



Light and Shadow: Storytelling lamp

Submitted in partial fulfillment of the requirement of the degree of

Master of Design
by

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Project Guide
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Approval Sheet

The Design Project II titled "Light and Shadow" by Rani Panit roll number 22m2231 is approved in partial fulfillment of the Masters Degree (Industrial Design) at the IDC School of Design, Indian Institute of Technology Bombay.



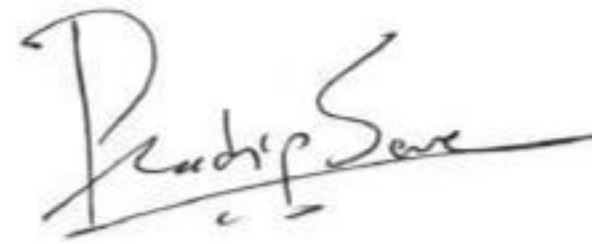
Project Guide



Internal Examiner



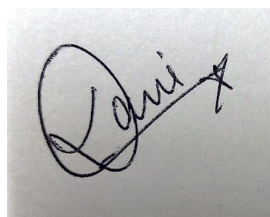
Chair Person



External Examiner

Declaration

I declare that this project report submission contains my own ideas and work, and if any pre-existing idea or work has been included, I have adequately cited and referenced the original author(s). I also declare that I have adhered to all the principles of academic honesty and integrity and have not misinterpreted, fabricated or falsified any idea/ data/ fact source in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from the sources.

A small, square image showing a handwritten signature in black ink on a light-colored background. The signature appears to be 'Rani' followed by a stylized flourish.

Signature:

Name: Rani Panit

Roll no.: 22m2231

Date: 08/11/23

Abstraction

Shadows, a common natural occurrence in daily life, have been explored as an artistic element in various fields, including architecture, painting, and theatre. One of the oldest and popular applications is shadow puppetry. However, there has been limited exploration of shadows in product design. A notable example of the artistic use of shadows in a product is the Sun Dial, showcasing a beautiful integration of shadow as a design element.

Childhood stories serve as a vital component by simplifying complex ideas for kids, imparting moral values. Through imaginative narratives, children develop creativity, language skills, and emotional intelligence. Stories also contribute to cultural awareness, critical thinking, and bonding with caregivers. Essentially, they provide an engaging avenue for children to explore, learn, and develop essential life skills in a relatable and enjoyable manner.

My project tries using shadow to tell stories. In my project, I aim to leverage the concept of shadow as a functional element. I am exploring ways to integrate shadow as a purposeful and practical component within the project's design or functionality.

Acknowledgment

I would foremost like to sincerely thank my project guide, Prof. Avinash Shende, for his valuable mentorship, support and guidance throughout my project.

This endeavor would have not been possible without the support of my family, friends and peers.

I would like to thank to my friends Priyadarshi, Prince and Souvik for constantly supporting and giving their feedback. Prince for helping me with the mechanism.

I would also like to thank the IDC workshop staff for being available all the time to help me with the project.

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Introduction

Light and Shadow

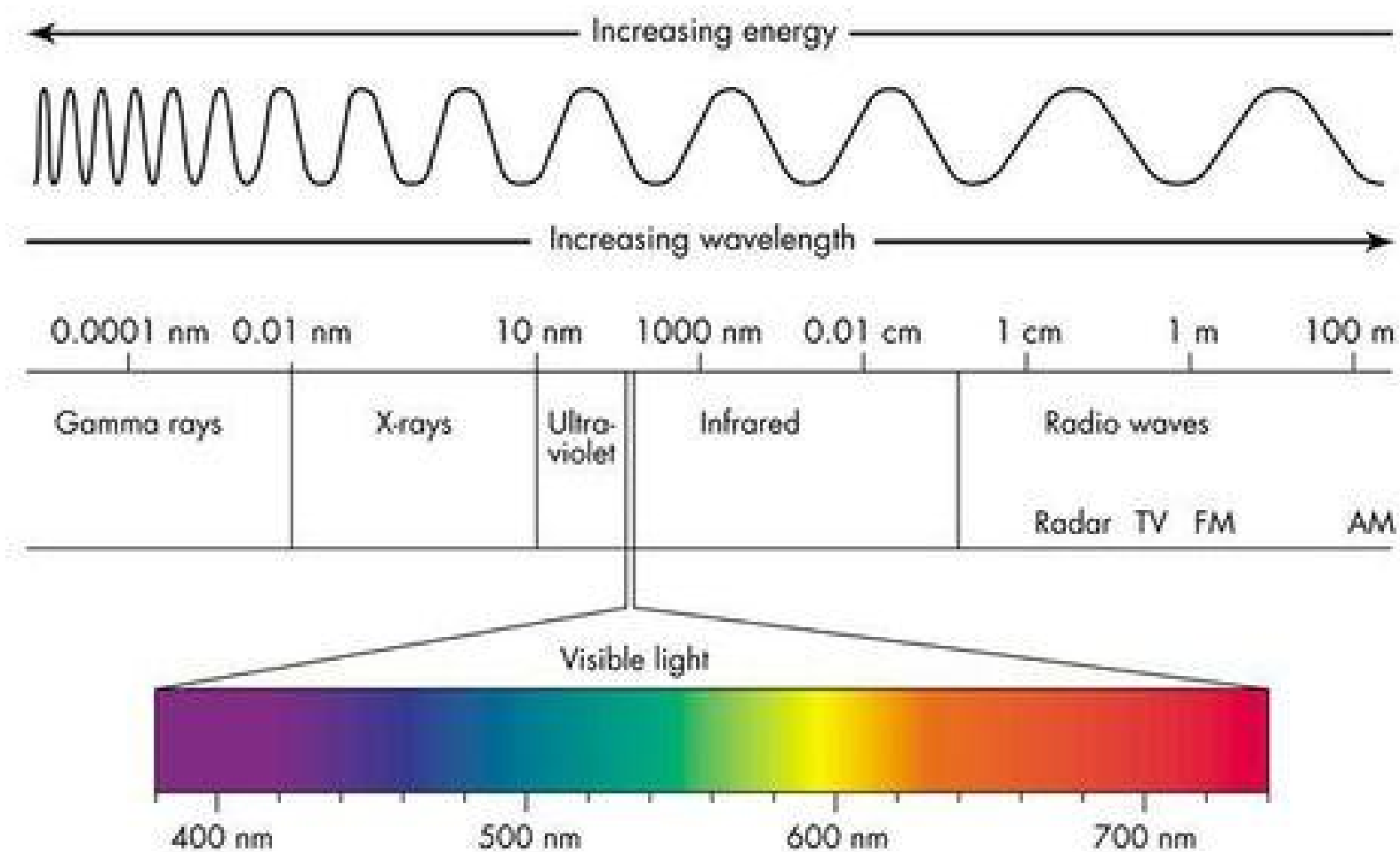


Image source: Google

“Where there is light, there is shadow.”

Since childhood we have encountered light and shadow. They both are very common to humans that we often do not think or even notice them.

It was class 10th when I encountered the light in physics world (image in the reference shows it).

For humans light is the spectrum whose wavelength falls between 400nm to 700 nm. Any wave below or above this is cannot be seen by humans.

Shadow is obstruct of light by an opaque object resulting in the formation of dark figure.

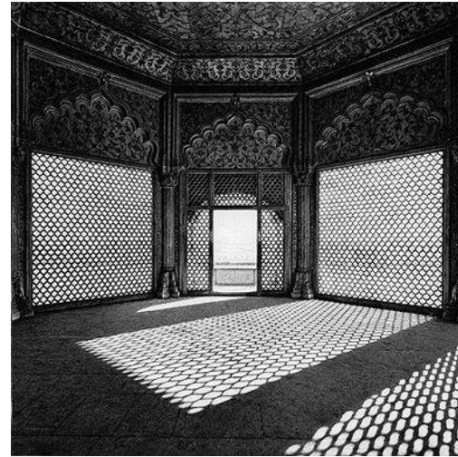
This natural phenomenon of light and shadow has been utilized by different experts in their respective field, exploring its different aspects and uses. Through this project I am going to explore this very naturally concurring phenomenon of light and shadow in product.

Source: Wikipedia

Research

Exploration of light and shadow in different fields

Architecture



Red Fort, Delhi



TWA terminal



The changing angles of sunlight throughout the day create dynamic silhouettes, transforming the appearance of a building from one hour to the next. This dynamic quality adds a sense of movement and life to the structure.

TWA Terminal, light and shadow work together to paint the space. they give colour to space.

Illustration



Source: Vincent Bal's Instagram



Illustrations by Vincent Bal

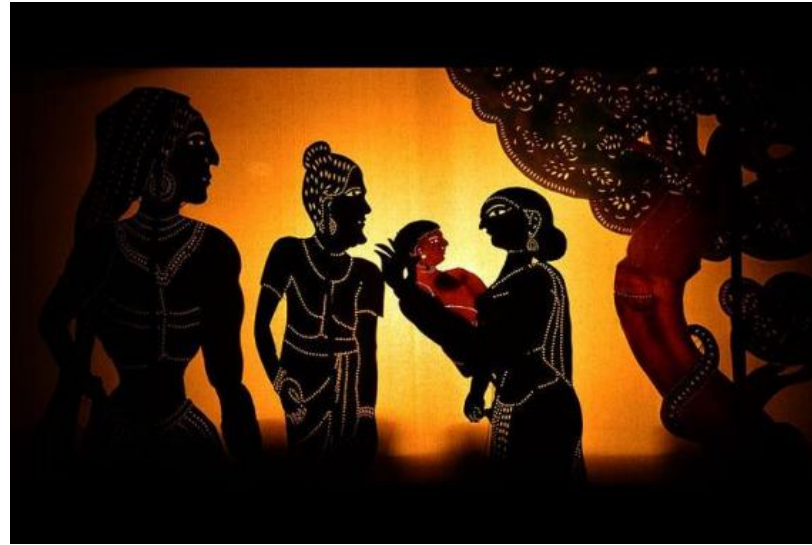
Vincent bal is a Belgian filmmaker and visual artist widely known for his artwork based around shadows cast by everyday objects. He turns shadows of everyday objects into funny sketches.

It all started when Vincent Bal was working on a new script and noticed the shadow of his teacup on a piece of paper. He drew some lines on it and turned it into an elephant. He then took a pic of his creation and shared it on Facebook. The pic went viral and since then he's been posting a doodle a day.

<https://121clicks.com/art/everyday-objects-funny-doodles-vincent-bal>

Shadow Puppetry

India



Tolu Bommalatta (Andhra Pradesh)



Chamadyacha Bahulya (Maharashtra)



Ravana Chhaya (Odissa)



Tolpava Kuthu (Kerala)

Shadow play theatre has been an ancient part of India's culture. References to shadow play can be found in the visual traditions of the country. Temple murals, folio paintings, and narrative paintings depict this art form in action. One of the earliest mentions of shadow puppetry is in the ancient Tamil text **Thirukkural** written in **300 CE**. During the 20th century, it was thought this art was lost to the marching of time, but by the 1930s it became clear that this art form was not just existing, but also flourishing in the rural regions of Kerala, Karnataka, Andhra Pradesh, and Maharashtra.

In Andhra Pradesh, this shadow theatre is known as **Tholu Bommalata**, which translates to '**dance of the leather puppets**'. Earlier, deerskin was used to make these puppets, but now **goatskin** is used. A stage is set up, with a white, semi-transparent material draped across it as a projection screen for the puppets' pictures. Behind the screen, the puppets are stretched on a rope, and their shadows are projected onto the screen by a bright oil lamp placed behind them. Steel frameworks for the stage, loudspeakers to magnify vocals, and an arc lamp in place of an oil lamp have all been used in modern times in this art form.

According to Keith Rawling (2003), in India, shadow play had been given a high support by the local rulers and allowed settlements in different regions. **The clan**, which was a wandering tribe, spread their art as they migrated to the further south, performing the shadow plays of Maharashtra. Another clan of the original tribe migrated to Karnataka, taking their art form with them.

<https://pdf.sciencedirectassets.com>

Shadow Puppetry around the World



China



Indonesia



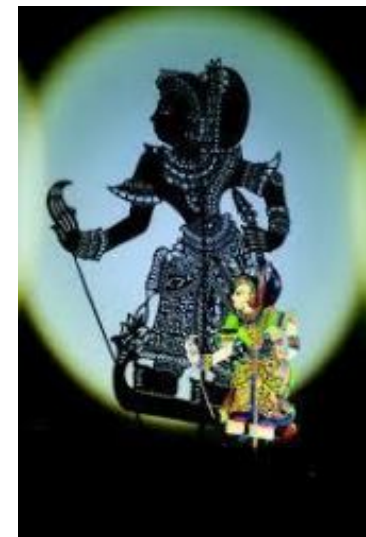
Malaysia



Cambodia



Iran



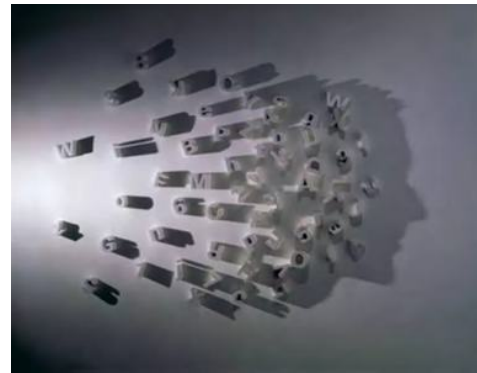
Thailand

Shadow puppet's play contains high quality of art and craft. The art and craft of the character itself, takes in many forms such as painting, crafting, and they also bring together visual art, vocal and instrumental music, drama, literature and dance, as well as the art of the puppeteer, who need to be skilled enough to bring life to shadow play's characters. Shadow play inspires variations of theme, mood and style, depending on their performances. People have been creating them for thousand years in building motion and life. It is a way for individuals and communities to express and engage themselves with family, friends, and their neighborhood's communities. In addition, it influences the audience as a means of communication, also as an extension of human expression through its unique philosophical value (Ismunandar, 1994).

- Shadow play is an old tradition and it has a long history in Southeast Asia, especially in Indonesia, Malaysia, Thailand, and Cambodia.
- It has been an ancient art and a living folk tradition in China, India, Iran and Nepal.

<https://pdf.sciencedirectassets.com>

Shadow in Art



Artists today also make use of light and shadow to express their art where cleverly using shadow as the art work

Shadowgraphy



Shadowgraphy is the art of performing a story or show using images made by hand shadows. It can be called "cinema in silhouette". Performers are titled as a shadowgraphist or shadowgrapher. The art has declined since the late 19th century when electricity became available to homes because light bulbs and electric lamps do not give off good shadows and because cinema and television were becoming a new form of entertainment. Shadows are greatly defined by candlelight; therefore hand shadows were common in earlier centuries.

[https://en.wikipedia.org/wiki/Shadowgraphy_\(performing_art\)](https://en.wikipedia.org/wiki/Shadowgraphy_(performing_art))

Shadow live Performance



Dance



Theater

Photography



Source: Google



Fan Ho

He was one of the most important street photographers of the 20th century.

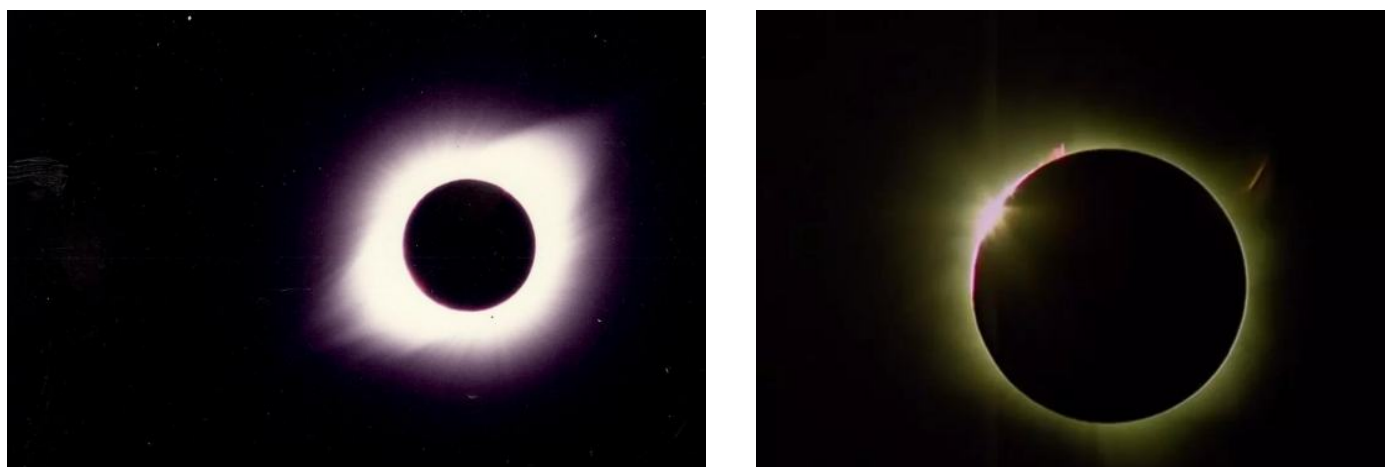
His use of some basic photography techniques such as leading lines is also brilliant. But where his photography really shines is the use of light and shadows.

<https://aboutphotography.blog/blog/2020/2/14/fan-ho-the-great-master-of-lights-and-shadows>

Shadow in nature



<https://science.nasa.gov/eclipses/types>



Source: Google Images

A solar eclipse happens when the Moon passes between the Sun and Earth, casting a shadow on Earth that either fully or partially blocks the Sun's light in some areas. This only happens occasionally, because the Moon doesn't orbit in the exact same plane as the Sun and Earth do. The time when they are aligned is known as eclipse season, which happens twice a year.

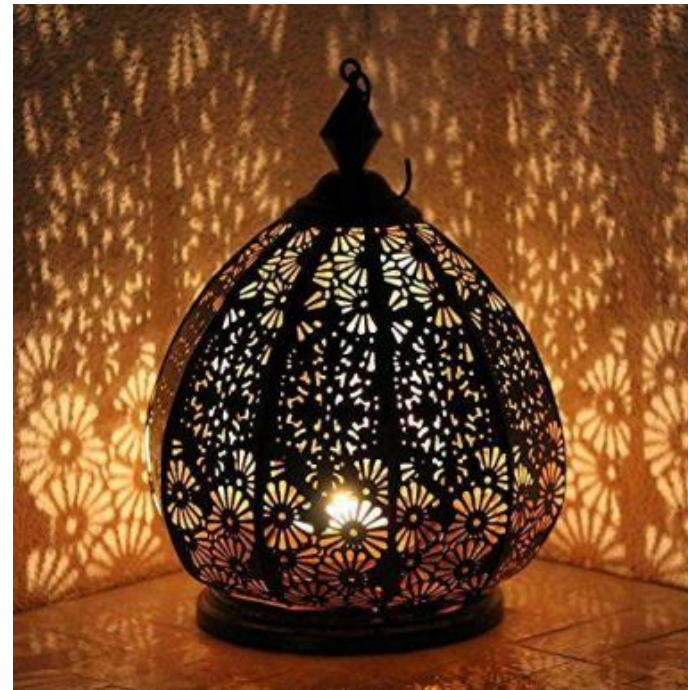
<https://science.nasa.gov/eclipses/types>

Products

Iranian Lamp



Source: Pinterest



Sun Dial



Source: Pinterest

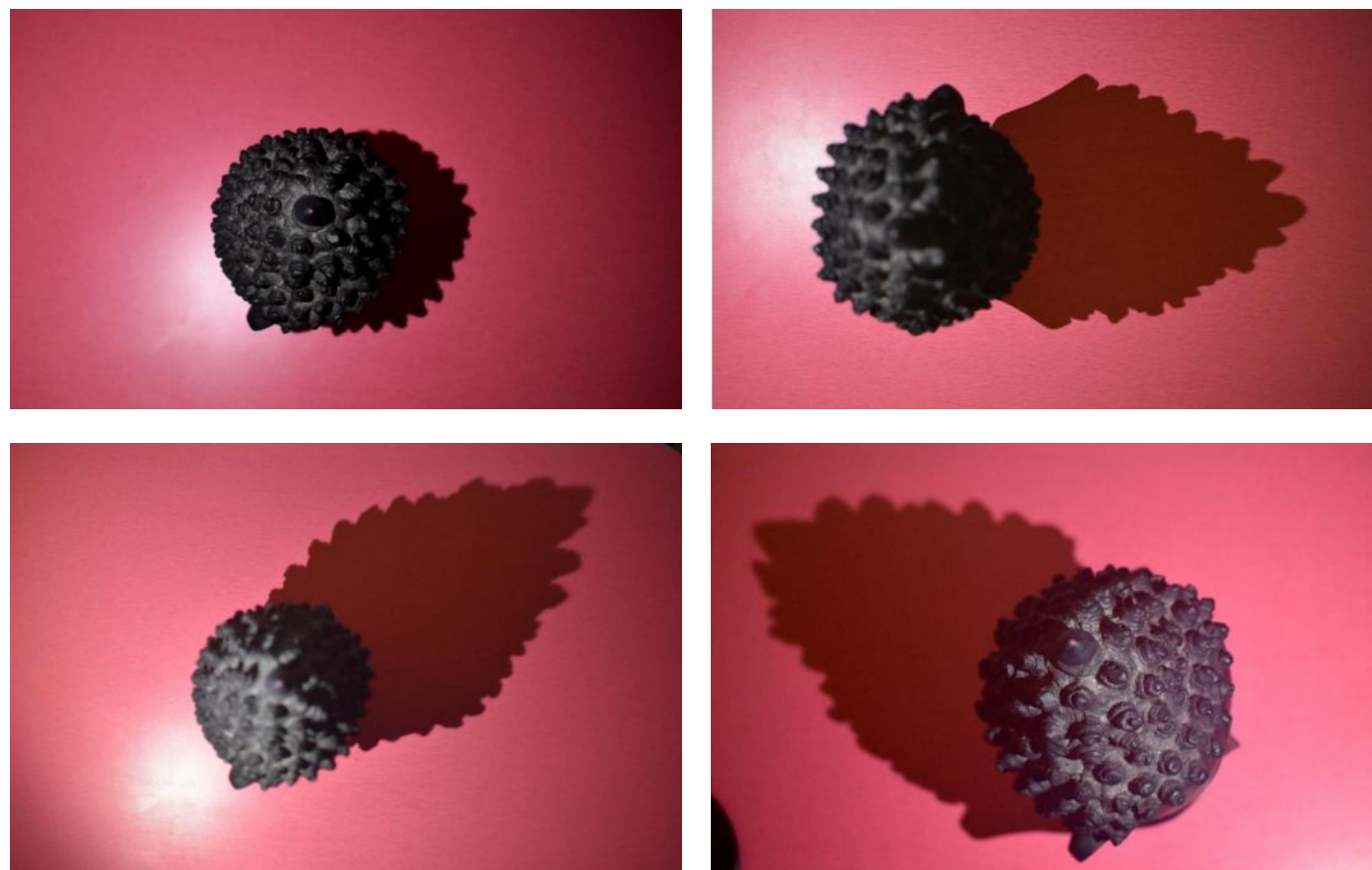
Understanding Behavior of Shadow



As the object is brought nearer to the light keeping light stationary, the size of object is enlarged.



Changes in pattern when object is rotated on its axis keeping light and surface stationary.



Shadow changes in length when the light revolves around the object. It also changes its direction if the direction of light is changed.



It behaves like switch like on and off



It behaves like regulator, from complete pattern to slowly diminishing pattern.

Intensity of light governs how soft or sharp a shadow will be. Also if there will be a shadow or not. Also, it creates precise patterns.



Opportunity

Field Visit



We see use of QR (Quick Response) codes everywhere, most of them usually printed here and there or there is bulky QR box kept on table which also has pasted QR. What if there could be shadow based so if the QR changes we would not need to remove stickers.



In picture we can see a truck taking a person to that height to put that banner. What if banner casting lights can be put that casts shadow of what is there in banner.



Similar to QR codes, there are arrows pasted on floors of mall to give direction. there is lot of light present in mall if that light can be used to create arrow shadows.

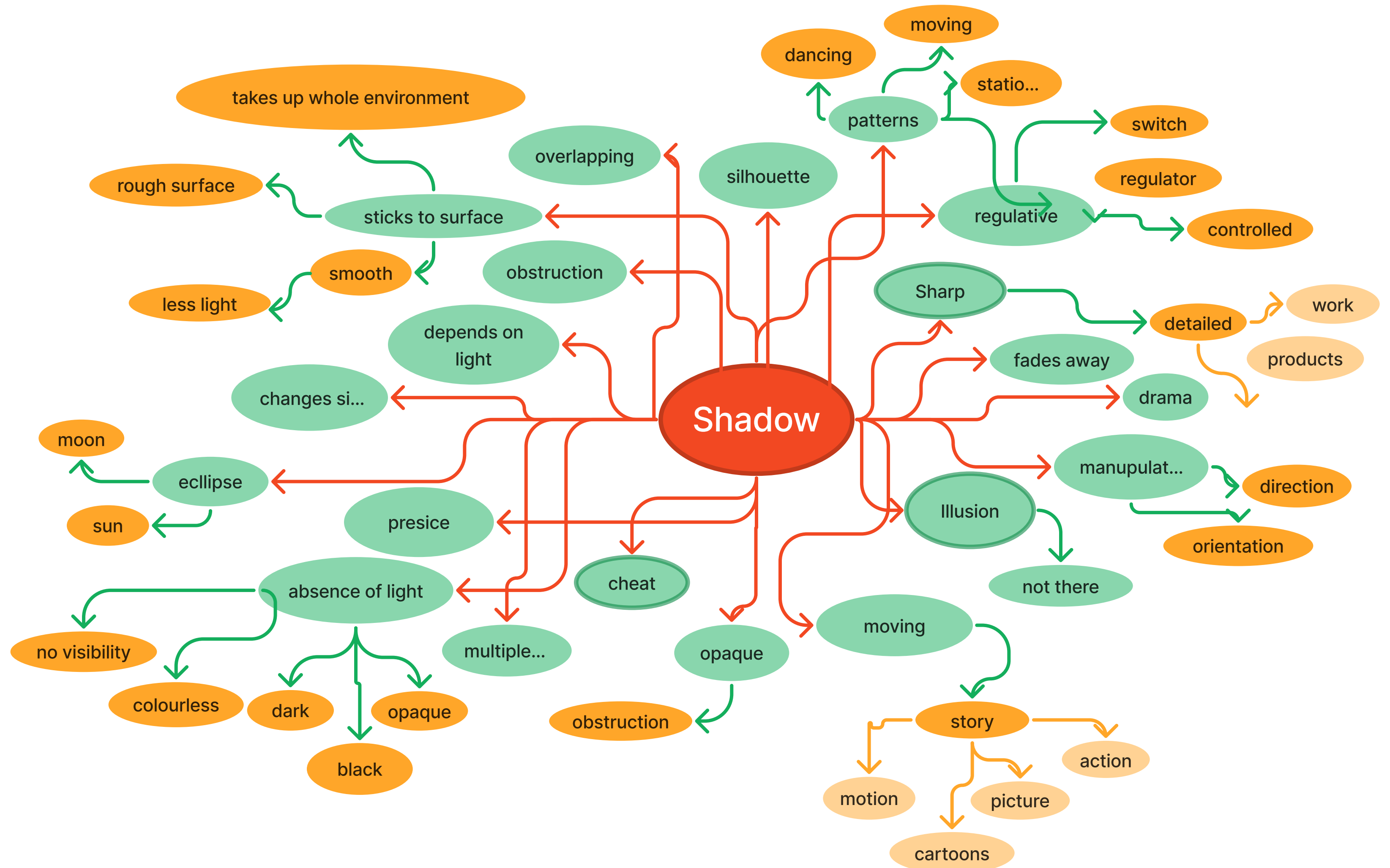


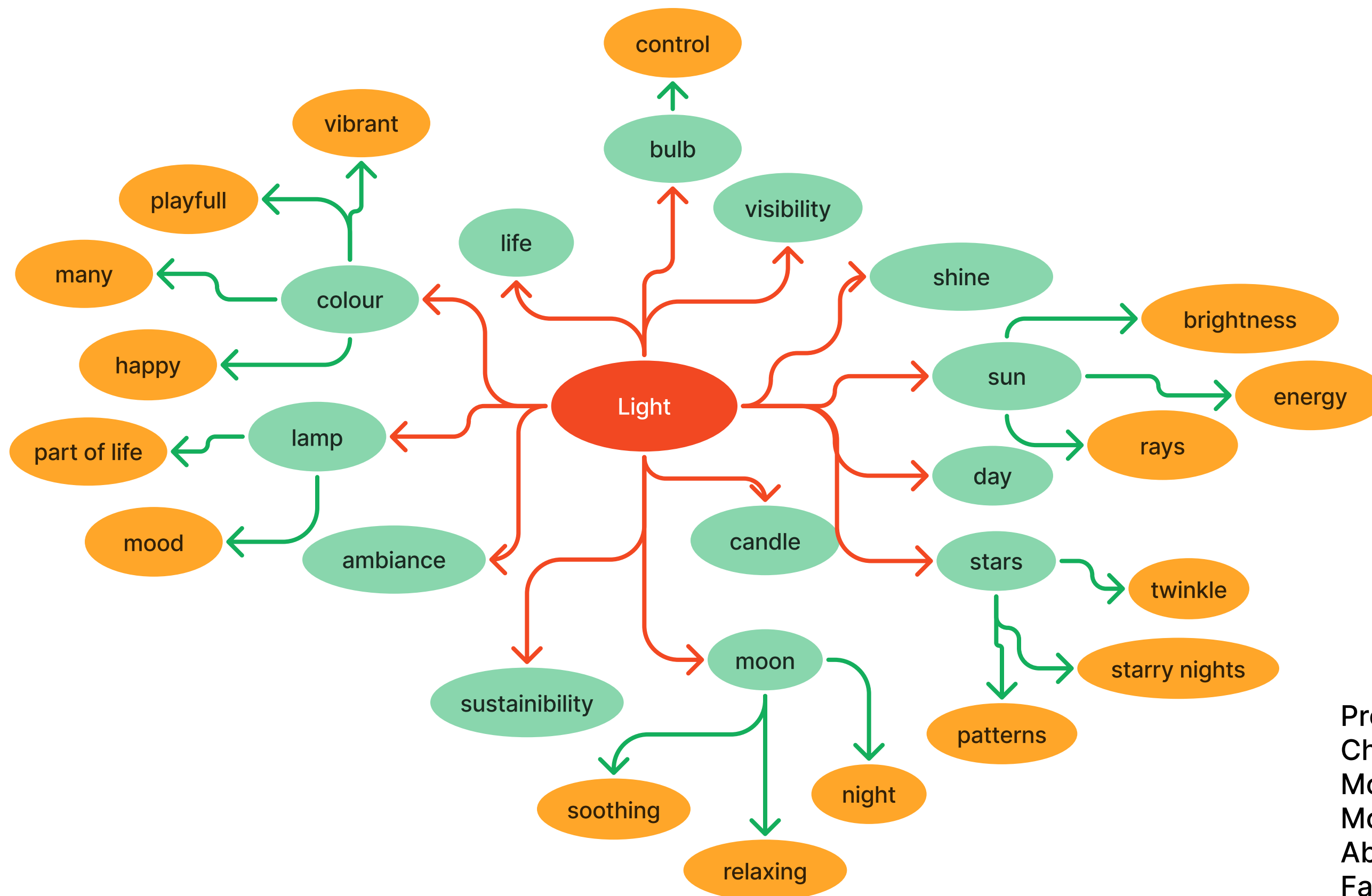
We usually see such sign boards with light at top of them to highlight them. If the spot light and these boards can be combined.



We can see two spot lights highlighting the whole banner. If light could be used in such a way that the spot light casts the shadow of what is written in banner then it will become easy to change banner everytime.

Mind Mapping

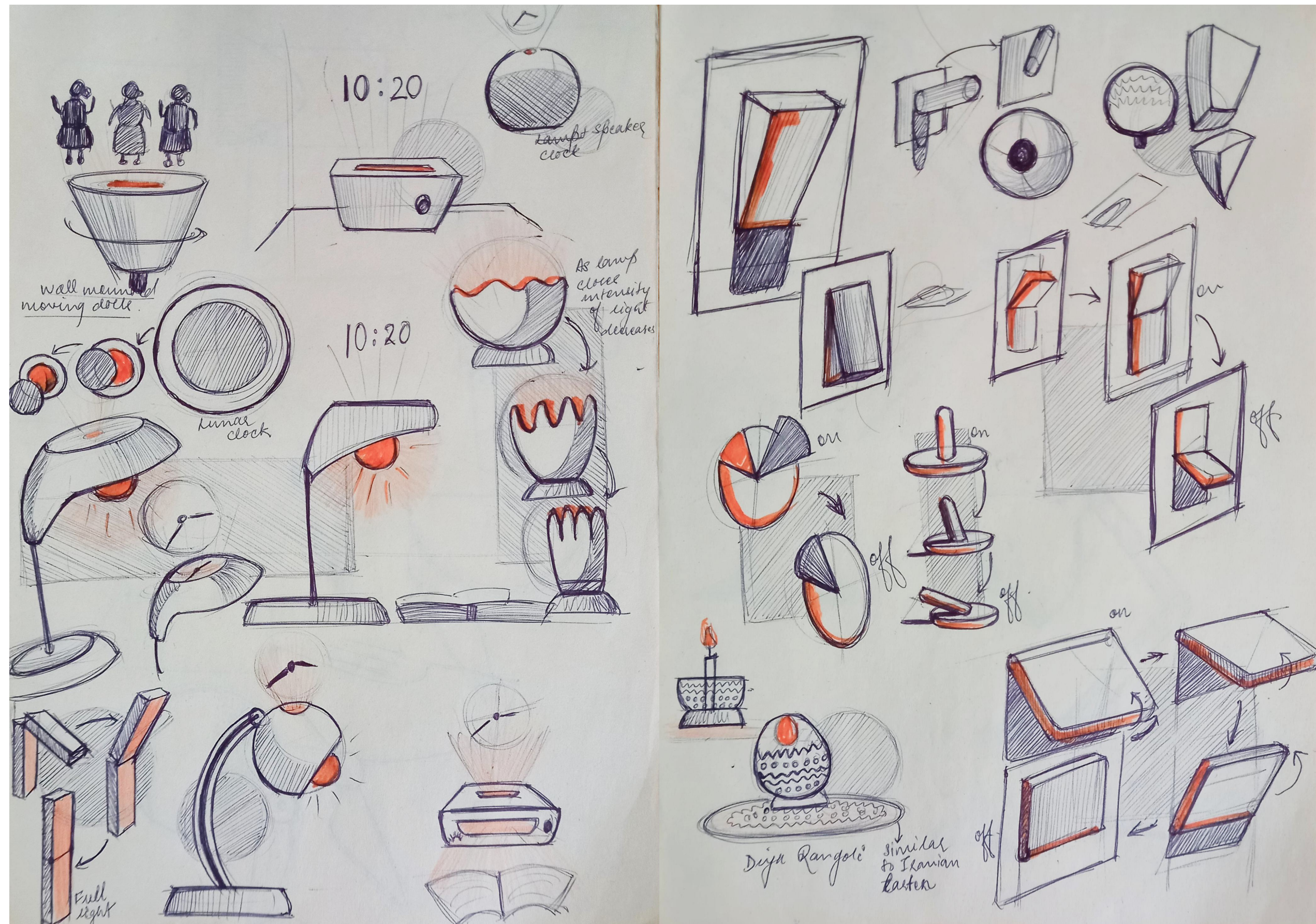


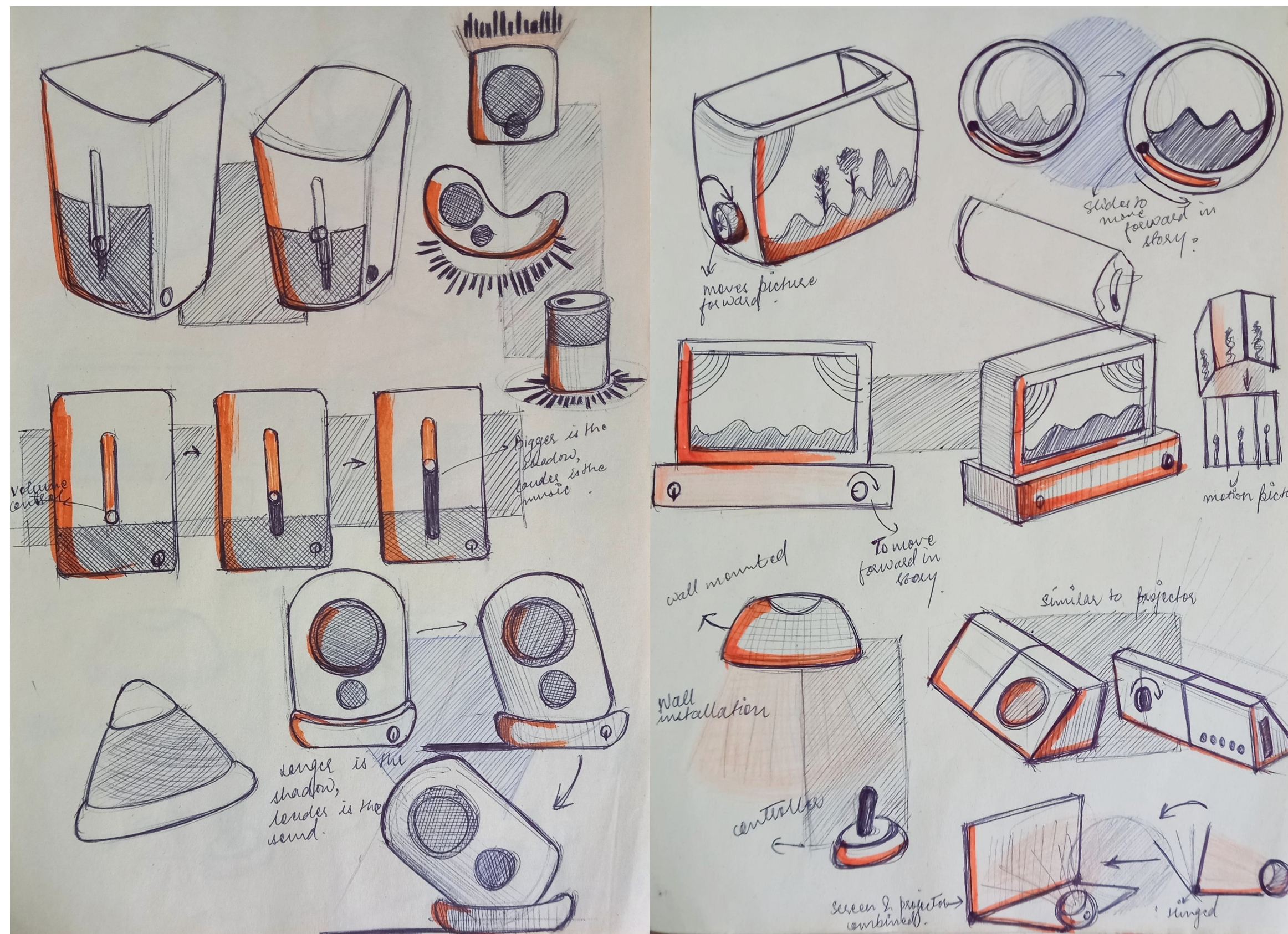


Mapping leading to certain ideas

Precise + Regulation
 Changing shape + Patterns
 Moving + Picture
 Moving + Drama
 Abstract + Playful
 Fades away + night
 Brightness + control
 Visibility + absence
 Starry night + Lamp
 Drama + Playful
 Moving + Story
 Detailed + Visibility
 Candles + patterns

Thoughts





These were the sketches after field visit, brainstorming and mind mapping. After the review there was a thought about what if the mini kids theater can be converted into lamp and theater. The thought was to design a lamp that also tell stories, which is bedtime stories lamp.

Research

Storytelling

Increases logical thinking, with repetition, they start to notice patterns, such as rhyming words. Increased ability in visual processing and imagination.

According to a study from the journal American Academy of Pediatrics in 2015, bedtime stories are correlated with neural activation in the left side of the brain that supports language processing.

Stories often deal with complex emotions and themes, which can help children learn to empathize with others and understand their own feelings.

Bedtime storytelling can start from the time baby is in uterus and is effective till the age of 3 to 4.

Kids above 5-6 years of age normally develop their own reading habits.

Movies

Help to develop kids to dance and to talk in a new, imaginative languages.

It has been found that cartoons affect 78% of children, and more than half of them also change their behavior and language after watching animation.

Maintaining focus, Forms long term memory.

Kids rely on a variety of senses. The auditory sense is accelerated, and the visual sense is enhanced by connecting the visual and auditory senses.

Kids' understanding of vision and existence assists kids to solve complex tasks.

Kids can be shown movies when they are of 18 to 24 months.

The limits tends to be one hour and then can be increased with increase in age.

Types of lamp



Plugin Lamp

A nightlight is a small light fixture, usually electrical, placed for comfort or convenience in dark areas or areas that may become dark at certain times.



Bedside Lamp

Lamps that are mostly it is by side of the bed for the most comfortable light output and switch is by the side of bed.



Starry Night Lamp

It is a projector that projects night views of stars on the walls of room. It helps them relax in a soothing Atmosphere, not keep your child awake or disrupt his sleep.



Pendant Lamp

A lone light fixture that hangs from the ceiling usually suspended by a cord, chain, or metal rod.

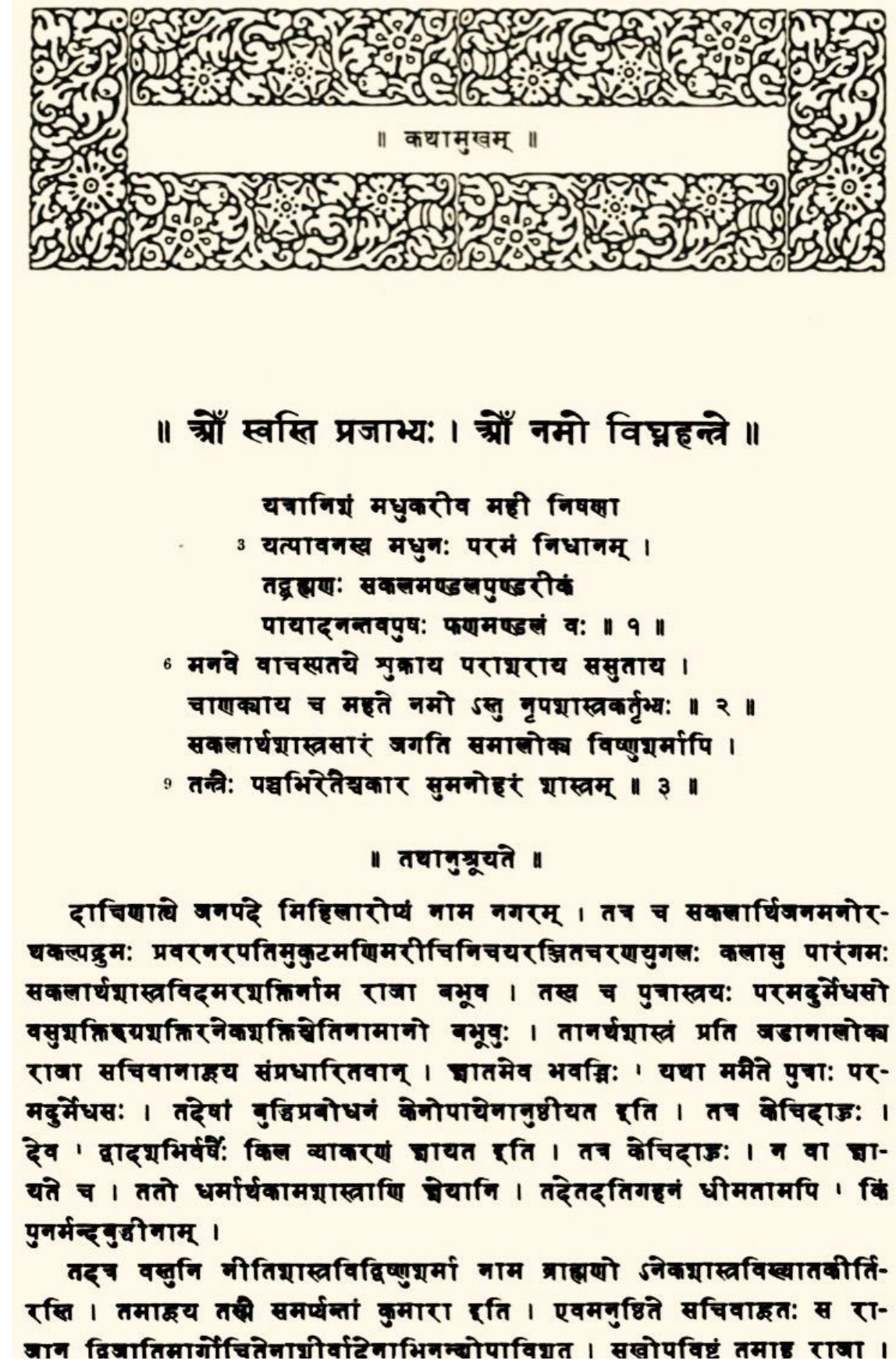
Panchtantra Stories

Panchtantra is an ancient Indian collection of interpreted animal fables in Sanskrit verses and prose arranged within a frame story. The surviving work is dated to be 200 bce but the fables likely much more ancient. It has been written by Vishnu Sharma, a scholar and author. It is "certainly the most frequently translated literary product of India" and these stories are among the most widely known in the world. There is a version of Panchatantra in nearly every major language of India, and in addition there are 200 versions of the text in more than 50 languages around the world. The prelude section of the Panchatantra identifies an octogenarian Brahmin named Vishnu Sharma as its author. He is stated to be teaching the principles of good government to three princes of Amarasakti.

Though the text is now known as Panchatantra, the title found in old manuscript versions varies regionally, and includes names such as Tantrakhyayika, Panchakhyanaka, Panchakhyana and Tantropakhyana. The suffix akhyayika and akhyanaka mean "little story" or "little story book" in Sanskrit. The text was translated into Pahlavi, in 550 CE, which forms the latest limit of the text's existence. The earliest limit is uncertain.

The Panchatantra is a series of inter-woven fables, many of which deploy metaphors of anthropomorphized animals with human virtues and vices. Its narrative illustrates, for the benefit of three ignorant princes, the central Hindu principles of nīti (the wise conduct of life). Apart from a short introduction, it consists of five parts. Each part contains a main story, called the frame story which in turn contains several embedded stories, as one character narrates a story to another. Often these stories contain further embedded stories.

<https://en.wikipedia.org/wiki/Panchatantra>



The first page of oldest surviving Panchatantra text in Sanskrit

<https://en.wikipedia.org/wiki/Panchatantra>

Bedtime story positions



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

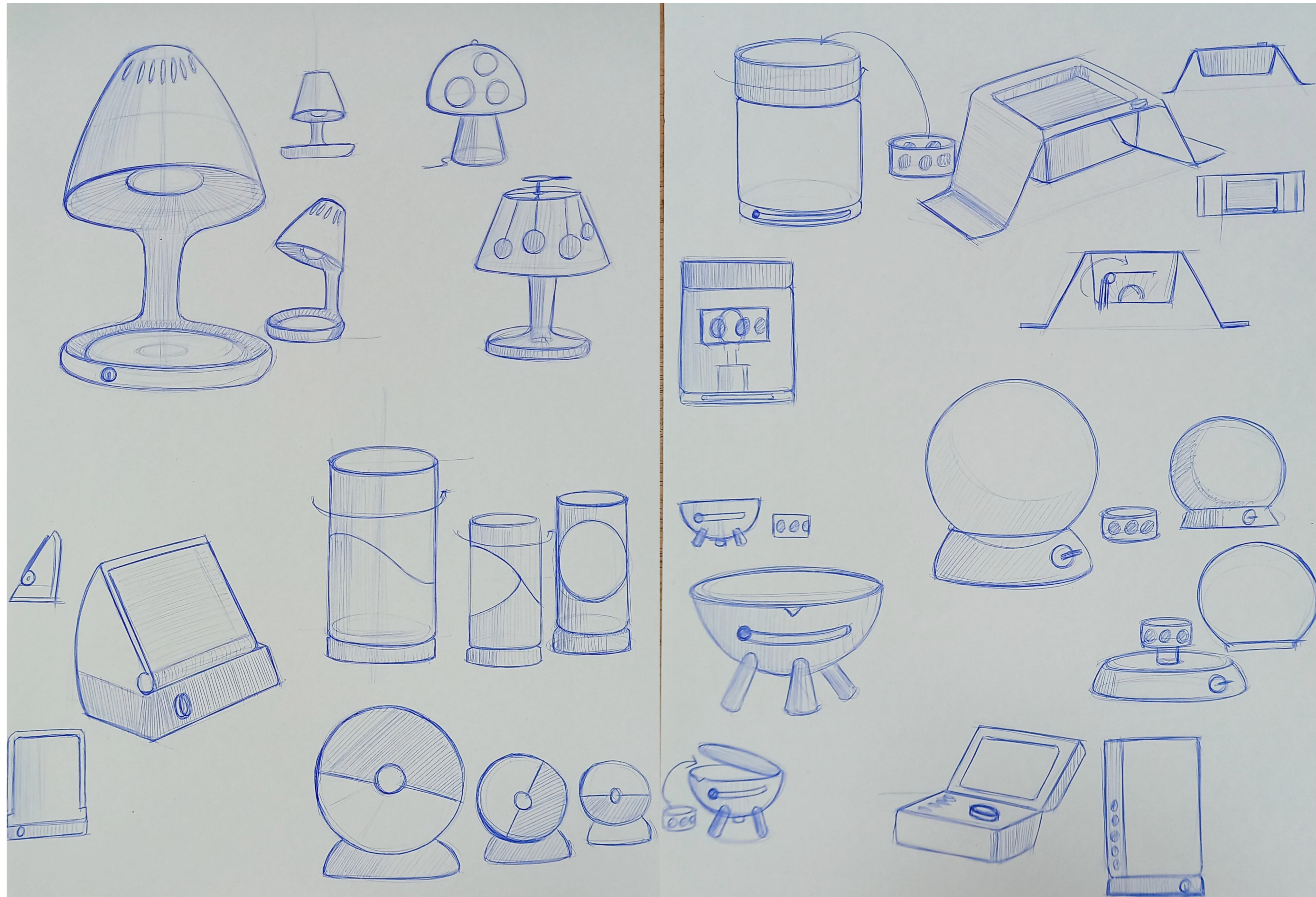
- The position of child and parent is half layered.
- Book is prominently kept on the lap of parent whereas child is at the adjacent side.
- There is continuous interaction between child and parent and point of discussion in between (fig. 3 and fig. 5).
- Spot light is focused on the book and no other light is present.
- Child seems to be continuously engaged.
- Parent is not only reciting but also pointing fingers maybe to the child with the track of story (fig. 10).

Design Brief

To design a panchatantra bedtime story telling lamp for kids of 2 to 5 years of age to enhance their experience of bedtime stories by adding visuals and motion by making it more focused and engaging for both parent and child.

Ideation

Lamp



Shadow building

Phase 1



Shadow building started with building frame first. Every story has certain number of frames but that has to be broken down in a number where every story can be aligned and also can fit with the lamp properly. Initially, stories were broken down into six frames each. The first set of shadow templates were too detailed to understand which instead of helping the story or context became chaotic.

Learning:

- Need to create scenes in more simplified form.
- Need to enhance the ability of silhouette so as it speaks more and there is minimum to no detail needed inside.
- Need to keep number of characters minimum or the environment subtle.

Phase 2

This phase started by simplifying shape and expressions. Initial thought was to make it look like cartoon like but due to excessive expression and different shape, it became difficult to understand the context.

This phase involved enhancing the expression through silhouettes and decreasing the amount of inner details.

Since, I was experimenting, I took one element rather than a whole story.



Phase 3



Here, I have tried to keep the details minimum also reduced the elements of environment so that focus is on the main context and to make sure the elements of environment does not confuse the story. But needed elements are put.
Also, I reduced the number of frames as it should fit properly inside the lamp and project well on the surface of the lamp.
Frames are given around to give the idea that one episode is over.

Concepts

Concept 1



The concept was a compact lamp where there are two pillars. One that has the template and the other on which template rolls when the story is running. The story here has frames attached to each other and hence there is continuous motion happening.

Shadow is projected to one of the walls of the lamp. Rotation happens manually with a knob. Manual knob is given to keep continuous interaction with lamp as done with the book.

Concept 2



This concept is inspired from the existing shadow theaters for kids. The thought is to have multiple stories inbuilt and child can choose which ever he/she wants to see. the story go by rotation which is manual ans it is shown on the screen.

The designed featured itself like a television. When the kid wants to watch a story can switch to story mode otherwise its a lamp with four side illuminating light.



Concept 3

This is the very common lamp that we see in most houses and hence there was a thought to keep the lamp as it is and add the feature of story to it. There is set of stories which need to be put from outside.

It is simple lamp, standing by the side of the table. There is a cap at the top of the lamp, can be seen in fig.2.

The story template is similar to what we can see in fig.4 and fig.6. These templates go inside the cap whenever needed and the shadows can be seen on the wall of the lamp which is here made up of paper.

Every time we have to see a story, we need to put the templates inside to make it story lamp.

The story runs by manual rotation of the template.



Fig. 5



Fig. 6

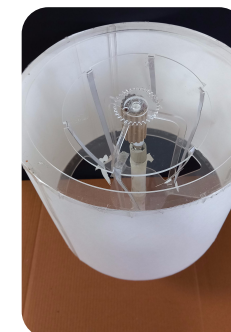


Fig. 1



Fig. 2



Fig. 3

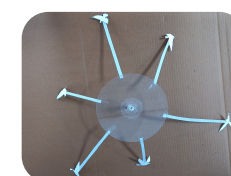


Fig. 4



Fig. 7

Concept 4

This concept also, deals with simple round lamp, which is very common and can be seen on most tables in houses. The thought was similar to concept 2, where we have simple round lamp by the side of bed on table but when we want, it can be turned into story lamp. It has external templates that needs to be put when want to see story.

It is put by removing the round shape and shadow is visible on the surface of the lamp.

This too operates manually by rotating knob.

This was chosen as the final concept as the round shape looked more friendly and compact. Also, convex surface gave more eye view than the flat ones.

This concept is taken further for detailing.



Concept 5

This concept is similar to the concept 1 as it also serves built in stories so we need to set which story we want to see.

The concept is there are **two broken cylinders** attached to another cylinder which is also the surface for shadows to be projected.

One of the broken cylinder is not fixed and hence it works like switch as we can see the progress from fig. 1 to fig. 3 where it is off in fig.1 and fully on in fig. 3. This also **helps in ambiance control** as we can place it anywhere in between fully off to fully on.

The visible screen is where projected shadows can be seen.

This also works on **manual rotation** where it is rotated by the knob.



Fig. 1



Fig. 2

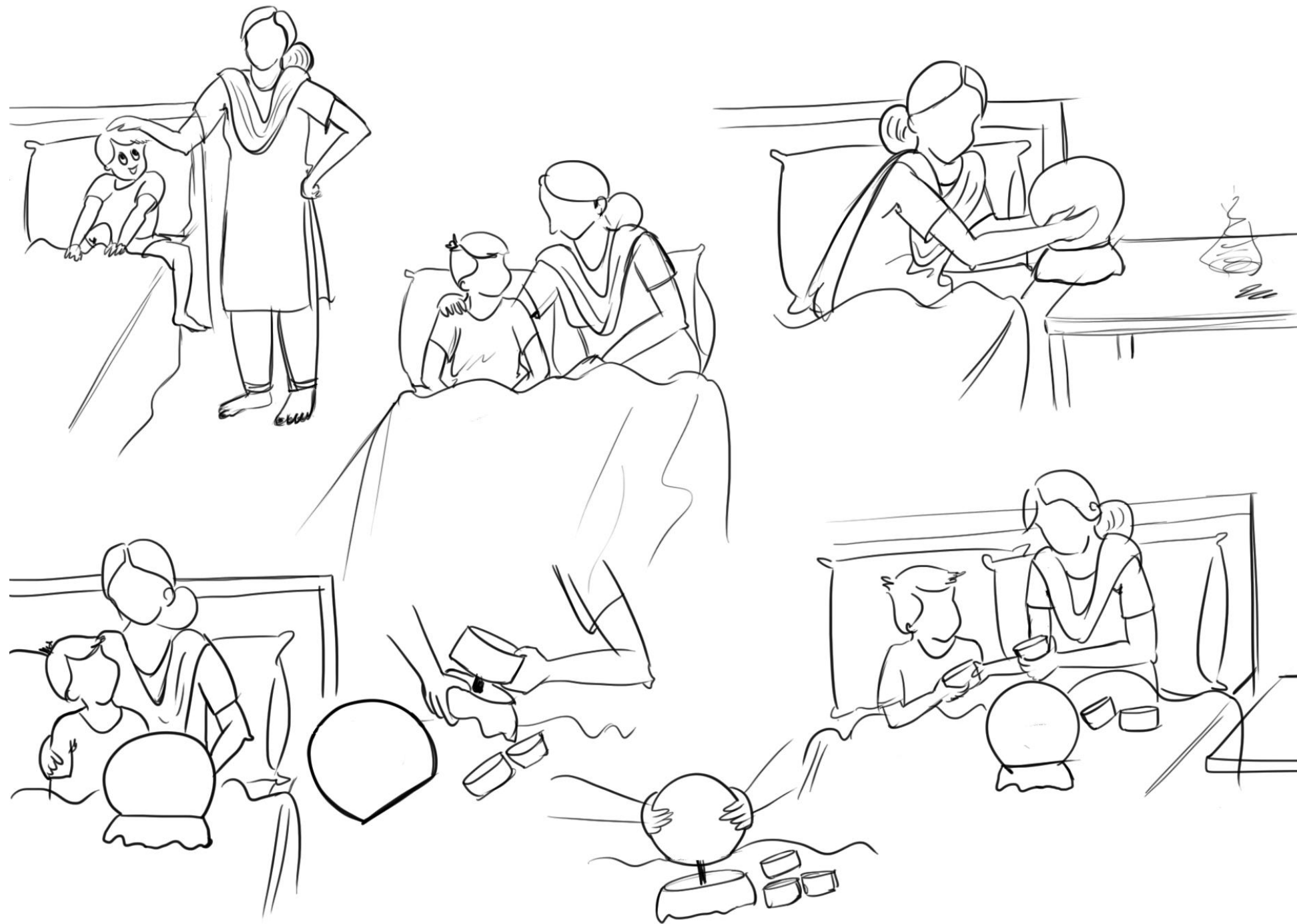


Fig. 3



Fig. 4

Scenario Building



- After finalizing the lamp form, I started with scenario building **to understand every action** and how the product will be used and what actions will be involved from picking lamp from table to starting with story as we do not want to compromise with their comfort position which half layed on bed.
- While story building there was a realization that the lamp is put on the lap of the parent or if child is playing he/she will be putting it to lap sometimes and hence the **base of the lamp should be soft** enough to give them comfort and dynamic enough to fit every type of lap and thigh.
- There was also a realization that the dome of the lamp is taken off to put the template inside and hence should have child lock so that child is not able to open it because lamp has got bulb inside.

Product Development

Concept 3

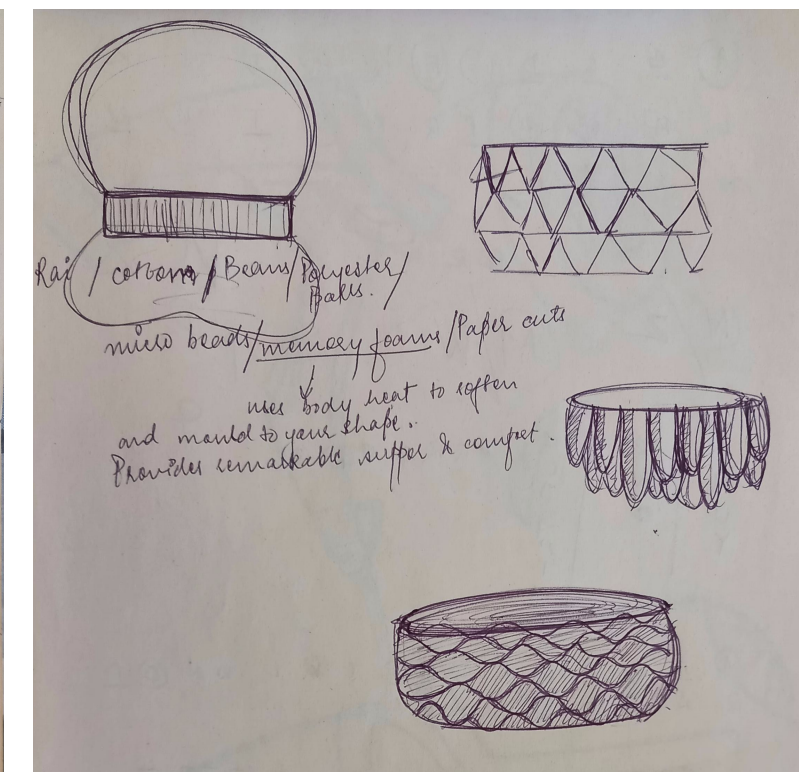
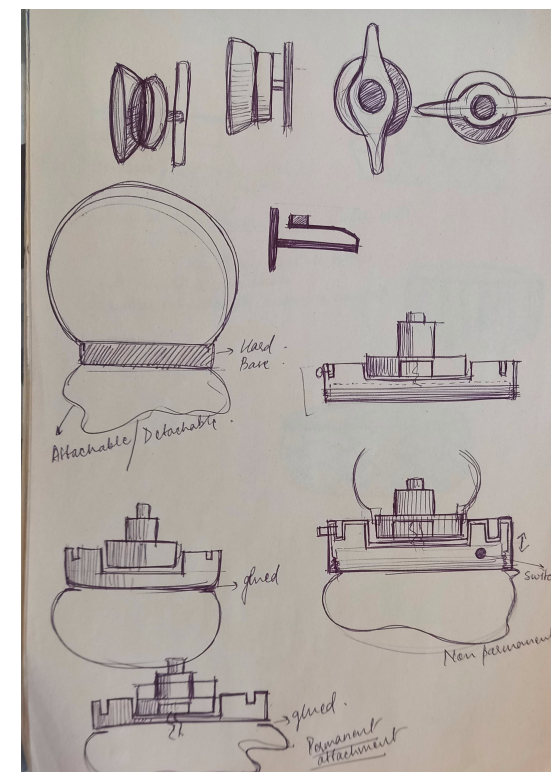
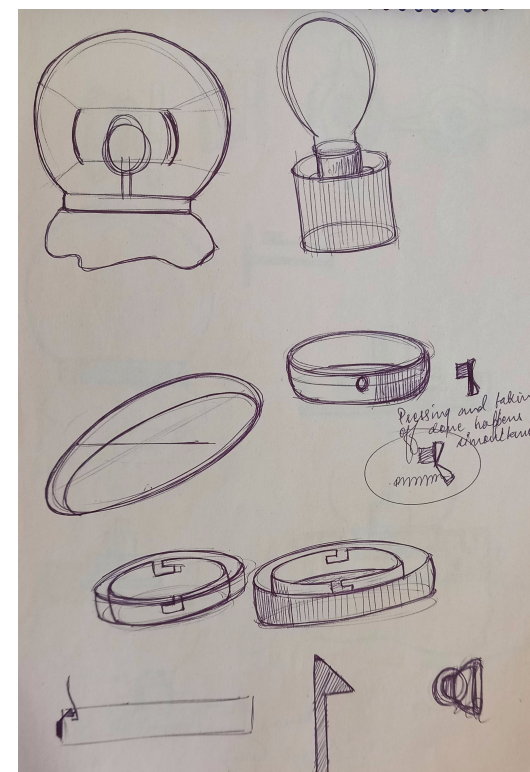
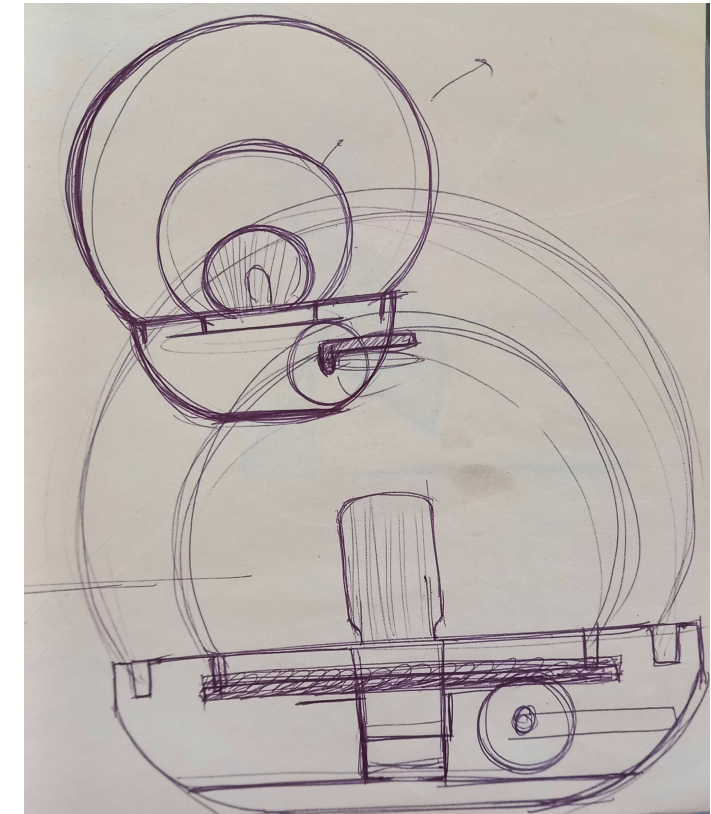
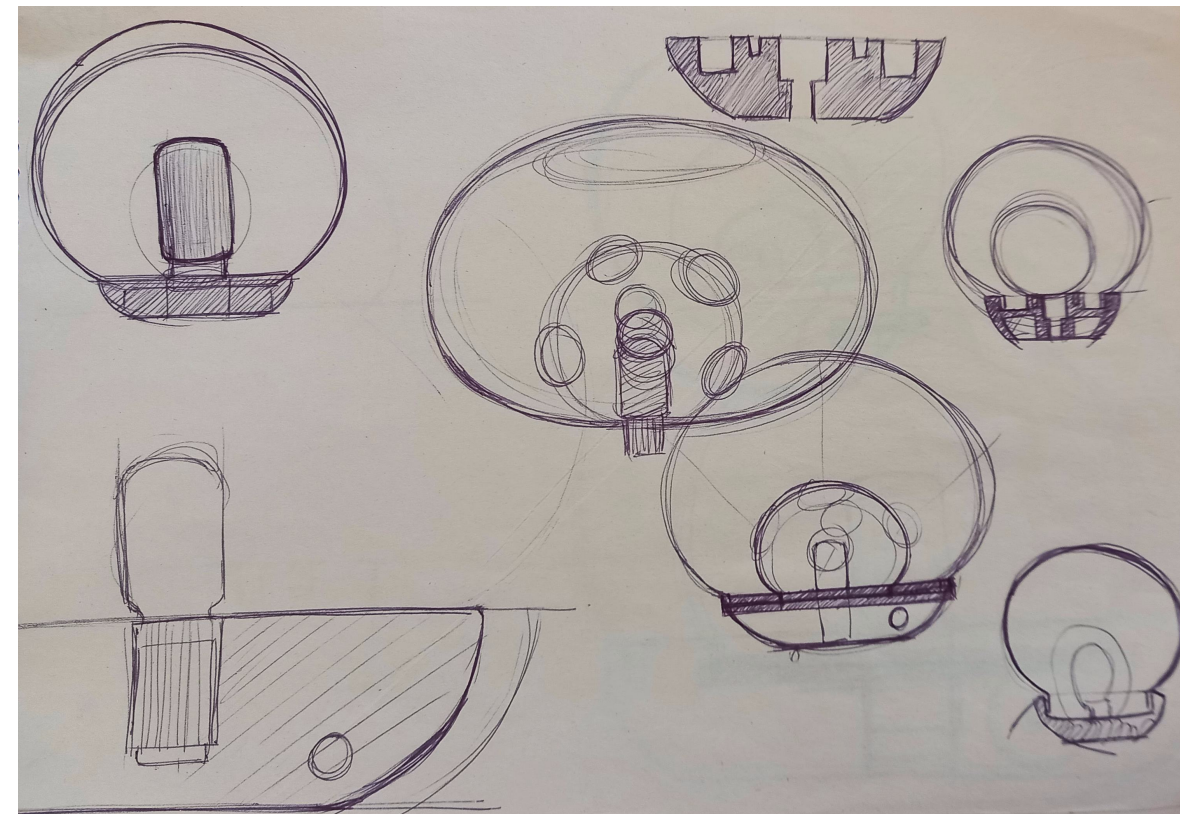
Detailing

After the observations from scenario building, I started working on the child safety lock and the base.

For base the thought was that it should be stable in two conditions

- When it is simply kept on table as a lamp.
- When storytelling is happening and it is on the lap and also it fits well.

For base inspiration was taken from bean bags as they take up the shape of the user and fits to their body. So, ideation started for base and lock. Ideation also involved how the base will fit with the lamp.



Base



Fig. 1 Pouch contains only mustard seeds



Fig. 2 Pouch contains thermacol balls and mustard seeds



Fig. 3 Cotton with finger shape

These are the three bases. The experiment was happening taking two things into consideration

- The shape
- The material

Fig. 1 contains mustard seeds as an inspiration from pillow that is made for new born kids as it easily takes up the shape.

Fig. 2 has Expanded Polystyrene and mustard seeds. Mustard seeds are added here to give weight to the base.

Fig. 3 has shape similar to the octopus legs and the material is cotton. The shape was chosen as it spreads more and cotton was chosen taking inspiration from pillow, which is very comforting.



Base is made detachable in case if somebody do not want or do not need or if there is need for replacement.

Templates

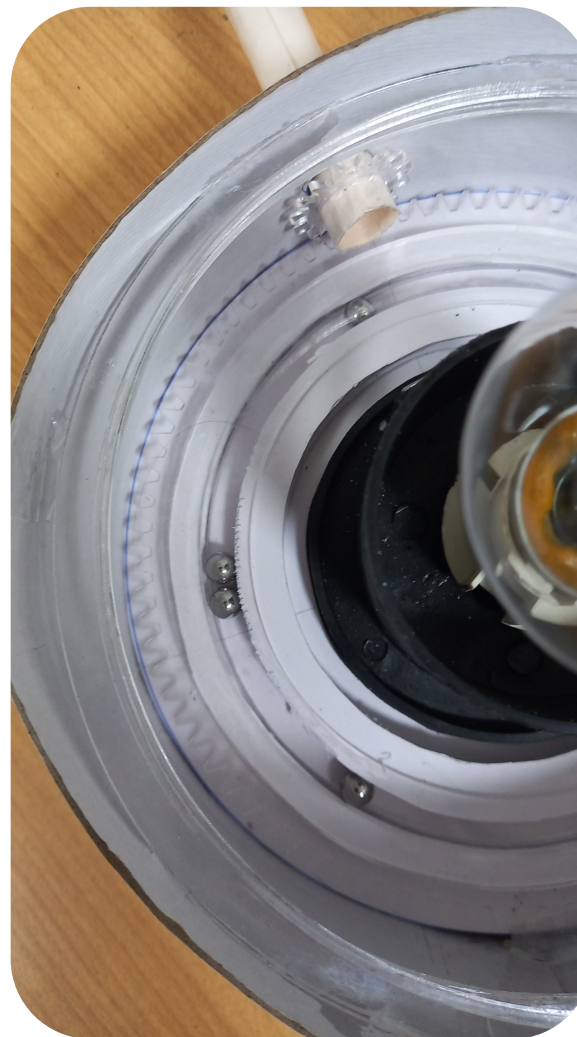


For both straight and convex
template shape the shadow formed
is blurry





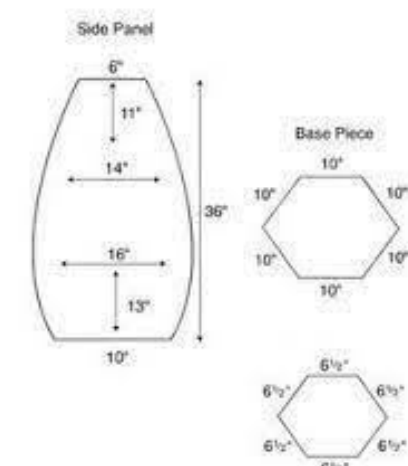
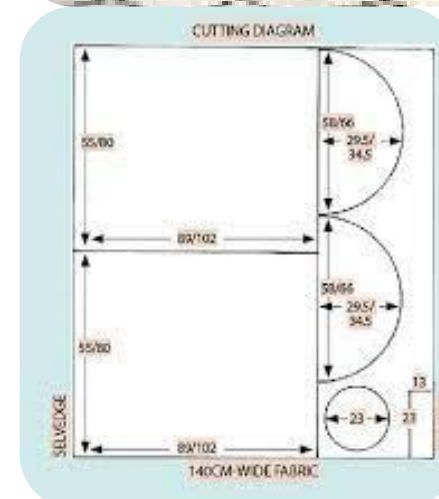
Story was put frame wise on an OHP sheet to maintain transparency so that only needed shadow was visible



Spur gear and ball bearing is used to give controlled rotational motion.



There are lot of creases in the bag that is attached and therefore I started looking at bean bag cutting and also how balls are made by cutting strips.



Bean Bag

<https://in.pinterest.com/adsborhan/bean-bag-pattern/>



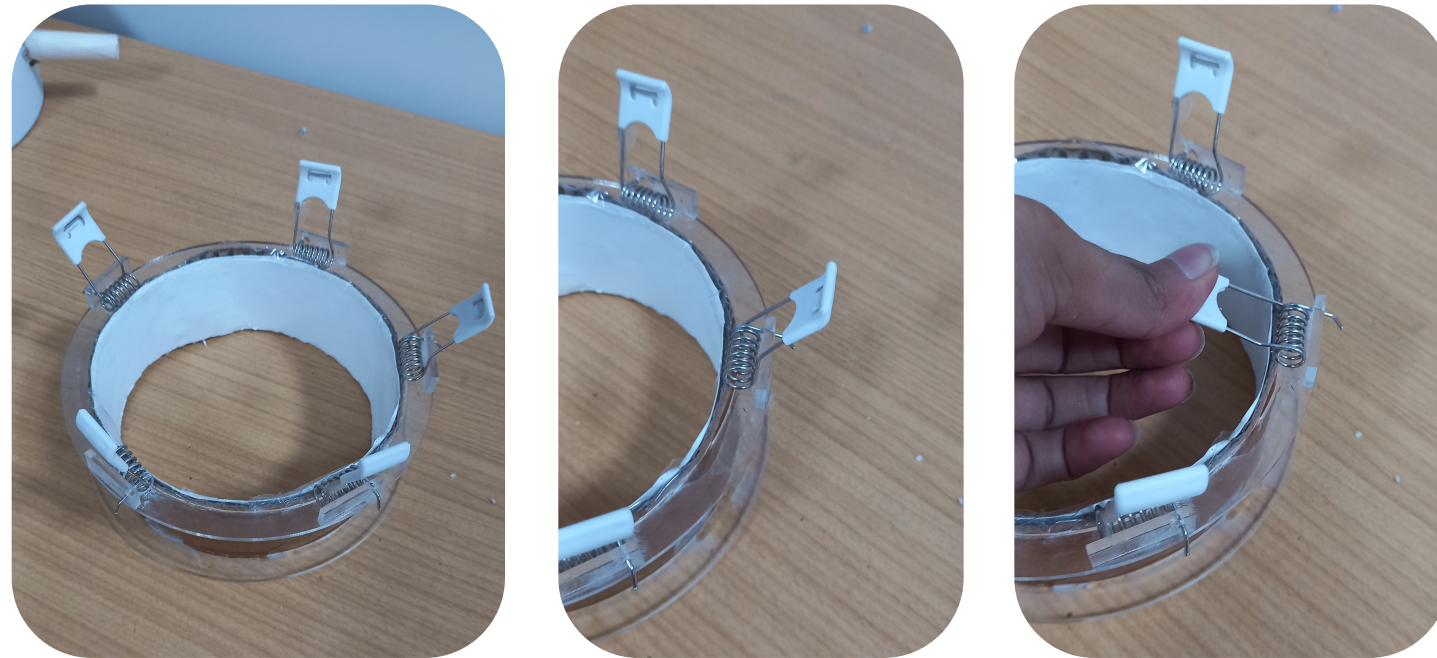
Cloth ball cutting pattern.

Parts

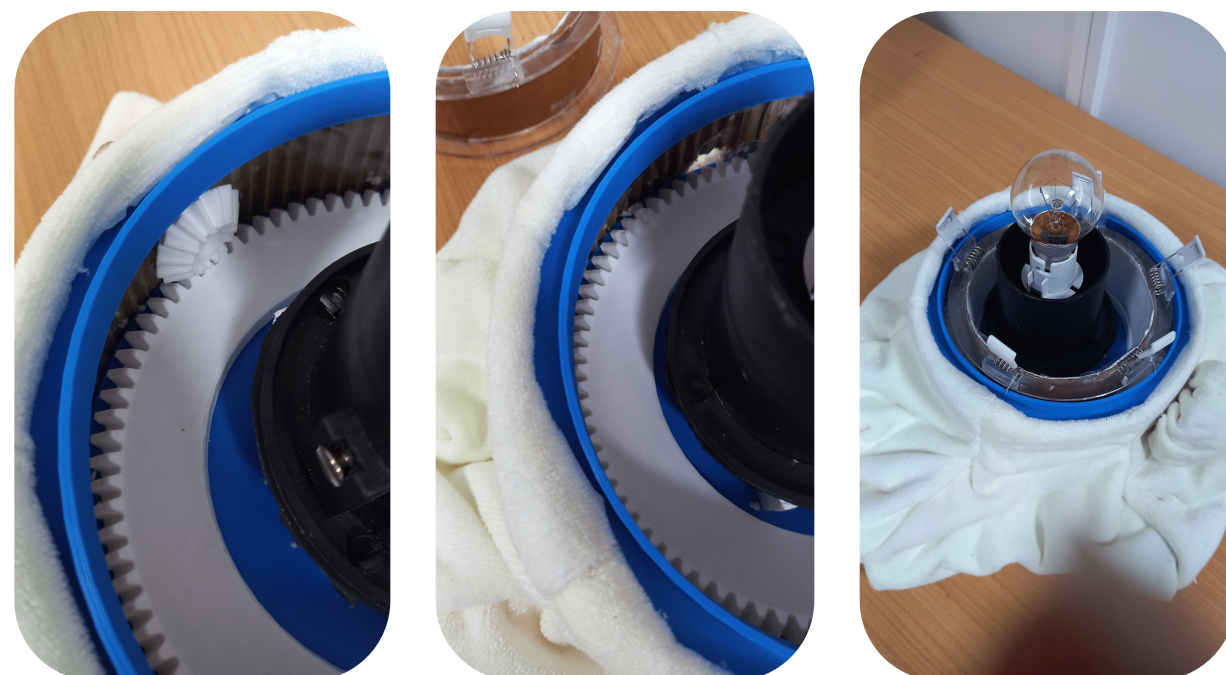
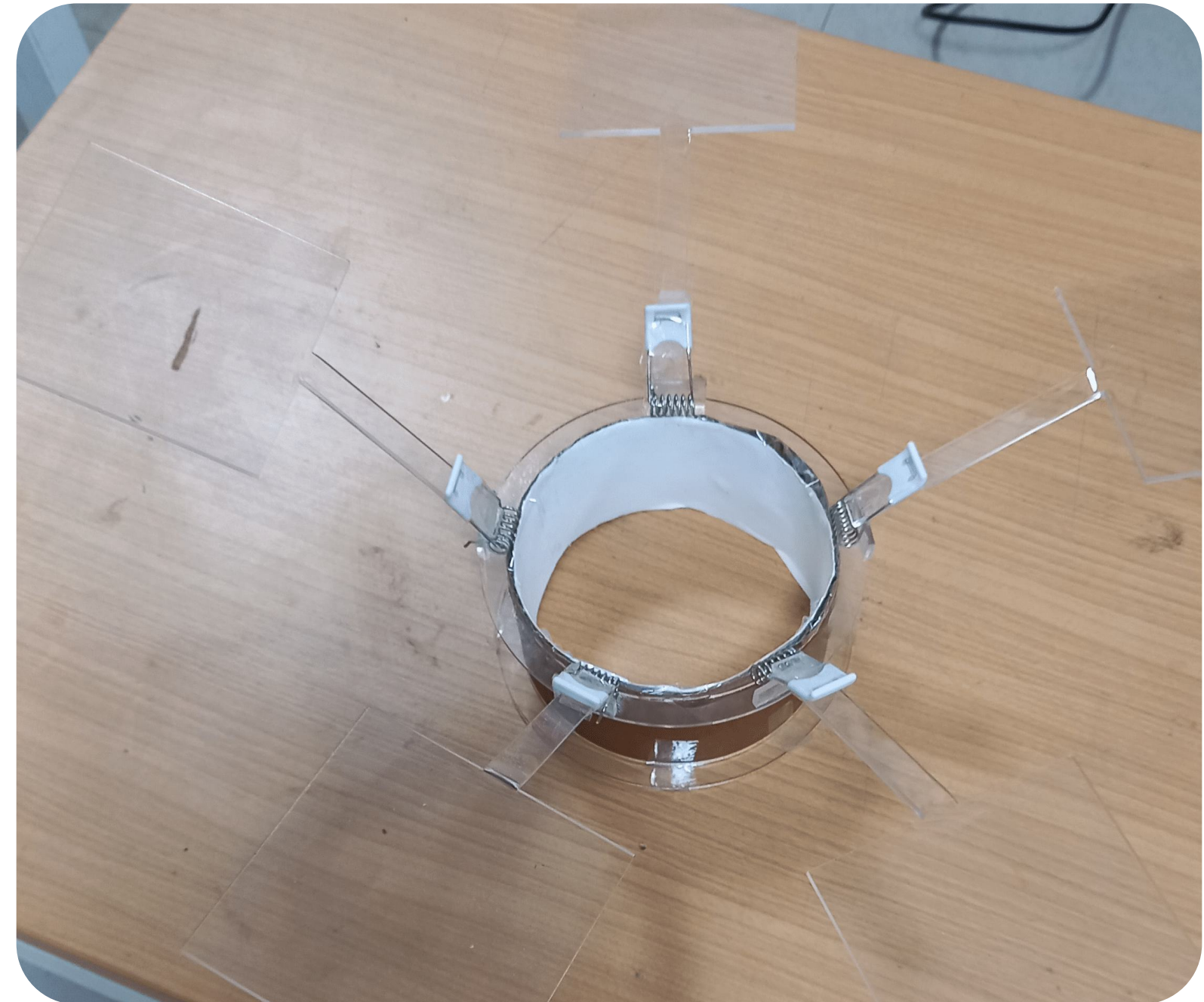
The lamp consists of 3 major parts:

- **Globe:** It the spherical part on which shadow is casted.
- **Template:** It is the part which carries story and rests on the base. It is moving part which rotates while story is going on. It is removal part. Different story consists of different template.
- **Base:** It is the part that that holds the template and the globe. It is cushioned at the bottom.





Blossom Mechanism: This mechanism was chosen so that templates can easily go inside contracting and spread after getting inside the globe.



Bevel gears were chosen over spur gears as these give more contact area and hence better motion at perpendicular.

Material

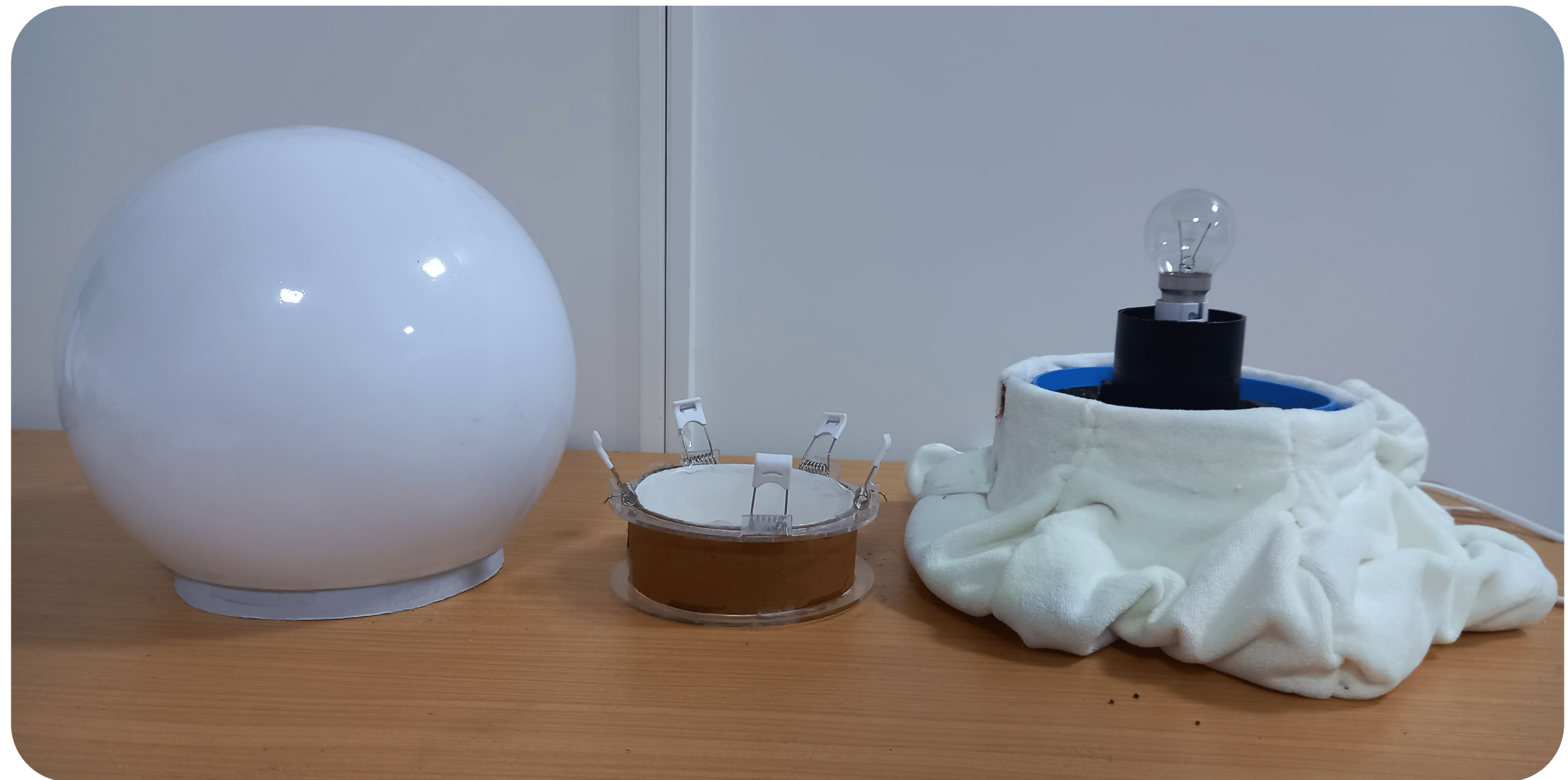
Globe: PMMA (Poly methyl methacrylate)

Base:

Cushion base: Fur Cloth
Base holder: Polypropylene
Bevel gears: Polyacetal

Template:

Template base: Polypropylene
Template stand: Acrylic
Story templates: Paper



Insights

To make shadows sharp and compact different methods can be used other than mechanical methods.

There are cameras now a days that take 360 degree photos, so instead of having definite number of frames we can go for something that helps take infinite frames and make it look like shadow motion picture.

To develop a way that can give maximum number of stories and not just a definite number.

Base is cushioned and takes up any shape depending upon where it is put.

It stays stable on table and deforms on lap.



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