

IMMERSIVE LIGHT EXPERIENCE

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INTRODUCTION

- Urban lifestyle – Apartments and workplaces
- Cities – Lack of open spaces to experience light



NATURAL LIGHT



WHY DO WE ENJOY NATURAL LIGHT ?

- has multitude of colours
- fresh and different
- has unique effect on our senses
- is living/dynamic
- is thought provoking/ allows reflection in our minds
- gives us an immersive experience



WHY DO WE ENJOY NATURAL LIGHT ?

The hues of natural light at different times of the day



LIGHT IN DIFFERENT FORMS IN NATURE



BACK TO NATURE TO REJUVENATE AND RELAX



VISUAL ATTRIBUTES OF LIGHT



Daylight
Intensity

Colour

Shape
and
Shadow

Motion

Daylight Intensity gives the illuminance (lux) at sunrise, mid-day, noon etc...ie. at different times of the day. Various colours of the sky and features of landscapes are visible because of light. It forms shadows and helps perceive motion.

RELAXATION



- Relaxation is the most essential key to well-being.
 - It helps to alleviate stress which eventually contributes to various diseases.
 - Relaxation gives the heart a rest by
 - slowing the heart rate,
 - reduces blood pressure ,
 - increases blood flow to the muscles & decreases muscle tension.
-

CONVENTIONAL RELAXATION METHODS

Yoga- Yoga places great emphasis on deep, rhythmic and effective breathing allowing the brain to be richly oxygenated and the body to relax.



Meditation - Relaxing with constant concentration, where the end goal is to achieve a calm state of mind by contemplation and reflection.

Imagery - It involves using imagery to completely immerse ourselves in a pleasing scene, recreating the sights, sounds, smells, and tactile sensations.



Self-Hypnosis- Unlike meditation, in self hypnosis, optimistic statements are used to manage stress, build self-confidence and bring in positive thoughts.

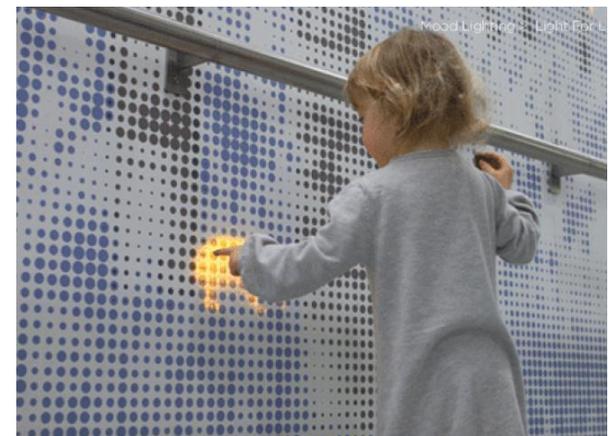
Physical Relaxation Techniques – It is a method to consciously tense and relax the muscles to feel the maximum effects of relaxation



Music – Listening to soothing music is quite helpful for relaxation

OTHER RELAXATION METHODS

Mood Lighting – Sensory Deprivation Chamber and Phoenix Hospital Lighting, Arizona



LIGHT AND RELAXATION

Results from Research Papers:

“Dim colour is more pleasurable and induces a relaxing feeling for clients ”

-Arefan Atlier, 2011, 'Interior light effects on human mood and social behaviour- LITERATURE REVIEW'

“ Preliminary experiment results show that low color temperature with low illumination intensity of LED lighting enhances relaxation level and high color temperature with high illuminance improves attention level”

-Chan-Su Lee, ' The effect of visual stimuli of LED lighting by color temperature and Illuminance control on attention and meditation level of mind', Yeungnam University, Korea ,P1-16

- Use of Light therapy for alleviating Depression
 - Light's effects seem to only occur if the light source is above or at face level, not below
-

COLOUR AND RELAXATION

Results from Research Papers:

“Certain wavelengths of light may have specific impacts - example, blue light may improve cognitive performance “

*-Lehrl S, Gerstmeyer K, Jacob JH, Frieling H, Henkel AW, Meyrer R, Wiltfang J, Kornhuber J, Bleich S.
Blue light improves cognitive performance. J Neural Transm 2007; P457-460*

“**Red** is a bright, warm colour that evokes strong emotions; Red is also considered an intense, or even angry, colour that creates feelings of excitement or intensity. Red stimulates the physical and adrenalin. It raises blood pressure, the heart rate and respiration.”

“**Blue** calls to mind feelings of calmness or serenity. It is often described as peaceful, tranquil, secure, and orderly. Blue is often used to decorate offices because research has shown that people are more productive in blue rooms.....”

COLOUR AND RELAXATION

“Green is restful, soothing, cheerful and health-giving. Green is thought to relieve stress and help heal. “

With regard to colour healing, it is suggested that colour can be used as a **treatment tool** in conjunction with the seven chakras of the body . The chakras are considered to be energy centers within the human body. Under the colour-chakra theory, a colour is linked to each of the seven chakra and these **colours are associated with body functions and dysfunctions** within each chakra area.



DEFINING IMMERSIVE EXPERIENCE

Experiences involve us in being in situations and reflecting about our involvement in these situations.

Immersive experience is a part of the many experiences that people have.

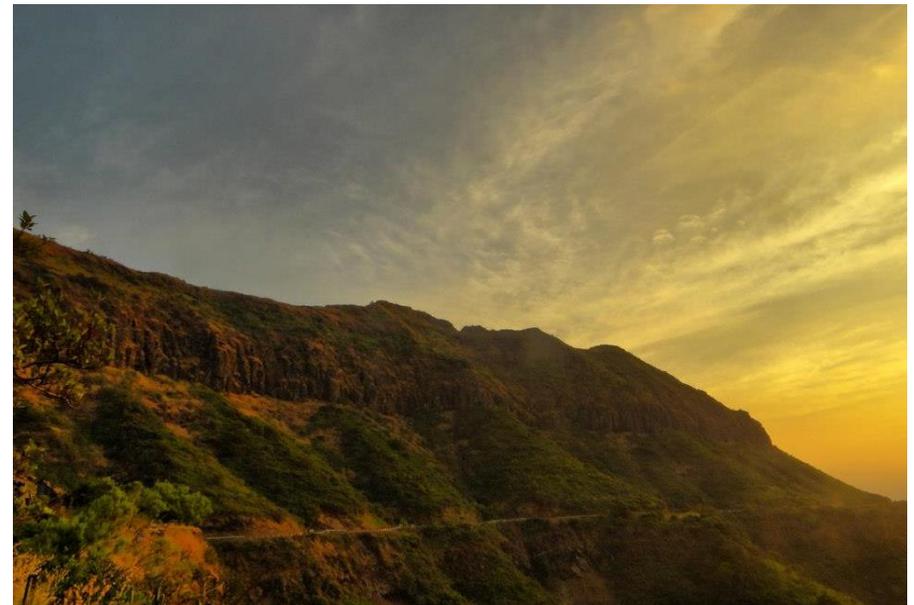
Immersion is a metaphorical term derived from the physical and emotional experience of being submerged in water. *Being immersed* gives a feeling of submergence and engrossment.



USER STUDY AND THEIR CONCEPT OF IMMERSIVENESS

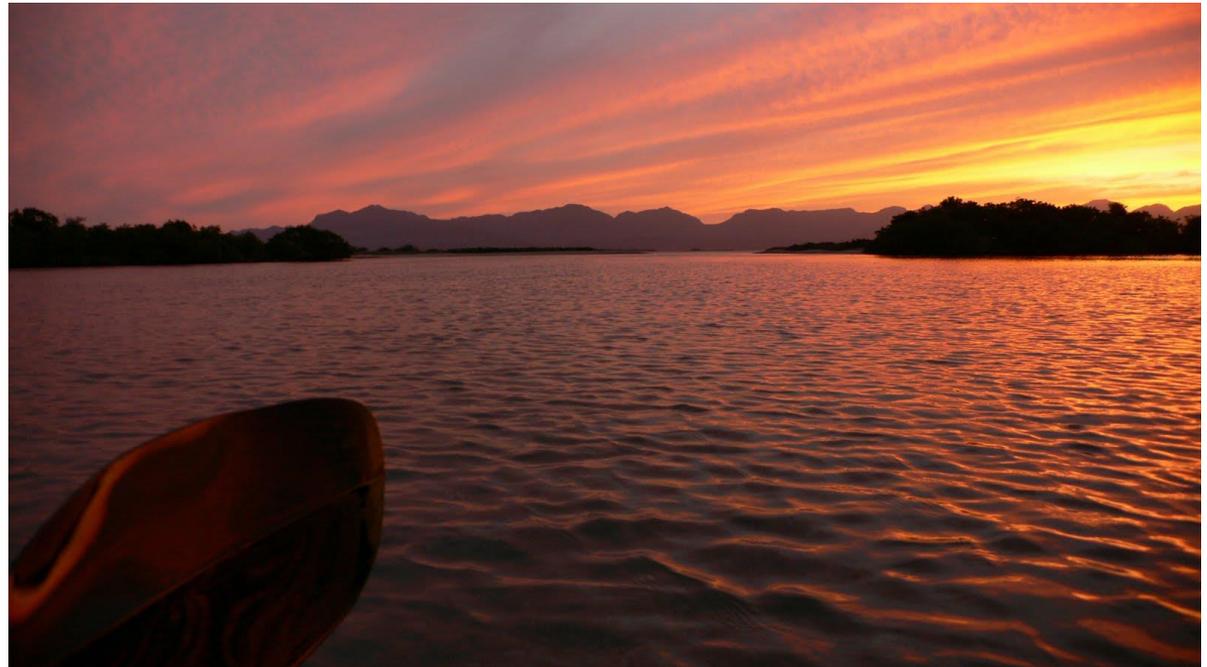
Instance 1• Immersiveness in Nature

Goes on treks to forts and likes discovering old ruins on weekends and feels like a '*hero of that story*'. The smells of the earth ,the breeze, the sway of grass envelops him and he feels mesmerized by the play of light and shadow. A feeling of '*renunciation*' comes while experiencing the dusk in its purple-orange haze...



Instance 2• Immersiveness in Pattern

Interviewee talked about how involved she got watching the pattern in the waves on a ferry ride to the Elephanta caves. ‘The crest and the trough formation was beautiful especially with the streaks of sunlight shimmering on the tips.’



Instance 3• Immersiveness in Random

Interviewee was attending the 'Evening Aarti' in Benaras and found himself captivated by the flickering of the flames of the diyas that float on the water. He talked about the way the floating diyas moved in the water...sometimes clustering and then separating...the randomness was immersive...



Instance 4• Immersiveness in games

Interviewee stated 'I have been playing this game for a year (temple run and paper plane) and I've never seen what's the end of this game like...I want to know what's so special about getting to the end...playing this game involves me completely.'



Instance 5• Immersiveness in technology

Interviewee was amazed with 'Microsoft Surface'. He mentioned that 'it was the first time a table top application was so interesting and engaging in different ways. It responded to your weight if you bent on it, recognized any object you kept on the surface, and multiple touch options'...



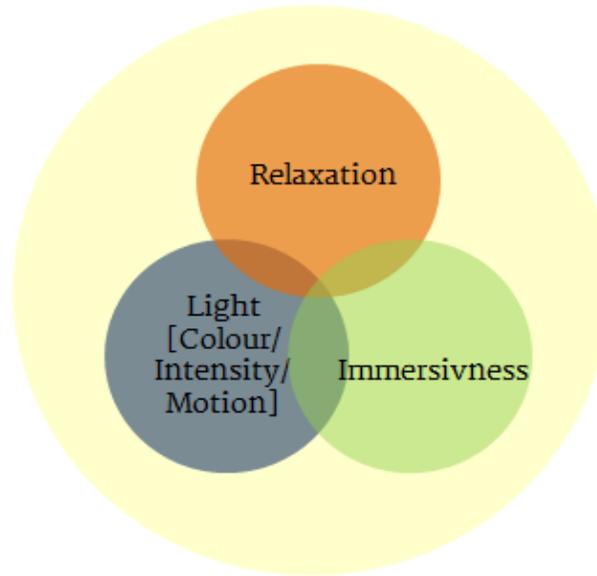
ELEMENTS OF IMMERSIVE EXPERIENCE

Mentioned are the keywords that were selected from the experiences that were shared by different users. From these words the elements of Immersive Experience were derived :

- The sensory cues
 - feel (breeze, temperature)
 - smell (earth, grass, rain)
 - touch (surfaces),
 - sight,
 - sound
- The effect of colours
- A sense of motion
- The perception of scale
- Interaction and engagement for a certain period of time

Discovery, Feel, Smell, Breeze, Play of light and shadow, Colourful purple-orange haze, Mesmerized, Experiencing, Watching, Pattern, Streaks of sunlight, Shimmering, Flickering flames, Movement, Randomness, Involves, Aware, Amazed, Engaging, Interesting, Other-worldly, Different, All-encompassing, Indescribable, Familiar-yet new, magnificent, Personal, Fun-but scary, Makes me aware of what I don't know, Liberating...

COMBINING LIGHT, RELAXATION AND IMMERSIVENESS



Relaxation	Low Level	Medium Level	High Level
Colour	Blue/Violet	Yellow/Green	Red/Orange
Intensity	High	Medium	Low
Motion/Movement	Slow	Medium	Medium
Music/Sound	Calm/slow/string instruments/deep bass		Fast/ has beats(percussion instrument)/high pitch

PROJECT BRIEF:

“To design an immersive light experience that is derived from the elements of natural light which helps urban professionals to relax in a personal space.”

From the data gathered and optimized, the colour, illuminance and motion factor of the light will be utilized to help achieve relaxation through music.

USER AND USAGE:

User - The target user would be urban working professionals from age group of 22 years and above who experience a lot of work and travel related stresses during the day. They need relaxation and tranquility to de-stress themselves for better performance and productive work.

Usage - This product will allow the user to have a personal space to relax. Hence it can be used in homes and in public spaces(like recreational rooms in offices or as a relaxation space in airport)

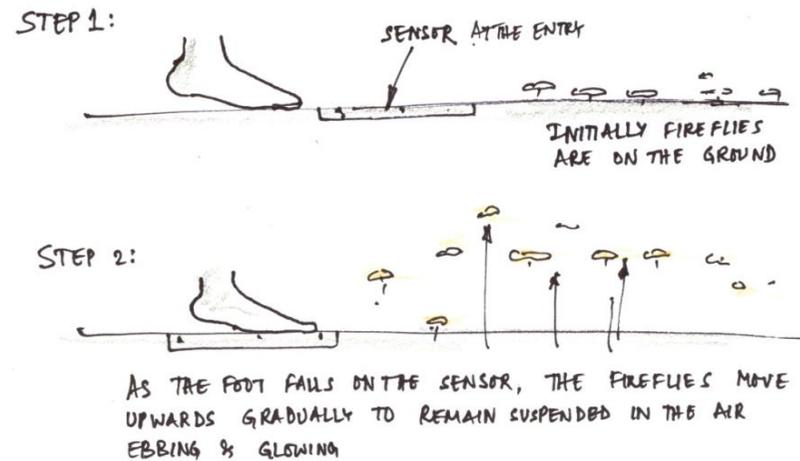
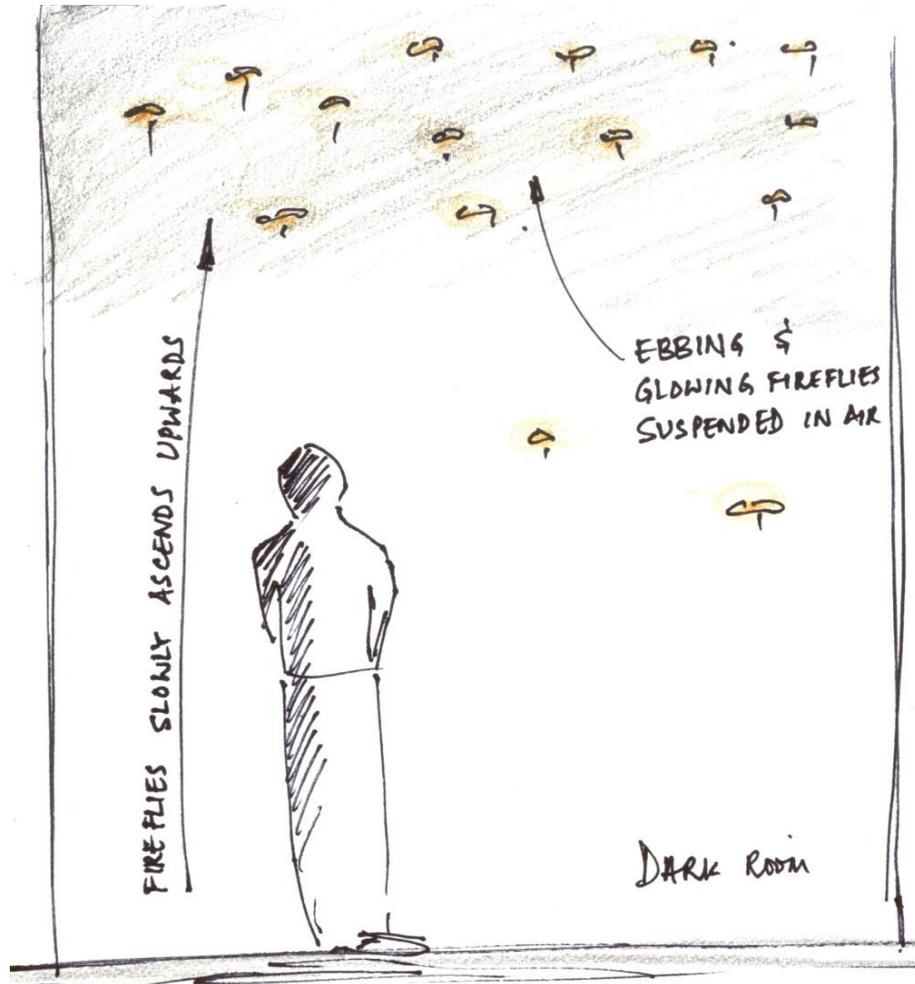


IDEA GENERATION

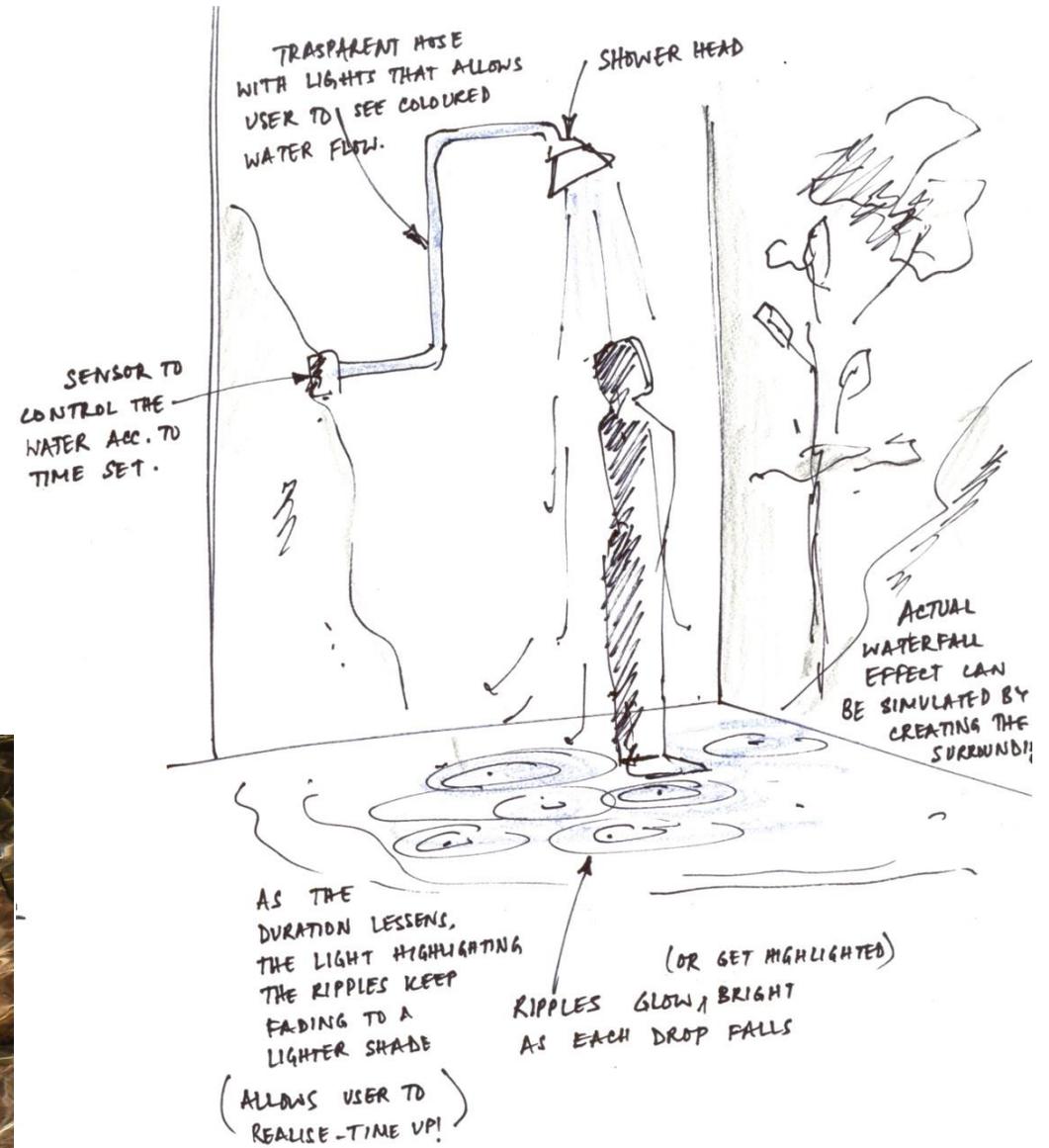
The following Ideas were generated to bring in the elements of light , relaxation and immersiveness together.

- 1: Experience of a Summer night in forest with simulation of fireflies
 - 2: Experience of flotation with lights with interactivity using sound and touch
 - 3: Kaleidoscope effect of lights in an immersive cocoon- formless light
 - 4: Streak of lights- lights that change colour and glow with hand gestures(sound could be involved)
 - 5: Experience of a waterfall that enhances the bathing experience-ripples effect highlighted with lights as water drops
 - 6: Imitate the motion of fishes in a bath tub with lights
 - 7: Motion sensing balloon that lights up when it senses activity and then fades off
-

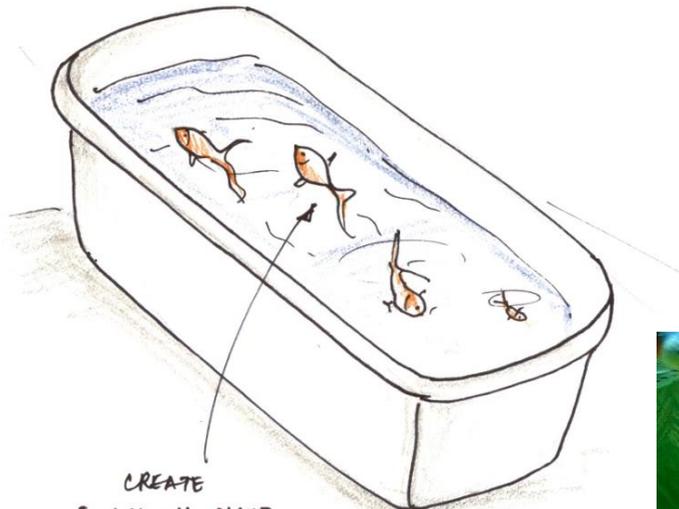
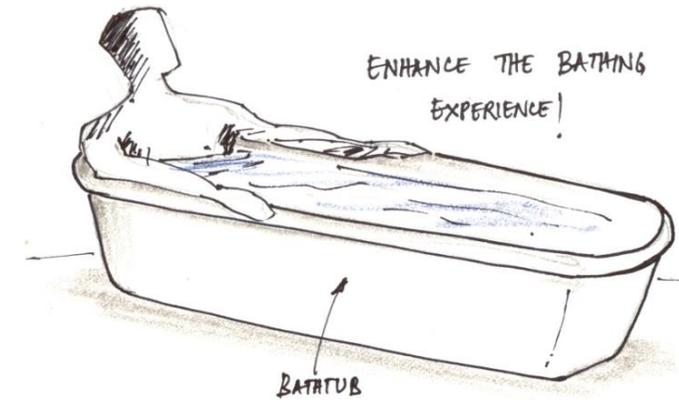
IDEA - Experience of a Summer night with fireflies



IDEA - Experience of waterfall



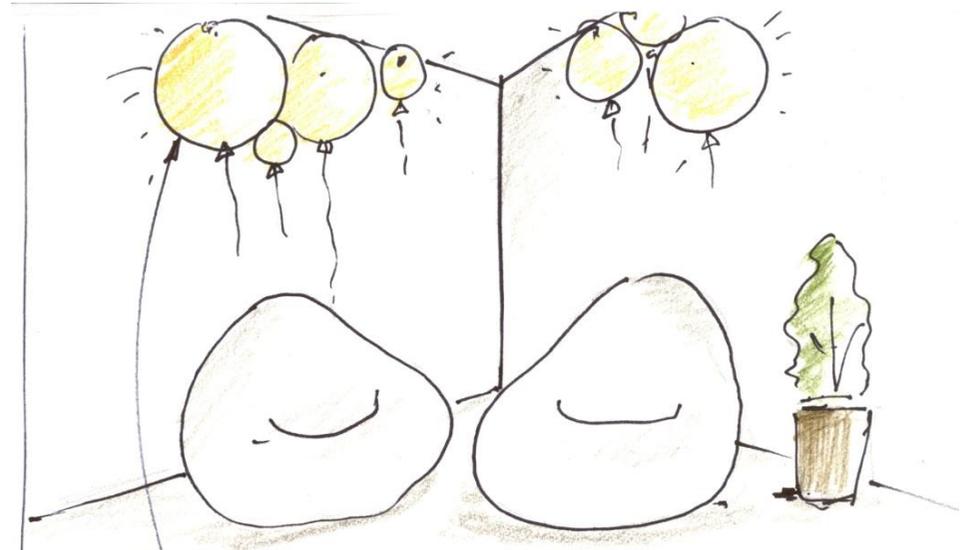
IDEA - Fishes in Bathtub



CREATE
IMAGINARY LIGHT
FISHES THAT SENSE THE HUMAN POSITION
AND MOVES AROUND.
FISHES ARE PURELY CREATED BY PROJECTING
LIGHTS.

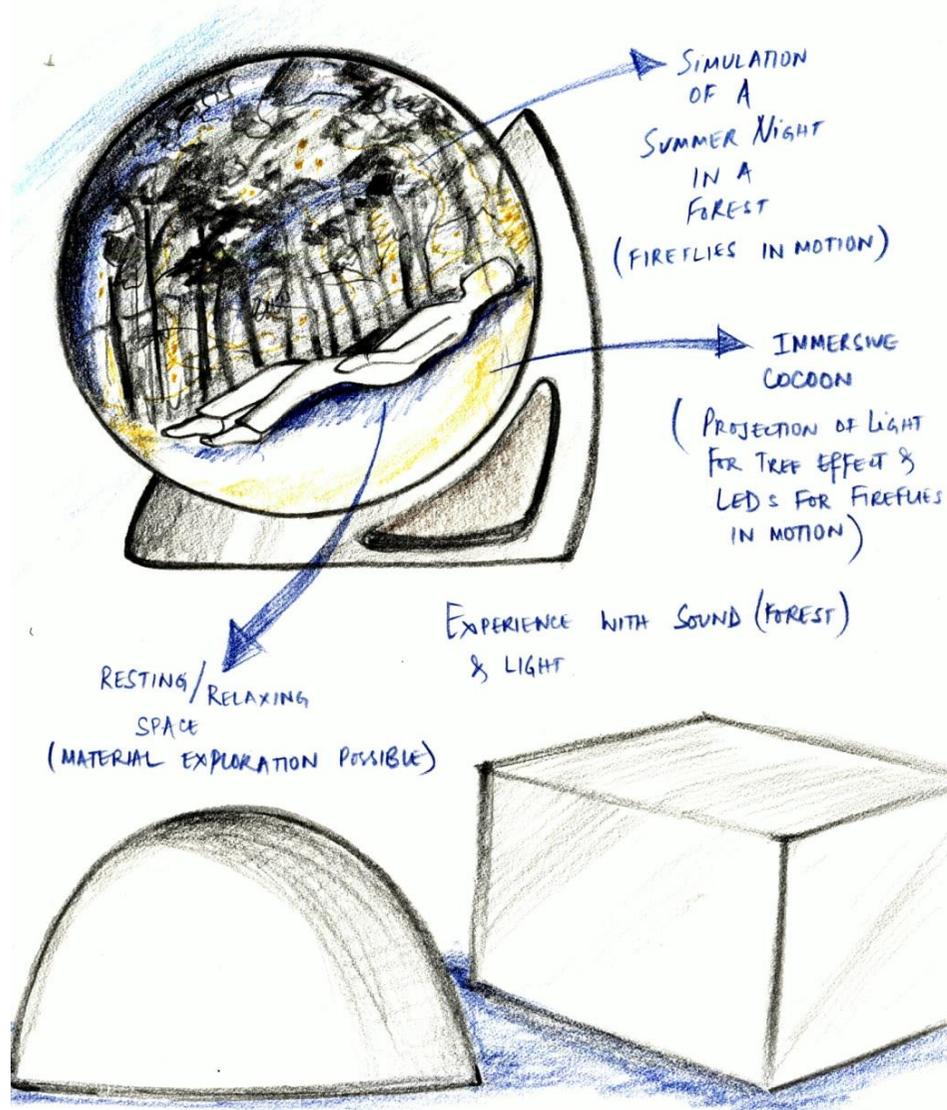


IDEA - Floating Lights



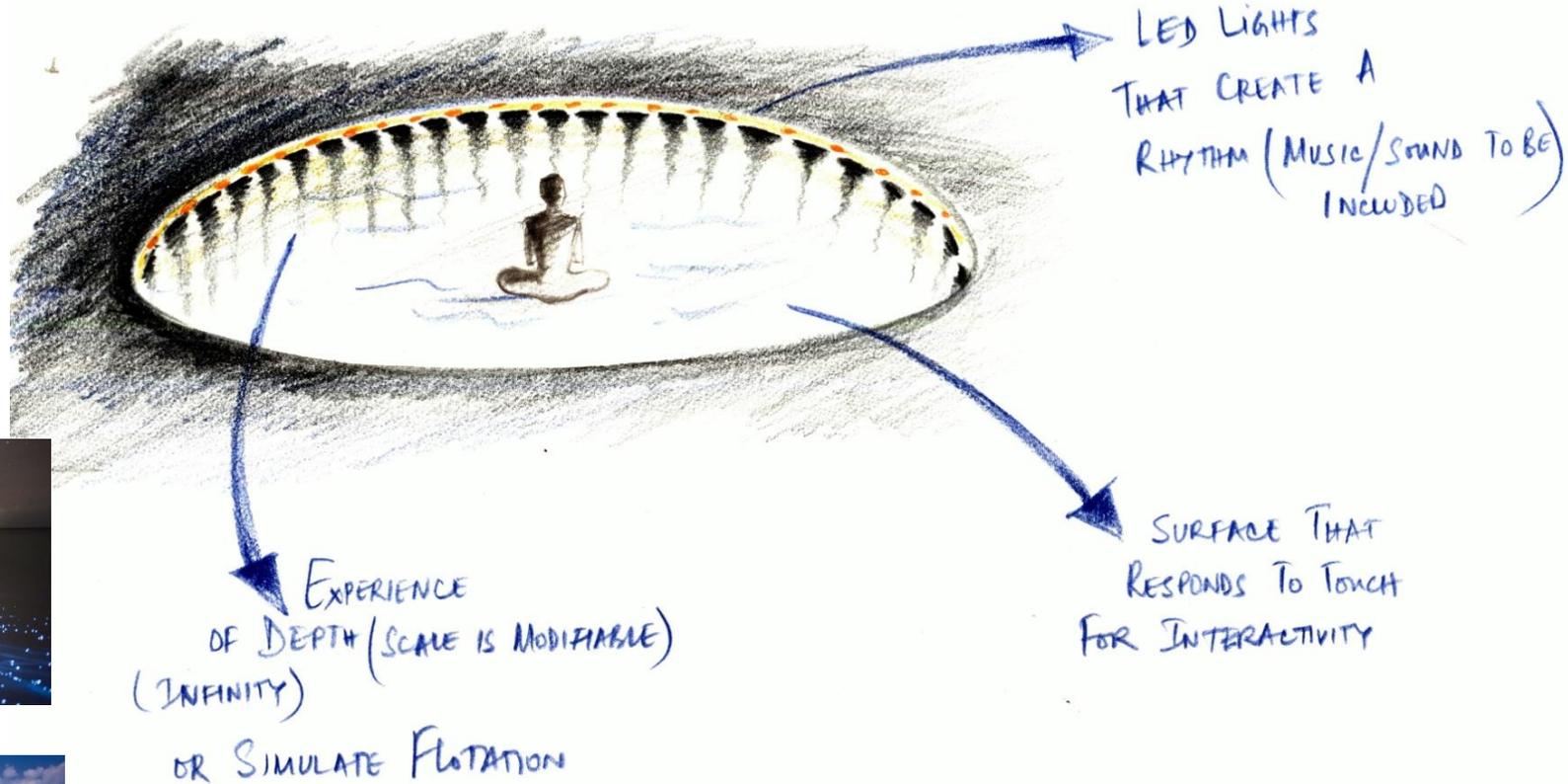
HANGING/SUSPENDED
GLOWING LIGHTS THAT ARE MOTION SENSING ALSO!
THEY GLOW WHEN MOTION IS DETECTED
THE FLOTATION OF LIGHTS ALLOW IT TO BE MOVED AROUND
FROM ROOM TO ROOM (LIKE FLOATING CANDLE)

IDEA- Immersive Cocoon



Technology Exploration-
Light projection,
Interactive lights - ebb and
glow of fireflies
Relaxation chair material for
sensorial experience

IDEA-Experience of flotation with lights

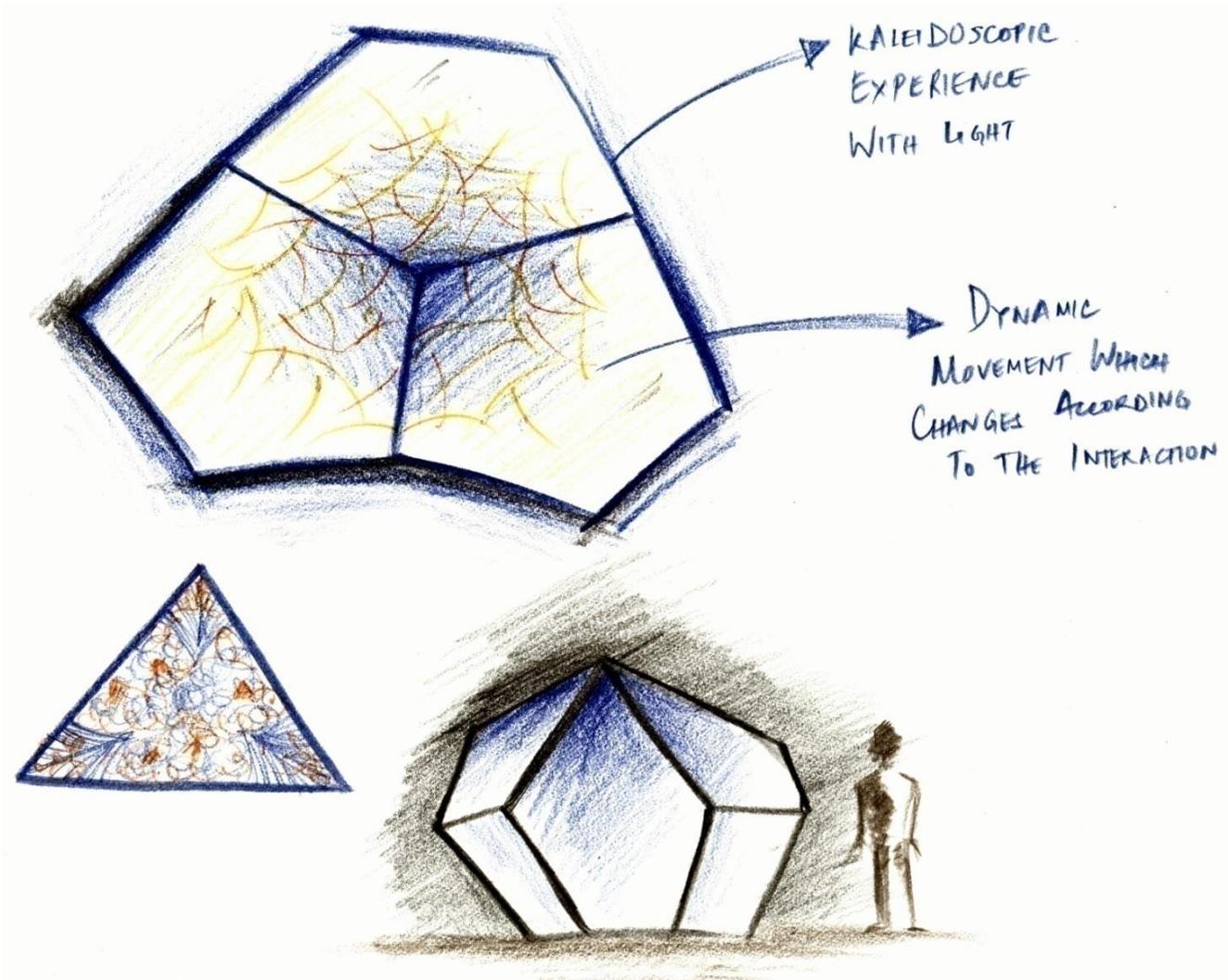


Technology Exploration•

Response of Light with Sound

Increasing Interactivity

IDEA- Kaleidoscope effect of lights in an immersive cocoon- formless light



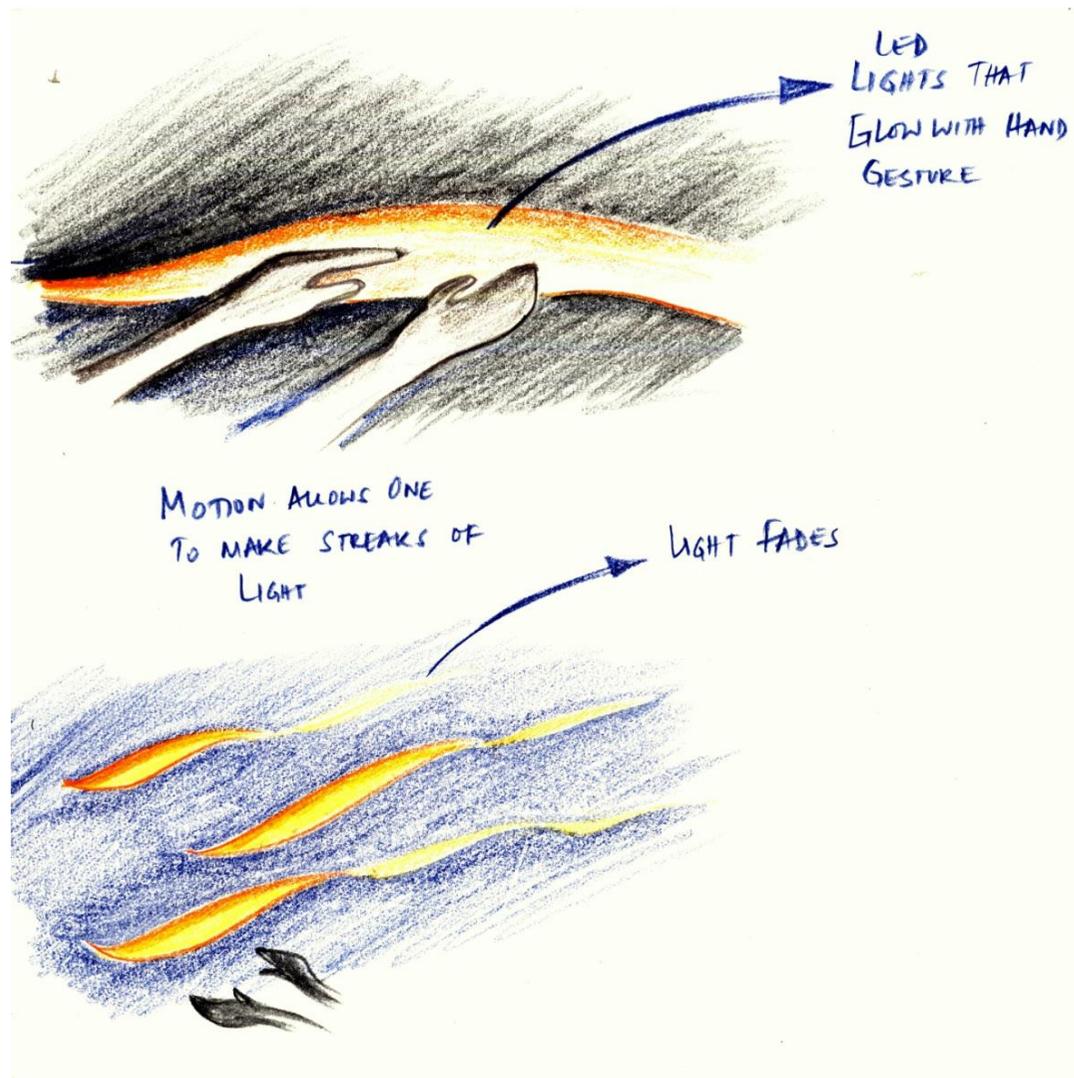
Technology Exploration•

Response of Light with Sound

Increasing Interactivity

Projection mapping

IDEA- Streak of lights- lights that change colour and glow with hand gestures



Technology Exploration -

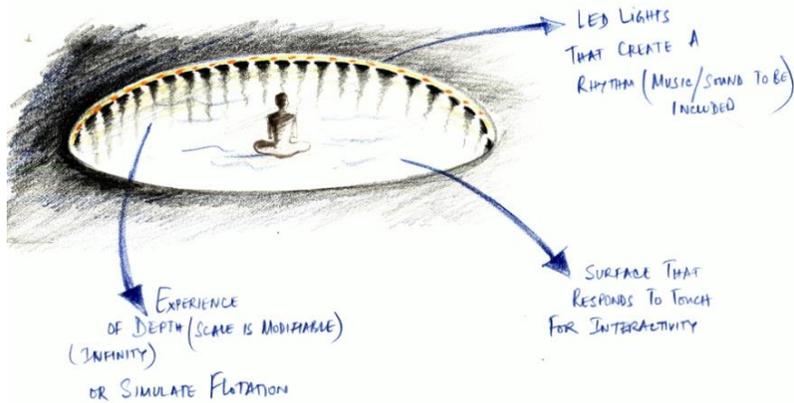
Motion sensing

Proximity Sensors

CONCEPTS AND SIMULATION

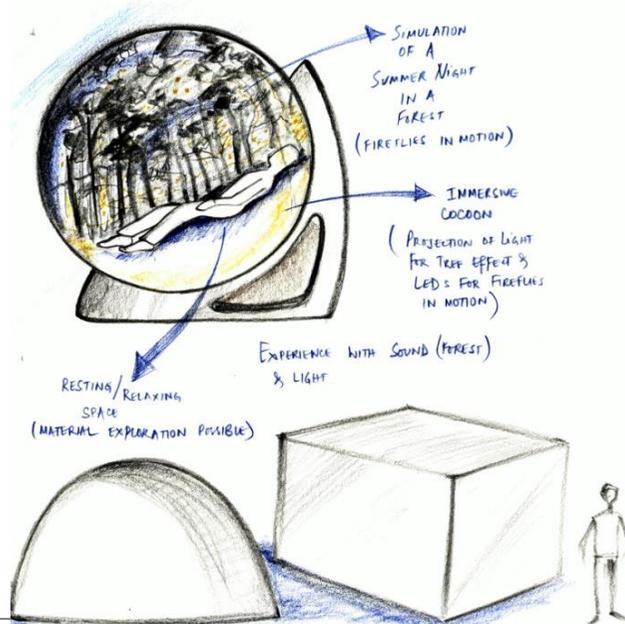
Of the Ideas that were generated, they were evaluated in terms of timeline feasibility, highest Immersive experience and whether they conform to the project brief. The first and the second idea were then selected for further explorations for concepts.

CONCEPT A :Experience of flotation with lights

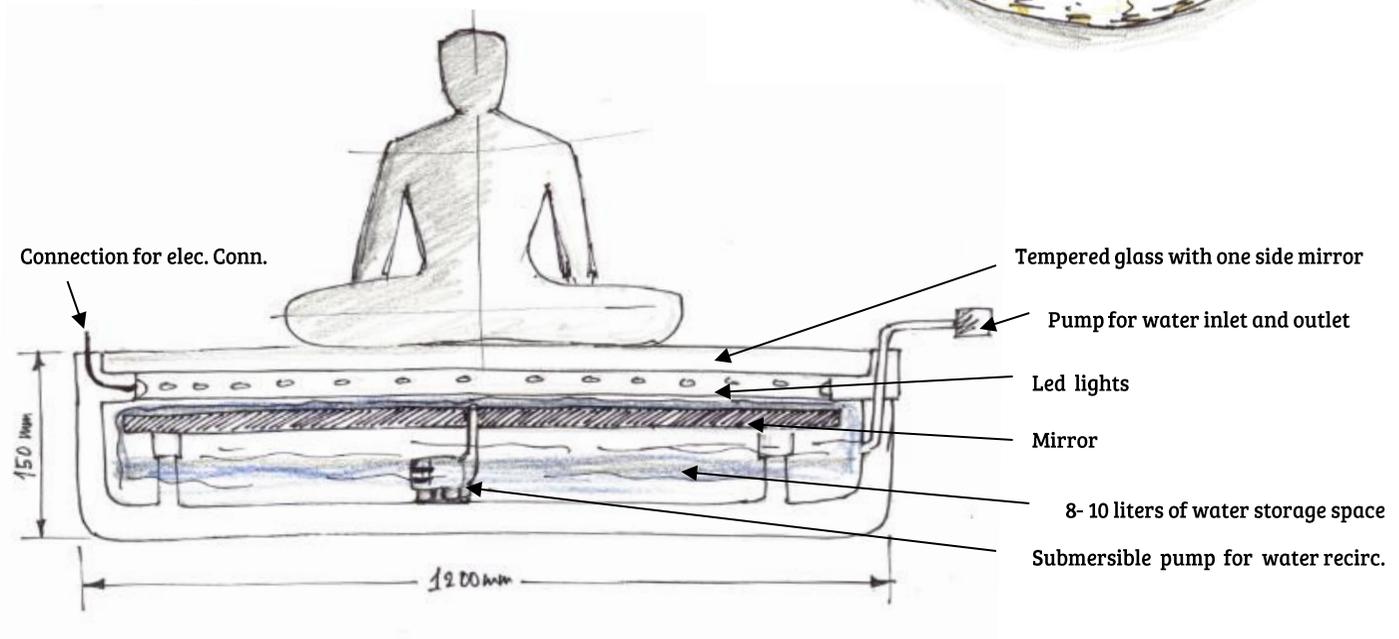
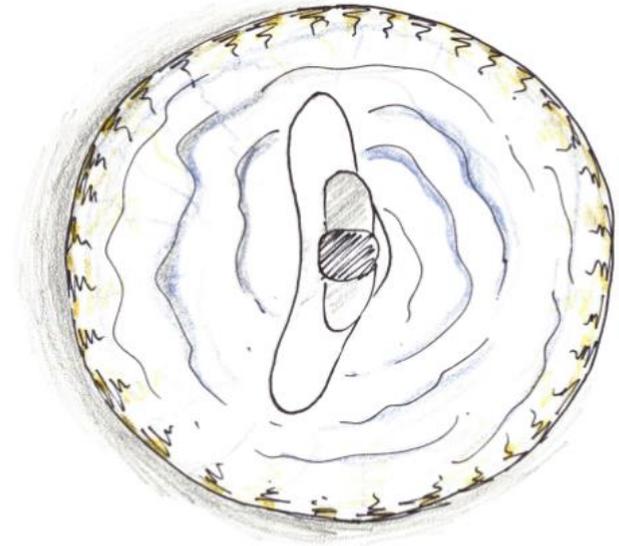
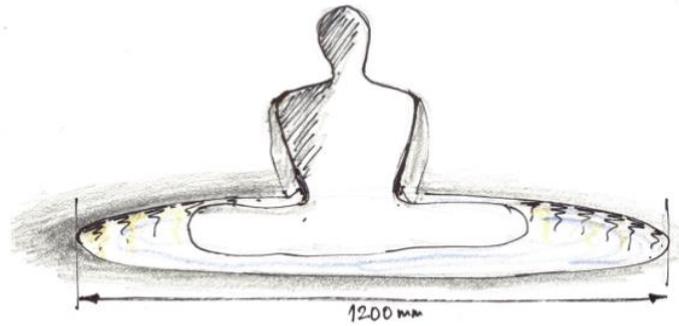


CONCEPTS AND SIMULATION

CONCEPT B : Immersive Experience of a cocoon. Here the coloured lights will be synchronized with music for helping the users to relax. The top of the structure will have modulating glow of optical fibers to simulate the effect of 'stars'.



CONCEPT A : DETAILS

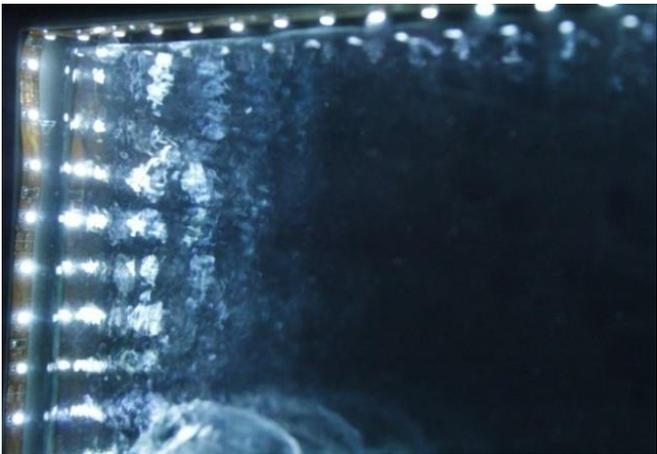
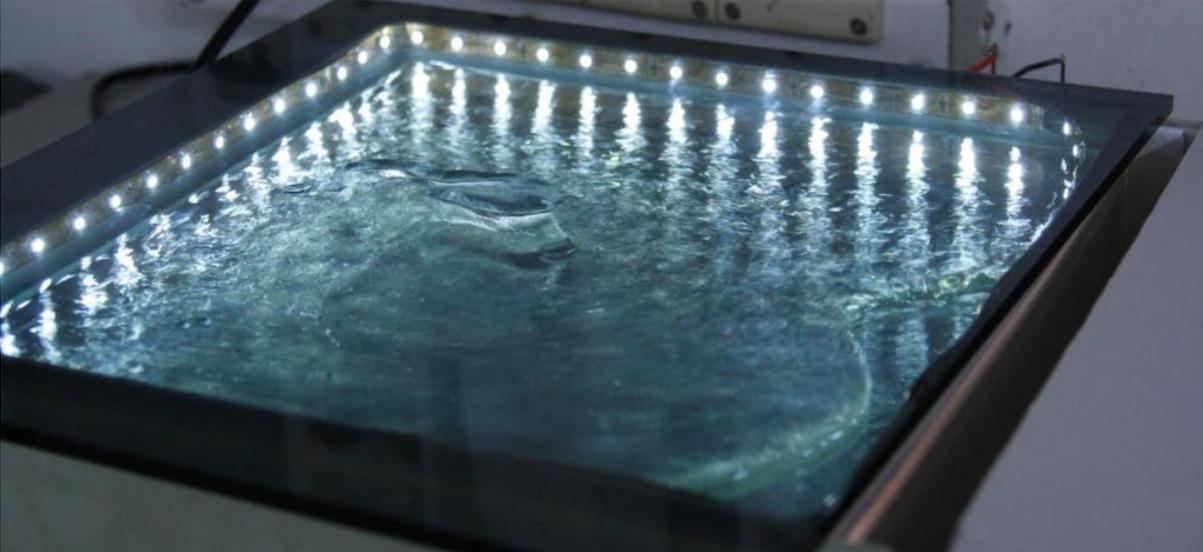


PICTURES OF ROUGH MOCK UP MODELS.

The prototype was first tested without the effect of water. A strip of LED was placed between a mirror and a glass with one side mirrored to simulate the effect of flotation.



Set up is a testing prototype for the dynamic effect of flotation. This is where water flows between the mirrors and is constantly re-circulated using the submerged pump.



CONCEPT B : IMMERSIVE EXPERIENCE OF A COCOON

- The Immersive Cocoon is located in the user's house.
 - The Stressed User, after returning from work wishes to relax and hence approaches the cocoon
 - The User sits and enters the cocoon as shown in the following slides.
 - The interior of the cocoon is made of soft white cotton which allows air to circulate . There is a plush cushiony surface on which he can sit and relax.
 - There is a USB port which is to the right of the user (input port) to which he connects his cell phone.
 - Immediately a soft warm yellow glow fills the entire cocoon.
 - In the cell phone an application asks the user about his stress level (3-min/5/8-max) on a scale of 10.
 - After the user selects his level, the lights moderate into colours and a soothing music accompanies the lights. Further into the music the lights moderate on the basis of the users stress levels. The more stressed he is, more of blue, violet hues are generated as per previous research reference to calm him down.
 - The ceiling of the cocoon has tiny lights ebbing and glowing to simulate the effect of stars.
 - After the music stops, the cocoon goes back to the original glow.
 - An option of reading light is included if the user wants to relax by reading a book.
-

MOOD BOARD FOR FORM EXPLORATIONS



Figs : Cliff Swallow's nest, erica marifolia, woolen strands, butterfly cocoon, maize, pink waxbells, weaver bird's nest, nubuck leather bag, yellow flower
Ref: <http://ledgeandgardens.typepad.com>
<http://www.the-beautiful-things.com>

CONCEPT B : EXPERIENCE TRIAL AND ERGONOMICS

A rough mock up model was made to simulate the immersive effect with blue light

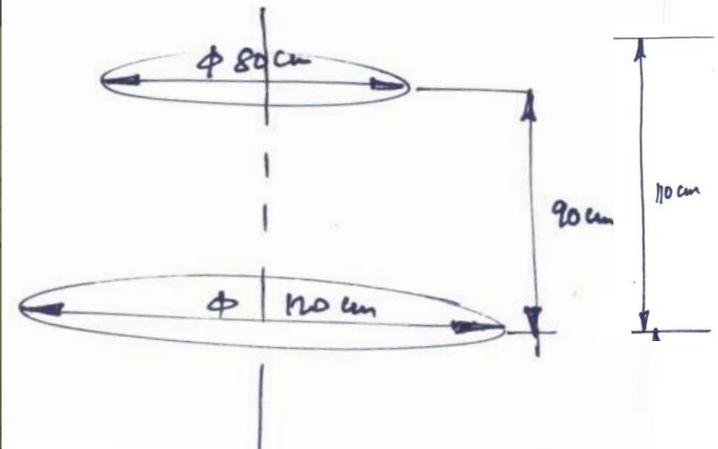
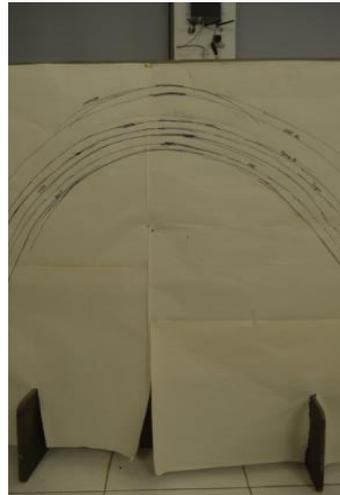
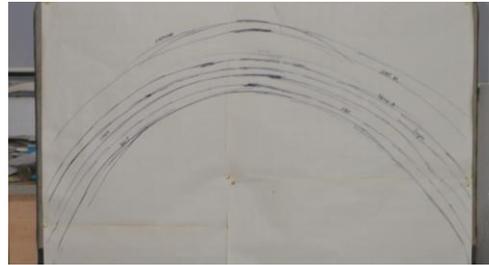




A user survey was conducted with 10 different users for ergonomic study.

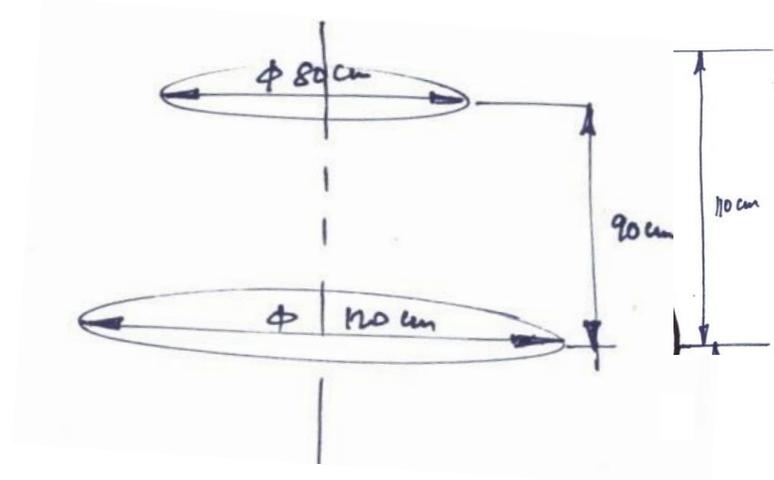
RESULTS FROM ERGONOMIC STUDY

Users were asked to indicate their level of comfort in an enclosed space by which the average height for the structure was determined.

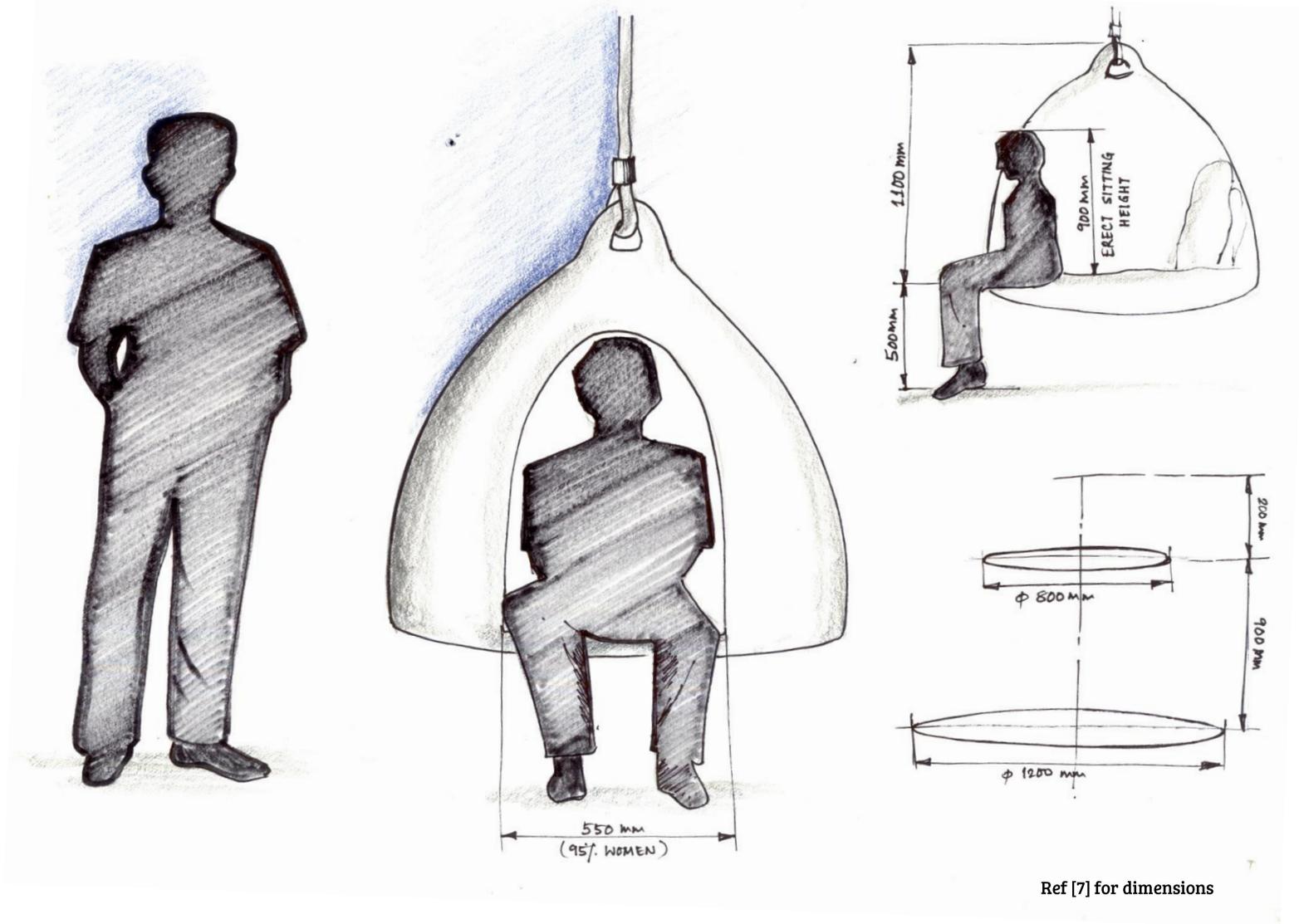


RESULTS FROM ERGONOMIC STUDY CONT'D...

- From the study, the minimum height of the structure was selected as 1100 mm
- The diameter covered by the umbrella was 900 mm, and the finalized dimension was 800 mm to include the form factor as well.
- The maximum dimension for a person sitting erect was found to be 880 mm and according to the referred anthropometric data book, the maximum height for 95% male is 900mm.
- The height from the ground referring to the data book was considered as 500 mm(75% combined)
- The opening area width is considered to be 550mm (95% women)

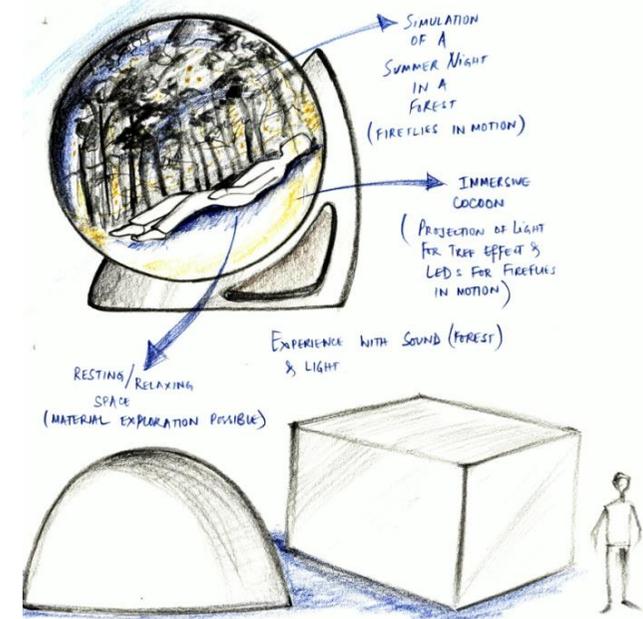
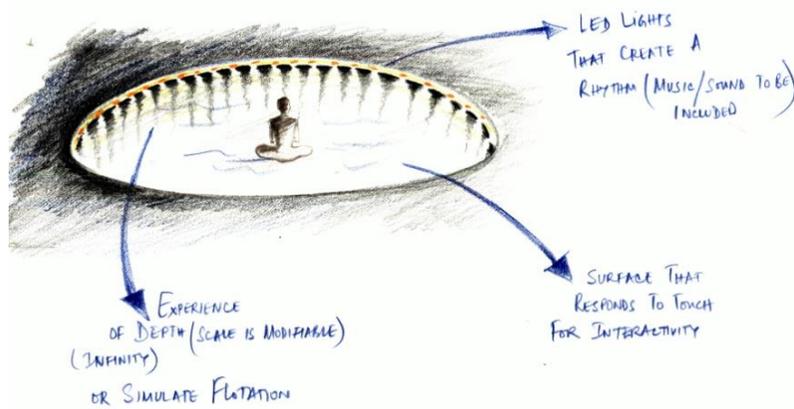


DIMENSIONS FROM STUDY AND BASIC STRUCTURE



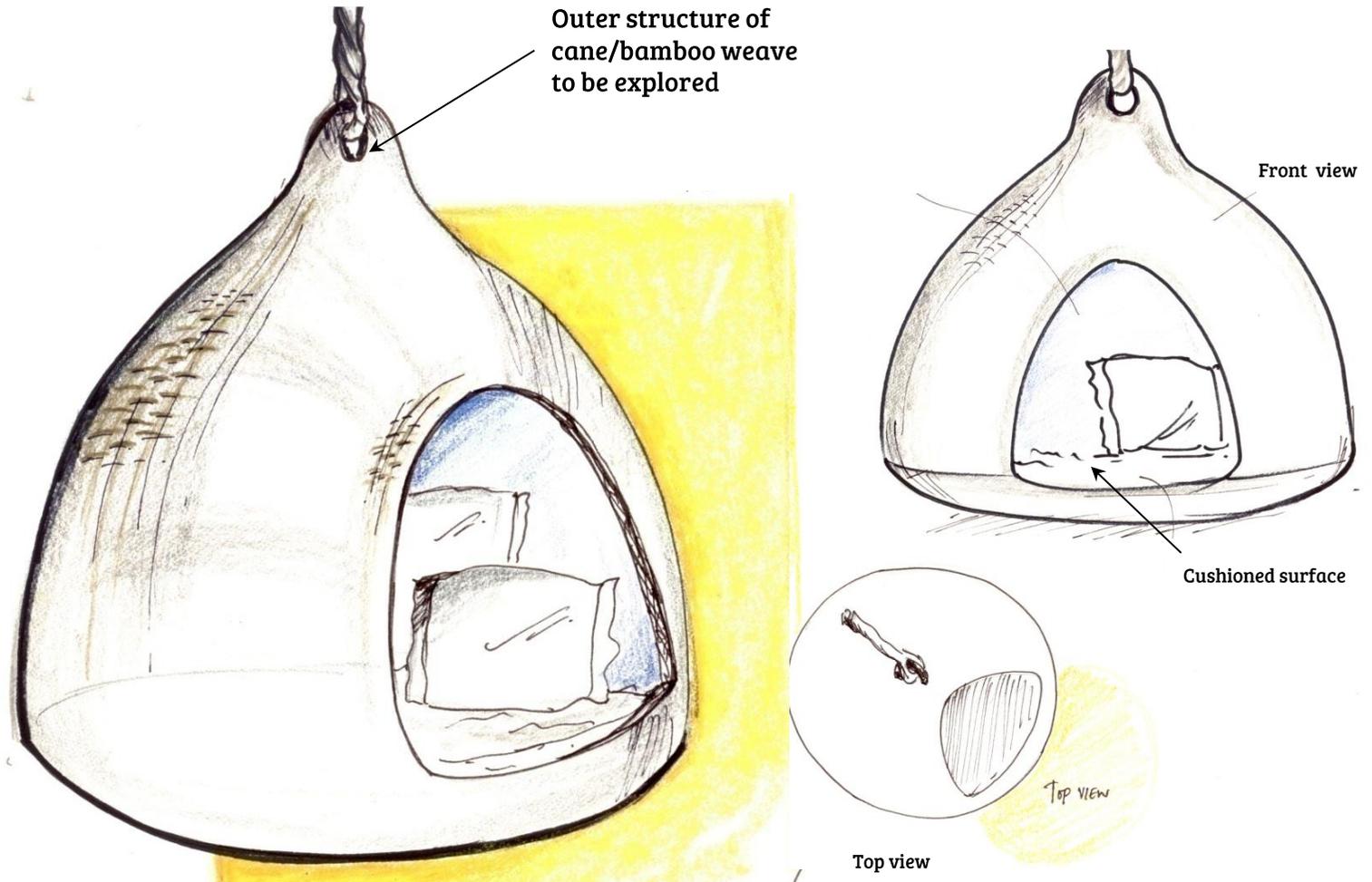
Ref [7] for dimensions

CONCEPT EVALUATION

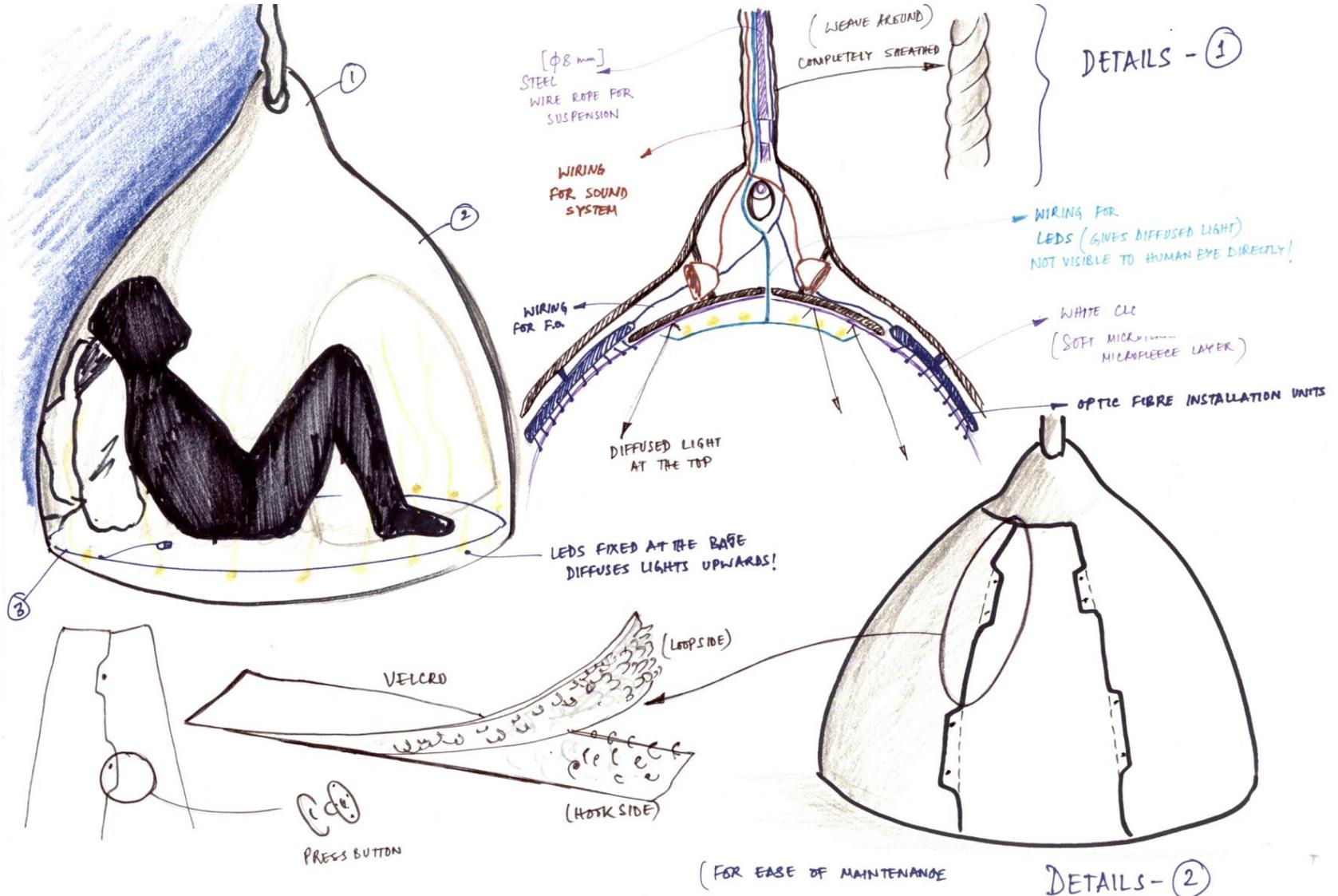


Criteria	Concept A	Concept B
Personal Space	Not defined	Defined
Ergonomics	Visuals are below eye level	Visuals are above and at eye level
Maintenance	Difficult due to water/leakage issues	Easier
Posture	Sitting/Standing	Sitting, Inclined Sitting
Immersive Experience	Good	Better

FINAL CONCEPT : B



DETAILS OF THE WIRING AND INSIDE STRUCTURE

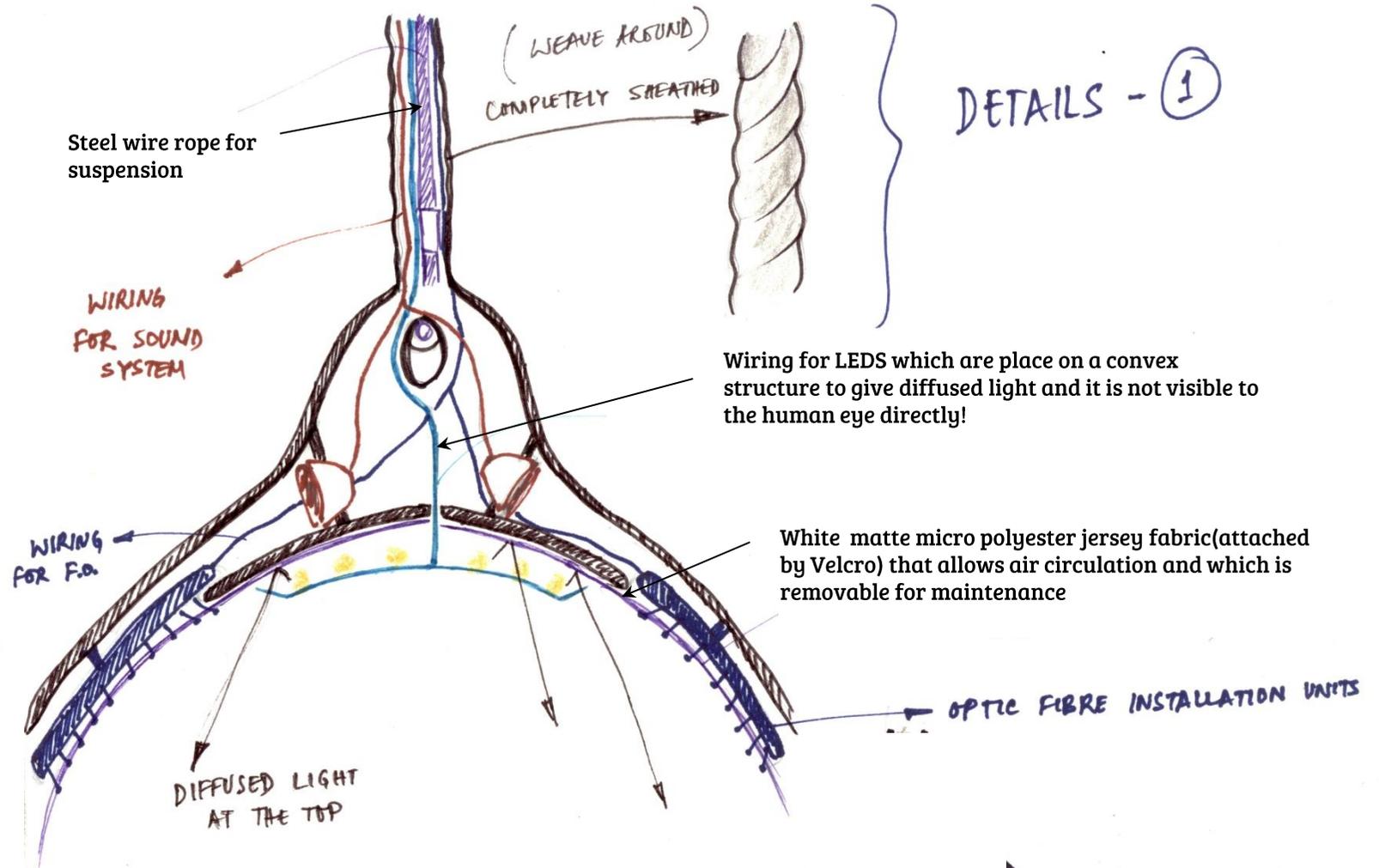


CAD MODEL EXPLORATION OF BASIC STRUCTURE

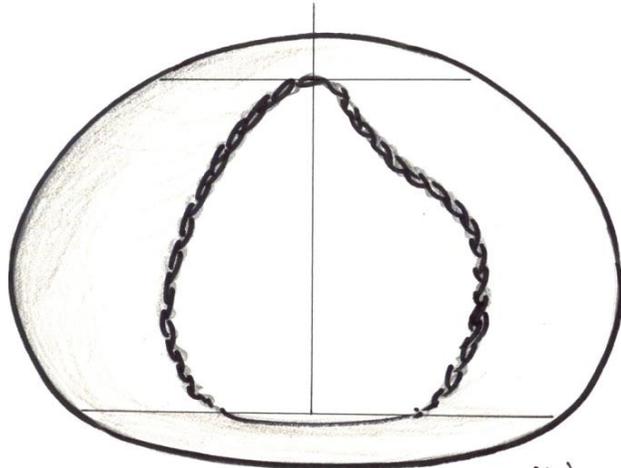
The basic structure has been explored in CAD to visualize the form which is constrained by the dimensions obtained in the ergonomic study.



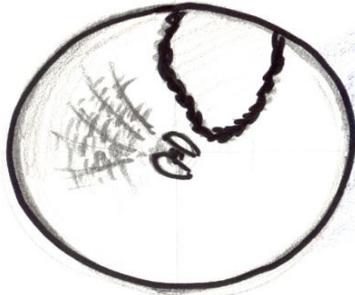
DETAILS OF THE WIRING AT THE TOP OF THE STRUCTURE



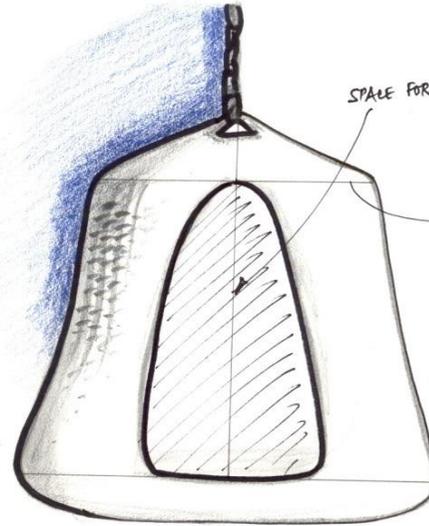
FORM EXPLORATIONS



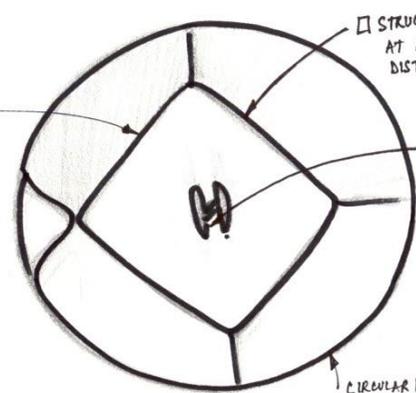
ENLARGED FRONT VIEW (CONSTRAINED WITHIN DIM.)



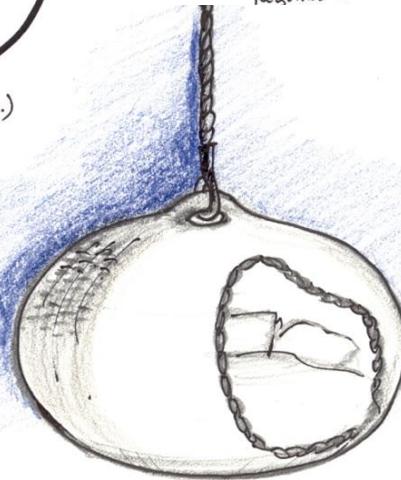
TOP VIEW



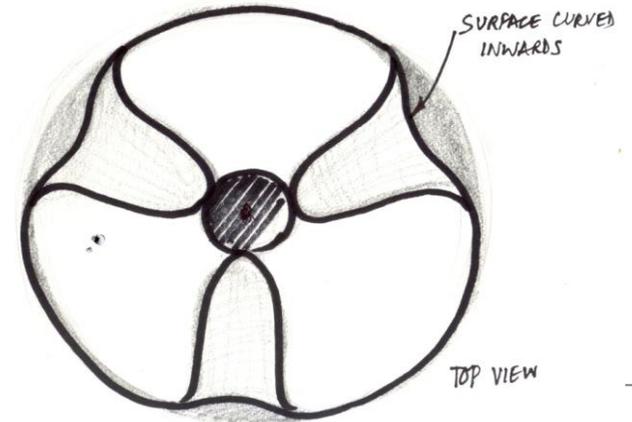
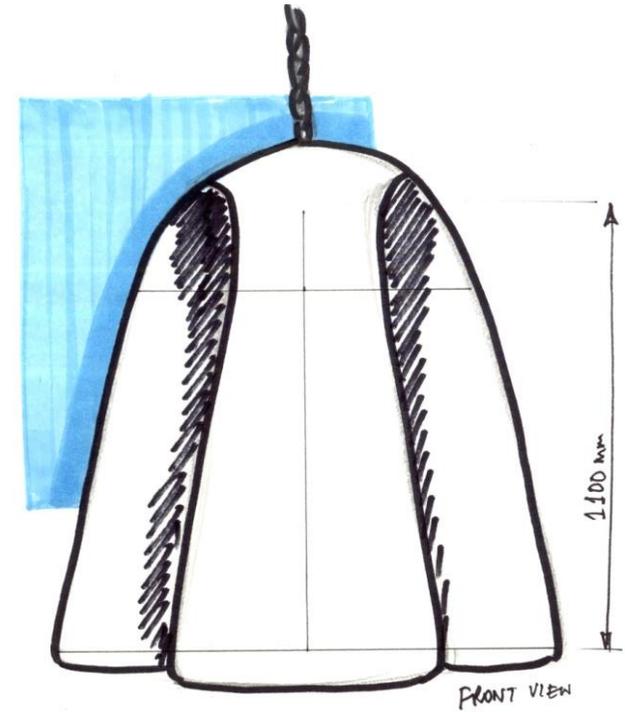
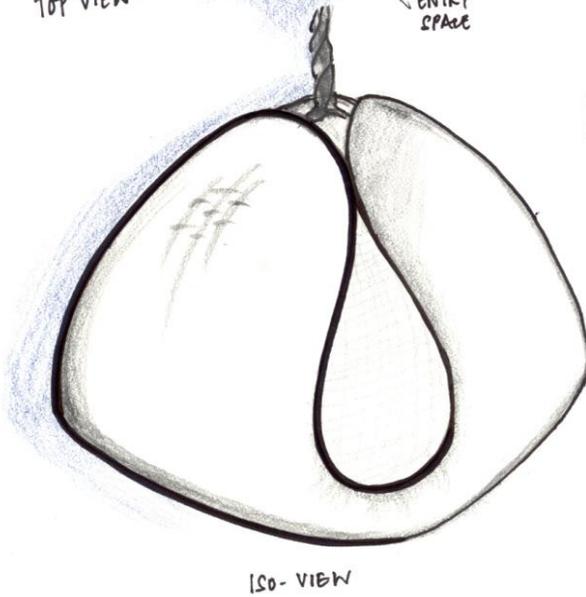
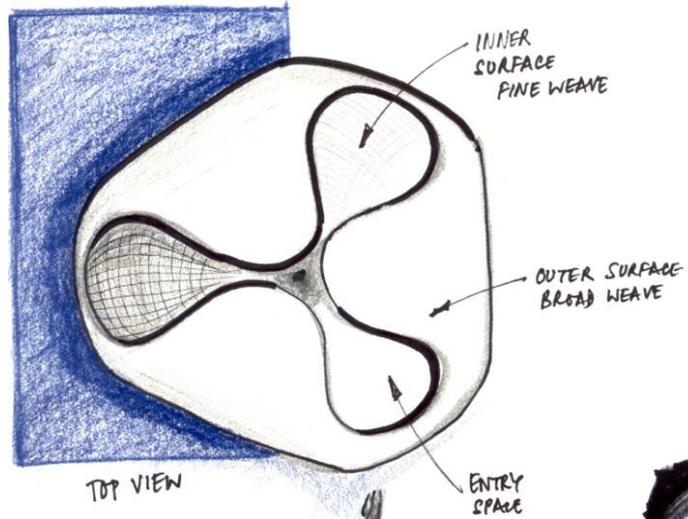
FRONT VIEW
(STRUCTURE CONTAINED WITHIN
REQUIRED DIMENSION)



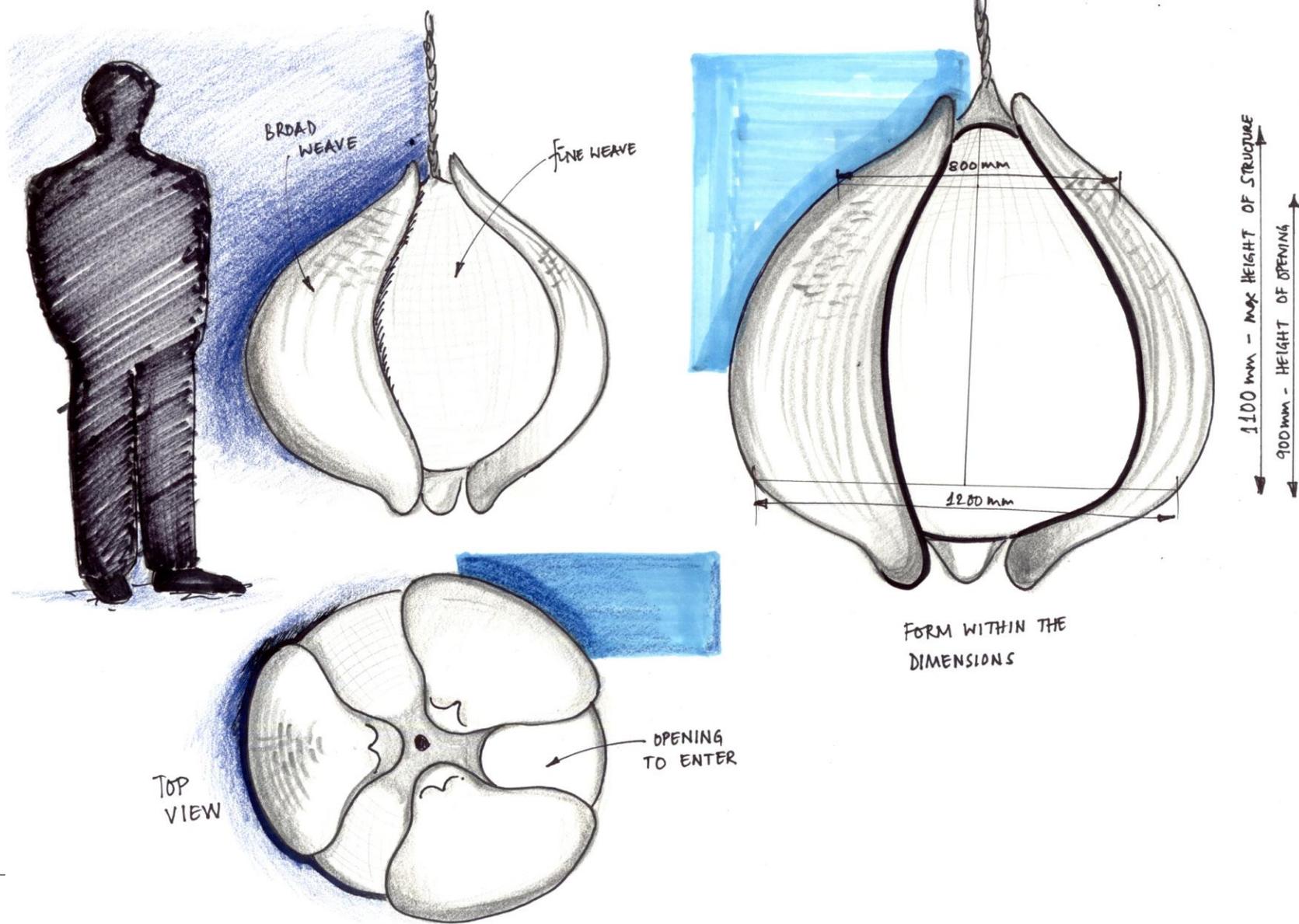
TOP VIEW



FORM EXPLORATIONS

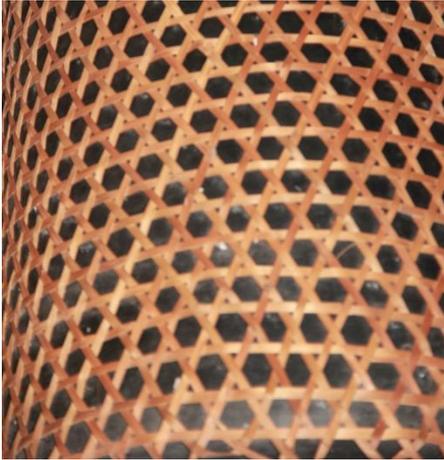


FORM EXPLORATIONS



MATERIAL WEAVE STUDY IN BAMBOO

Star weave



Star weave



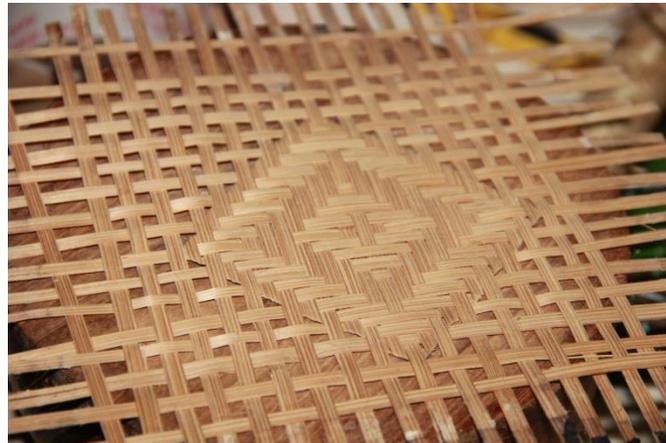
One by two Weave



Diagonal Weave



Cane and Bamboo Mixed Weave



Basket Weave



PART COST DETAILS FOR PROTOTYPE

Part	Qty.	Cost(Rs.)/item	Total(Rs.)
10 mm dia MS rod (10 ft)	10	192	1920
Bamboo Strips (cut to 6mm width)	240	5/strip	1200
Foam Material(47" dia)	1	1700	1700
White cotton cloth	20 m	40/meter	800
Led with controller	1	950	950
Welding of parts		2500	2500
		Rough Estimate	9000

(Other Overhead Charges not included)

PHOTOGRAPHS



PHOTOGRAPHS



PHOTOGRAPHS



REFERENCES :

- [1] Jennifer A.Veitch, Robert Gifford, 1996, 'Lighting effects on health, performance, mood, and social behavior', SAGE social science collections, vol.28, No. 4, P446-470.
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- [3] Chan-Su Lee, Ji Yea Shin, Jongwoo Nam, SinWon Park, Sung Yong Chun, Ja-Soon Jang, ' The effect of visual stimuli of LED lighting by color temperature and illuminance control on attention and meditation level of mind' , Yeungnam University, Korea ,P1-16
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