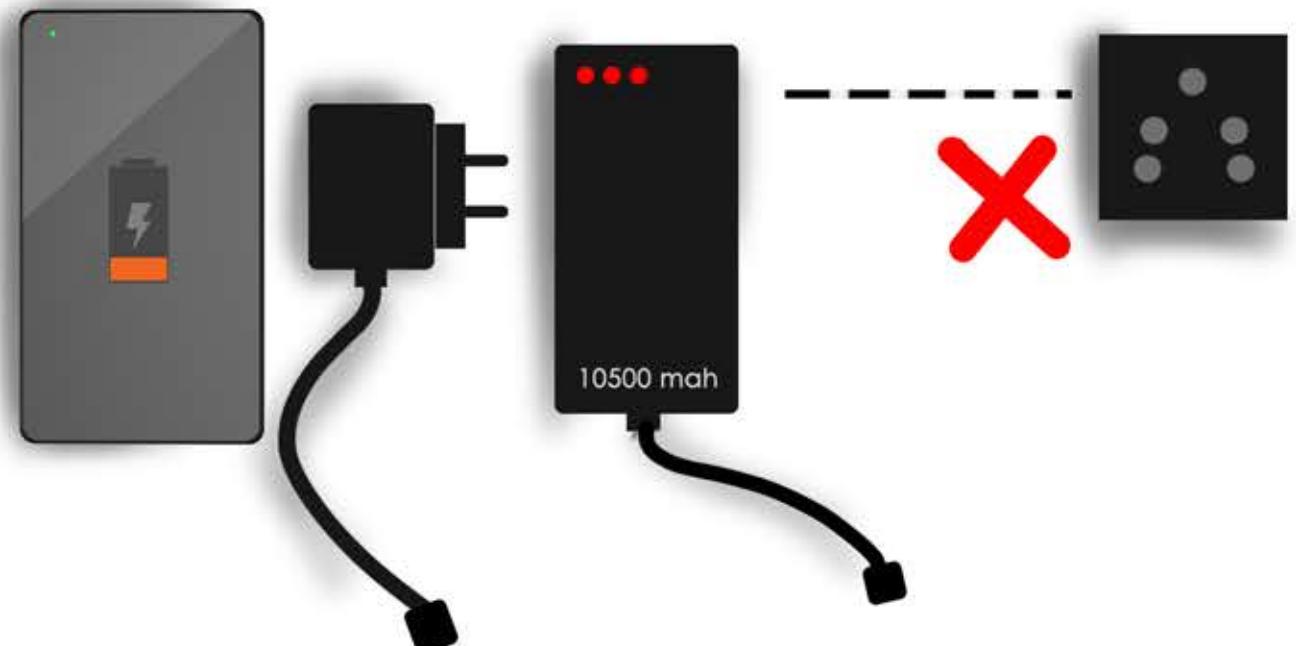
1

No mobile stand



2

Socket not available for charging frequently



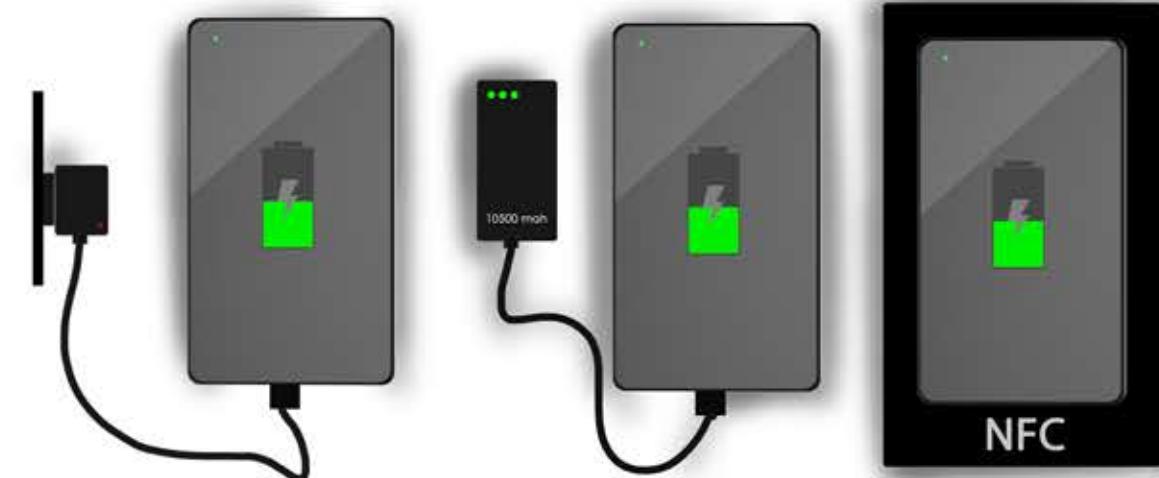
4

Handling so many things is difficult

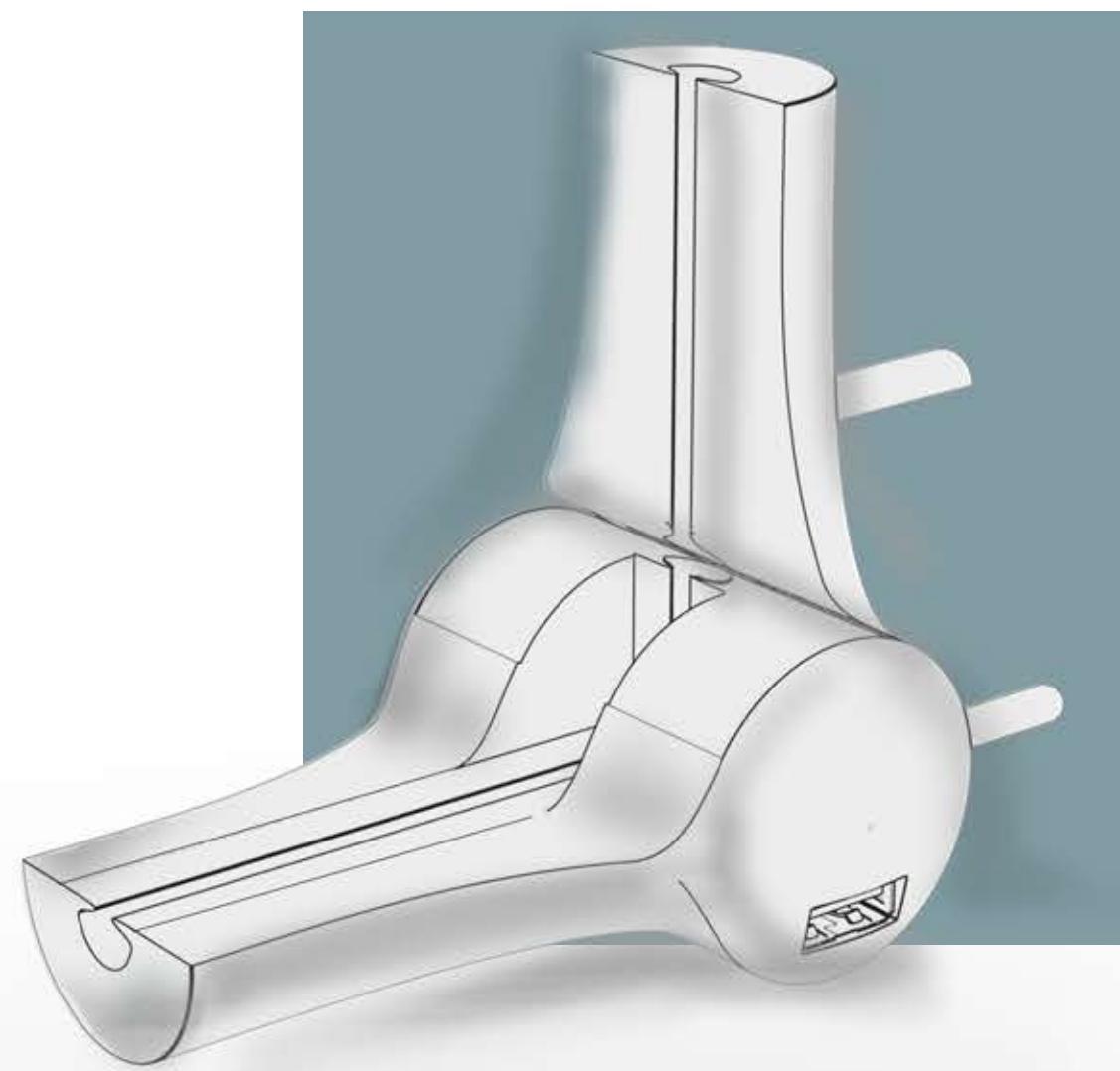
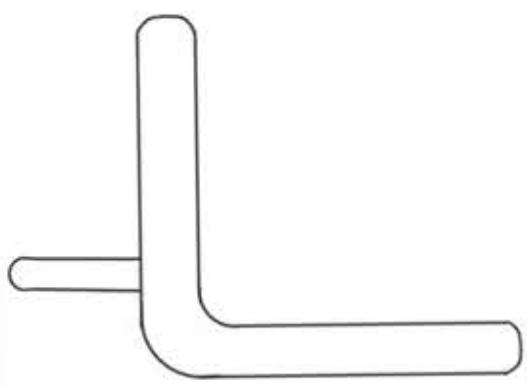
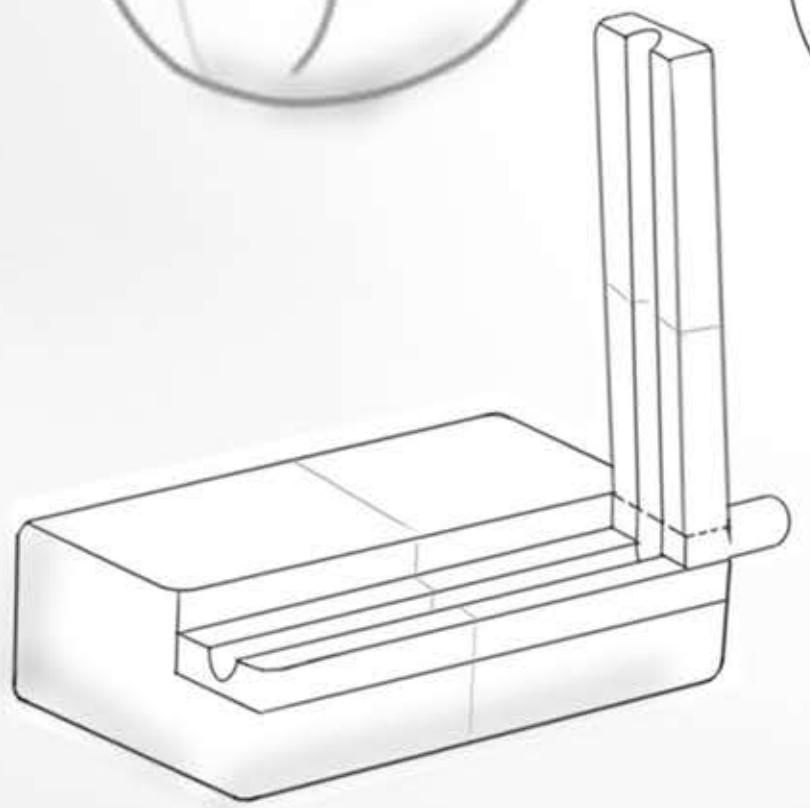
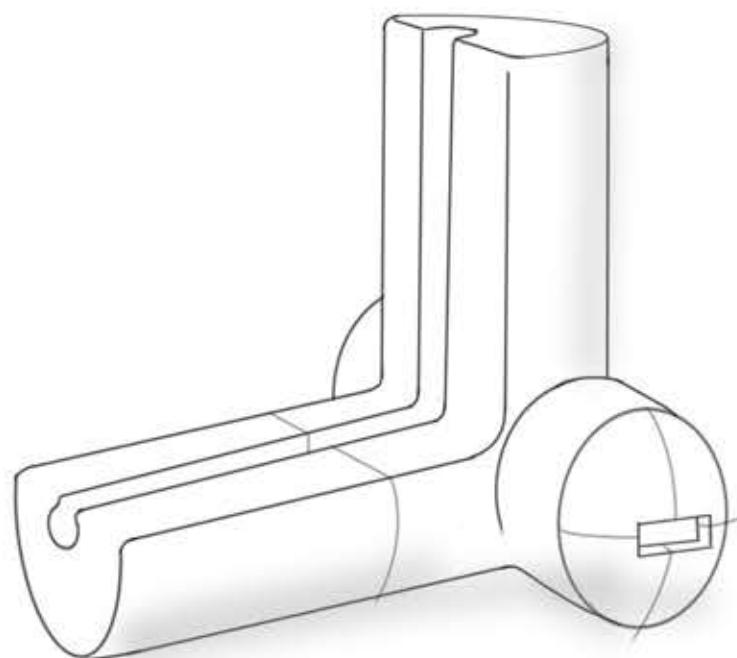
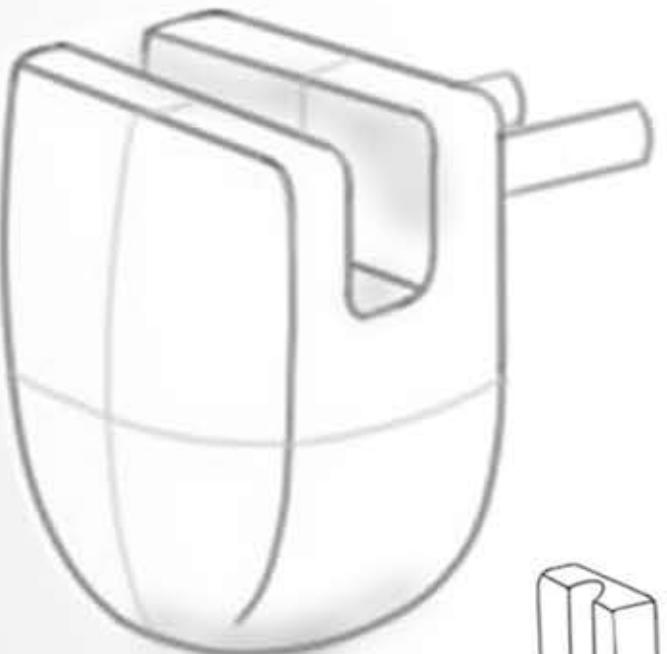
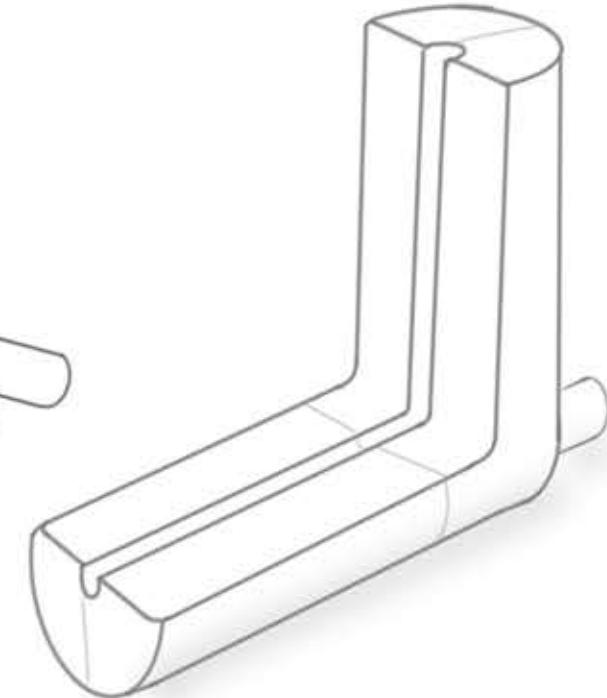
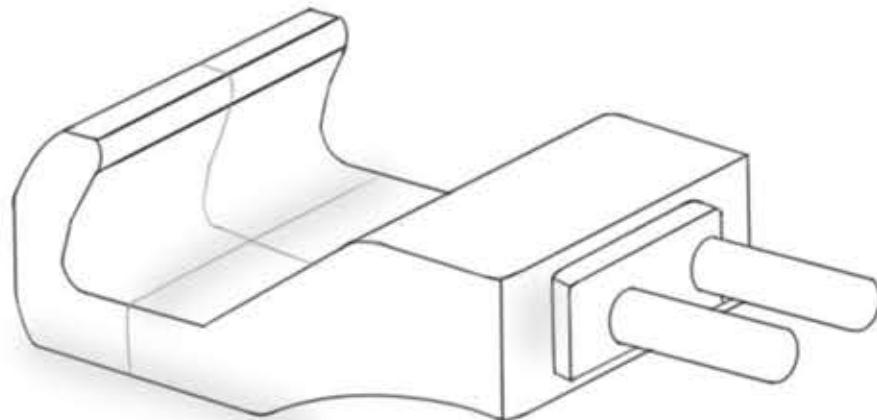
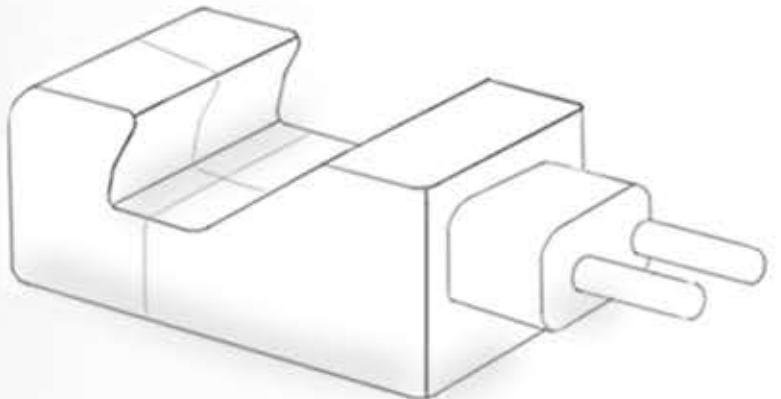


3

Why different types of chargers with the same purpose of charging



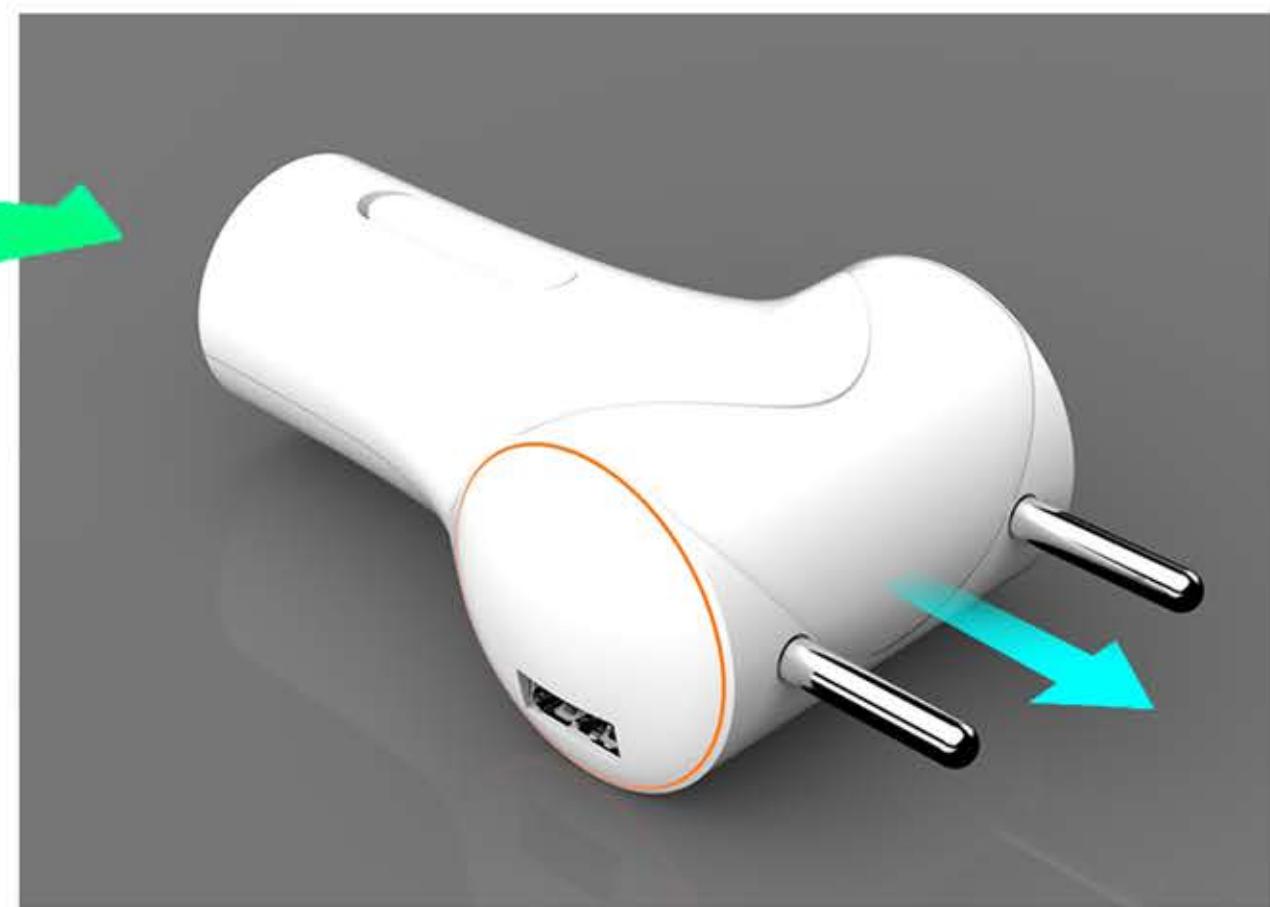
IDEATIONS



Working

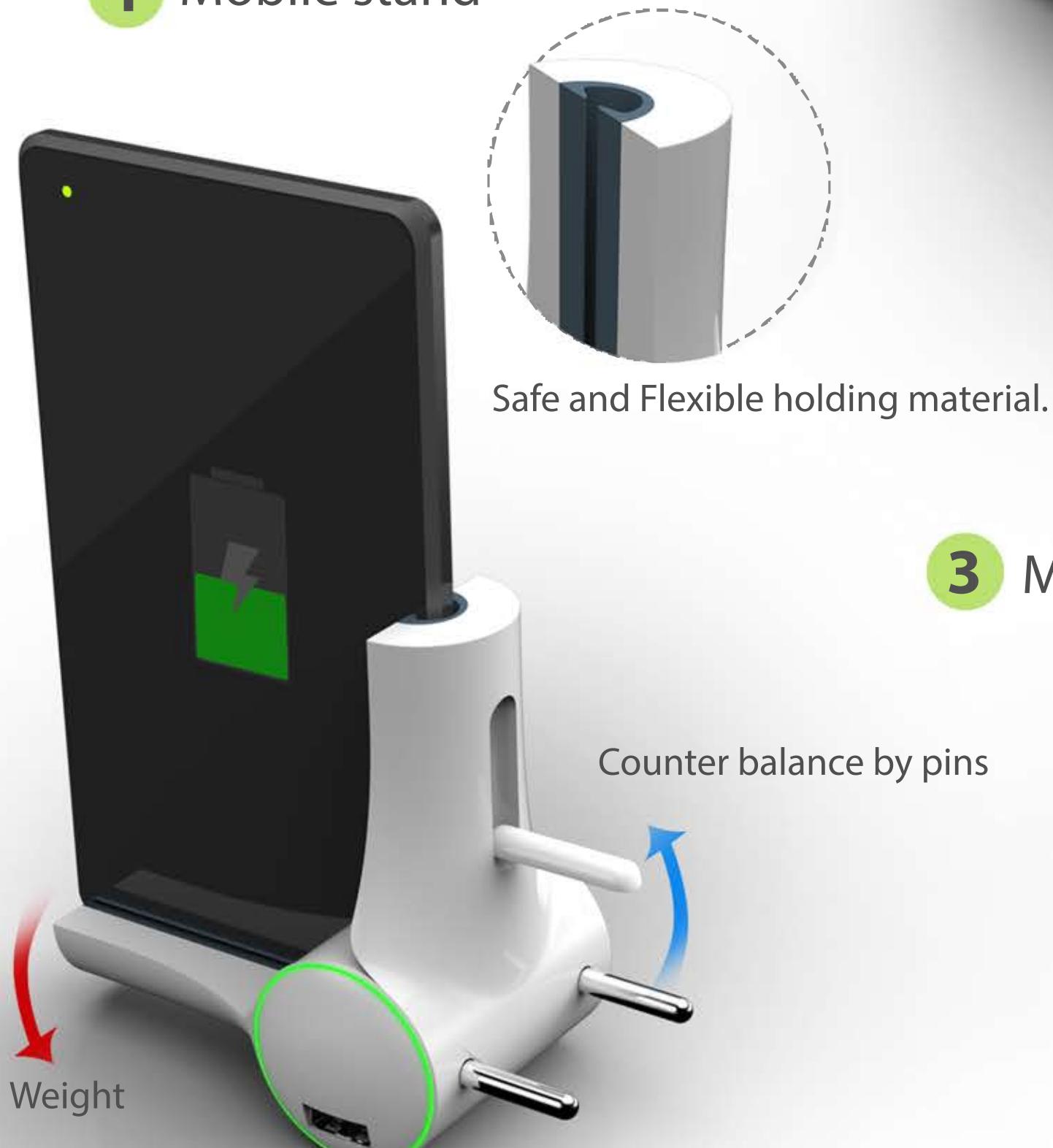


Pins open on a push
and the level of
power bank is
indicated via led
rings on both sides

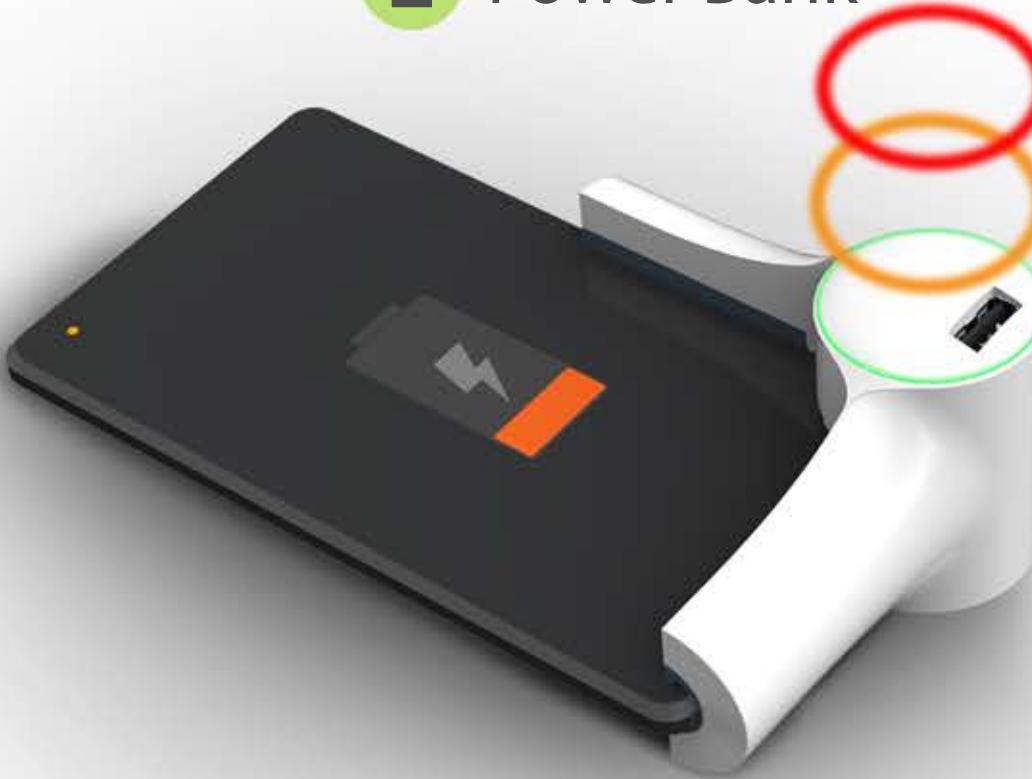


Functionality

1 Mobile stand

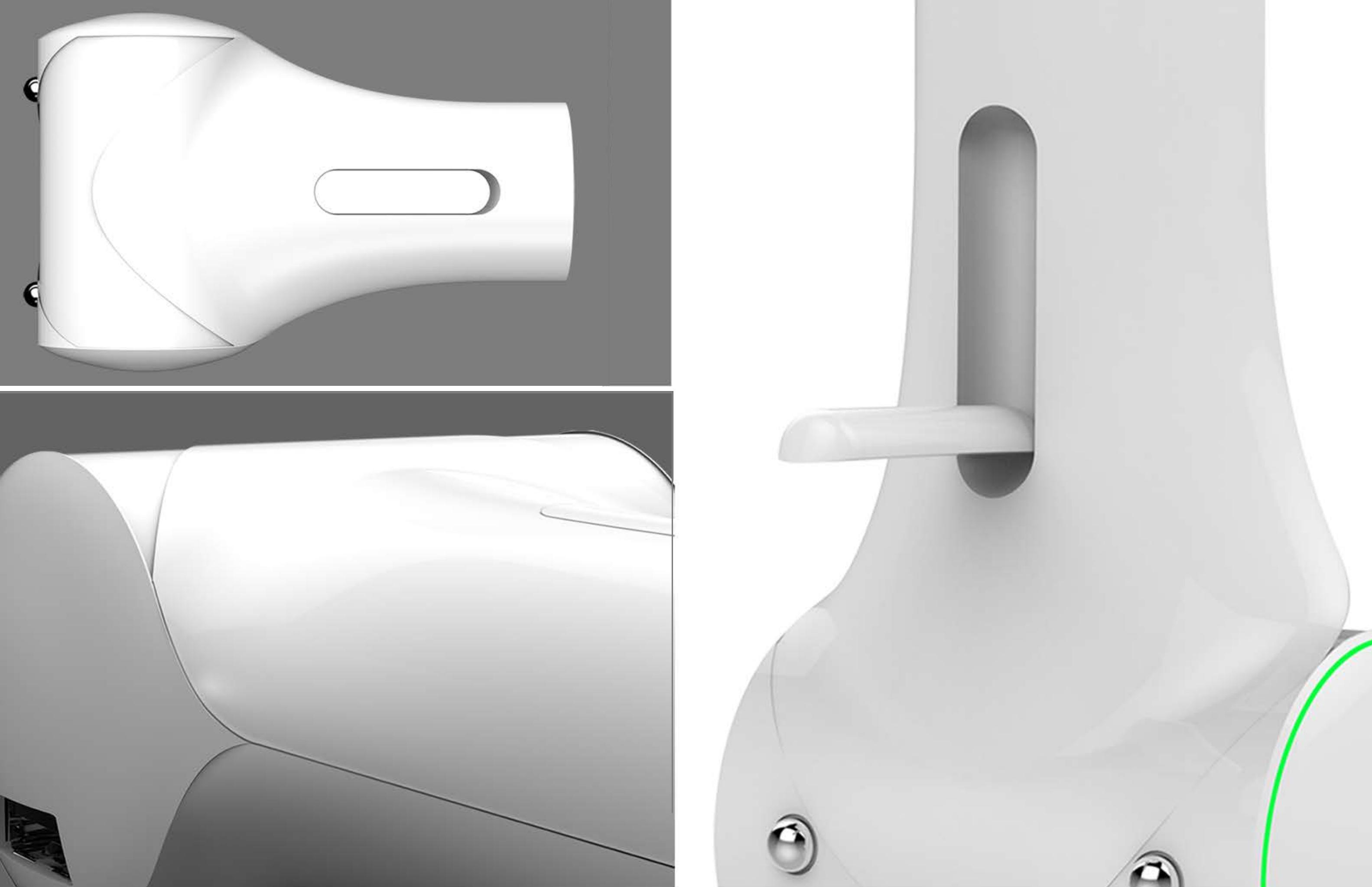


2 Power Bank



3 Multiple Mobile Charging





Charge is easy to carry , multi purpose device which fullfills various needs of mobile safety while charging. The overall form with an opening flap has been elaborated in terms of functionality and esthetics.

SIT

Hanging seats
for Metros



OBJECTIVE

To solve the problem of seating in metros

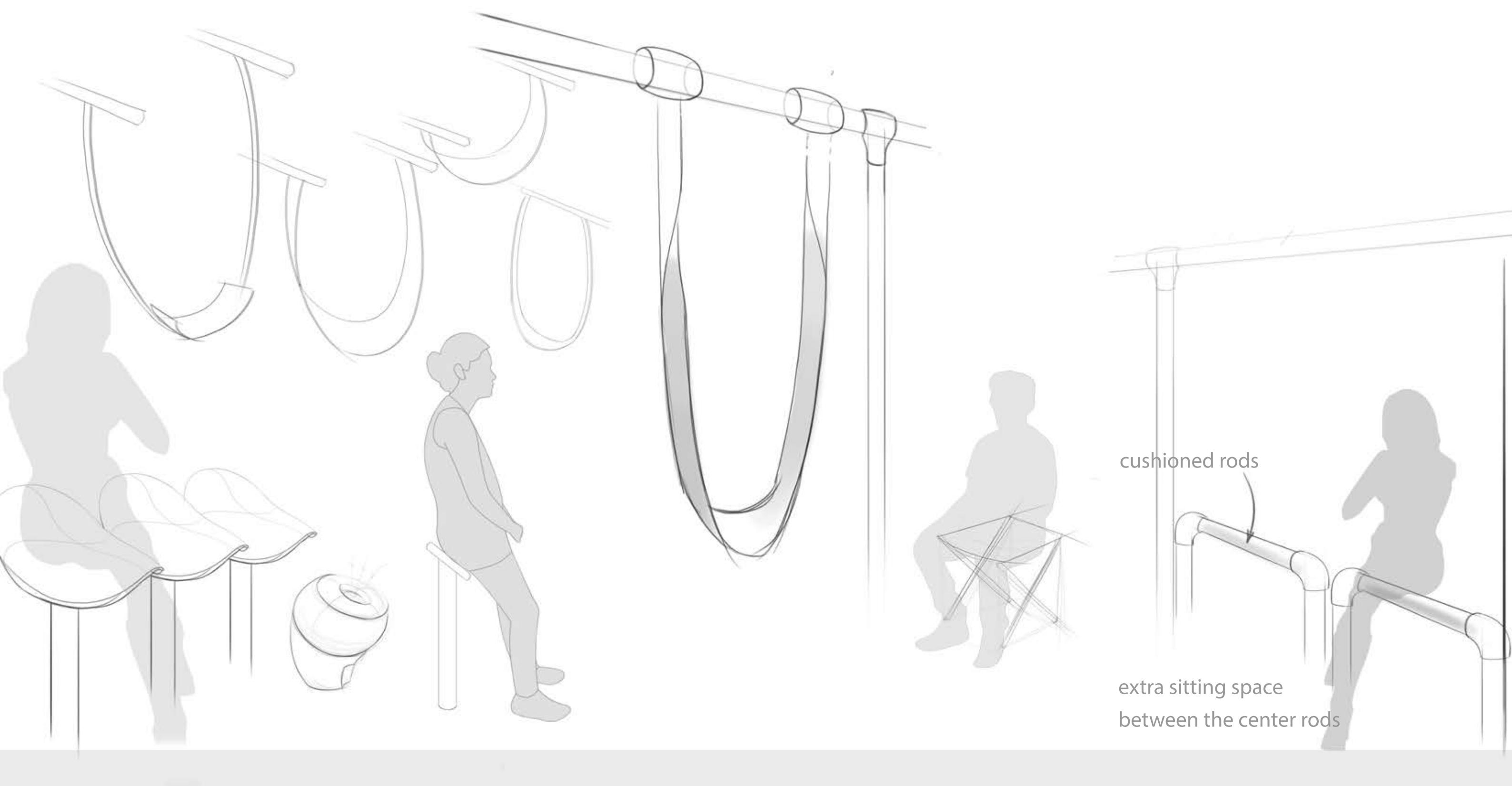
Standing in metros

In metros the arrangement for sitting is very less as compared to its carrying capacity, because of which most of the passengers do not get seat while travelling which causes tiredness and other stressful problems.



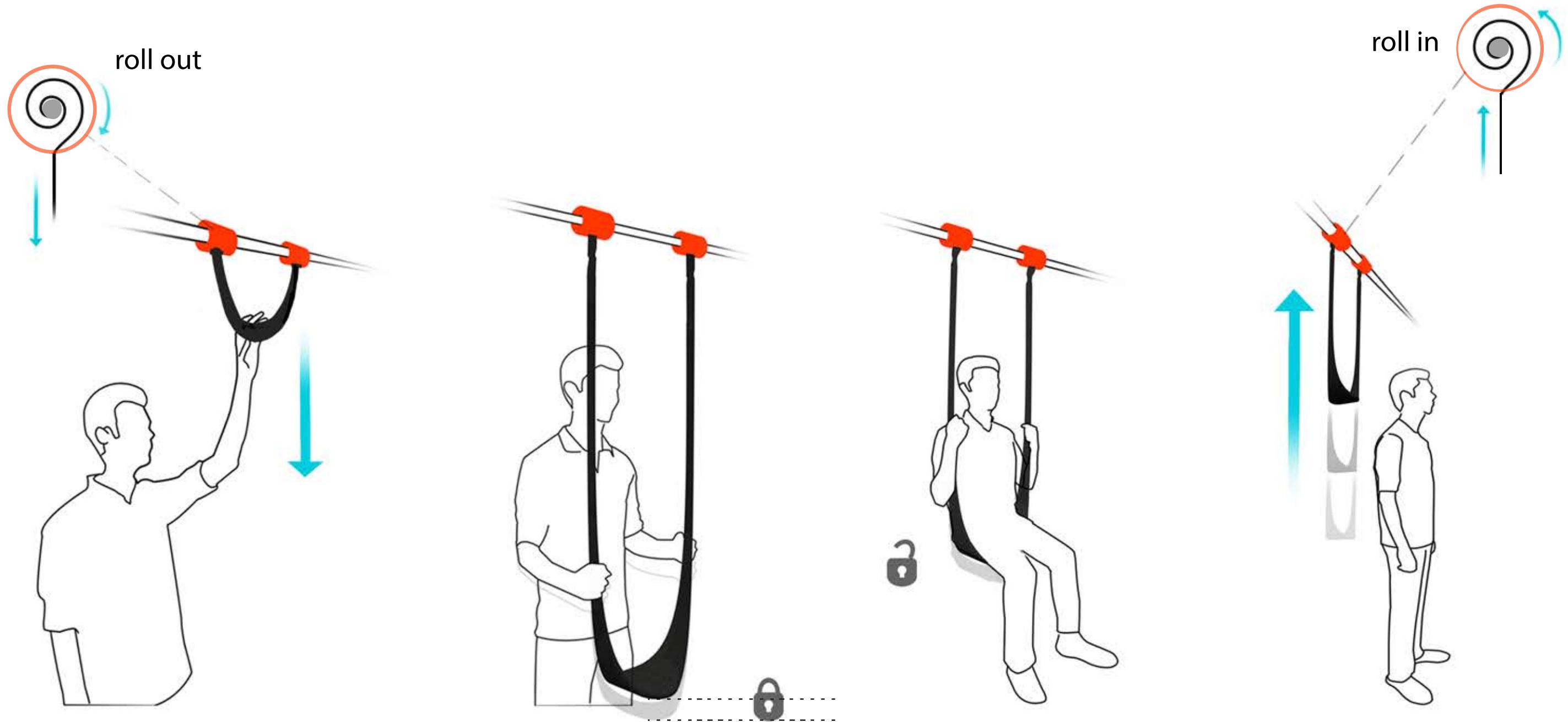
photograph referred from internet

Concept Ideations



Various ideas included designing temporary seating space. The area in between two pillars could be used to create seating arrangement as this space is less occupied in low rush hours. During rush hours maximum number of people get accommodated there.

Conceptualization



'SIT' is pulled down to sit. After pulling down to a certain level 'SIT' gives a click feedback and gets locked. When the person sits, it gets unlocked due to his/her weight. When the person gets up, 'SIT' automatically rolls up.

Conceptualization - Mockup



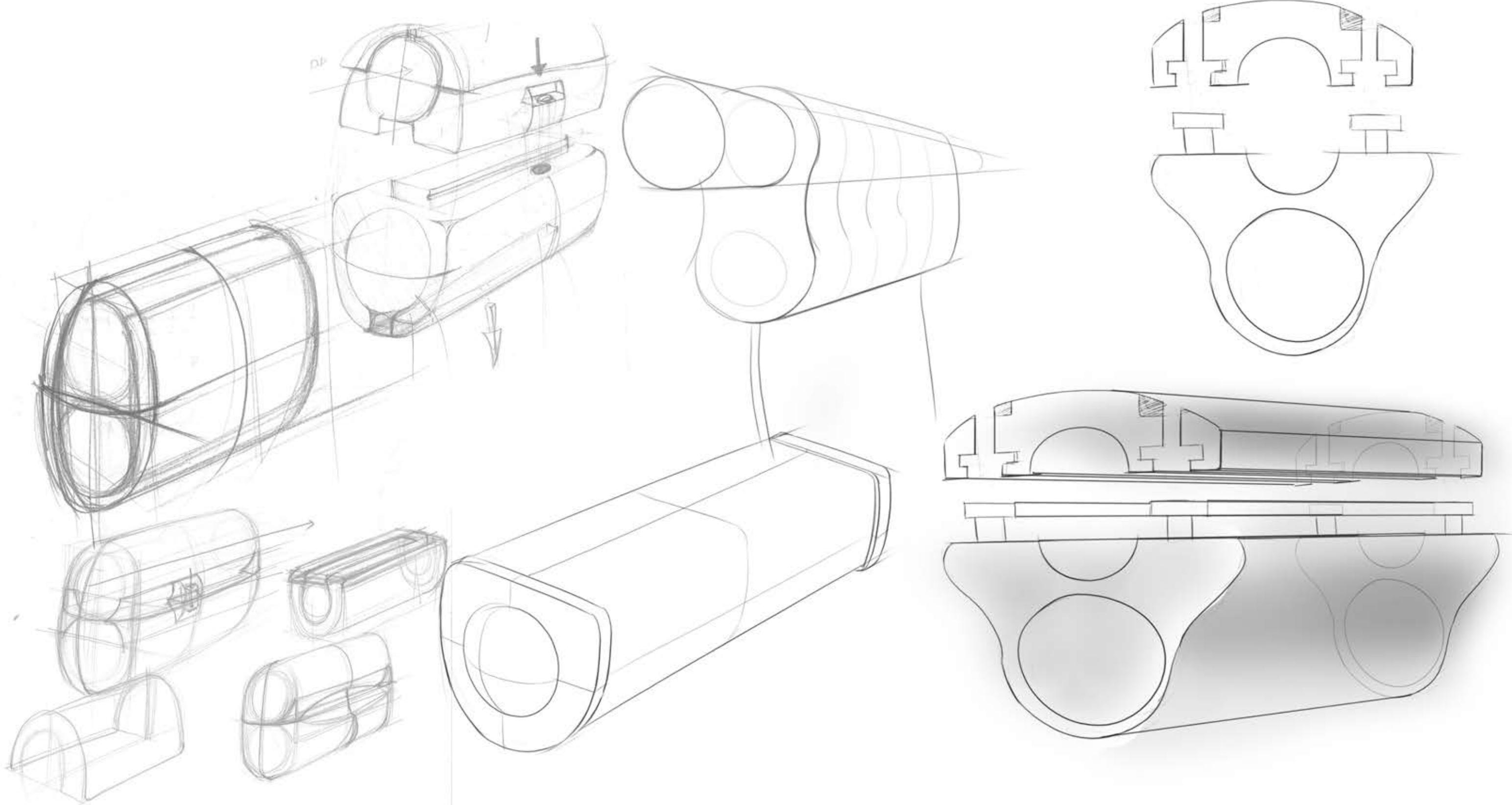
Mumbai metro - Swing Testing



A passenger travelling in Mumbai metro, sharing his experience.

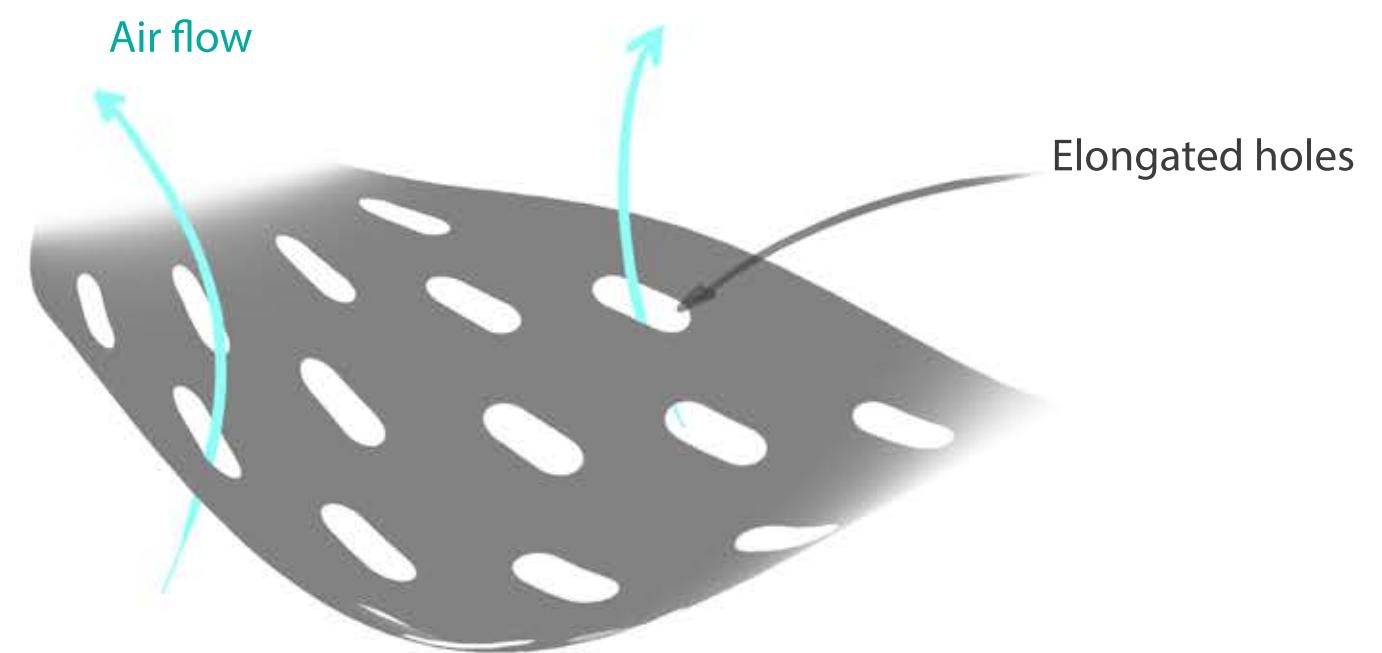
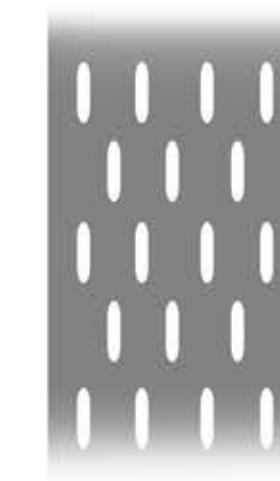
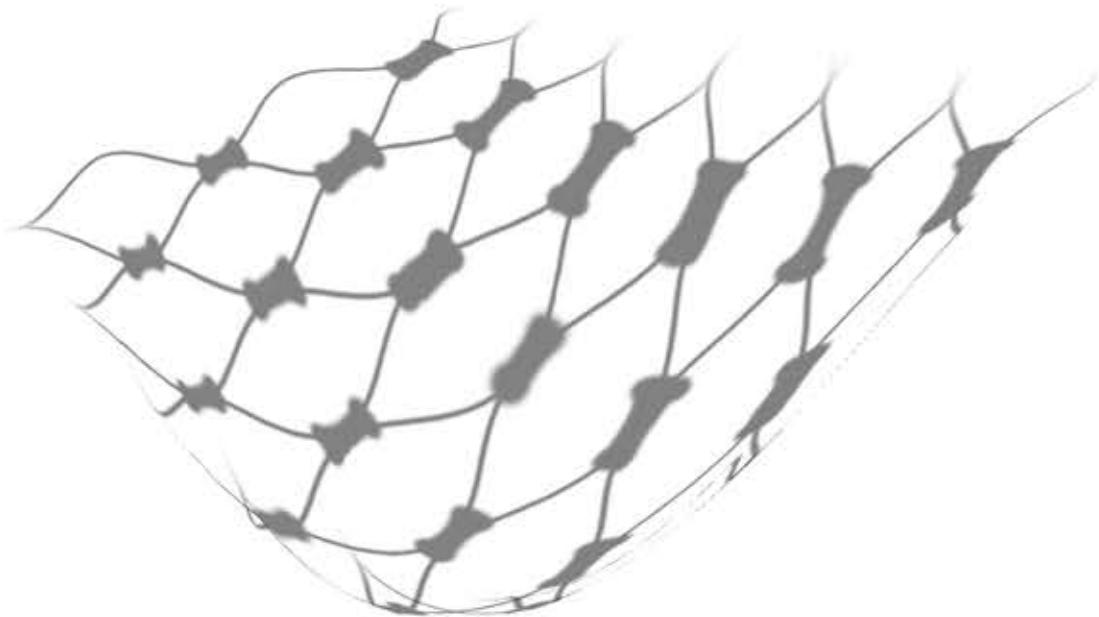
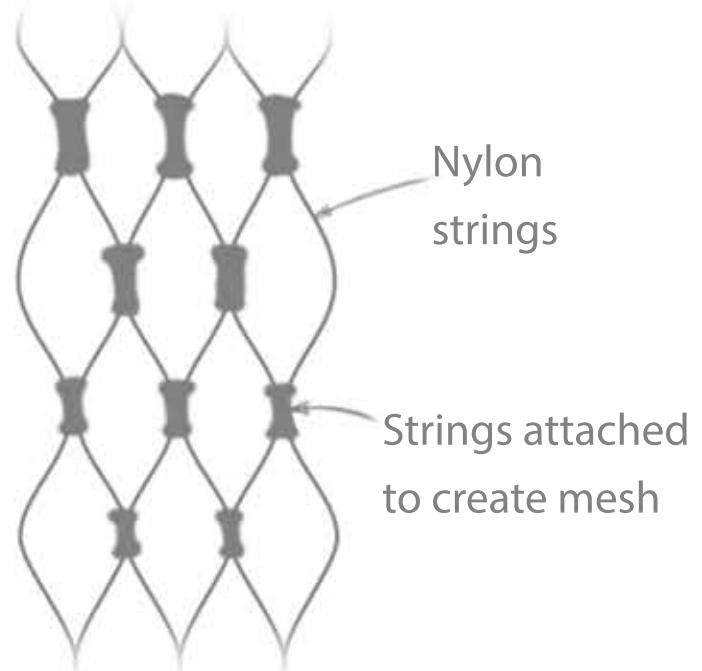
The mockup is made from car towing belt and muslin cloth. It was tested in Indian metros and the different passengers were requested to sit and test the mockup. Testing of the concept in terms of relative motion of seat with respect to metro in motion was stable. The overall feedback of passengers was very positive.

Form explorations for Hub



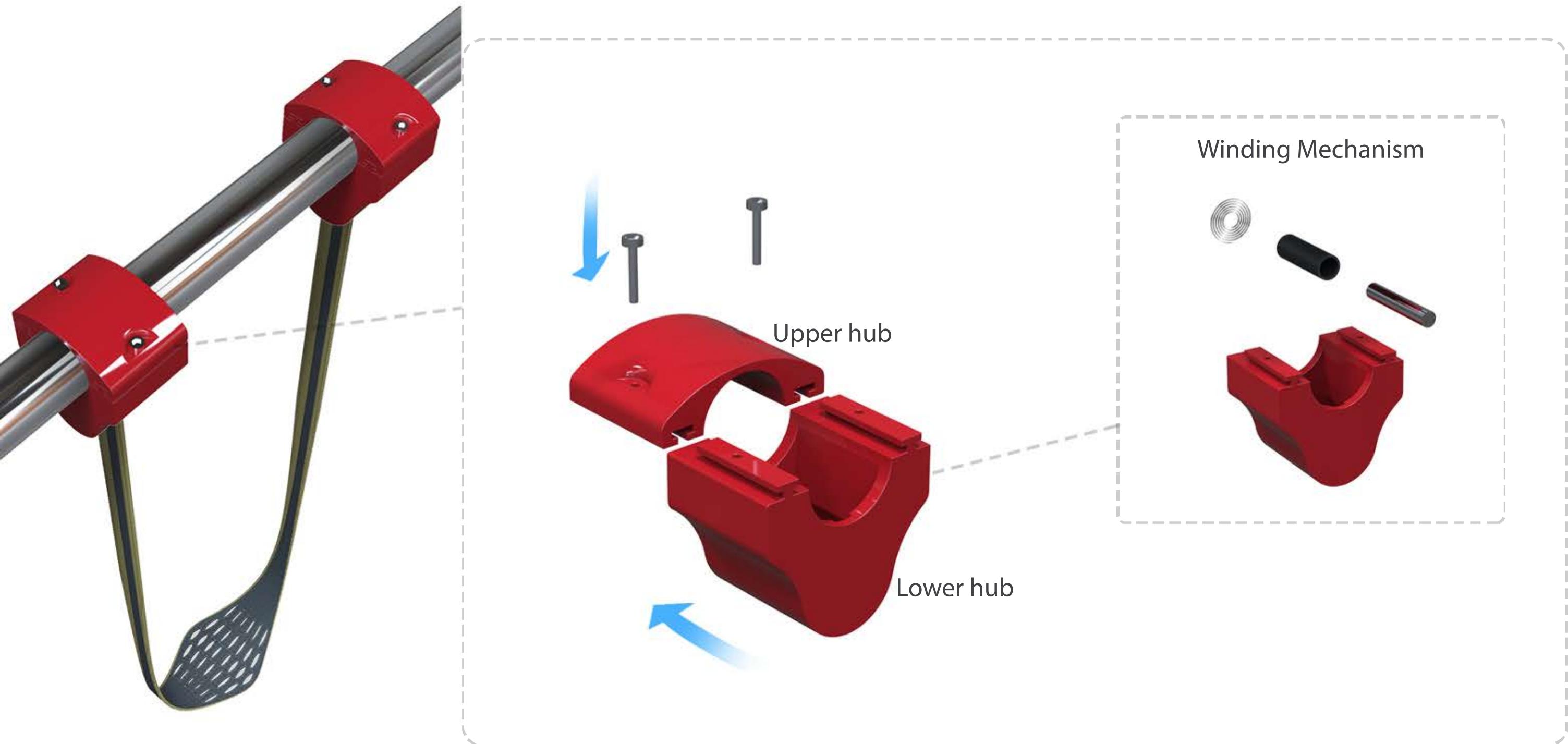
The hub was meant to contain the winding mechanism as well as the seating belt. Keeping required volume in mind, the forms for hub were explored. The easy mounting of the hub and maintenance was kept in mind to decide the mechanism of attachment with the existing rods in train.

Explorations for seat



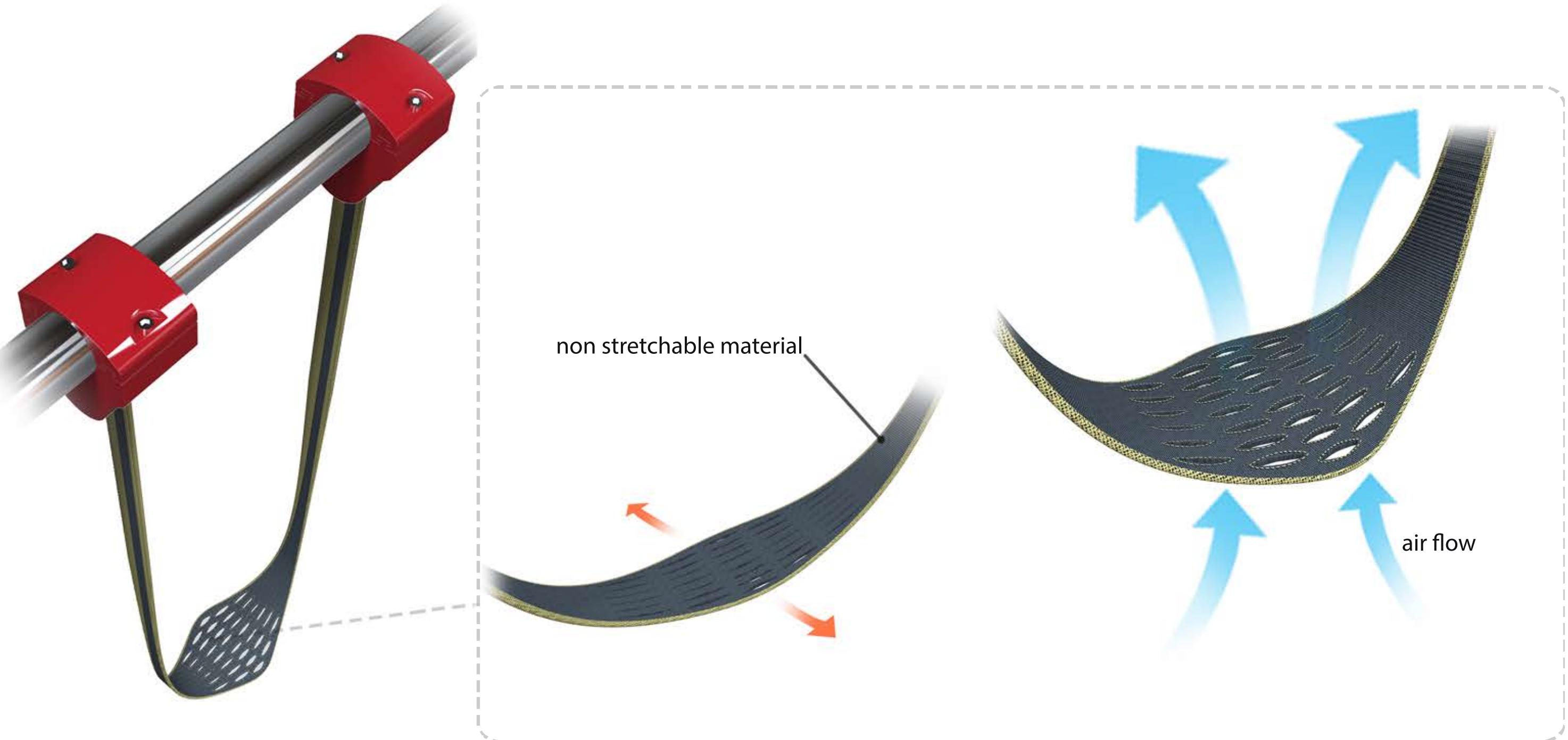
Every person requires comfortable space size for sitting. Also if proper ventilation is not provided then the seats will be uncomfortable resulting in sweat.

Final Concept - Easy External Attachment



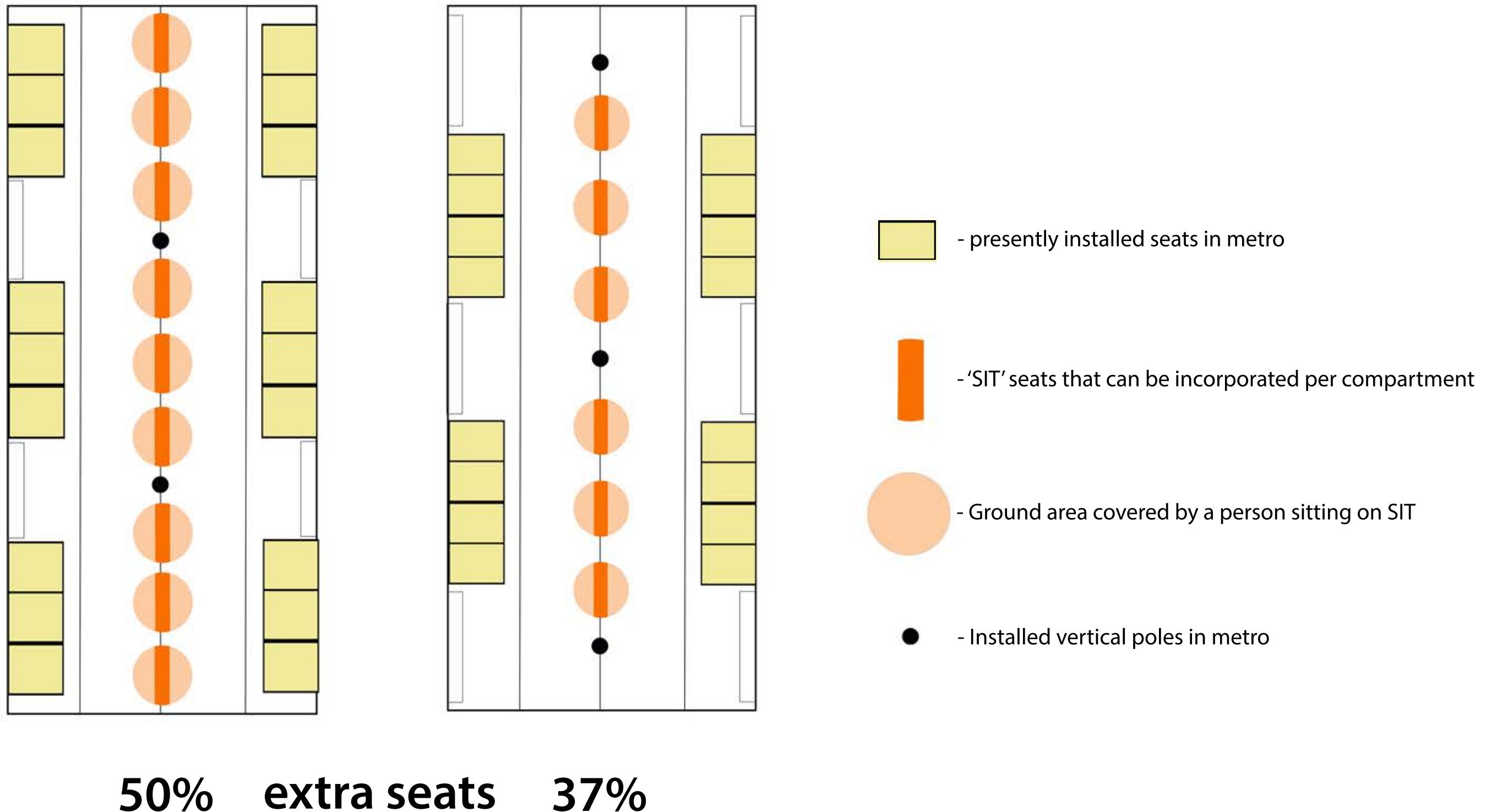
Since the 'SIT' has to be attached externally in metros the attaching mechanism is kept simple. The lower hub contains the winding assembly for belt, which slides into the upper hub. Both the hubs are locked to each other by screws.

Final Concept - Features

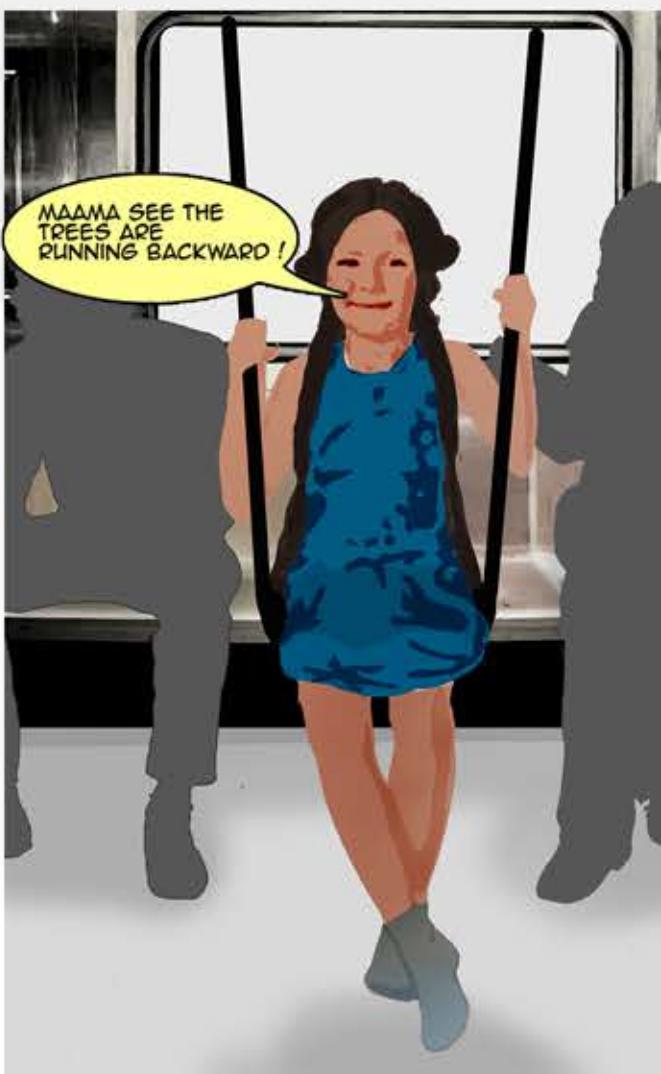


On the seating portion of the 'SIT' there are elongated holes, that help in stretching of the material hence creating more support area for the person. A person can stretch the portion according to his comfort. Also these holes create breathable space, due to which sweating and irritation is avoided.

Installation



Installation of 'SIT' & seats in different configuration of metro compartment is shown.



'SIT' provides comfortable and flexible seating for adults and a joyful swing journey for children.

CRABit

Whole crab packaging

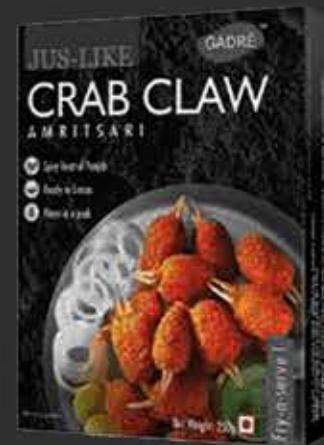


Objective

To design an interesting packaging for ready to eat whole crab for a company called Gadre

**Why do we need to
package
processed
whole crab?**

Only MEAT is packaged



**FRESH crab available only
in COASTAL region**



**Preprocessing before
eating is TEDIOUS**



**Unintuitive
Cuboidal
Unattractive**

**INTUITIVE
DESIGN criteria**

Make it COMPACT

STACKABLE

ATTRACTIVE

COLLAPSIBLE

WHAT we sell

Processed whole crab with cracked shell and bones

WHERE we sell

Entire INDIA

Target AUDIENCE

Working Single Youths



Crab lovers



First Time Eaters



Working Family

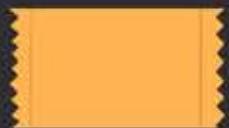


Main Revenue Area
NON COASTAL REGION



USP

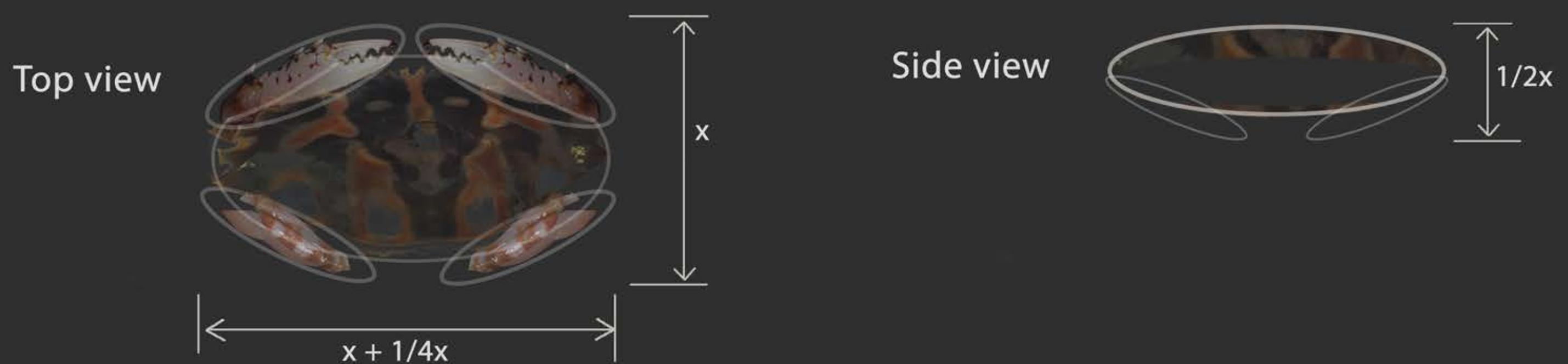
Crab MASALA Cracked SHELL and BONES



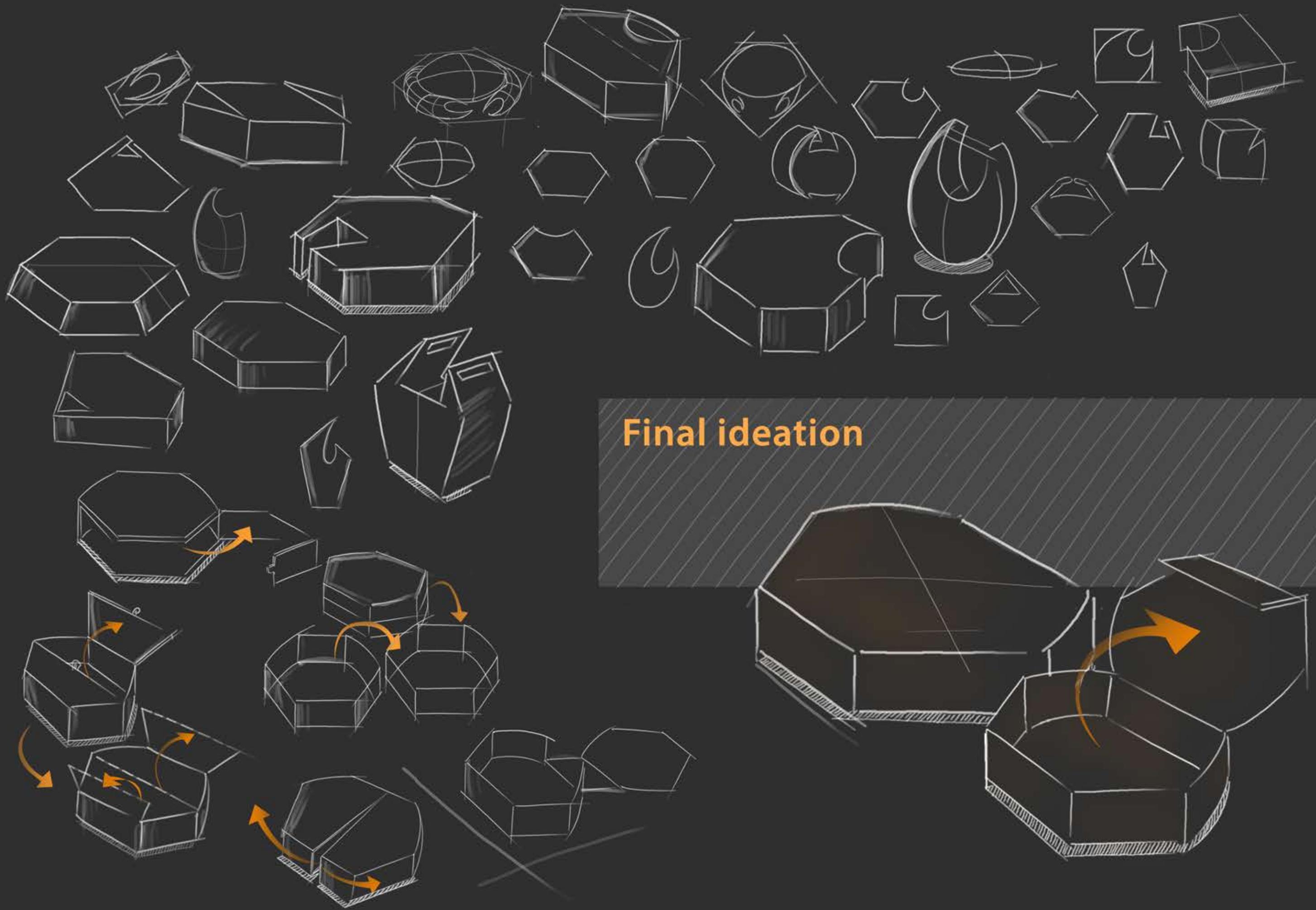
EASY cook

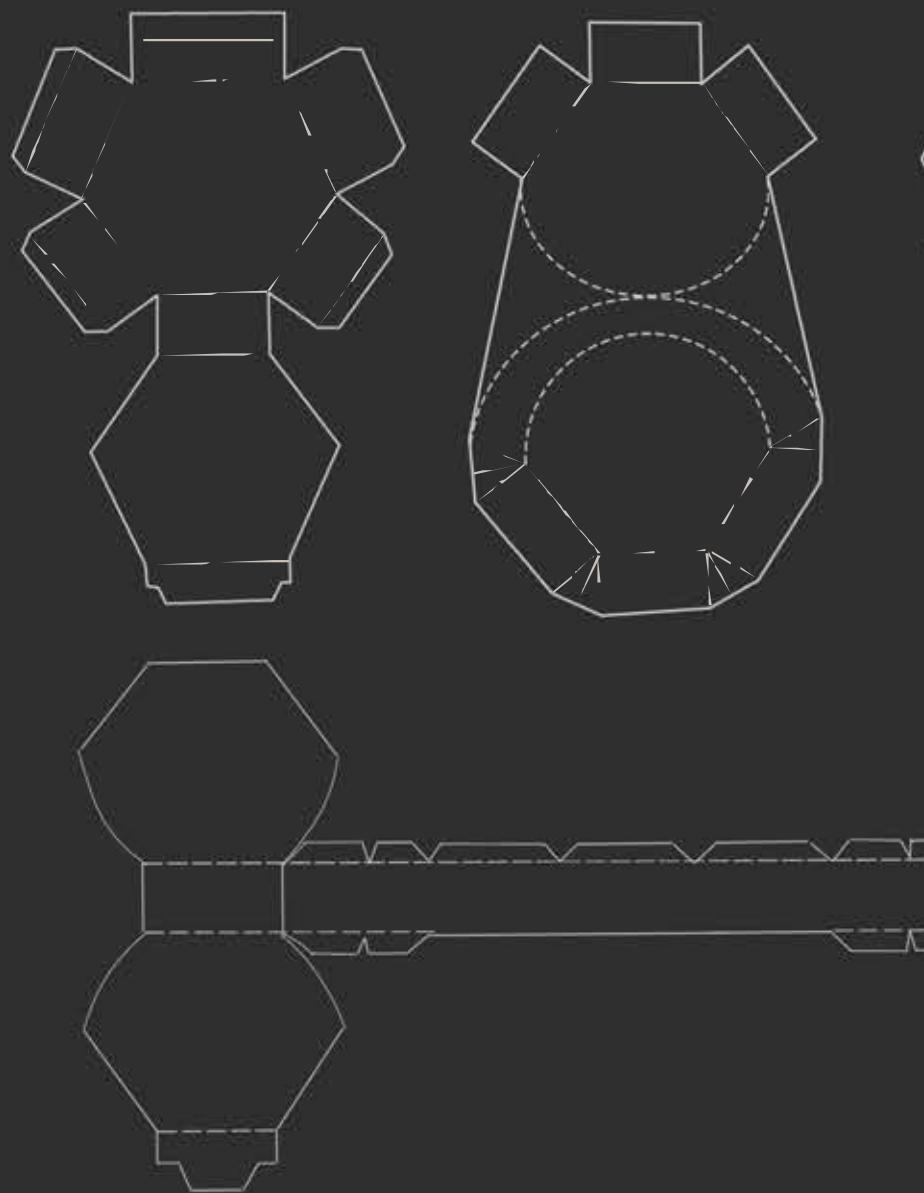


Thermoformed whole crab and its approximate dimensions



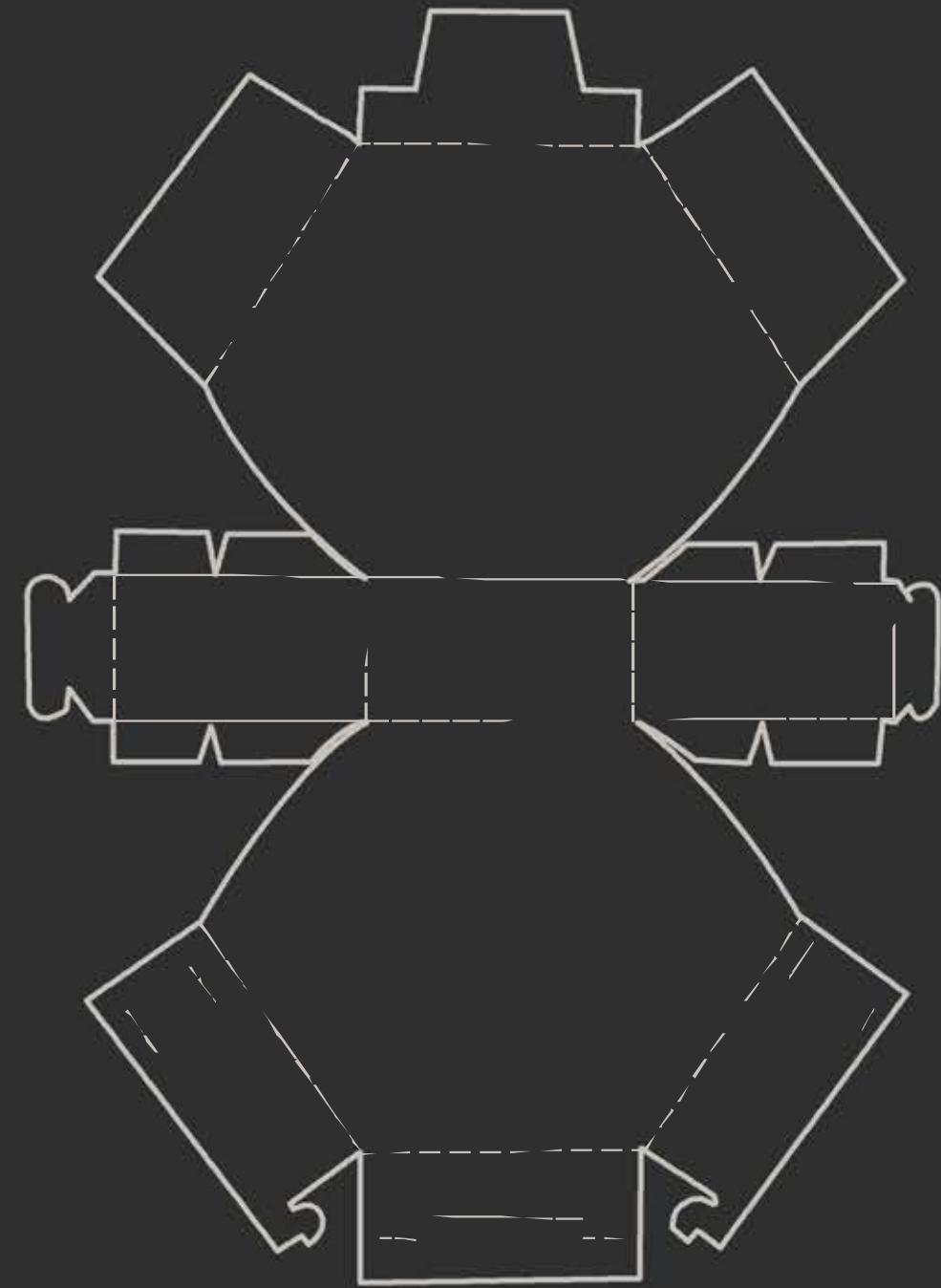
* since crabs are of different sizes its dimensions are approximated.





Final template was chosen by considering factors such as

pasting
collapsability
stability
feasibility



Final Outline template

Mock Ups



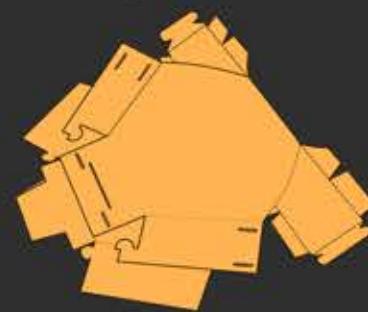
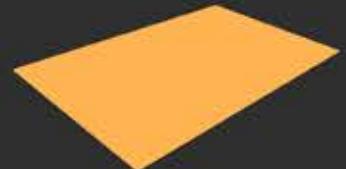
Final packaging is

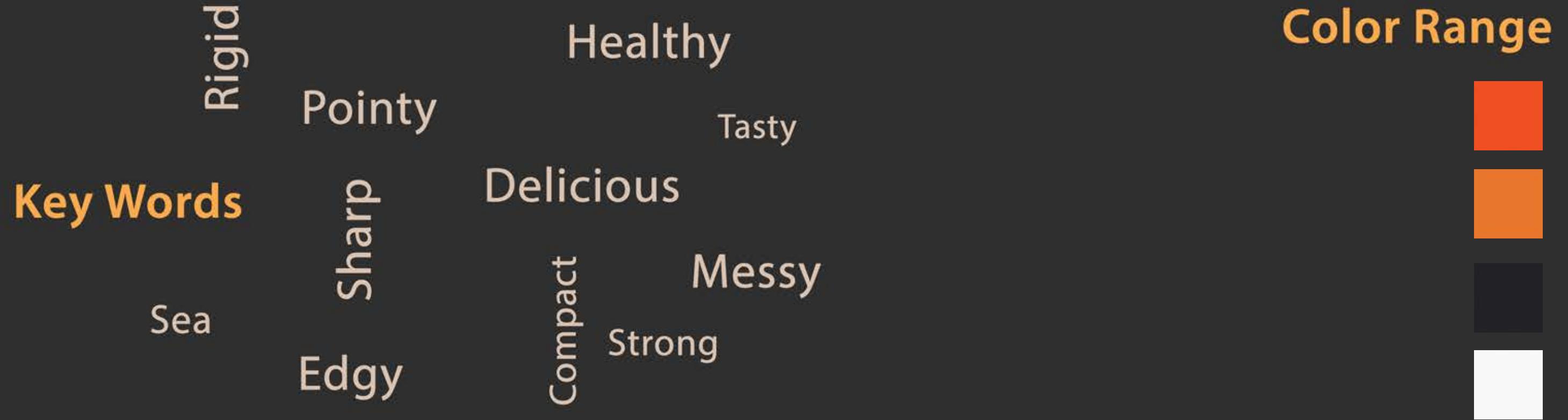
Single sheet

Easy to transport

Stackable

Collapsible





Logo explorations

CRABIT



Tray inside the package for
the thermoformed crab
PET

PREMIUM Packaging for Higher Middle class
Polypropylene Sheet



ORDINARY Packaging for Middle Class
Solid Bleached Sulphate(SBS) Board



Masala Packs, famous crab masalas from all over India
Sachet of VMPET

AB CLAW

oriental food now in india

Reviews

ims



Serve +
Try-n-Serve !

GADRÉ

CRABit

in 10 minutes

Cracked shell and bones
Removed inedible parts
Mud Crab



Just Like Tilapia Fish Fillet 250g

150.00

TWISTER

Desk top lamp



Objective

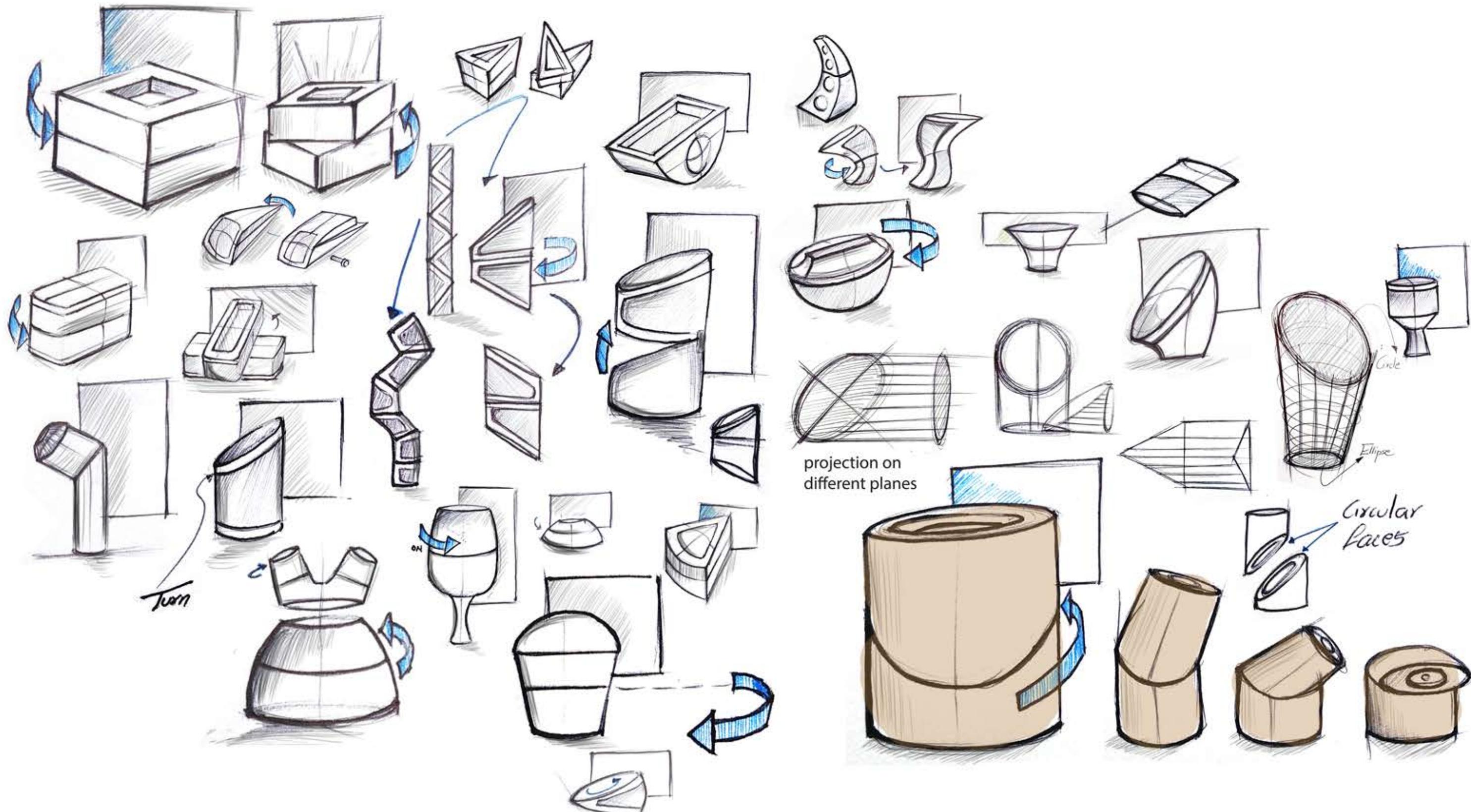
To Derive a simple and interesting desktop lamp

TWISTER

Desktop light- turned on by a simple twist

The aim of this project was to explore a personal light device and to create an innovative product user experience by taking inspiration from simple shapes like square, circle, ellipse etc. The light is turned on by a simple twist changing its form, avoiding the need to flip its switch on always.

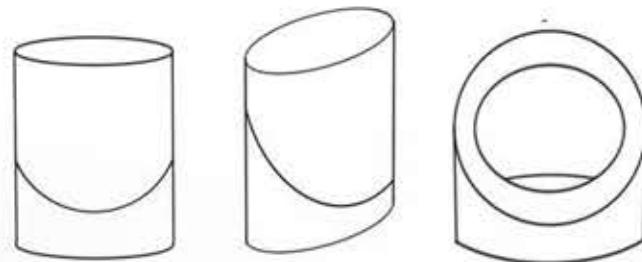
Keeping desktop scenario in mind the size of the lamp should be small ,minimalistic and it should be sleek and it should have easy turning on and turning off of light.



Final Form



The form is such that it has two equal halves, each half has a circle on a 45 degree plane which is projected on a horizontal plane to become an ellipse so the lamp is intuitive and sleek.

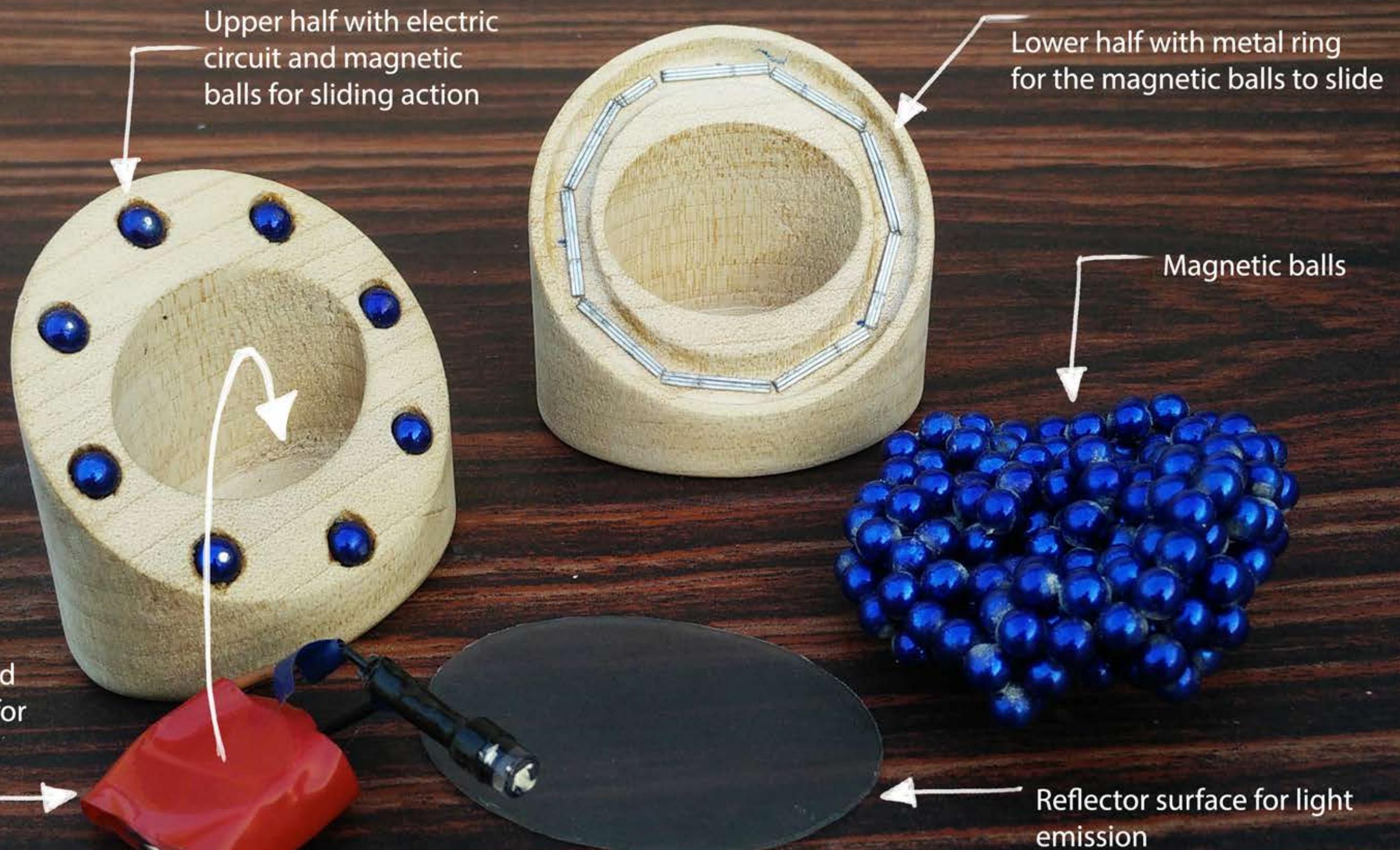


CNC Milled model



Attributes for designing the mechanism for rotation-

- Simple changeability of battery
- Sliding contact of two parts
- Two parts should be detachable easily
- Rotary mechanism without the offset of two parts



Features

- Easy on and off
- Two halves can be separated easily for battery replacement.
- To switch on the lamp, it can be turned in any direction from the below position.
- Handy and sleek



*This is the off condition of
the lamp*

Final model



THANK YOU for Viewing :)

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 **Priyank3rangparia@gmail.com**