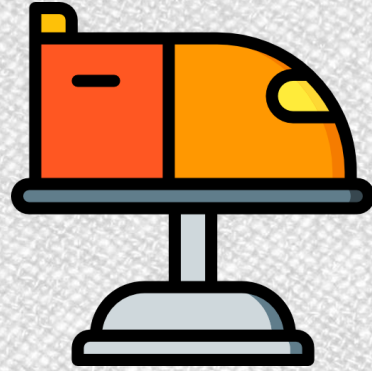




Immersive pod for VR experience

by
P Sri Hari

Under the supervision of
Prof. P Kumaresan



Virtual reality is a
computer-generated feel
real environment.



Existing Problem:

Most of the existing Virtual reality platforms rely only on the visual aspect (Sight) and do not stimulate other senses.



“The best Virtual Reality aims to achieve complete immersion”





Design brief:

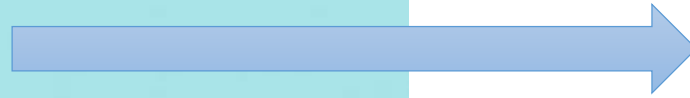
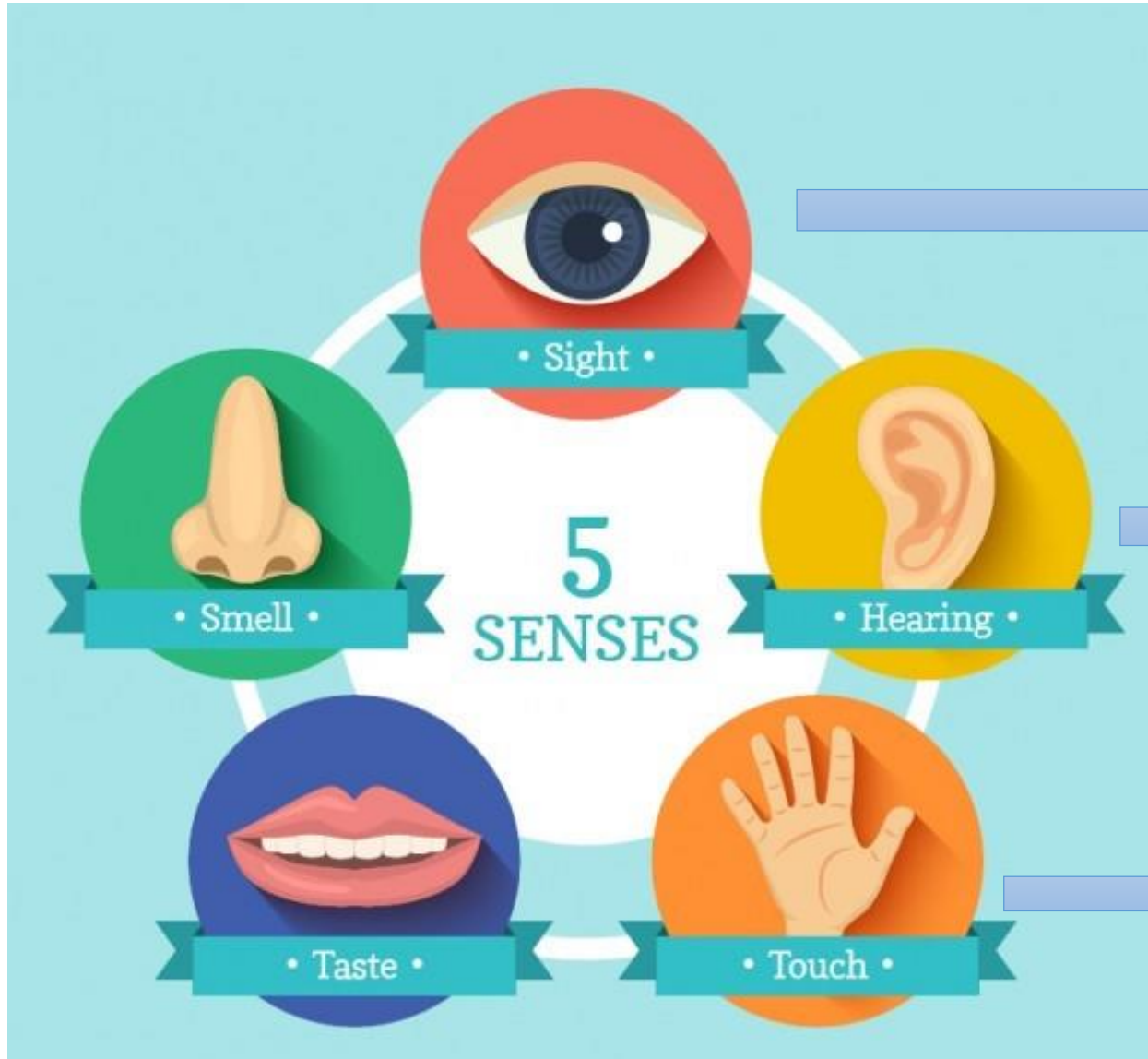
“ Design a system to enhance the virtual reality experience, making it more immersive”



Target Audience:

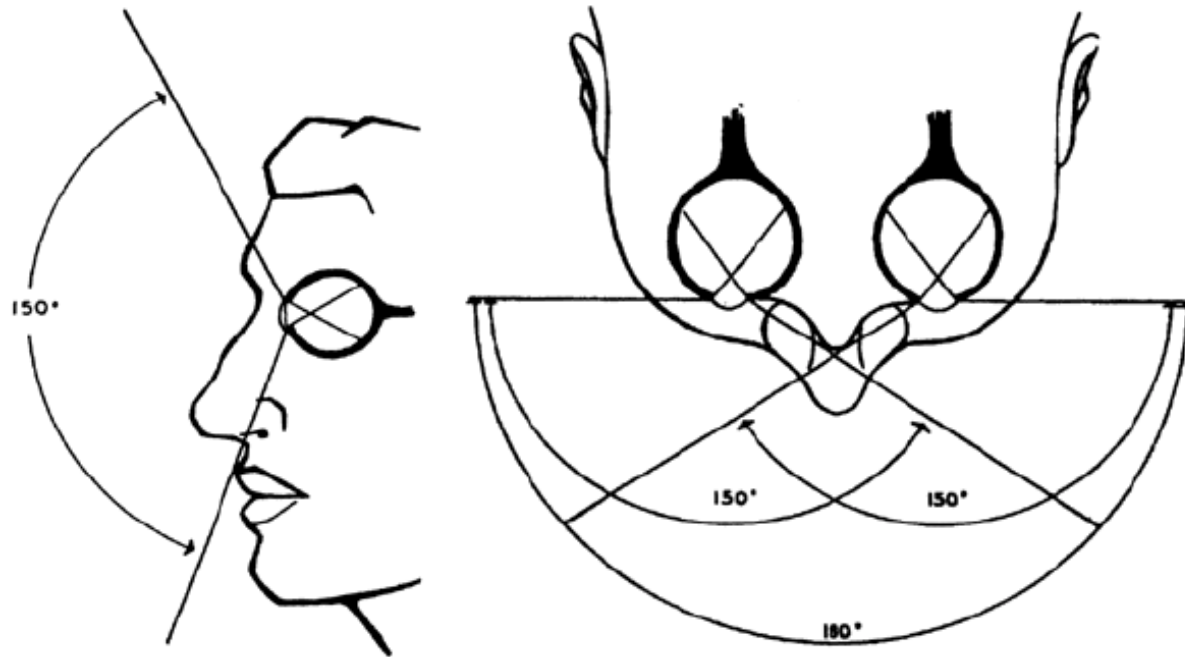
“Tech savvy high end customers”

- Curious
- Ample disposable income
- Exclusivity factor
- Celebrate success
- Customized services

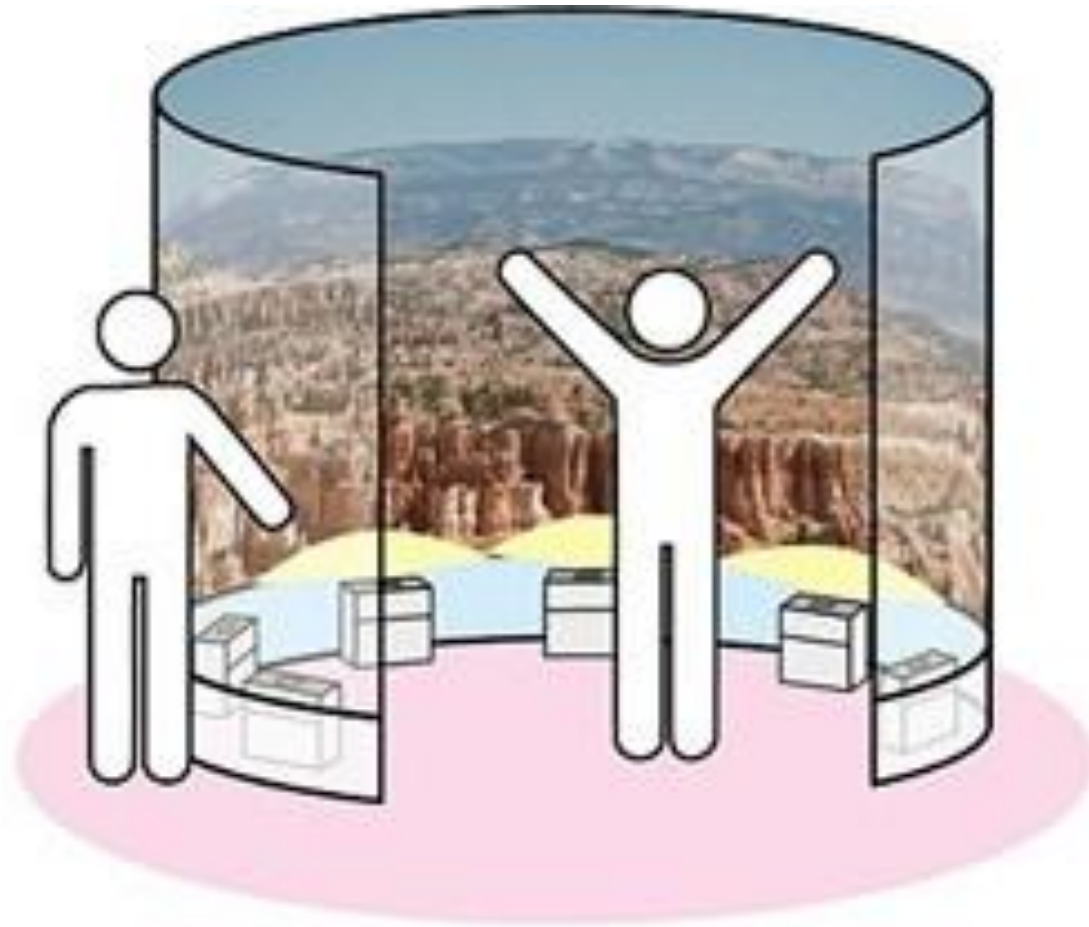


Technology Exploration (Sight)

Field of vision (FOV): Wider the FOV, the realistic the experience.



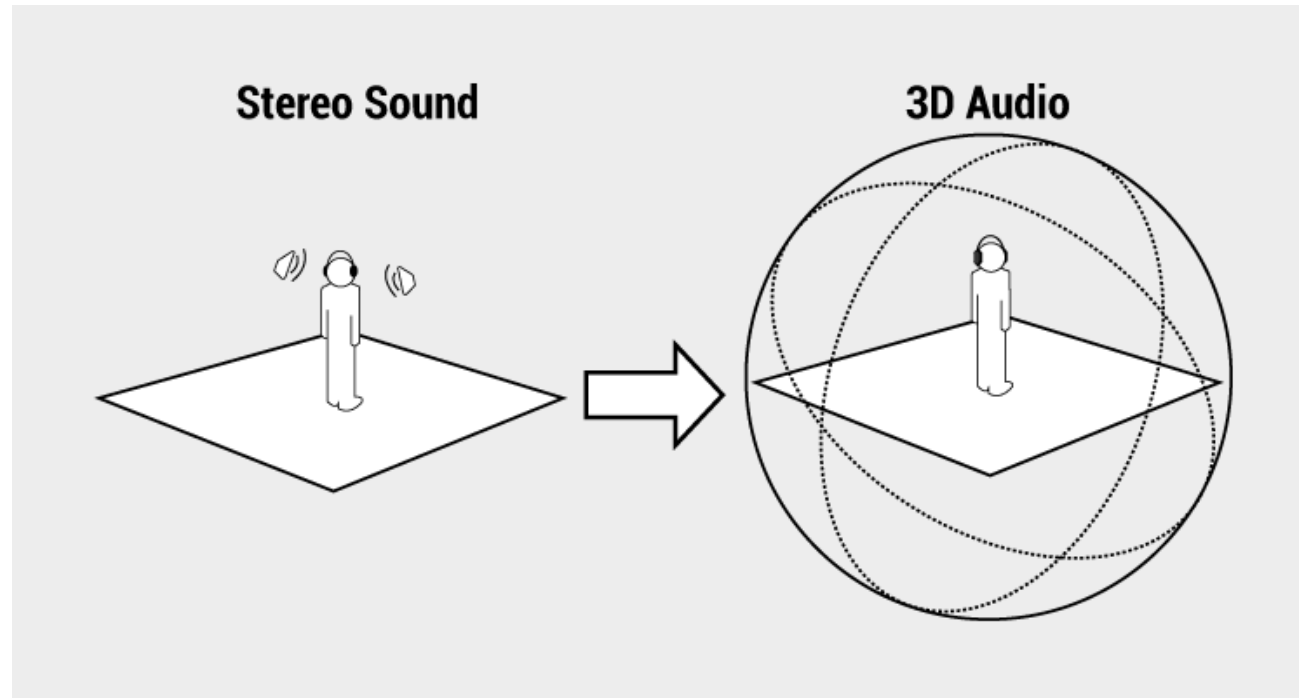
Human eye FOV (180 H X 150 V)



Immersive Projection

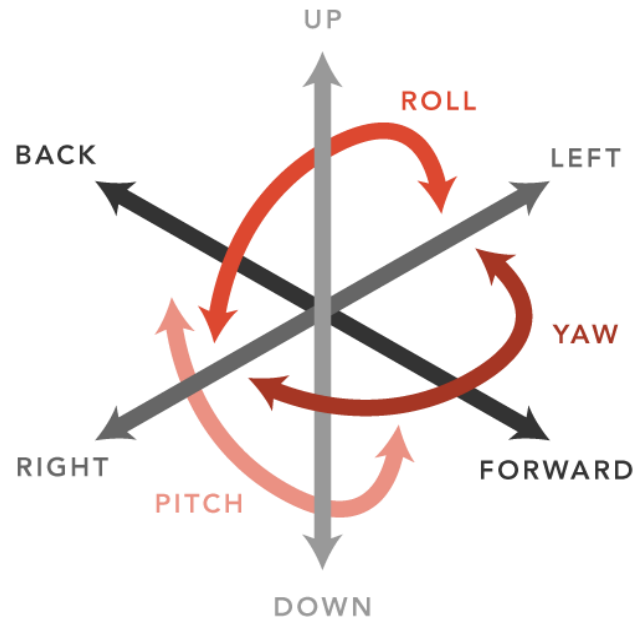
Technology Exploration (Hearing)

Ambisonics:



Creates Smooth, stable and continuous sphere of sound.

Technology Exploration (Motion)



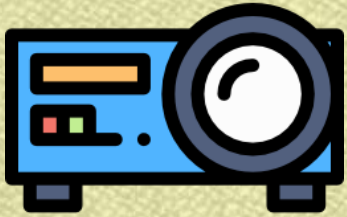
Motion of object in 3D space

To define the motion of an object in the free space, at least 6 DOF is employed. Six degrees of freedom refers to movement of a rigid body in 3D space.

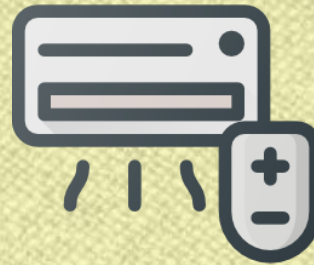
Motion Platform



Sub systems:



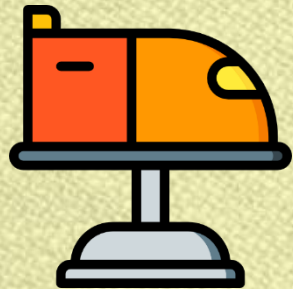
Immersive Projection



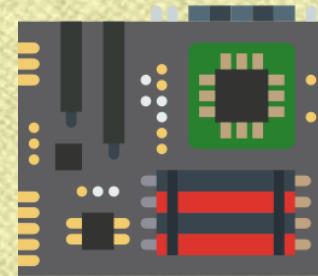
Air conditioning



Seating

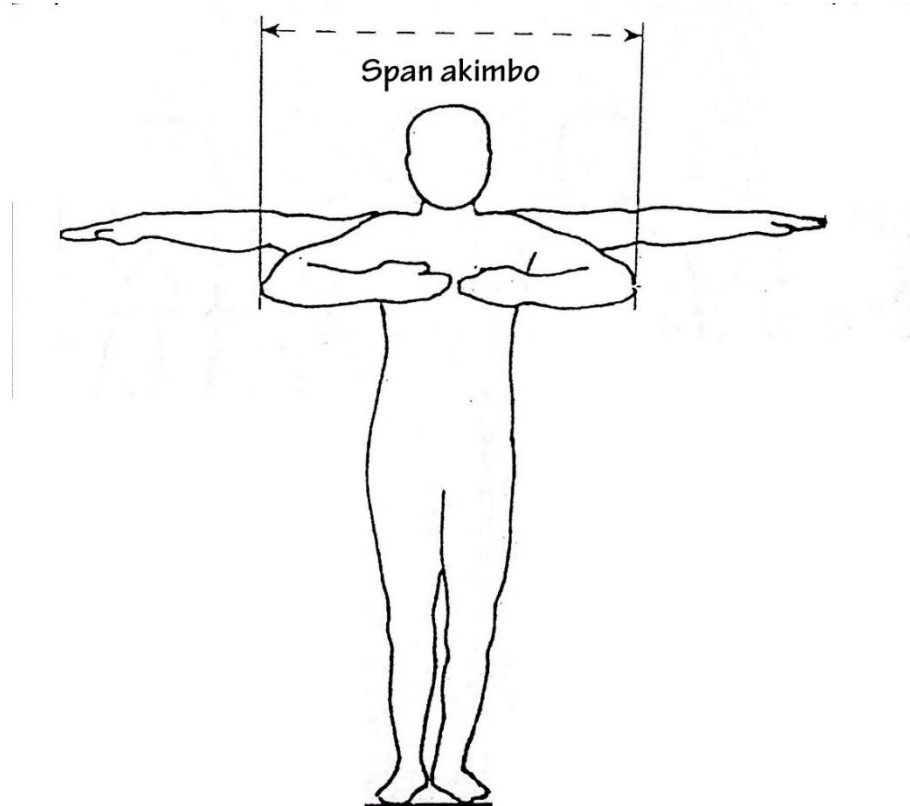


Motion Platform

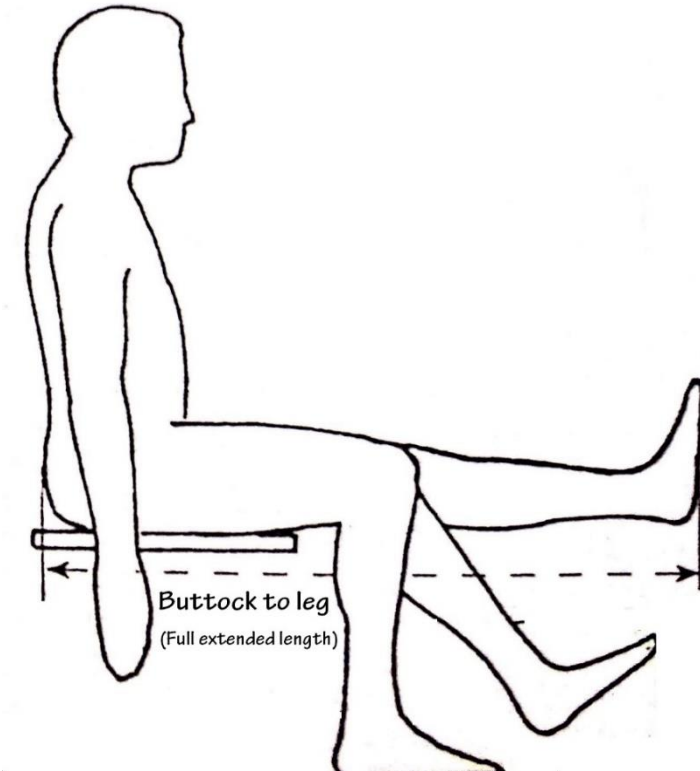


Electronics

Anthropometric considerations:

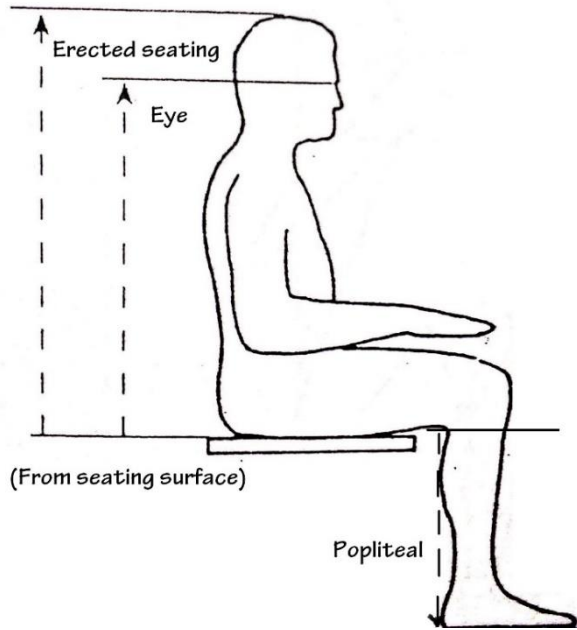


Span akimbo(Horizontal clearance)
95th percentile male = 959 mm



Buttock to leg (Vertical clearance)
95th percentile male = 1209 mm

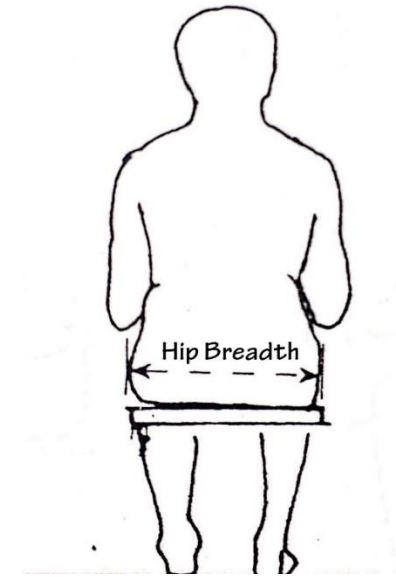
* Dimensions adapted from Chakrabarti, Deb Kumar. *Indian anthropometric dimensions for ergonomic design practice*, 1997.



Erected seating(from seating surface)
95th percentile male = 905 mm

Eye(from seating surface)
75th percentile combined = 751mm

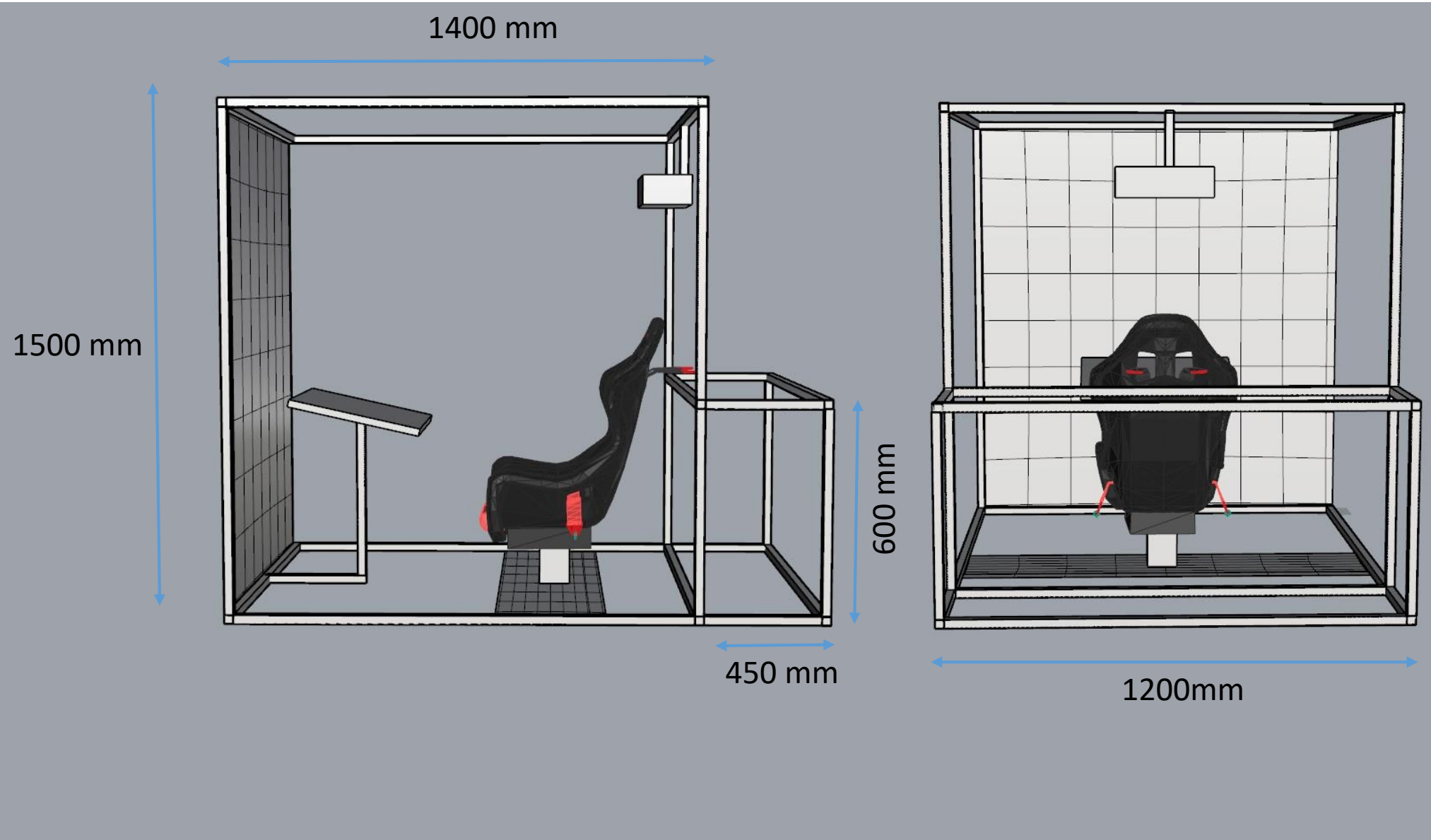
Popliteal(for variable seating height)
5th percentile female = 365 mm to
95th percentile male = 471 mm

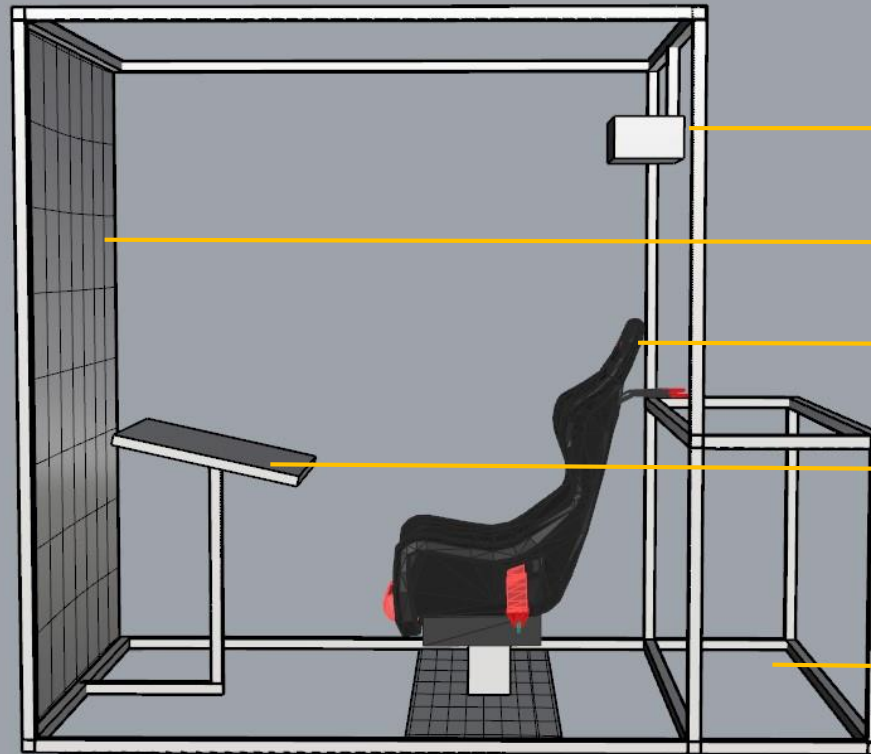


Hip breadth(for seat width)
95th percentile female = 429 mm

* Dimensions adapted from Chakrabarti, Debkumar. *Indian anthropometric dimensions for ergonomic design practice*, 1997.

Testing Rig:





Projector

Projection Screen

Seat

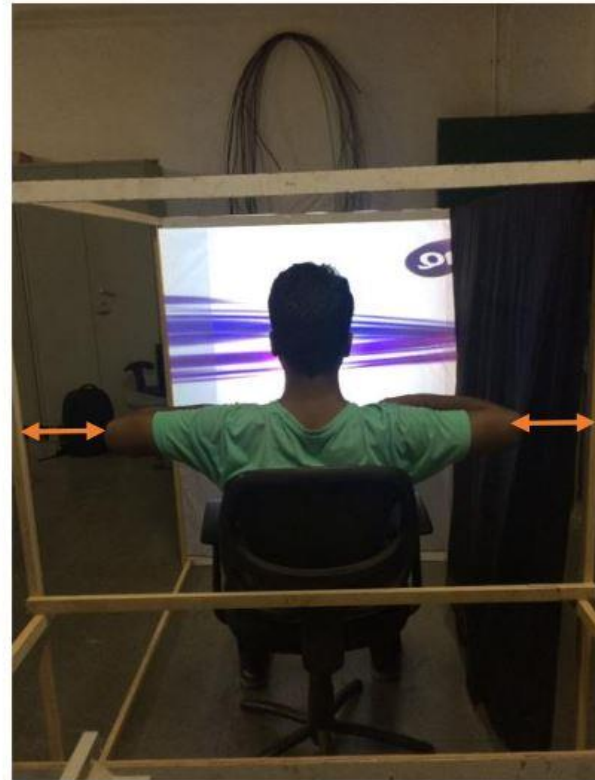
Adjustable Table

Storage space

User 1: Height 1660 mm



Leg clearance (310 mm)



Shoulder clearance (180 mm)



Hand clearance (460 mm)

User 2: Height 1842 mm



Leg Clearance (180 mm)

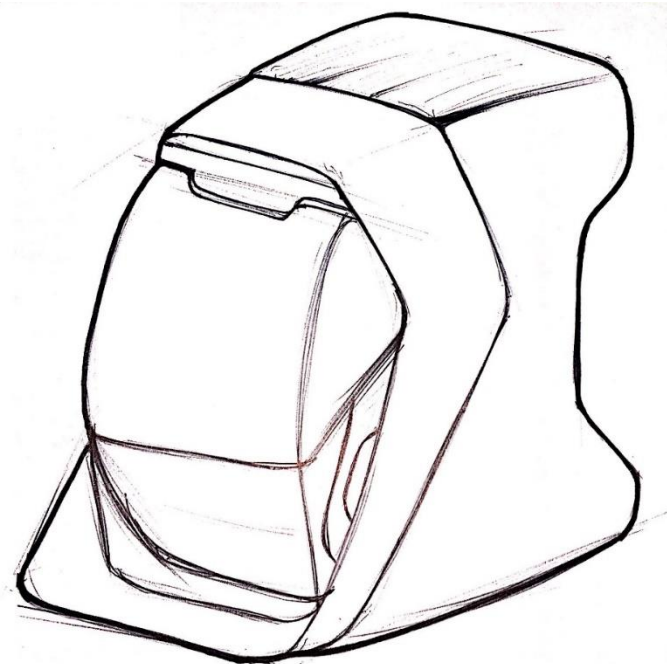
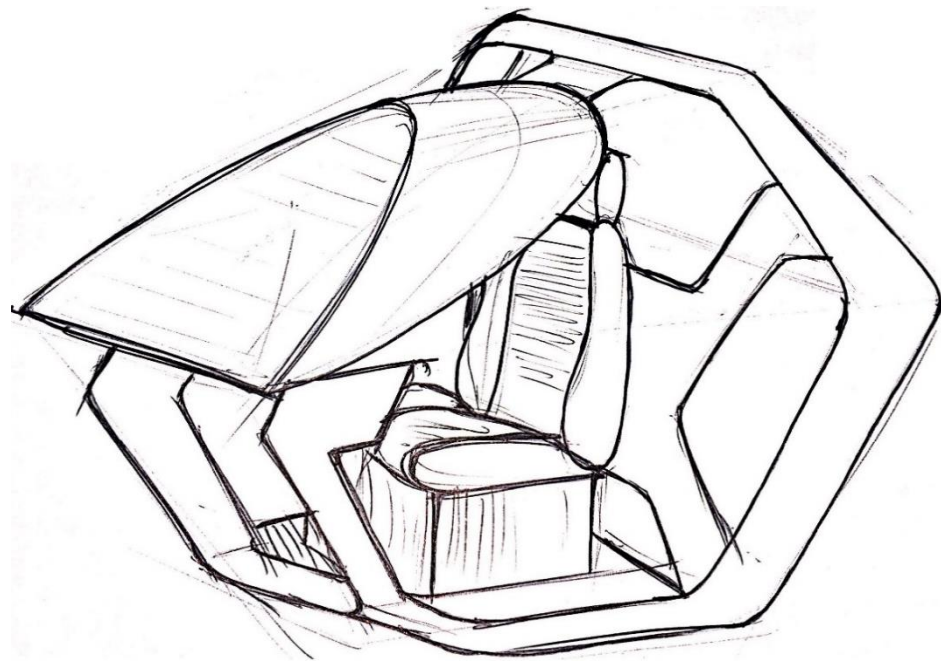
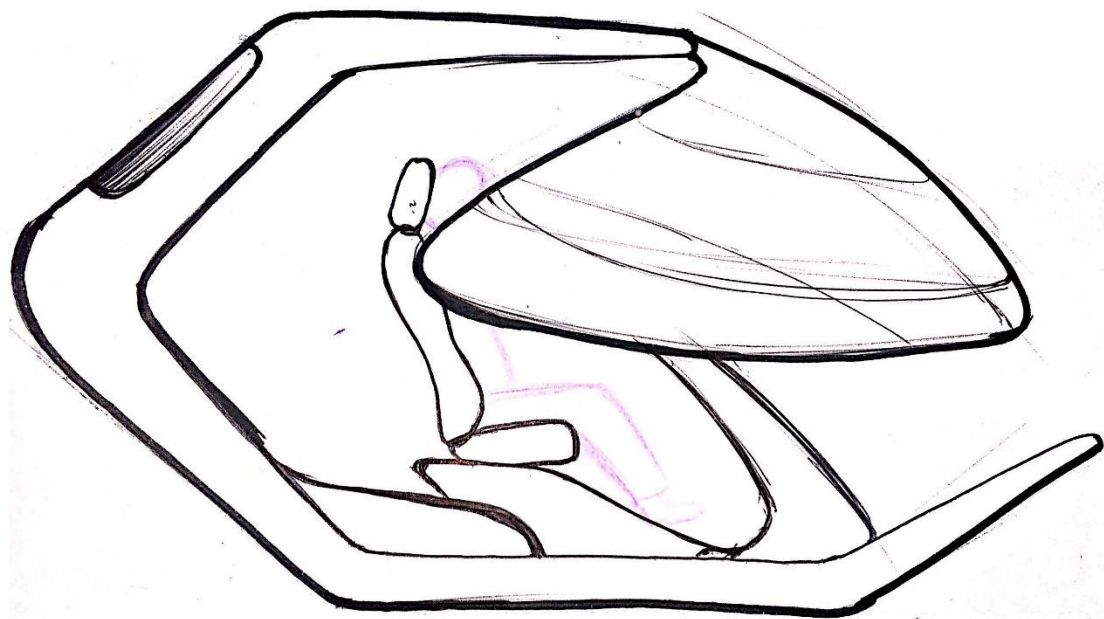


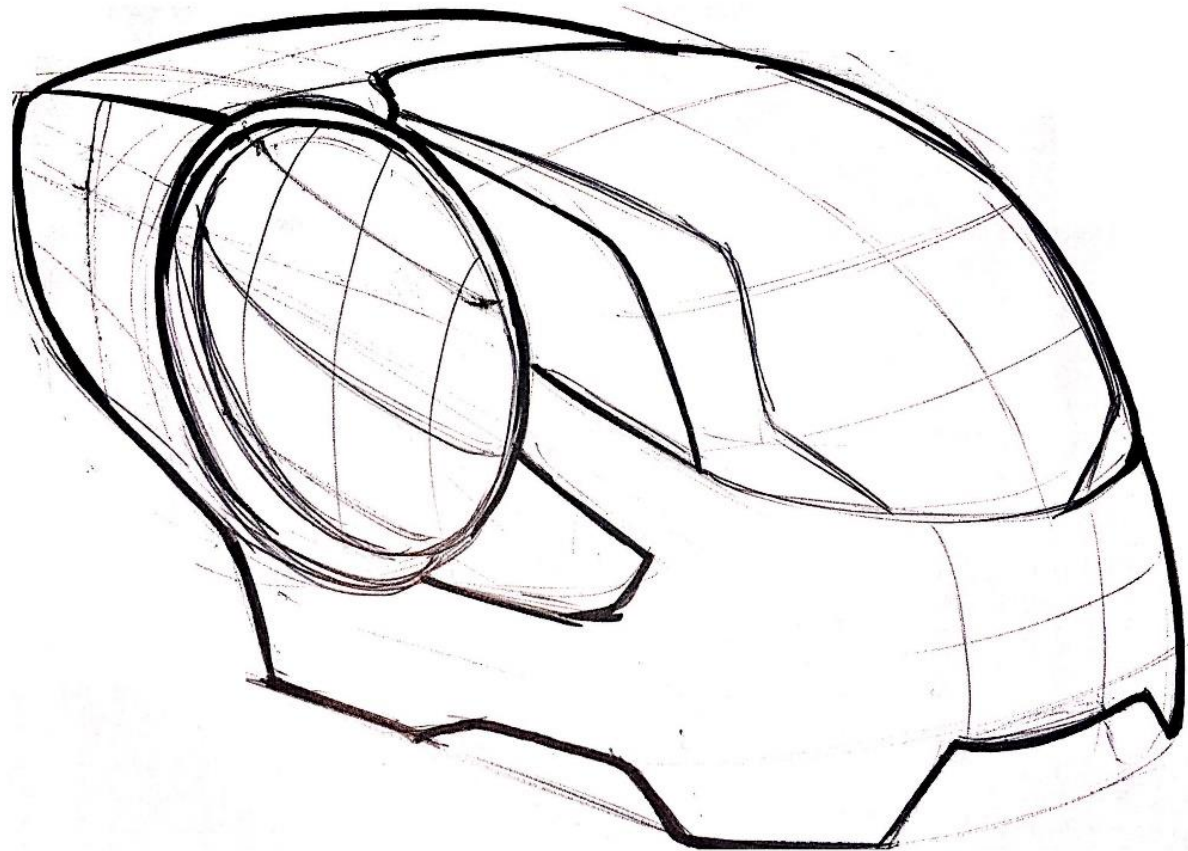
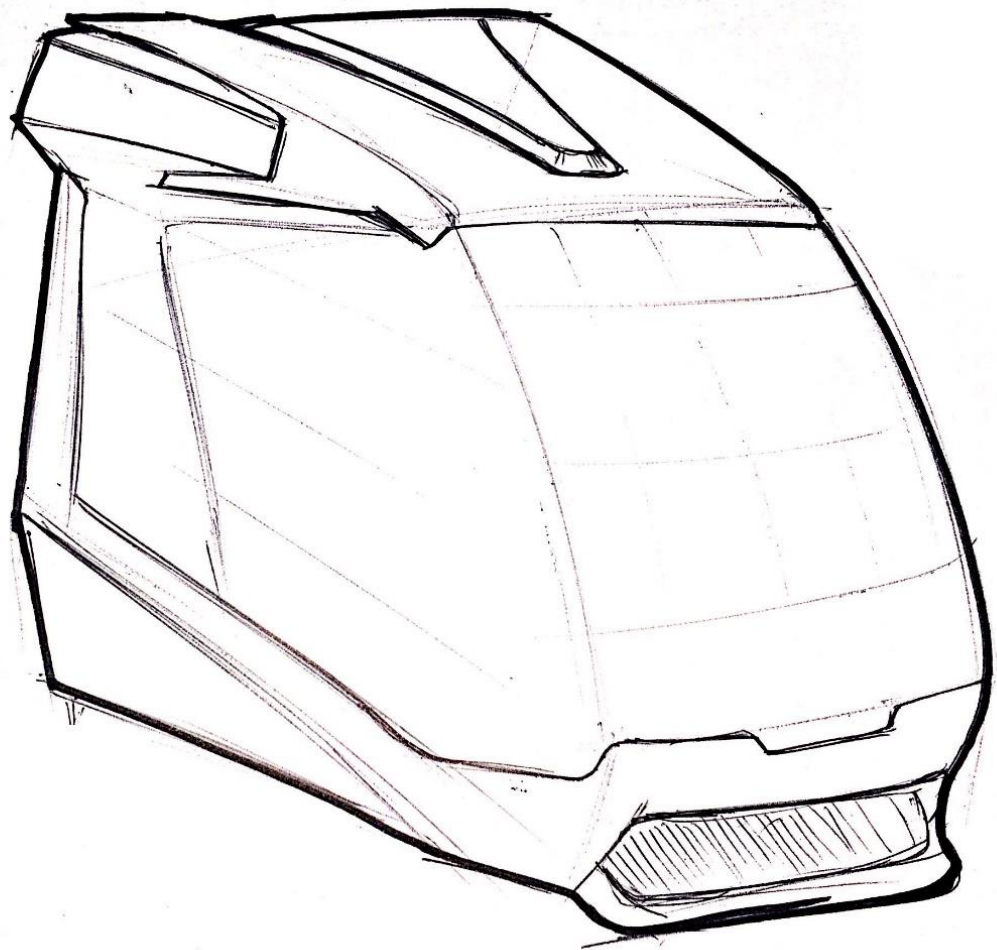
Shoulder clearance (160 mm)

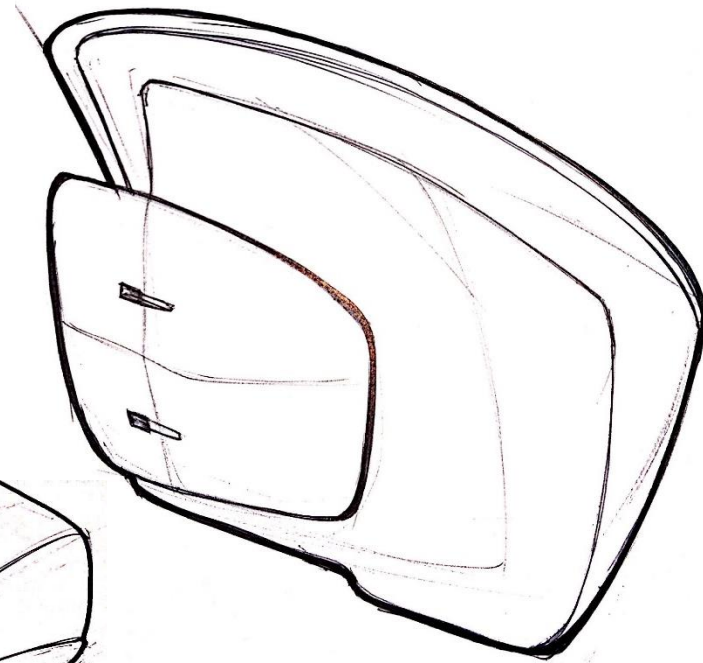
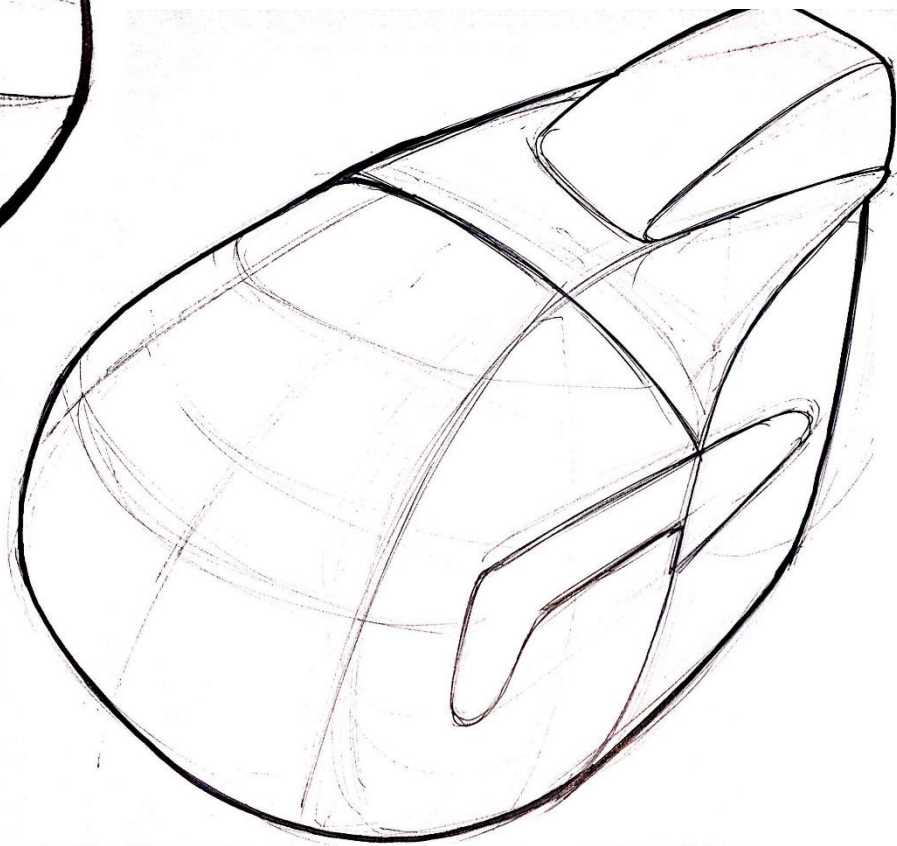
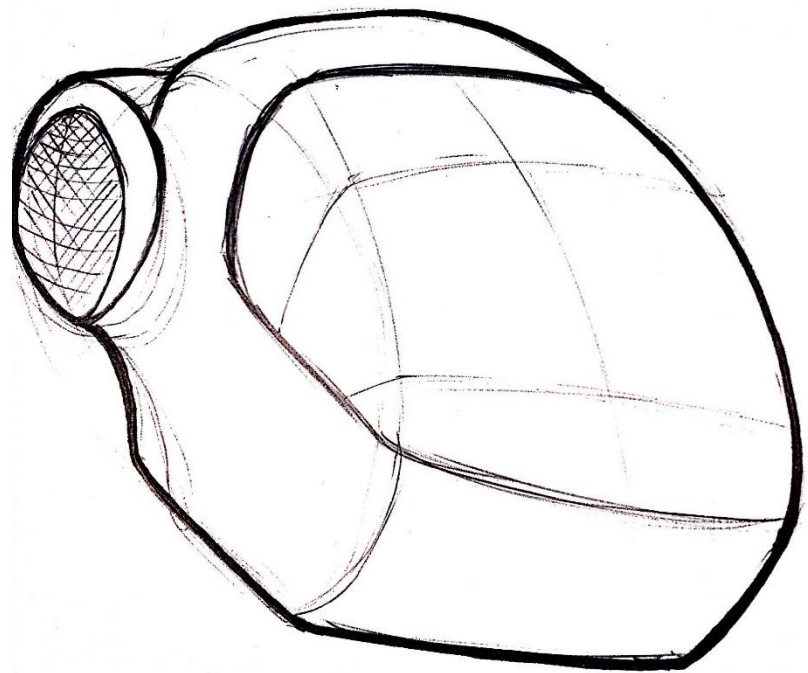


Hand Clearance (390 mm)

Conceptual Sketches:





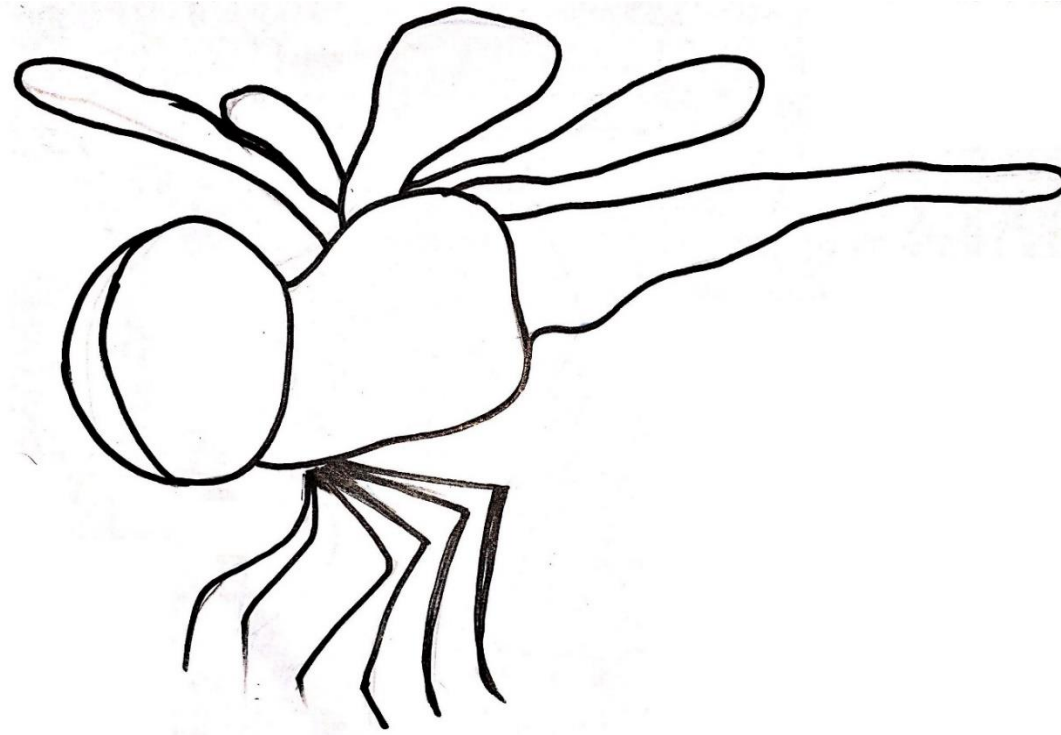


Design Inspiration:



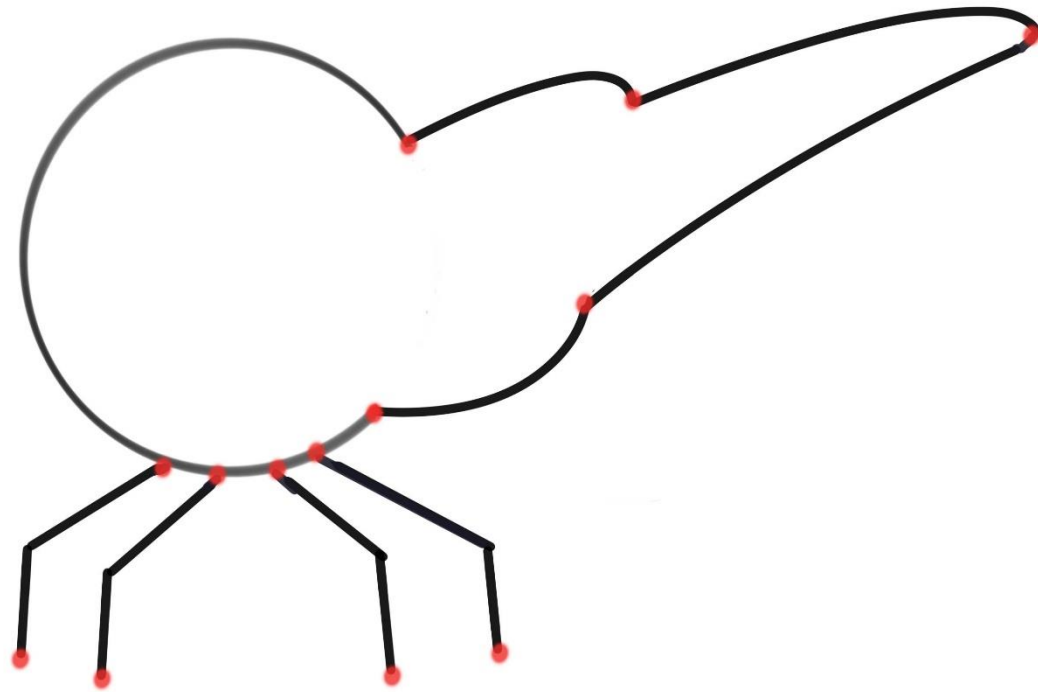
The eye of a dragonfly occupy about **half the area of the head** and provide the insect with a very wide visual field.

Shape exploration:



Abstract shape  Functional shape

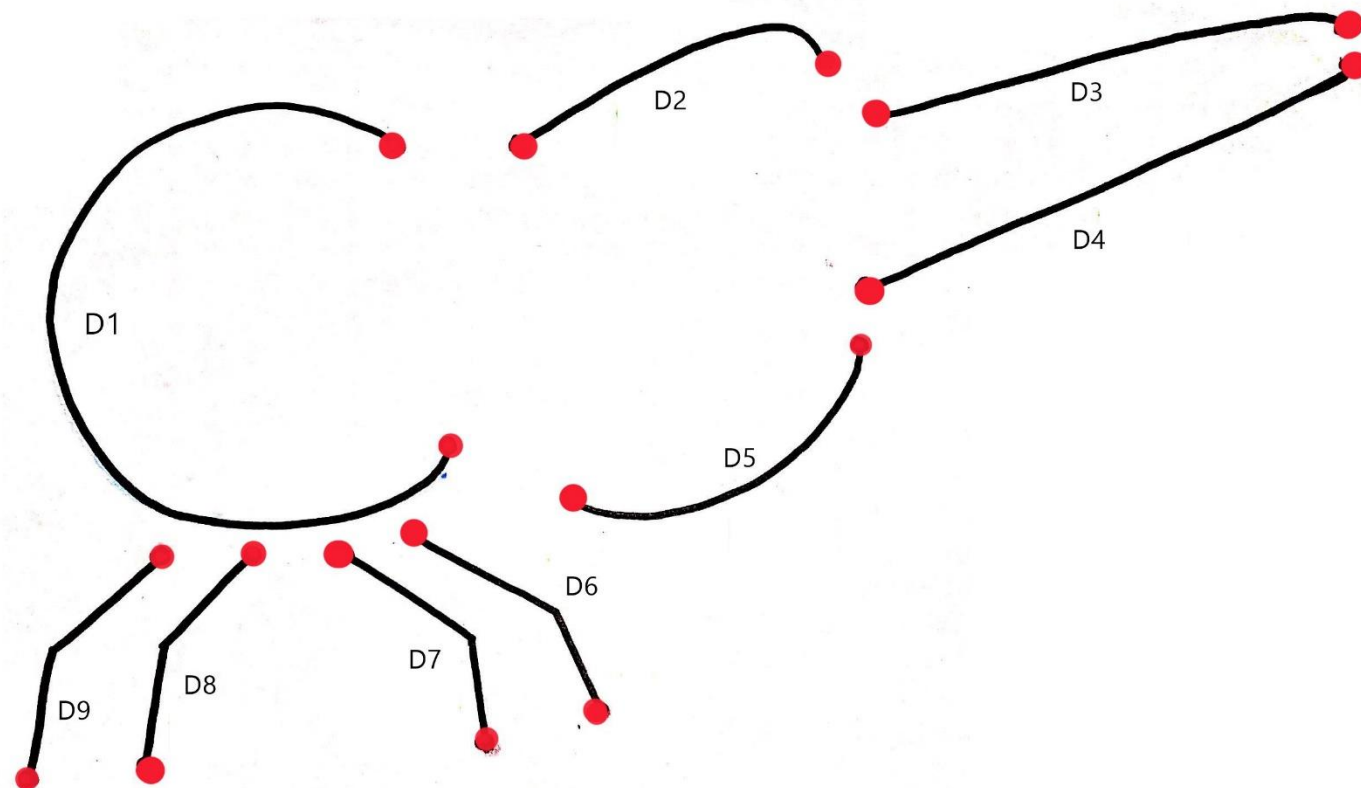
Contour layer: Outline of the initial design



Breaking Points

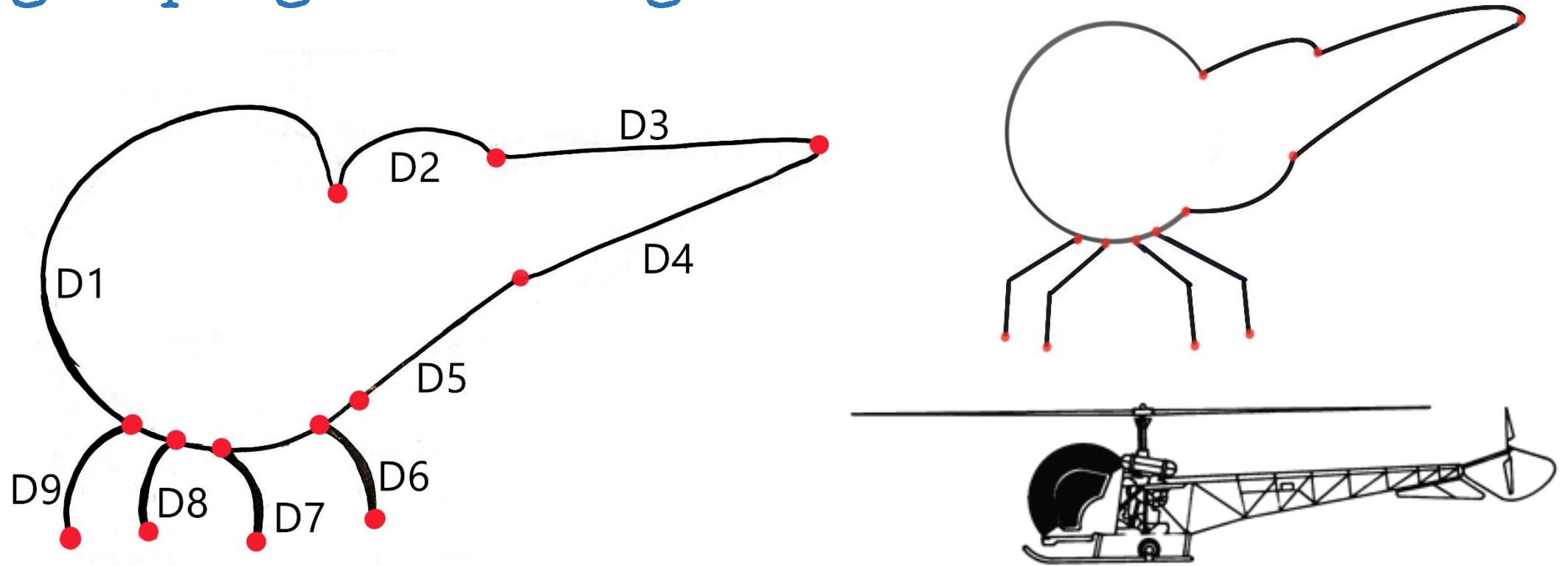
- Point of intersection
- Termination point of a line
- Point of discontinuity

Decomposition layer: Information of shape decomposition.
Formalises the elements identified in the shape



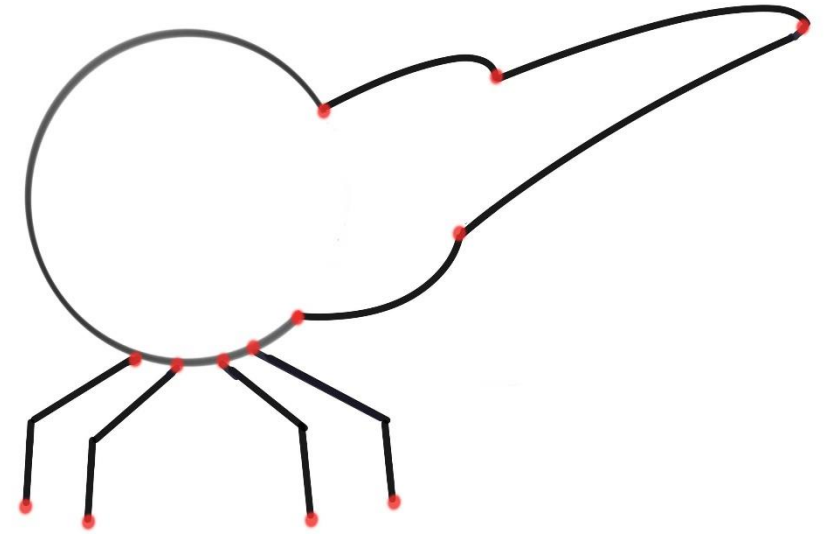
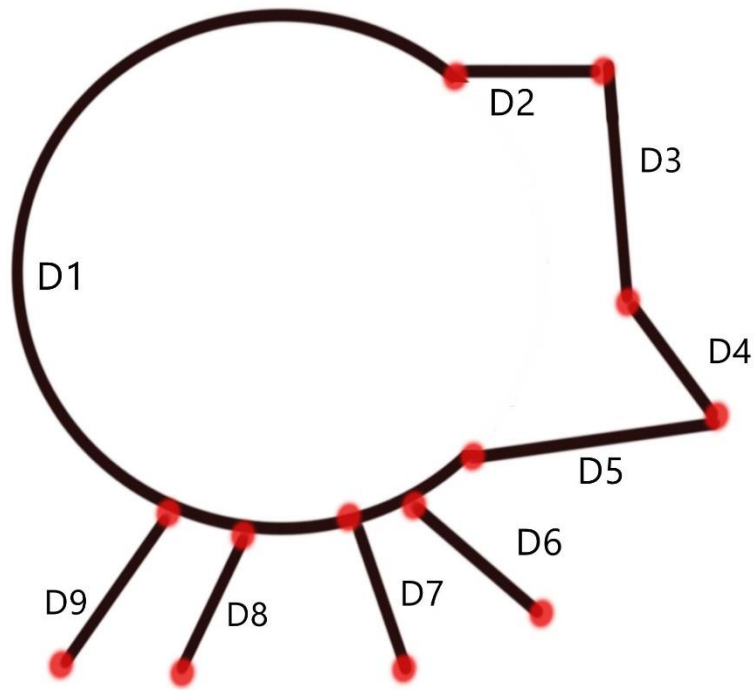
Element is a piece of outline of a shape

Structure layer: Formalizes the interpretation of the grouping and arrangements of elements.

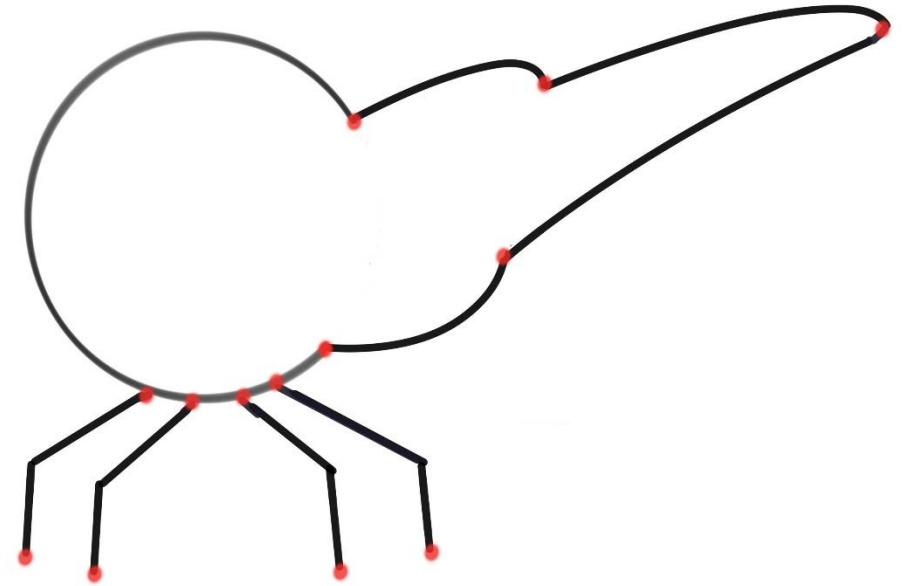
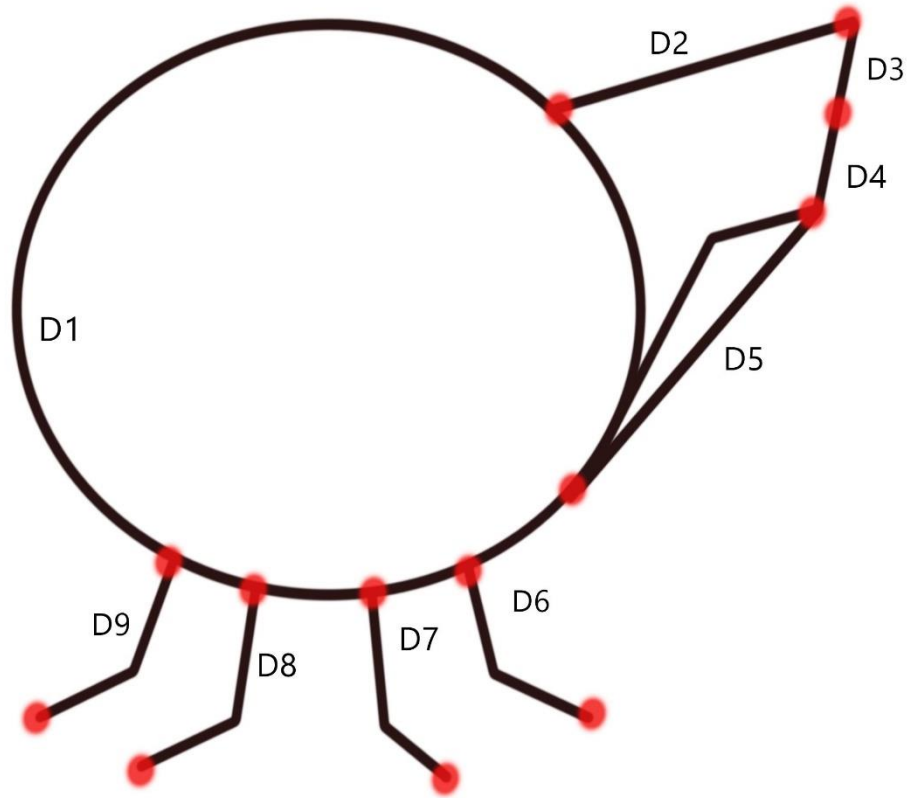


Bell 47

Modifying only decomposition lines (curves)

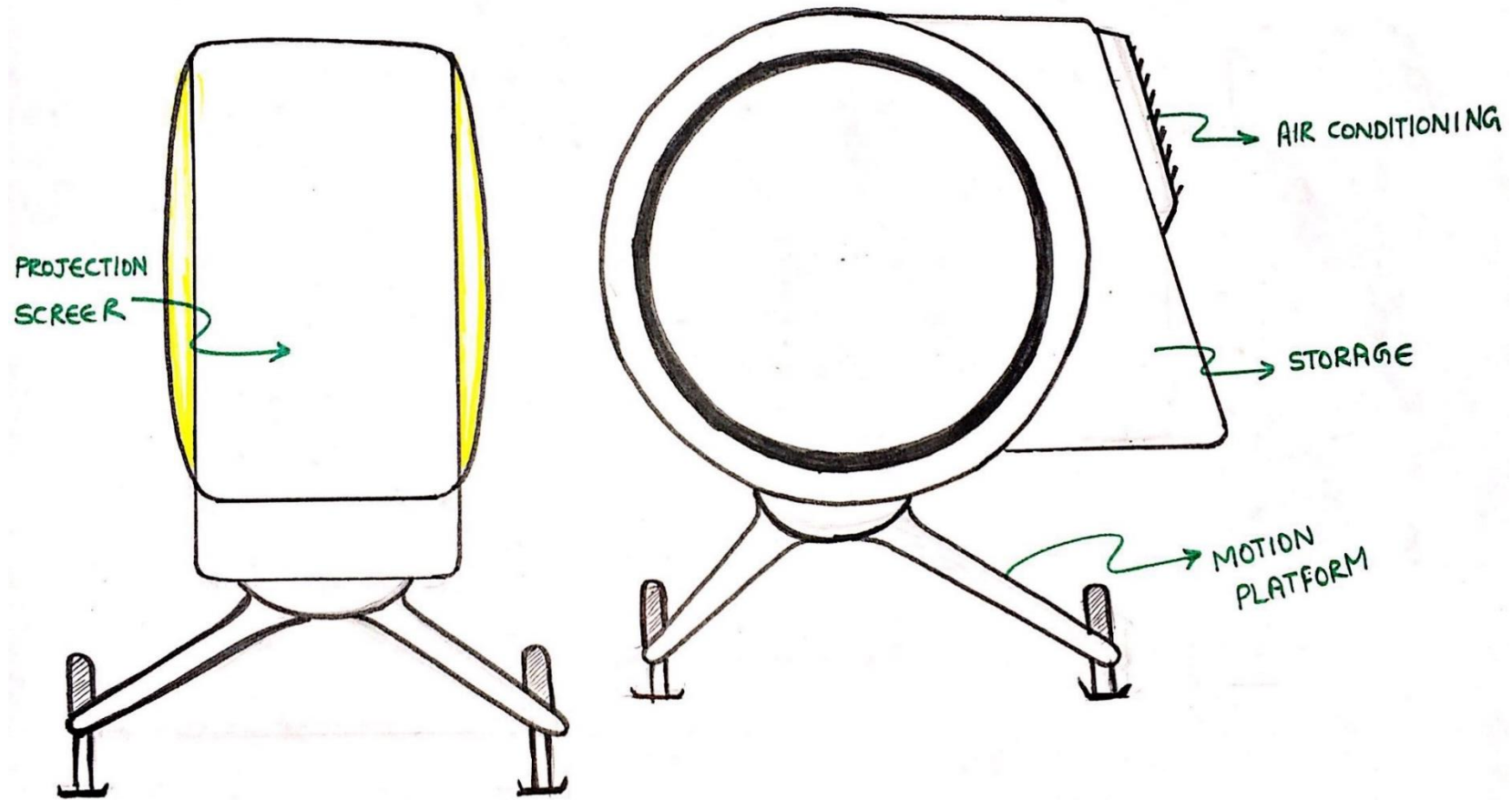


Modifying decomposition lines and repositioning
breaking points

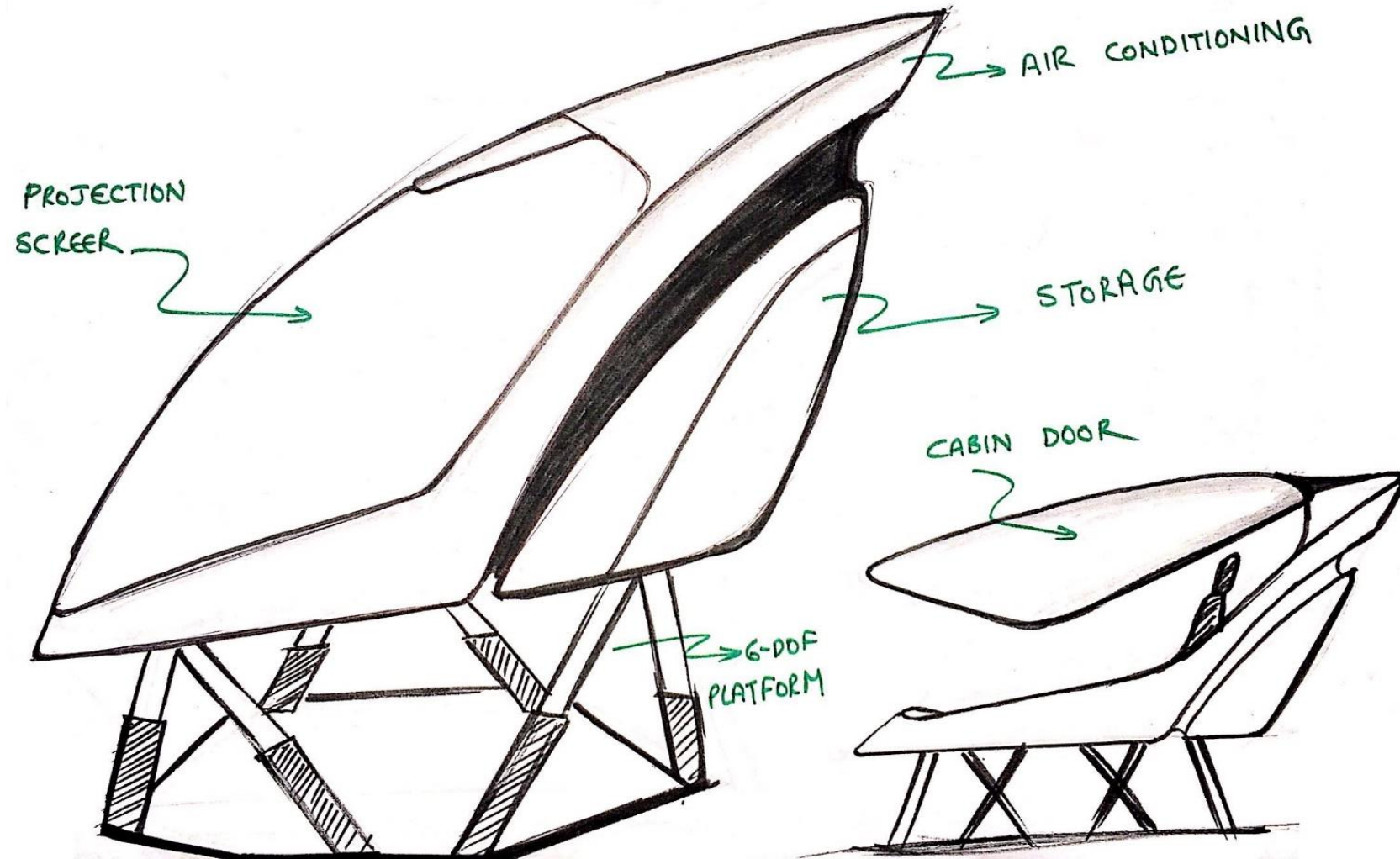


Modifying decomposition lines, repositioning breaking points and pairings

Concept 1:



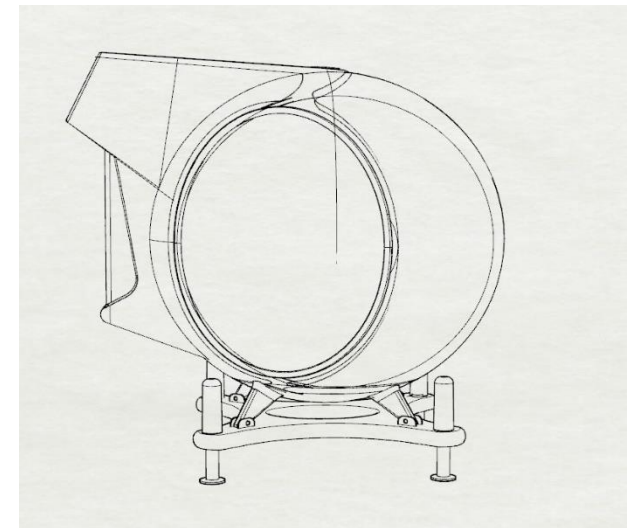
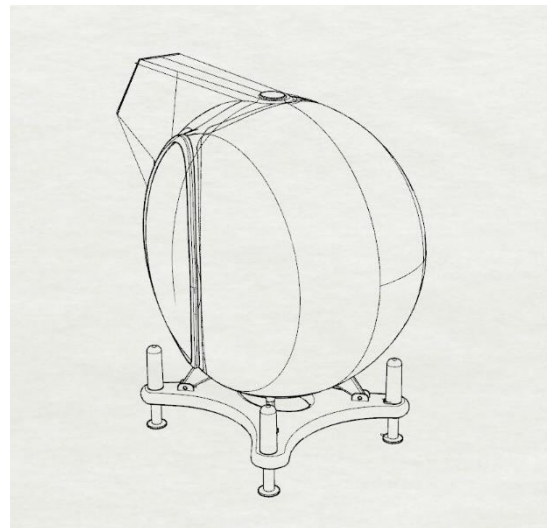
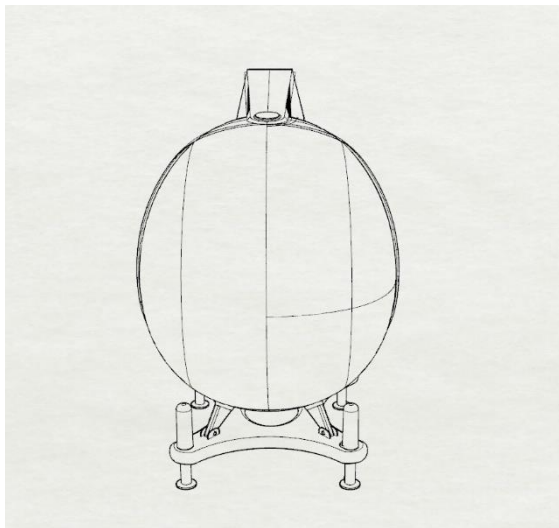
Concept 2:



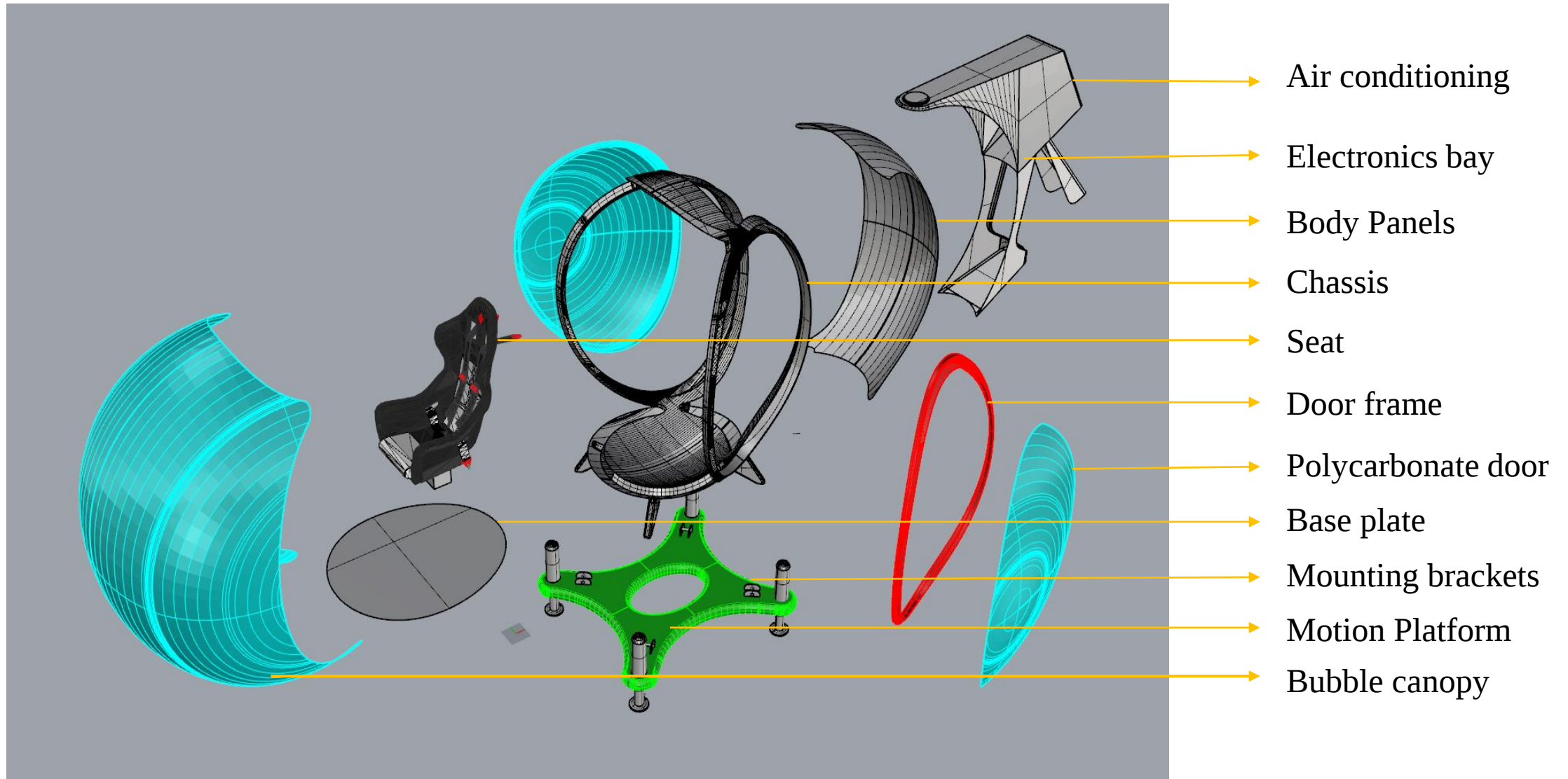
Concept Evaluation:

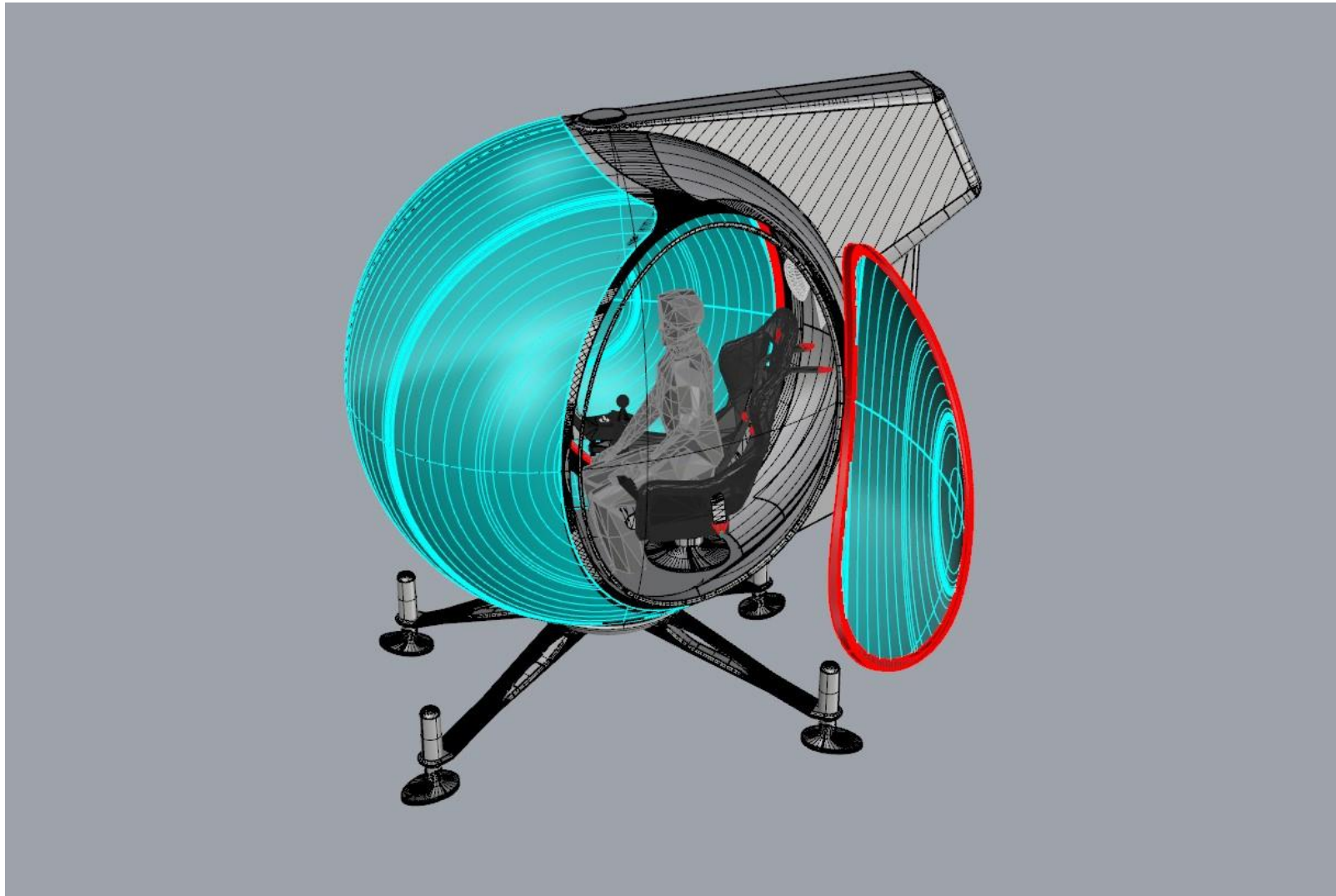
Sl. no	Evaluation Criteria	Concept 1 (Rated out of 5)	Concept 2 (Rated out of 5)
1.	Usability	4	3
2.	Immersiveness	3	4
3.	Modularity	5	2
4.	Cost	4	3
5.	Operatability	4	3
6.	Novelty	3	4
7.	Manufacturability	3	2
	Total	26	21

Design similarities:



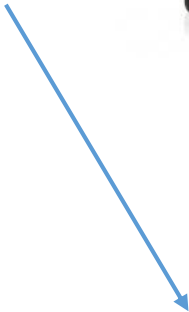
Exploded view:





User interacting in the pod

Modularity:



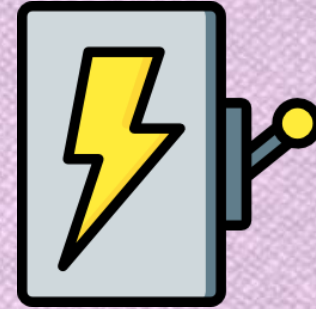
Safety features:



Seat belt



Grab rail



Master kill switch

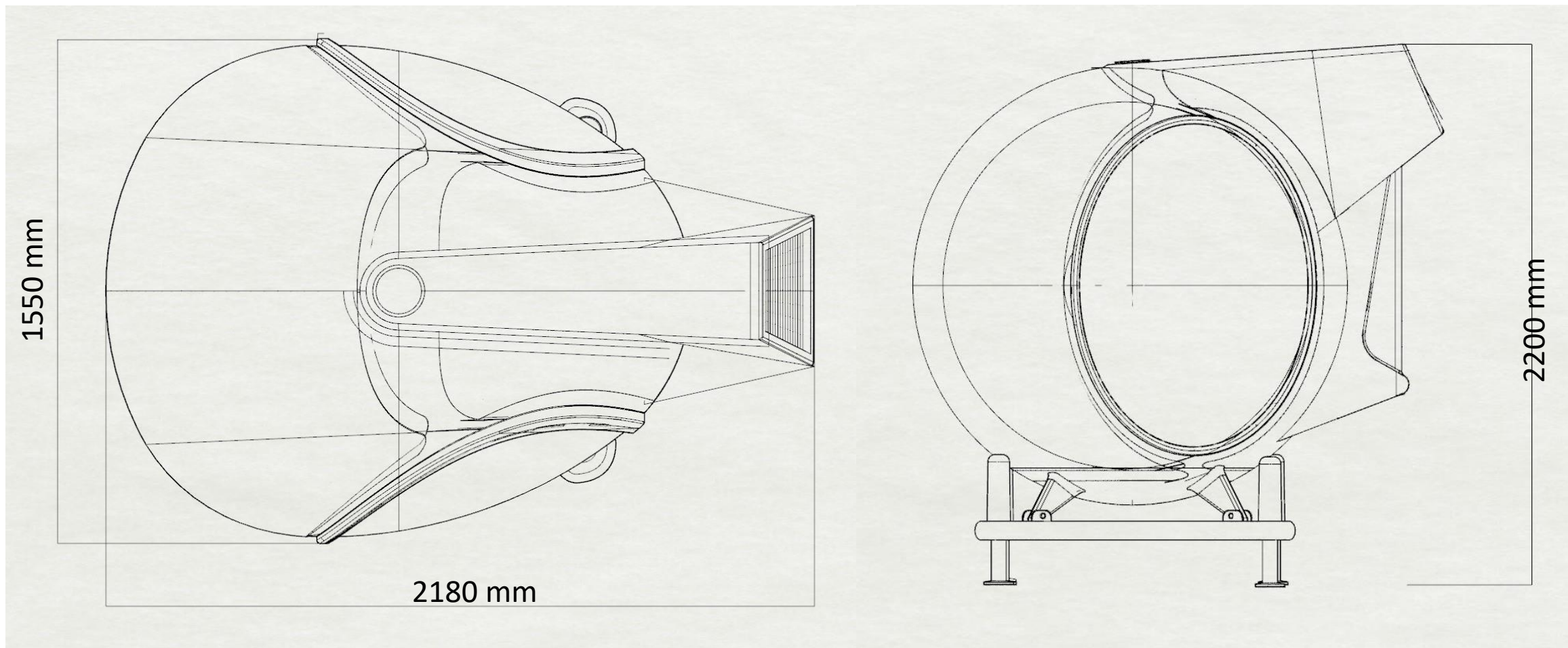


Fire extinguisher



Glass Breaker

Dimensions:



Materials:

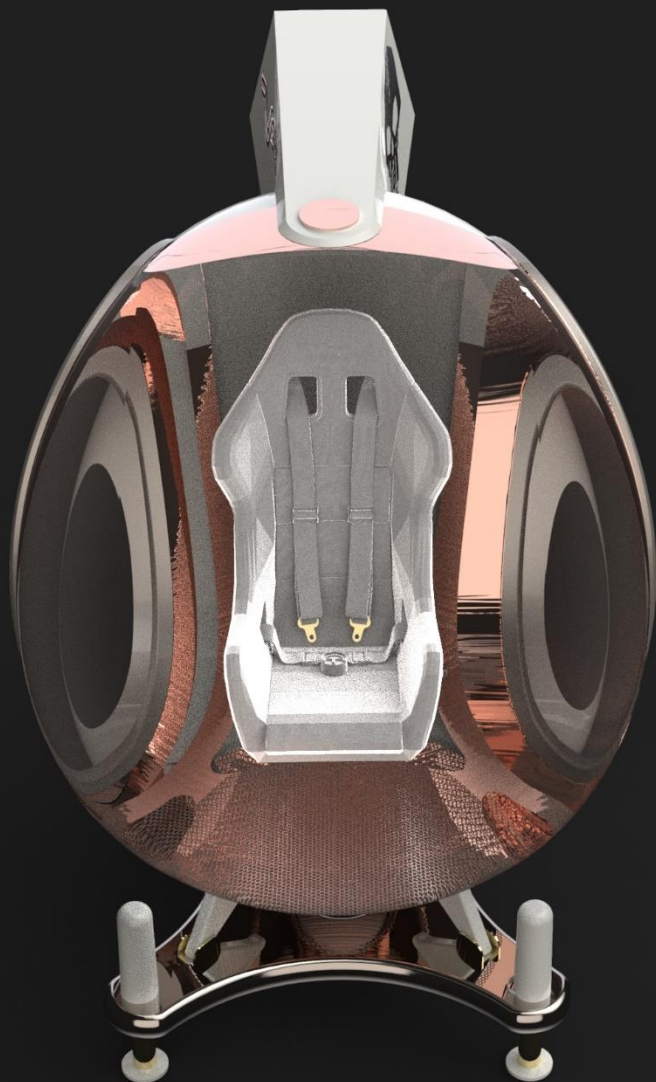
Sl.No	Name of the part	Material	Properties
1.	Linear actuators	Titanium	Strength, Temperature and corrosion resistant
2.	Frame	Aluminum	Light weight, High strength to weight ratio
3.	Bubble Canopy	Macrofol	Chemical and impact resistant, light, 200 x Strength of glass
4.	Seat Fabric	Tencel	Sweat wicking, textured, softer, cooler, breathable, biodegradable
5.	Foam	Sensus (Visco elastic Foam)	Interactive PU foam
8.	Body Panels	ARP(Aramid reinforced polymer)	Light weight, Strength

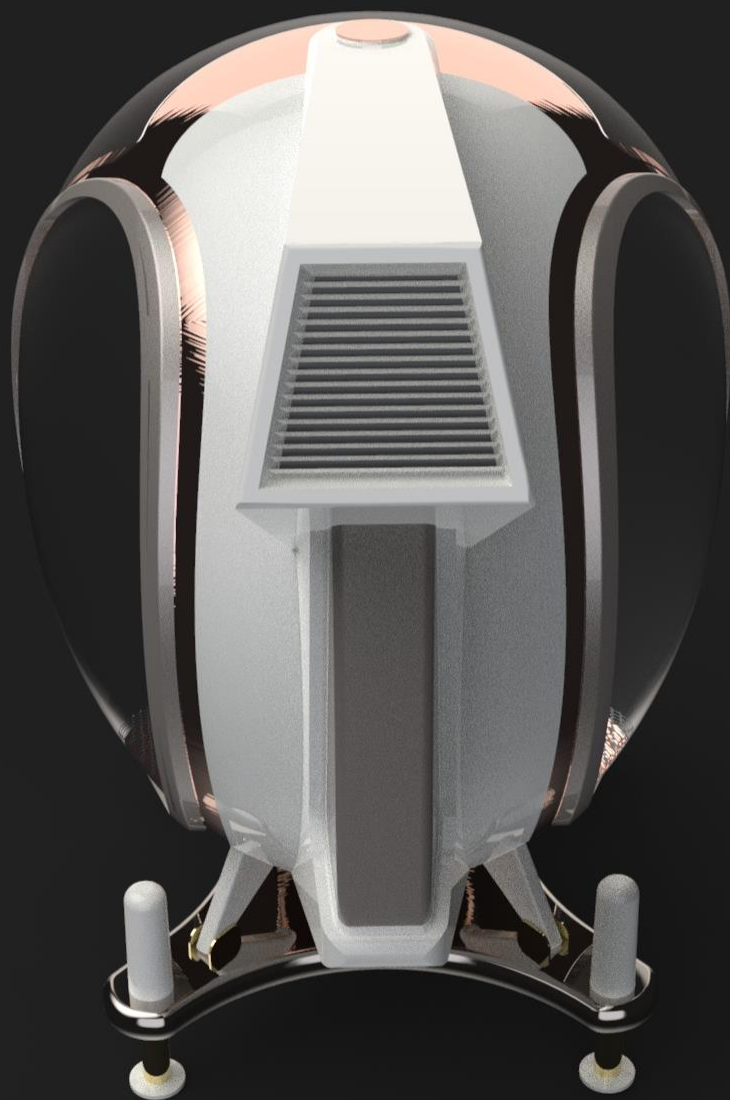
Design Variation 1



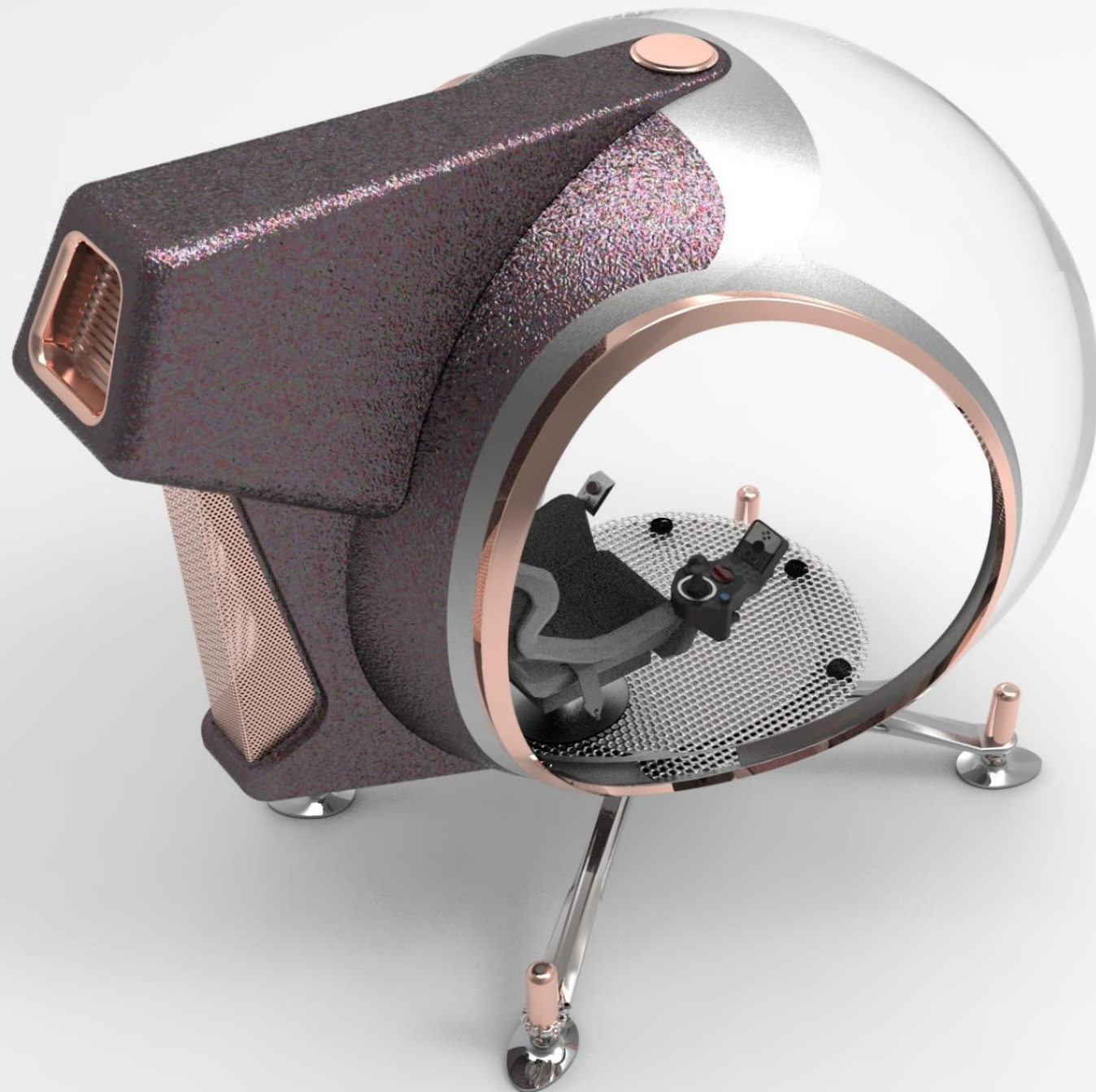


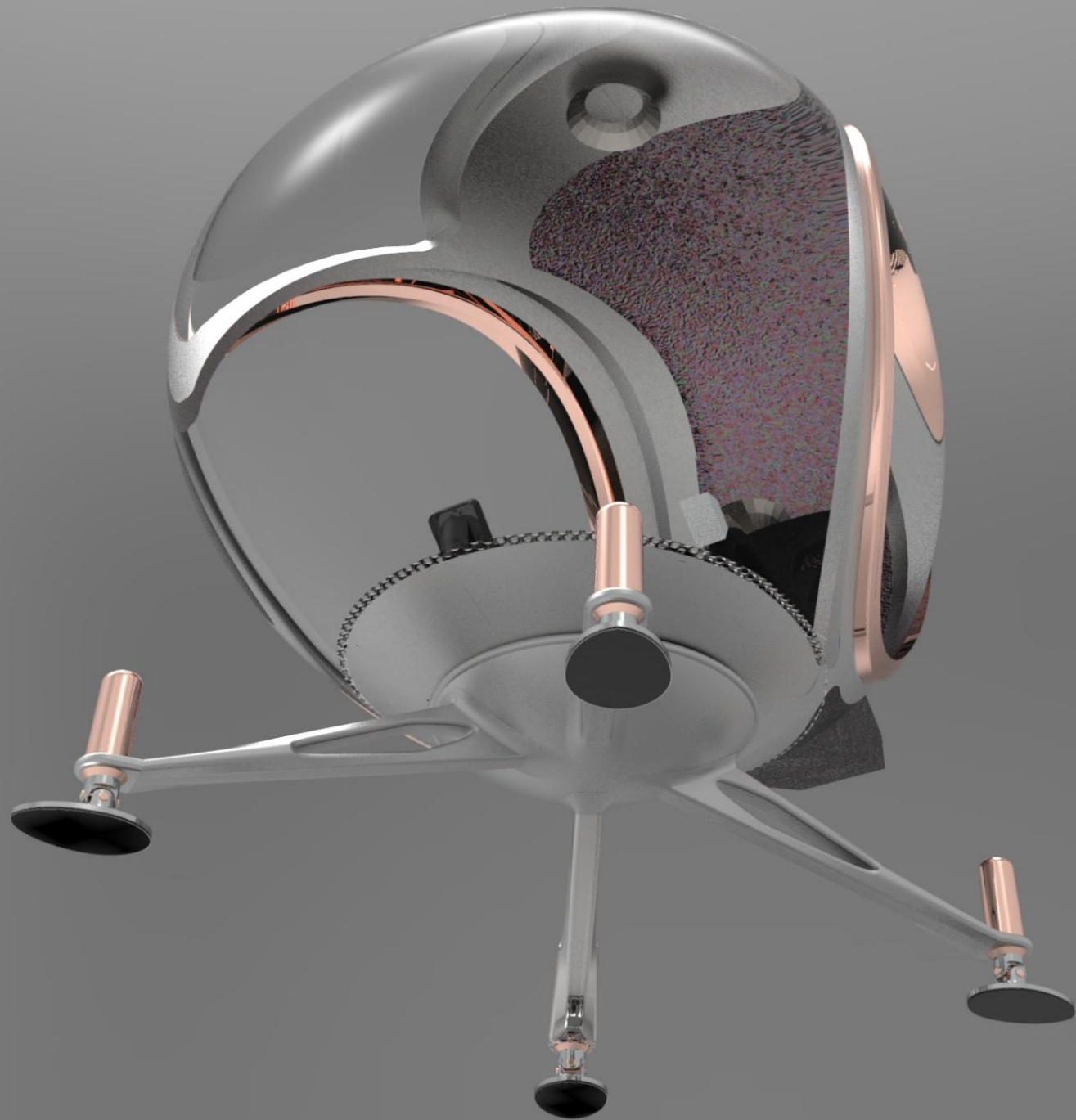




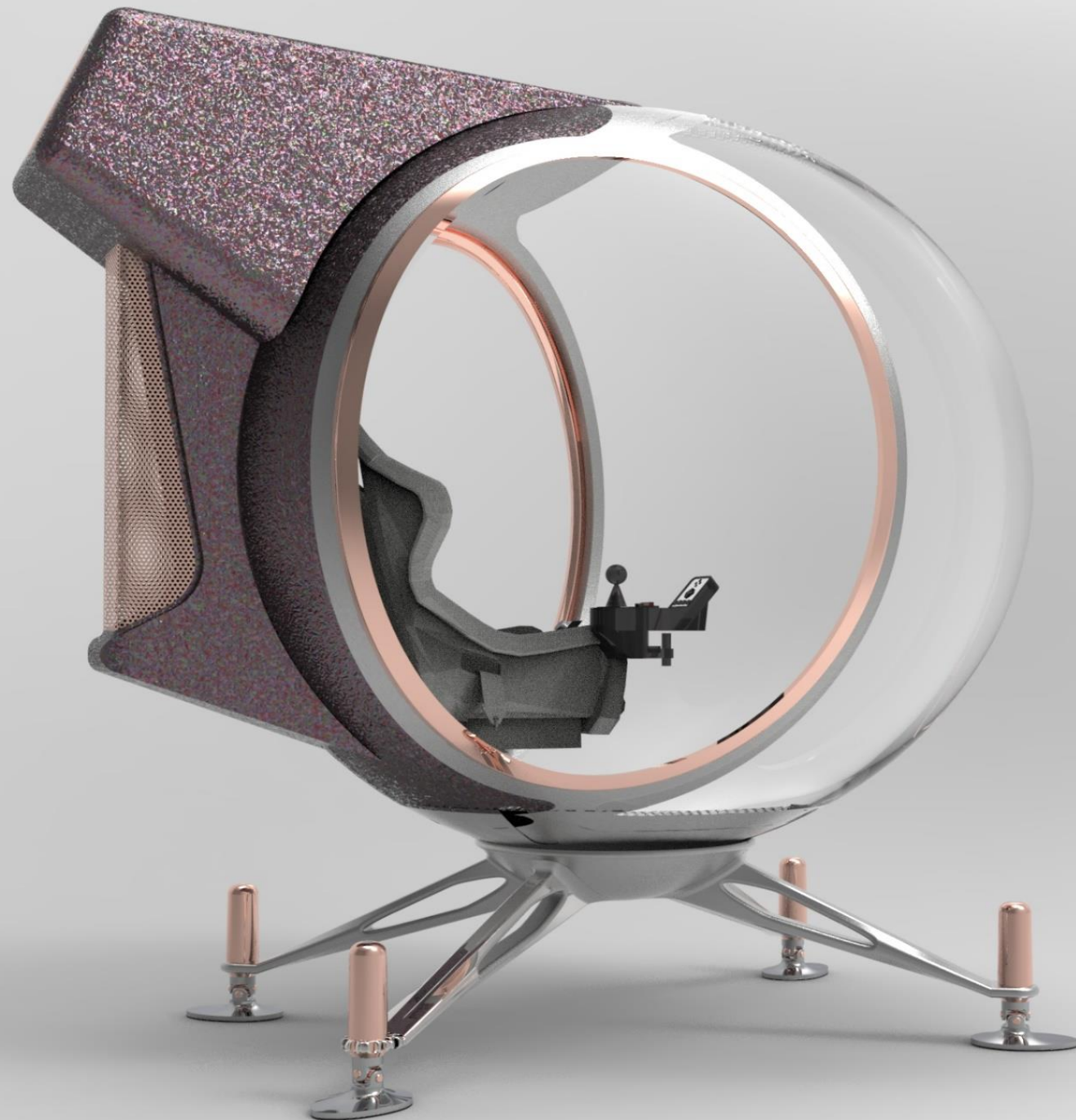


Design Variation 2











References:

1. <https://www.realitytechnologies.com/virtual-reality/>
2. <https://www.thetechadvocate.org/what-is-the-future-of-virtual-reality/>
3. <https://virtualrealitypop.com/new-hardware-innovations-for-top-vr-devices>
4. https://en.wikipedia.org/wiki/Flight_simulator
5. <https://www.microsoft.com/en-us/hololens>
6. <https://www.magicleap.com/>
7. <http://www.l-isa-immersive.com/immersive-experiences/#spatialized-creative-sound-design>
8. <https://www.digitalartsonline.co.uk/features/hacking-maker/360-video-projection-how-its-created-why-its-worth-your-time/>
9. Chakrabarti, Deb Kumar. Indian Anthropometric Dimensions for Ergonomic Design Practice. Ahmedabad: National Institute of Design, 1997
10. Prats, Miquel, et al. "Shape exploration of designs in a style: Toward generation of product designs." *AI EDAM* 20.3 (2006): 201-215.

Thank you