DEP 501

P2 Project Report

# Designing a table lamp to facilitate ambient and task lighting

**Guide**: Prof. Sandesh R

**by,**

Shankara Vigneshwaran V | 17U130016

IDC School of Design
अभिकल्प विद्यालय

**Declaration:**

I declare that this written document represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or 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 which have thus not been properly cited or from whom proper permission has not been taken when needed.

**Approval Sheet:**

The M.Des P2 titled “Designing a tablelamp to facilitate ambient and task lighting” by Shankara Vigneshwaran V, Roll No. 17U130016 is approved in partial fulfillment of the Masters in Industrial Design Degree at the IDC school of Design at Indian Institute of Technology Bombay.

Project Guide: Prof. Sandesh R.

Digital Signature
Sandesh R (i07139)
27-Jul-23 10:09:52 AM

Chairperson: Prof. Anirban Guha

Internal Examiner:Prof. B. K. Chakravarthy

External Examiner: Mr. Vinay Mundada

Date

**Acknowledgements:**

I wish to provide my sincerest gratitude to my guide Prof. Sandesh, and every staff member of IDC School of Design who aided me in every step of the process. I also thank my peers and everyone who took part in the surveys and aiding me in the evaluation of my ideas and concepts.

**Contents:**

**Abstract:**

Conventional lamps have been proven to be inefficient for use as work lamps for a variety of reasons and a sizeable population prefers to use no light while working with screens at night, this leads to eye strain and more chronic disorders if continued regularly, table lamps provide a middle ground for using as work lamps or to brighten up the surroundings a bit while working but have been slow in adaptation, in this I attempt to identify the reason for the low adaptation of table lamps and to improve upon their design for using them in mainly work environments.

**Introduction:**

A sizeable amount of the population prefers to work with the lights off when working on their computers late at night because it helps them focus better, It is a well-known fact that working in a dimly lit environment especially while working on screens is bad for the eyes and causes massive eye strain and tires the eyes out quickly but users still prefer to do so rather than work with their lights on.

Poor lighting usually leaves the person with eye strain. Eye strain is a very uncomfortable feeling and it can also get linked up with other eye-related problems. If one spends more time working in poor lighting, the quality of his vision may start to deteriorate. Also, most of the workplaces involve working with computers. This with poor lighting will definitely result in eye strain and eventually deteriorate eye vision.

Headaches are also a common effect of poor lighting at the workplace. Working with poor lighting could leave one with headaches, as one has trouble focusing on the computer screen or on the work in front of them.

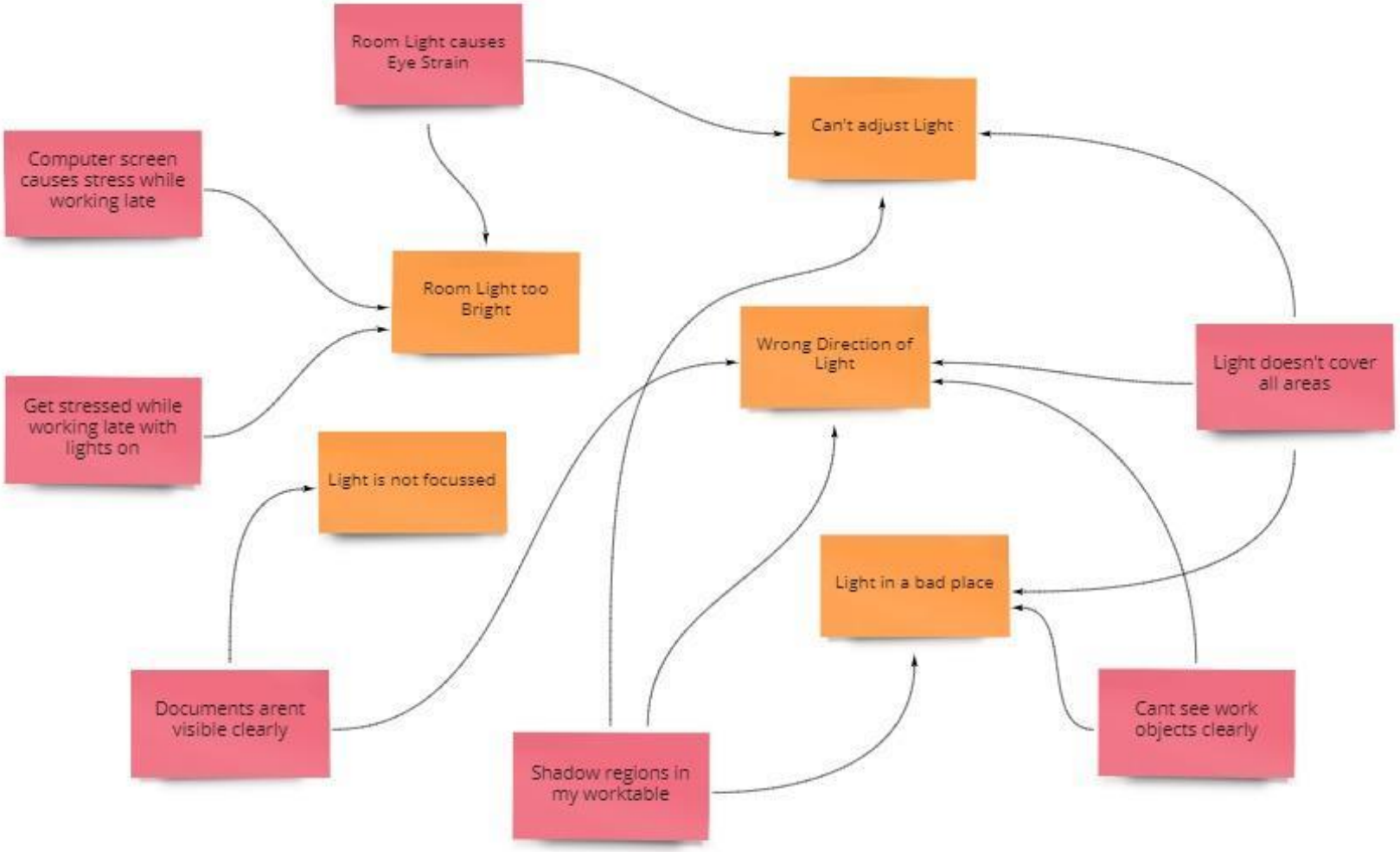
Painful back and neck can also be a result of poor lighting. Poor lighting usually makes you sit in an uncomfortable position while working. Making the user have to lean over to see items on the table. Low Light can also hence hinder one's productivity even though they might feel that it helps them focus.

Accidents are also more likely to happen in dimly lit environments, the lighting combined with other bad practices could cause problems, while the accidents in normal work environments while they rarely harm the user directly, could harm the work greatly, just a careless water spill could cause a major setback.

Table Lamps are usually recommended for those who ace these issues as they can produce a much milder illumination in a smaller area and ease the strain on the eyes. but table lamps have been mostly relegated as decorations or items of sporadic use.

Users were asked why they preferred to not use their room lights while working at night and the recurring answers are highlighted in the image below

.



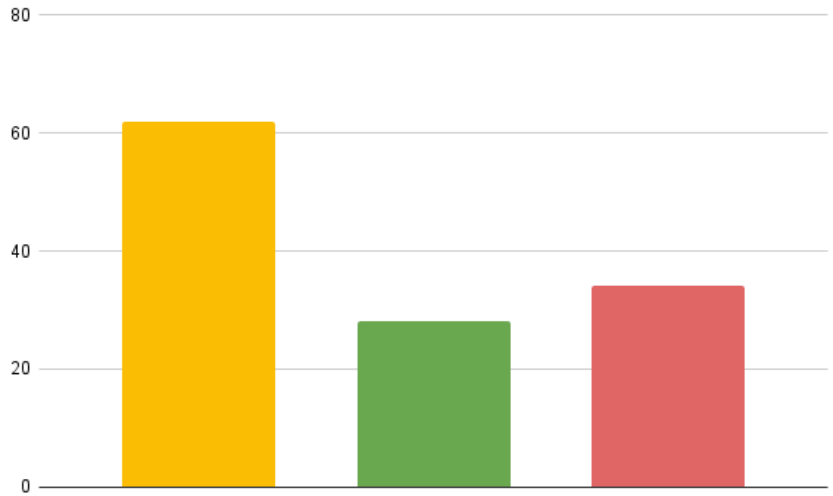

Issues users faced while working with their room lights.

| Activity | Typical Location | Average Illuminance (lux) | Minimum Illuminance (lux) |
|---|---|---|---|
| Movement of people, machines and vehicles. | Lorry park, corridors, circulation routes. | 20 | 5 |
| Movement of people, machines and vehicles in hazardous areas; rough work not requiring any perception of detail. | Construction site clearance, excavation and soil work, loading bays, bottling and canning plants. | 50 | 20 |
| Work requiring limited perception of detail. | Kitchens, factories assembling large components, potteries. | 100 | 50 |
| Work requiring perception of detail. | Offices, sheet metal work, book binding. | 200 | 100 |
| Work requiring perception of fine detail. | Drawing offices, factories assembling electronic components, textile production. | 500 | 200 |

Table 1: Recommended lux values for task lighting

According to table 1, task lighting at an office desk would require an average illuminance of 500 lux, which can be easily provided by an LED bulb, making the use of the room lights a waste of energy as well as LEDs provide the same lumens at a much better wattage as compared to traditional lamps

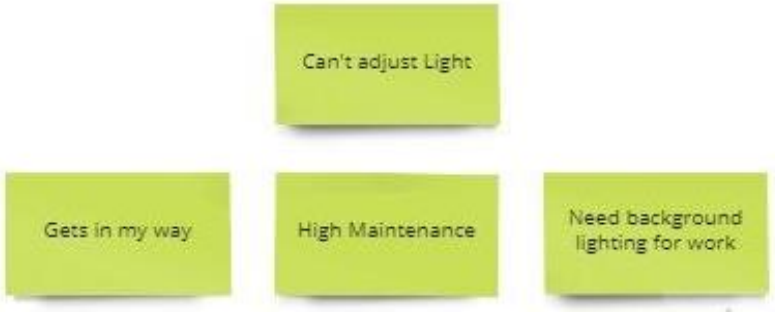
62 users who worked in computers in the dark were asked if they had a table lamp or not were interviewed and their results are in table x




Total users vs those who used table lamps

Only 28 users even had a table lamp and most of them were small lamps they would only turn on to find items on their table

The issue is compounded when the users have to work with physical material, like making sketches or simply taking physical notes while working on a computer, they use the light from the computer screens which is oftentimes not ideal.




The users felt that table lamps didn't cover all their needs and only illuminated a certain area and had to rely on the room lights or their phone flashes to find items not covered by the light. The users also felt that the lamps were high maintenance compared to the other bulbs which they could swap out at any time

Another point was that while lamps had a low profile on the table they occupied much more area vertically and through extension, and would often times get in the way, or their adjustment gets obstructed by other items on the table. The users also wanted a table lamp to be able to provide both task and ambient lighting.

**Design Brief:**

With the factors in mind, a design brief was conceptualized.

*“To design a modern table lamp to provide personalized ambient lighting and make screens easier on the eye and enable a comfortable mix of physical and digital work”*

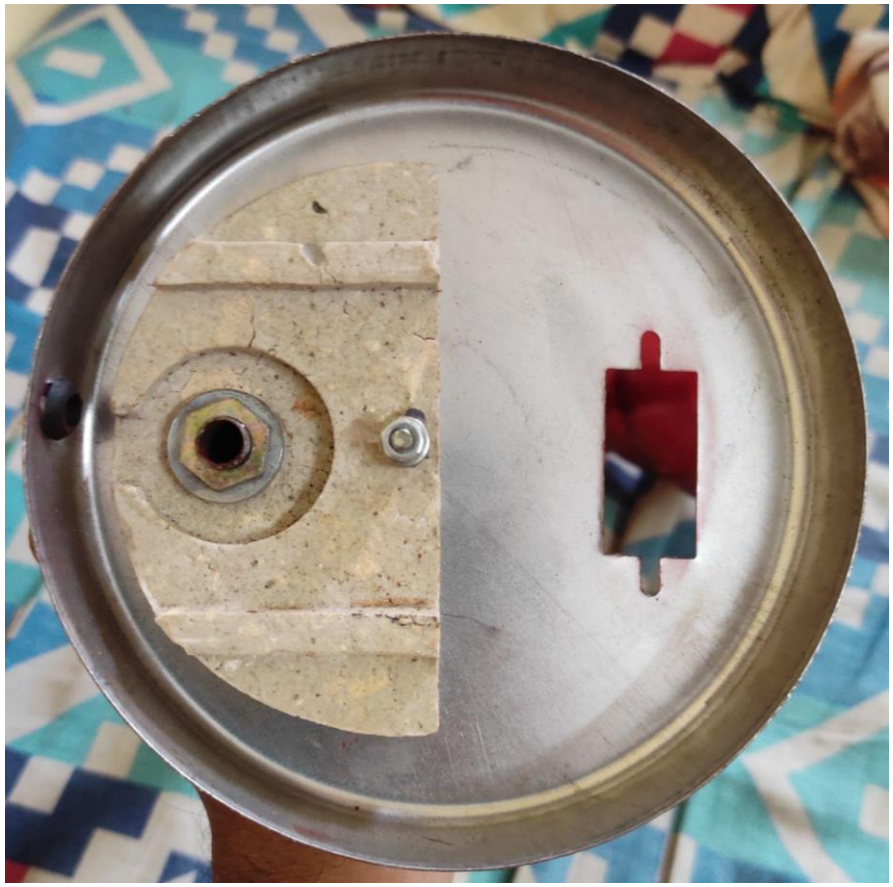
**Scope:**

Exploring different methods of machine motion and their translations into human movements

Exploring the different forms of table lamps

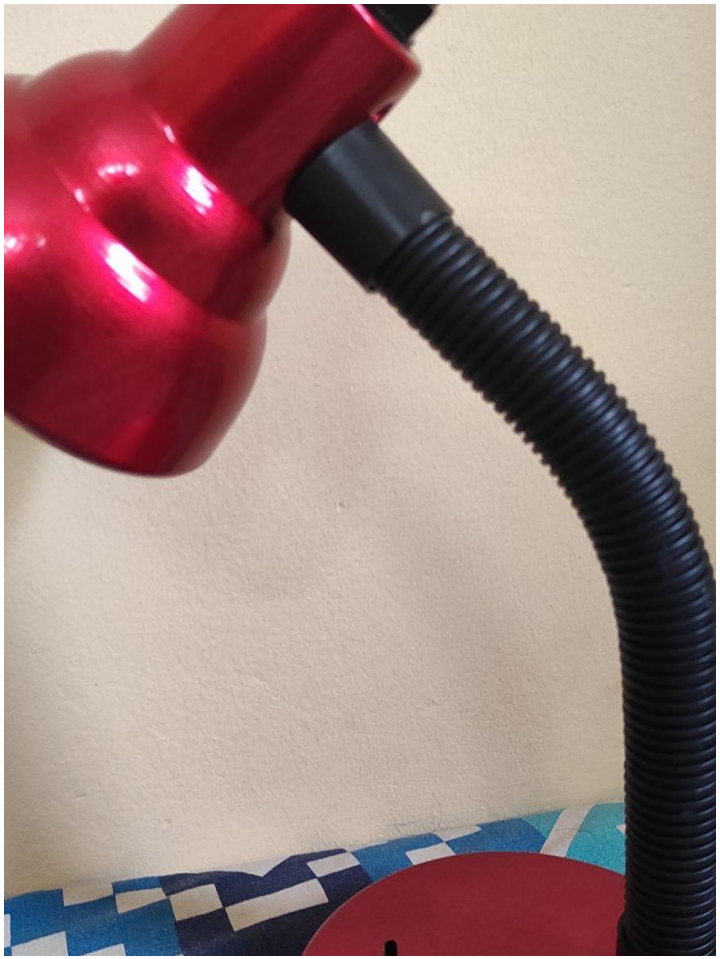
**The language of the Lamp:**

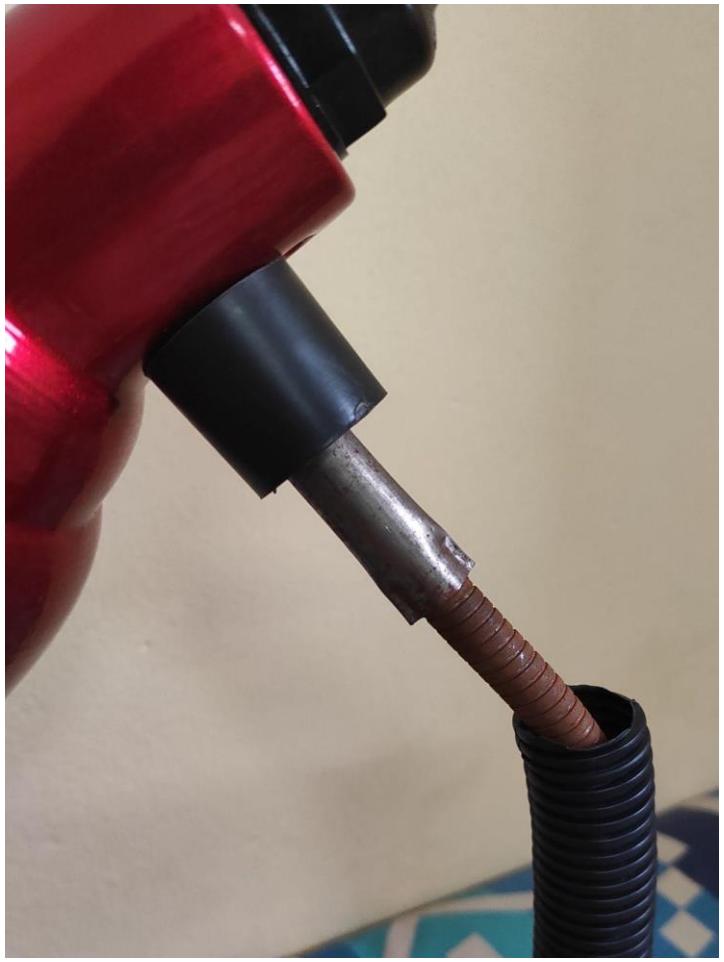
A table lamp was dissected to explore the various parts and their implications on the form of the lamp



Additional weight needs to be added to the base to make it stable, higher density materials can be used or space can be made to add additional weight

The conical head of the lamp is a result of having to conceal the bulb and the wire will always show out in this form and will become a part of the lamp’s aesthetic





A bendable neck comes with a price, the neck should be made of a solid strong structure inside and a bendable tube on the outside to facilitate a free and rigid movement of the neck

**Market Study:**

# Equo LED Lamp:

Cost: 250$

Unique feature: Uses a self-adjusting mechanism to keep the light flat at all angles

Brightness: 360 Lumen

The mechanism allows it to be adjusted easily even when using just a finger, the lamp can also be rotated 180 degrees to suit the user.

The adjustability makes it versatile in any use scenario from being a bed-side light to a task lamp

It has a modern minimal look making it fit into any modern aesthetic

The base of the lamp is minimal but the lamp head can get in the way while working and in some settings, it could even extend outside the table

# Bicoca Table Lamp:

Cost: 250$

Unique feature: Slightly tilted lampshade which provides a wider coverage of light

Brightness: 470 lumens (max setting)

Has a very playful aesthetic making it draw attention to itself and not just the light

The lamp can also be attached to any surface due to the magnet attached to its base and has a 5 hr battery life to operate from anywhere on full power and up to 20 hours on the lowest power setting

# FLUGBO by IKEA:

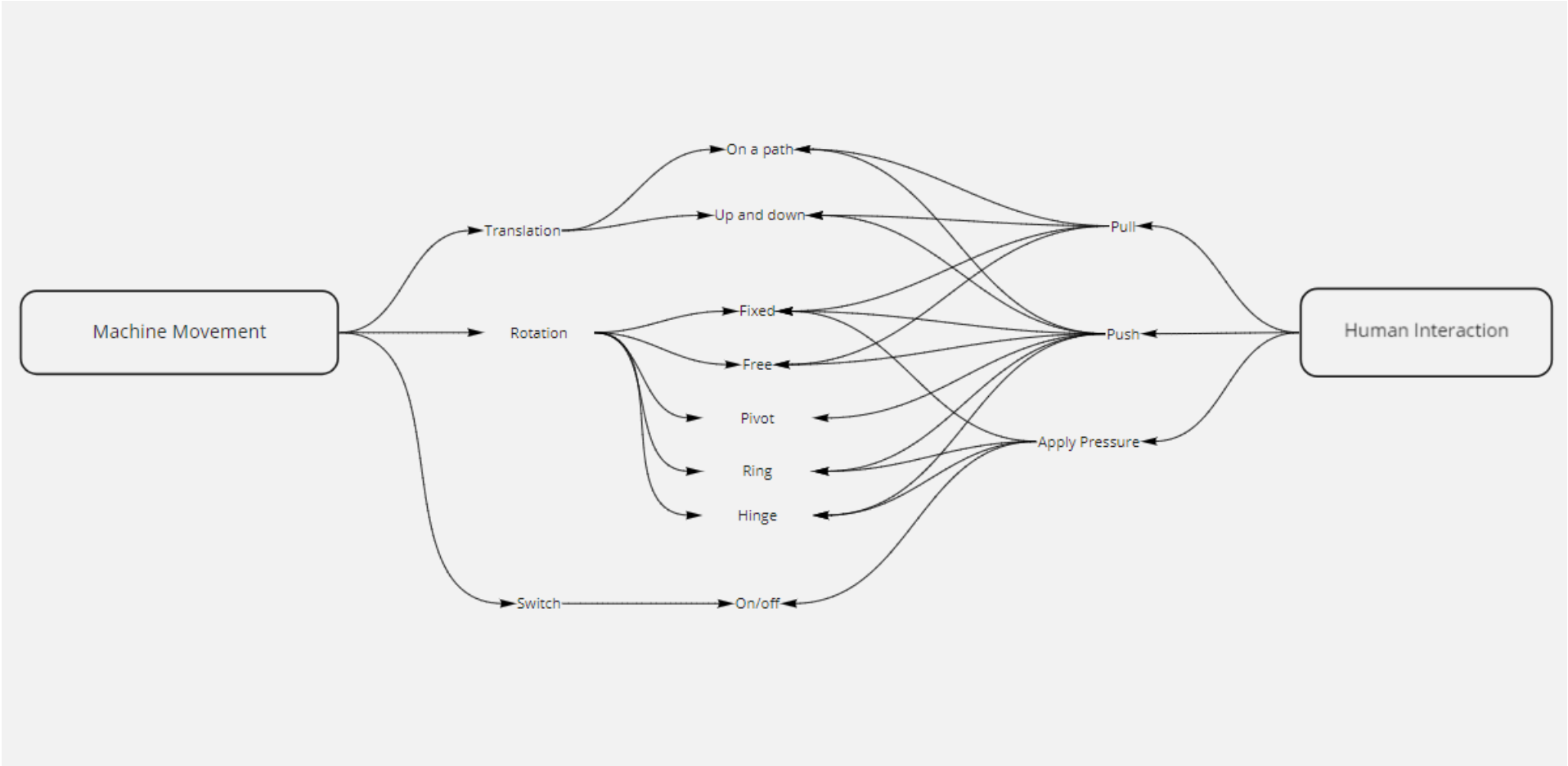
Cost: 2300 Rs

Brightness: Takes any standard bulb

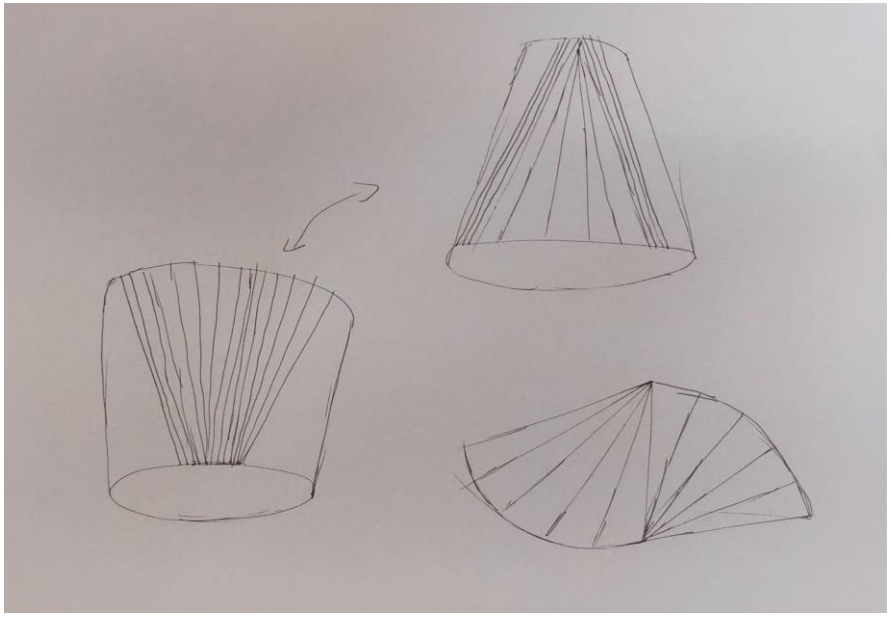
Hidden wire provides a clean form on the neck, glass lampshade provides a balanced light around the room, while providing focused lighting.

Very neutral aesthetic making it fit ay color of light

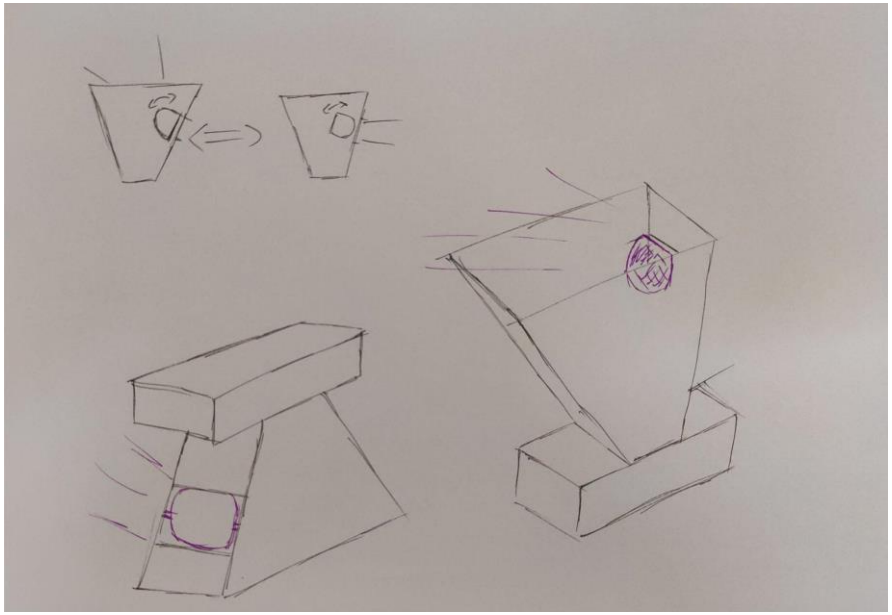
**Machine Motion vs Human Movement:**



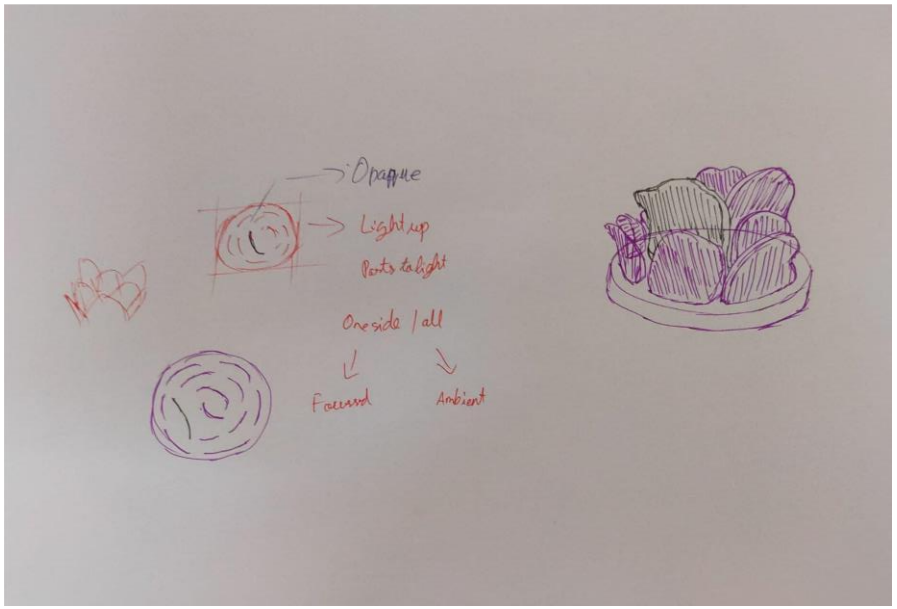
# Ideations:



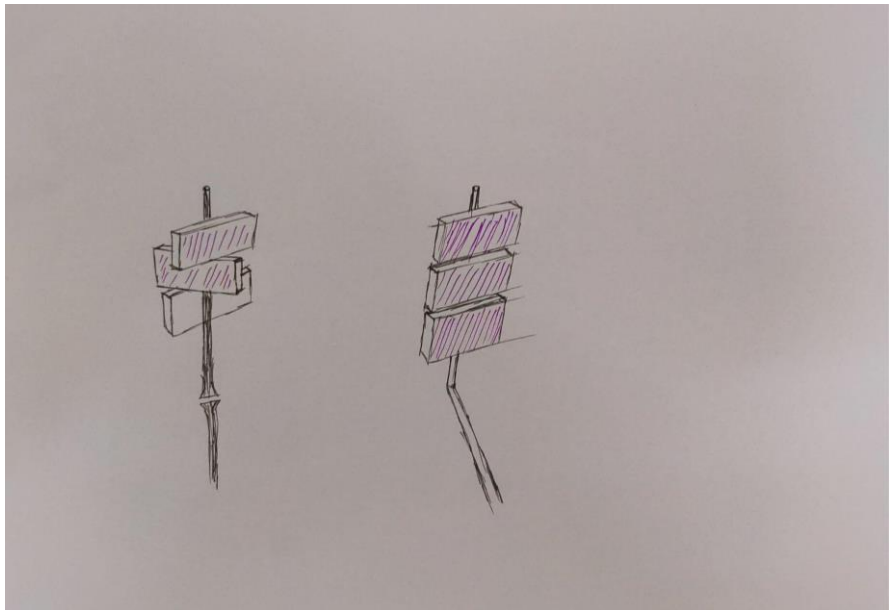
Dynamic shade with origami folds, each alternate section folds at the same time to direct the light upwards or downwards.



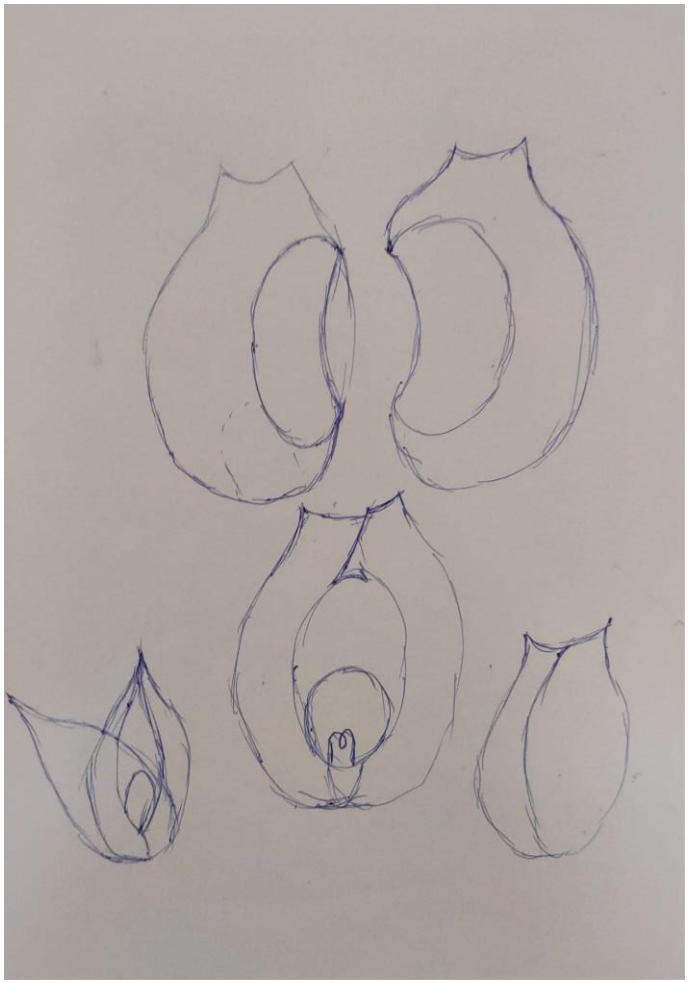
Penstand flip lamp, the lamp can be flipped around by hand to change the direction of the light

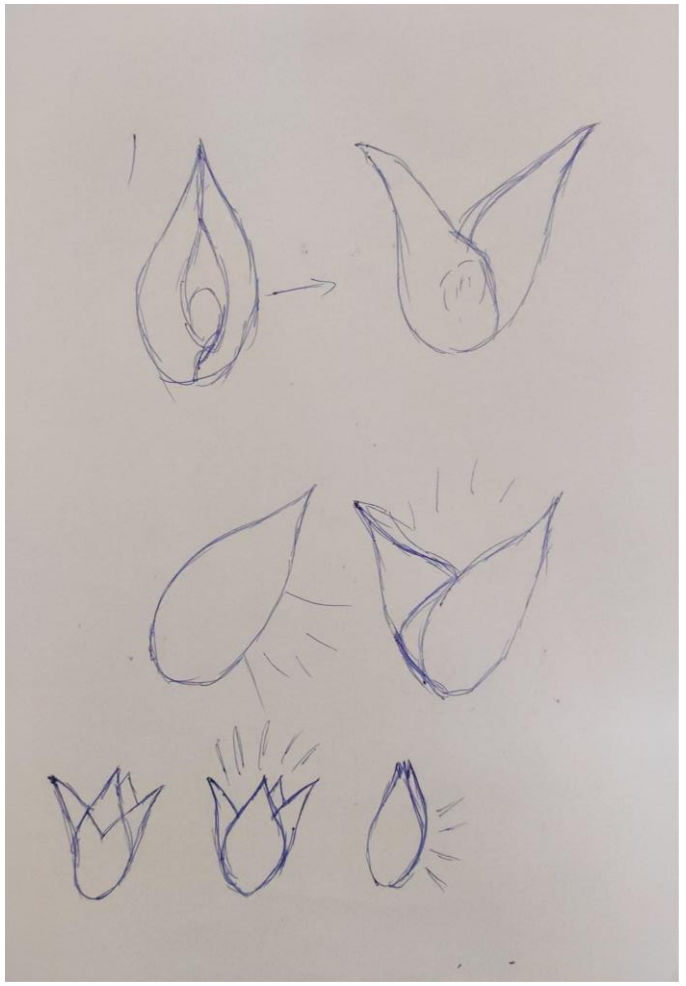



Flower lamp idea, some petals can be switched on for task lighting and provide a focused light, all can be turned on for ambient lighting

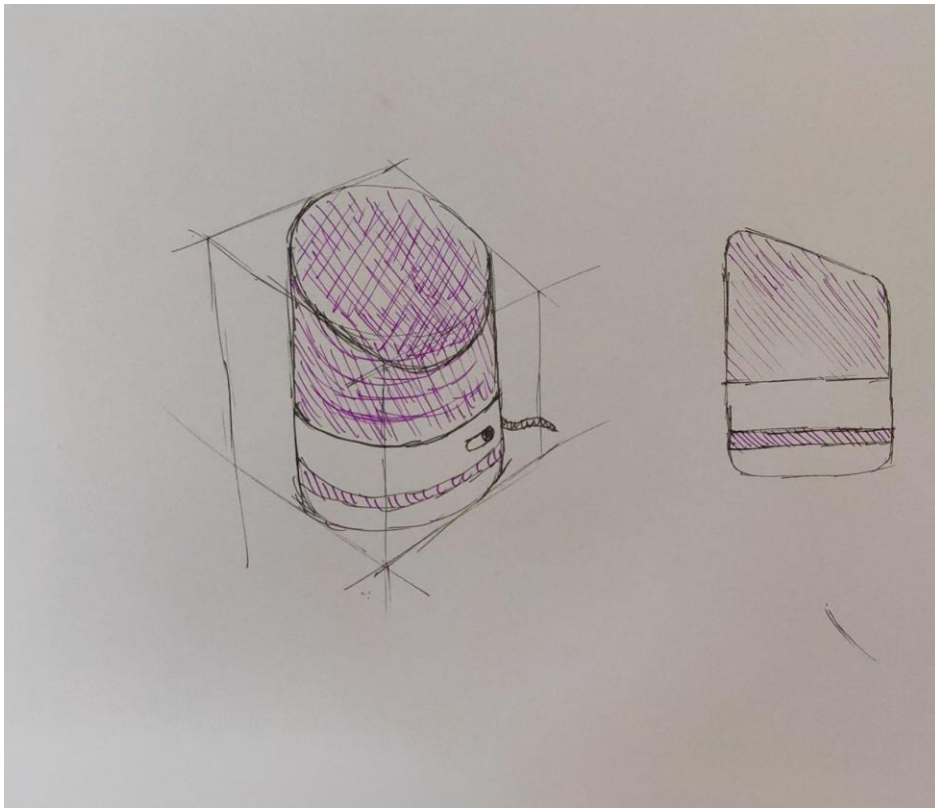


Rotating Lights, all lights can be on one side for a focused light and face different direction for a more distributed light

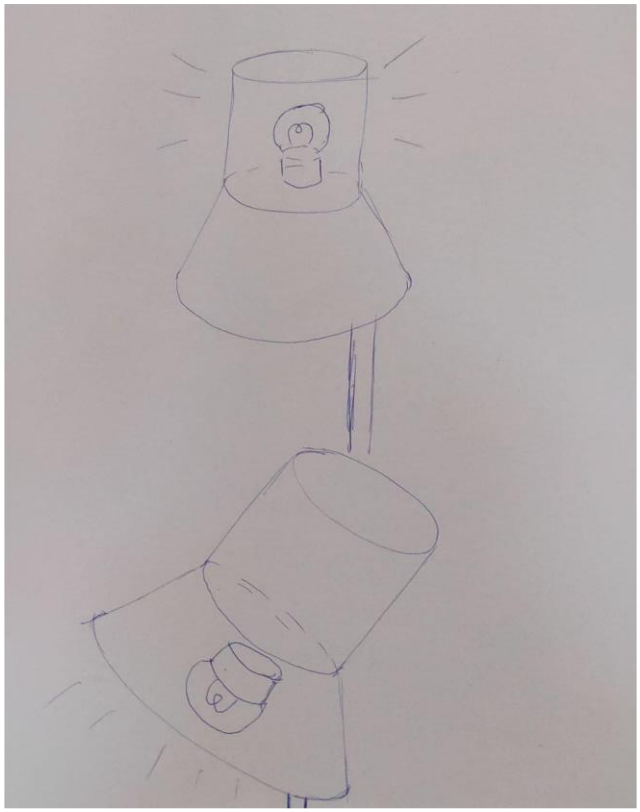




Flower - Bud idea, one-part stays in place while the other can rotate to give ambient light while open and a task light while closed

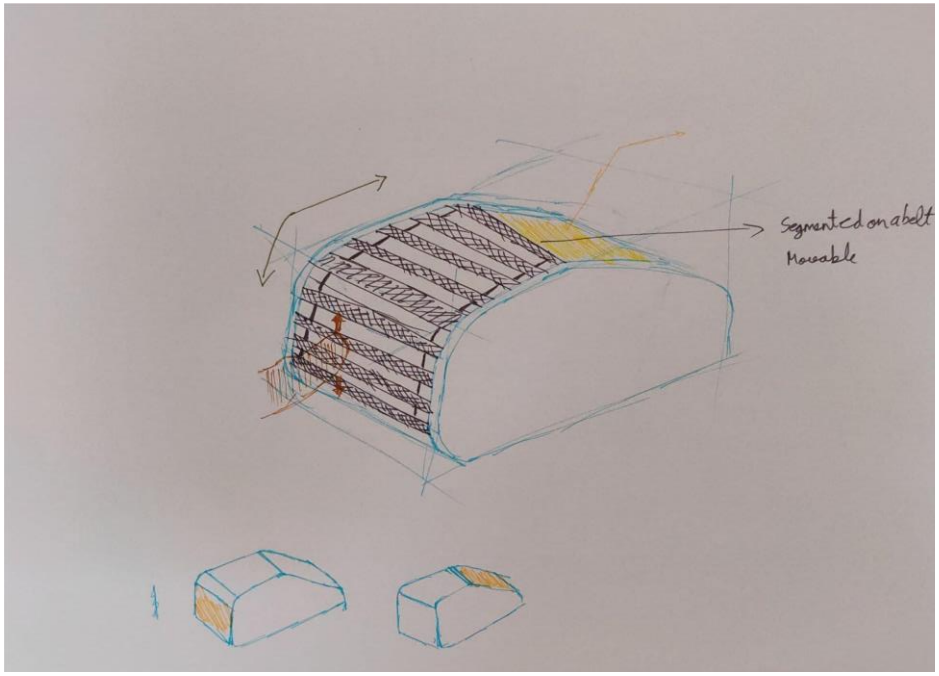


Multi lamp ideas: Small light bar at the bottom can be used for task lighting and the light above for ambient lighting



Lamp that switched bulbs as you tilt it, position on top is for ambient lighting and the position at the bottom is for task lighting

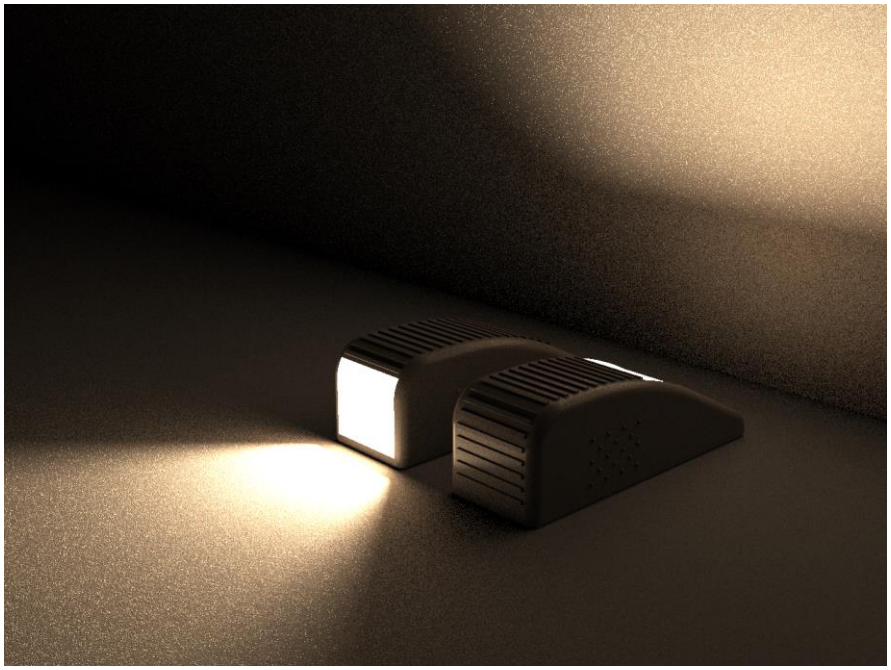
**Concept 1:**

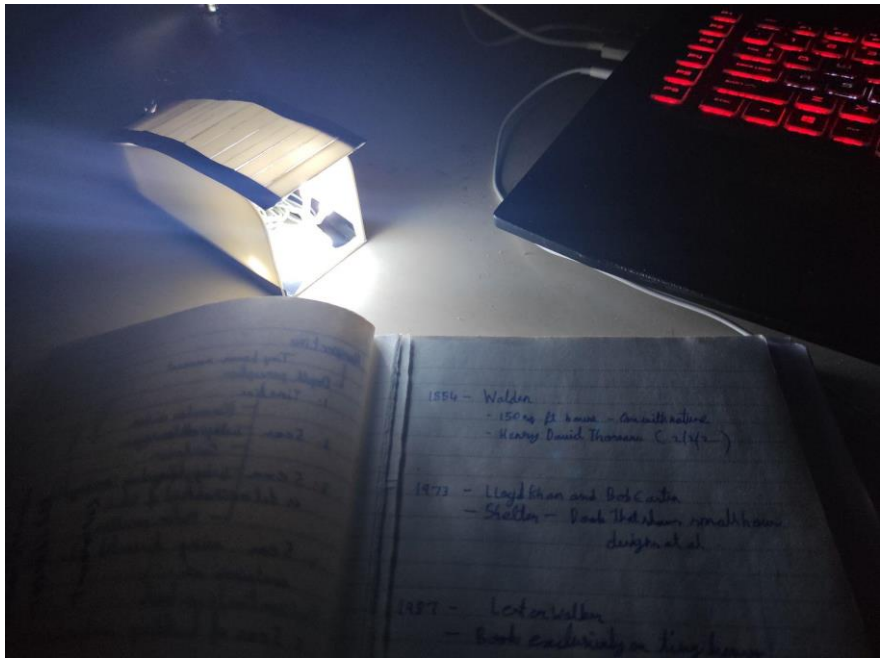



Sigle light lamp with a belt that can be moved to and from to change the direction of the light, the light is positioned in the middles and would throw light in the open direction.

Incline in the top to focus the light away from the eyes and to make sure there is no direct light.

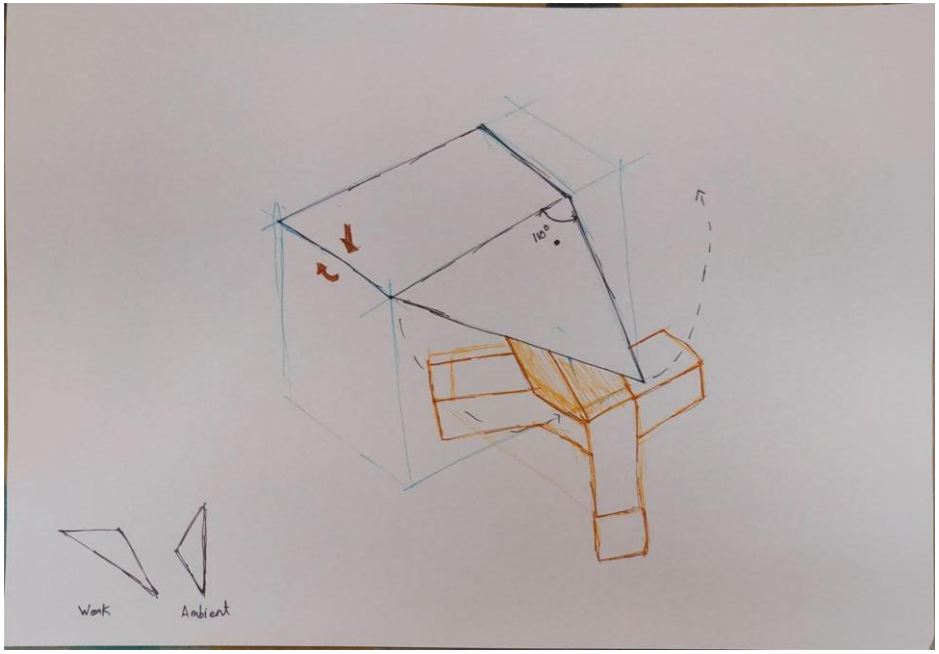
Can be easily moved around and operates on battery

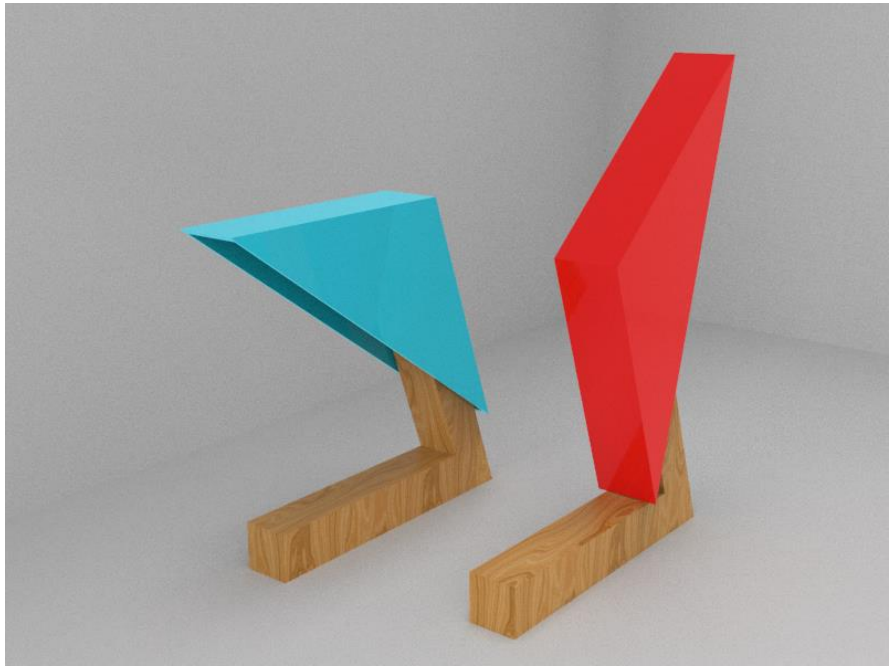




Render and Test model of the lamp

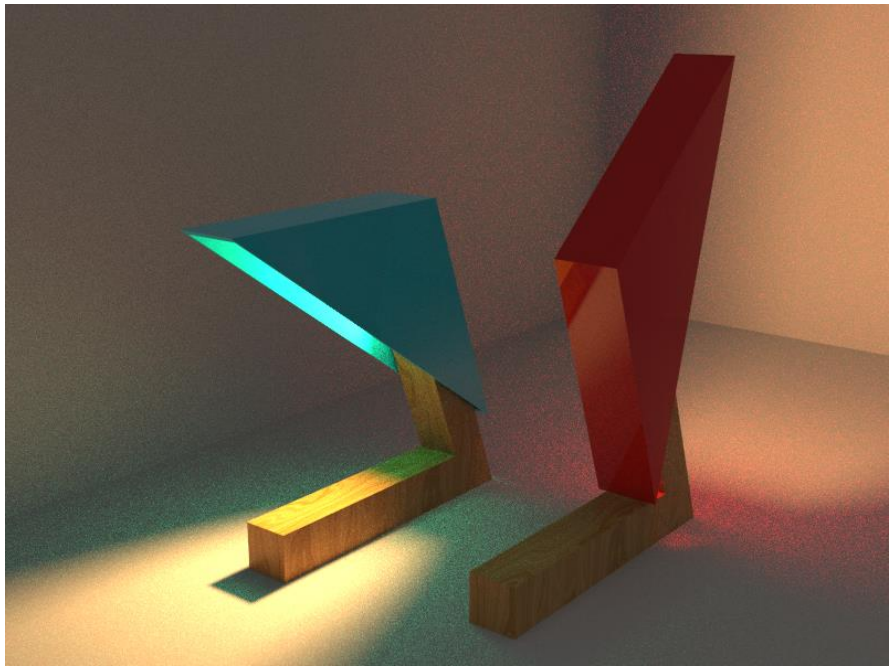
**Concept 2:**



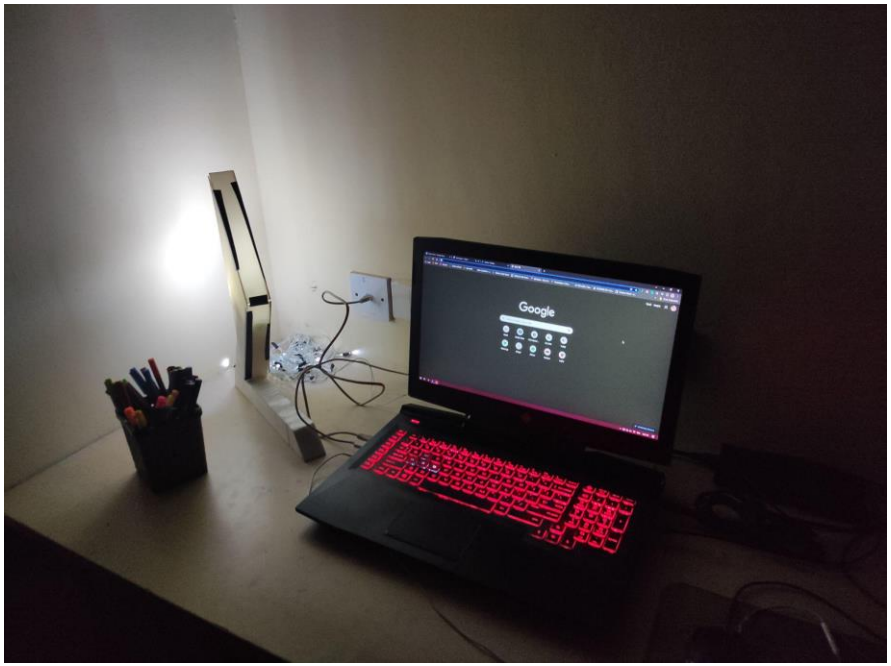



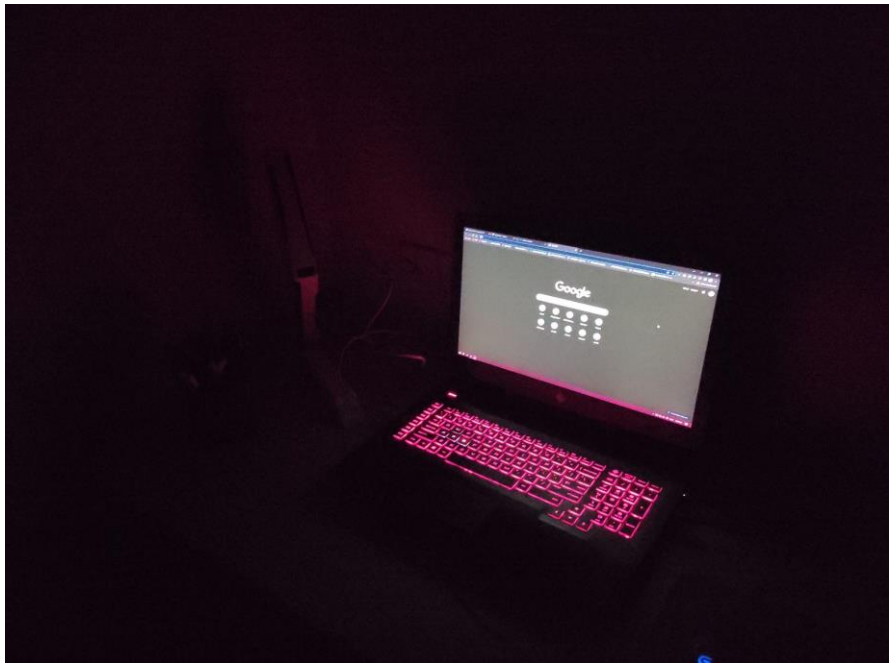
Fixed Light and the lampshade can be flipped to change the orientation from task light to ambient light

The light will be below eye level so the user will never see the actual bulb and the internal layer will be non-reflective



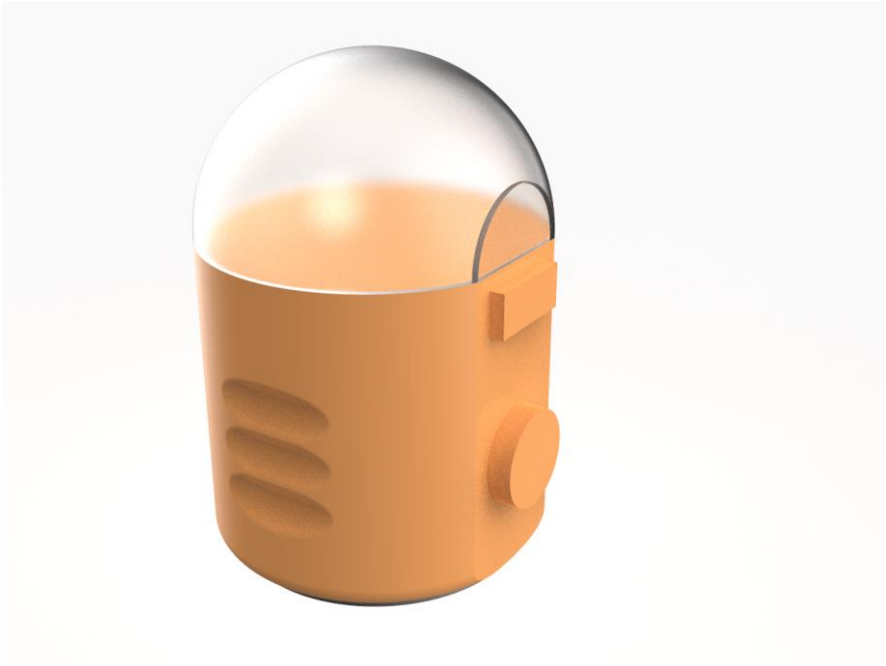
Usage as a task light




Illumination of the room with and without the Light

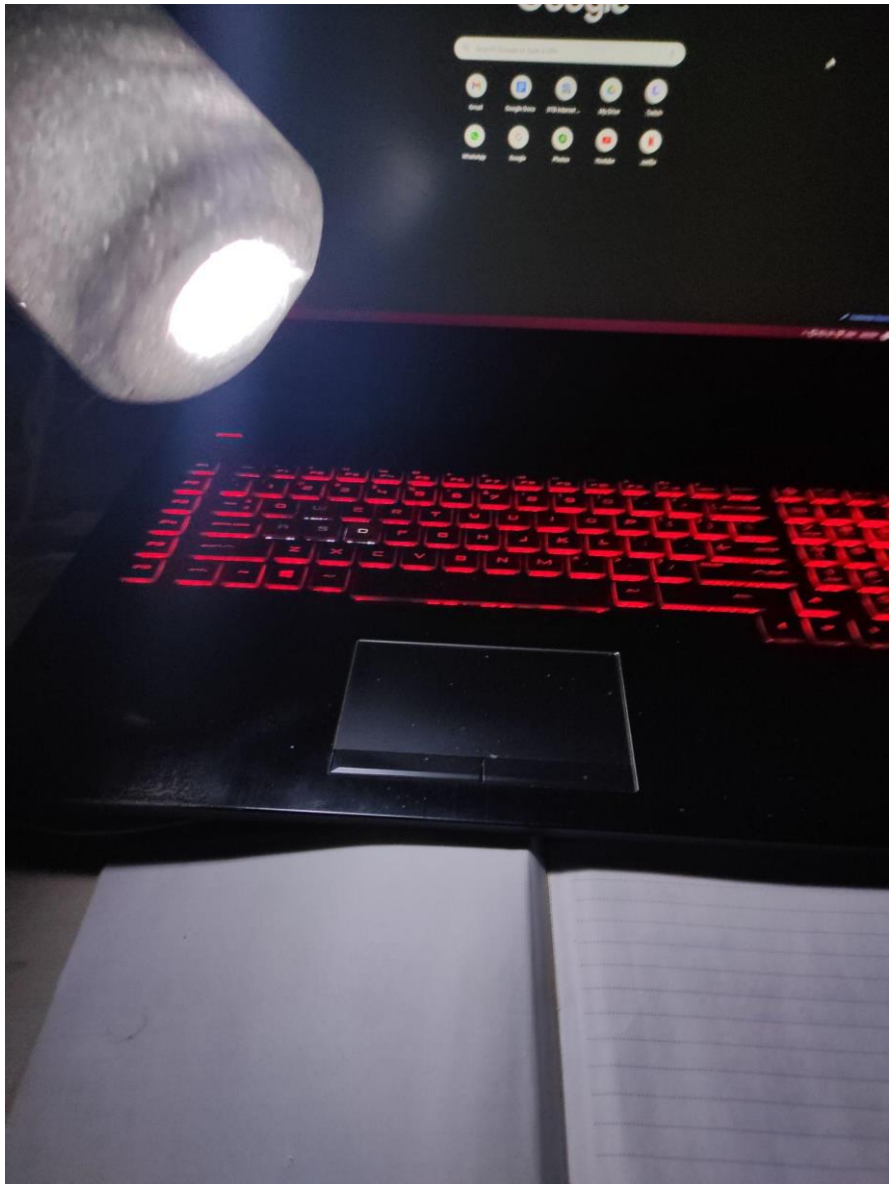
**Concept 3:**



Double light lamp which can be place on any magnetic surface, switch to swap between lights, light on top can be used for ambient lighting and one at bottom for task lighting

The lamp must be moved in order to swap, can be used while charging as an ambient light

Usage as an ambient light, and as a task light



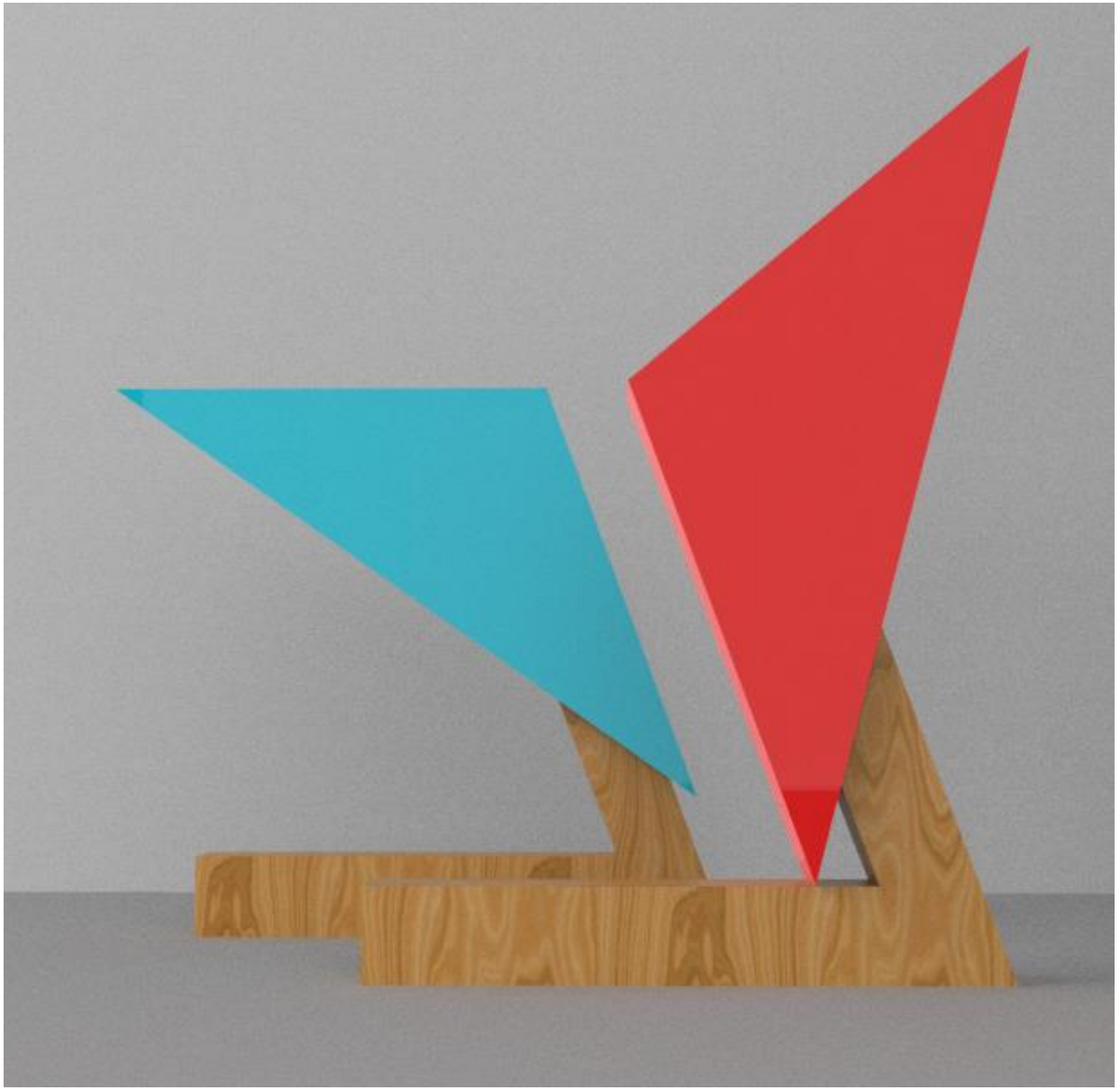
**Evaluation:**

The lamps were tested with 7 users and the wiring was consulted with one person with knowledge on the field, the results are as follows:

| | | User 1 | User 2 | User 3 | User 4 | User 5 | User 6 | User 7 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Ease of swapping | Concept 1 | 4 | 8 | 6 | 7 | 5 | 7 | 5 | 42 |
| | Concept 2 | 5 | 6 | 8 | 7 | 9 | 10 | 8 | 53 |
| | Concept3 | 5 | 5 | 7 | 4 | 3 | 8 | 4 | 36 |
| Quality of light | Concept 1 | 4 | 5 | 4 | 3 | 6 | 8 | 7 | 37 |
| | Concept 2 | 7 | 8 | 5 | 7 | 6 | 8 | 4 | 45 |
| | Concept3 | 8 | 4 | 2 | 3 | 5 | 1 | 7 | 30 |
| Size and placement | Concept 1 | 8 | 4 | 3 | 5 | 9 | 3 | 5 | 37 |
| | Concept 2 | 7 | 5 | 6 | 8 | 4 | 6 | 7 | 43 |
| | Concept3 | 3 | 2 | 5 | 6 | 7 | 5 | 3 | 31 |
| Wiring | Concept 1 | 7 | | | | | | | 7 |
| | Concept 2 | 9 | | | | | | | 9 |
| | Concept3 | 6 | | | | | | | 6 |

Concept 2 showed the best results in the testing and was chosen as the final concept to go ahead with

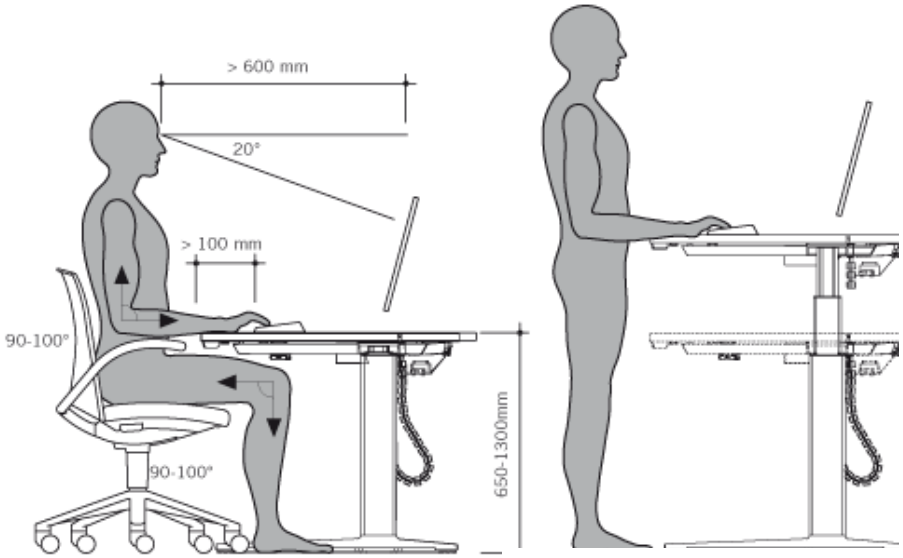
**Final Concept:**



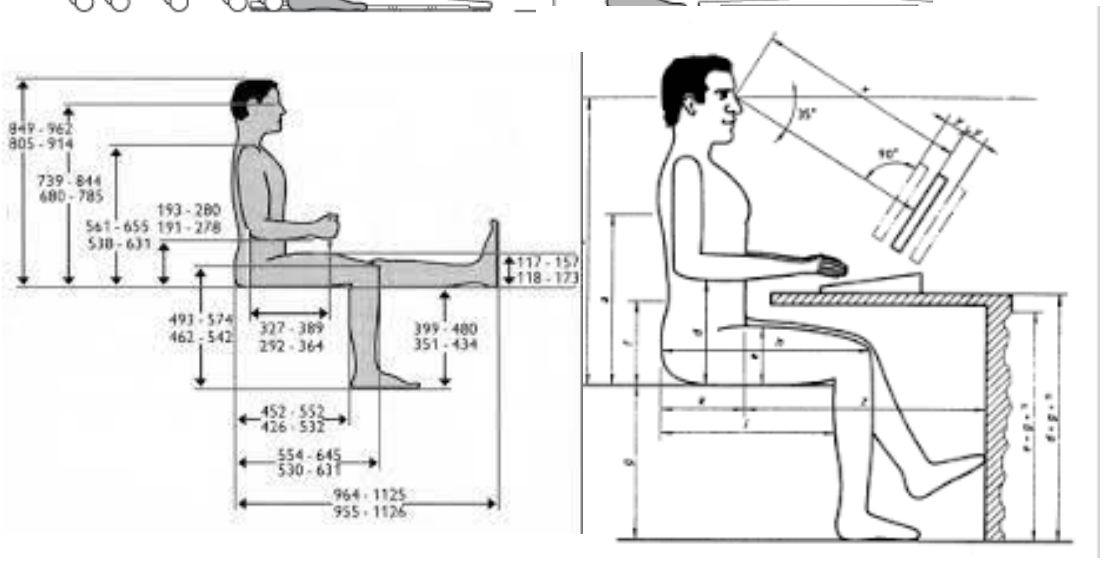
**Measurements:**



The smallest suitable bulbs were 6 cm wide and 10cm in height so the lamp must be able to fit them




To be comfortably below eye level the lamp must be below ~35 cm in height

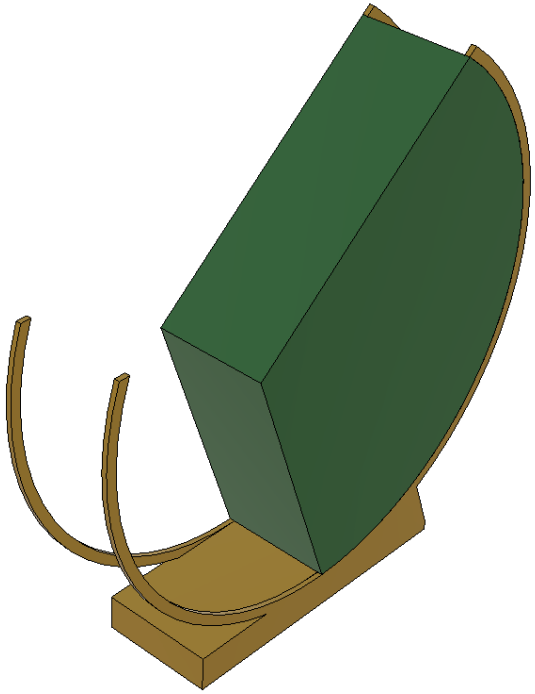


**Rails:**

Rotation constrained by rails and the base, allows movement between the 2 positions

Intrusive and gets in the way while moving

Fragile and can get deformed or break

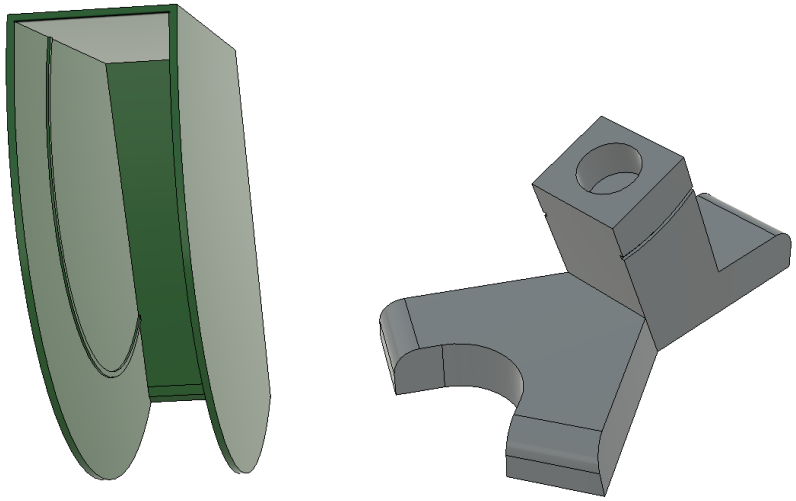


**Slider:**

Eliminates the need for a pivot, retains the same rotational motion

More pressure needs to be applied and can get stuck even if minor deformations occur

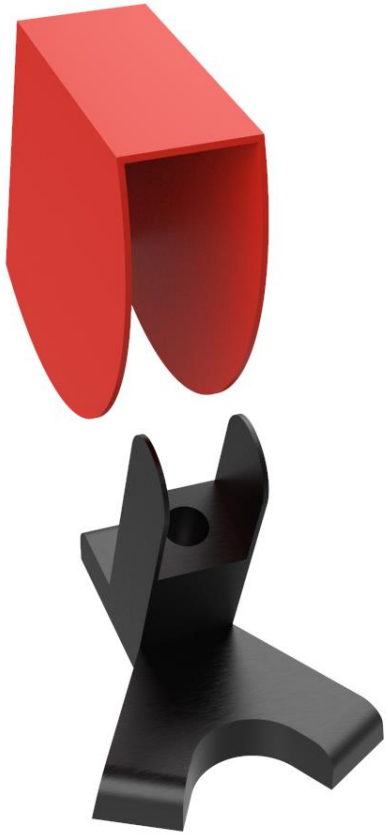
The same slider is used to support the shade so any deformation on the slider while moving can destroy the whole mechanism



**Pivot:**

Very low pressure needed to rotate

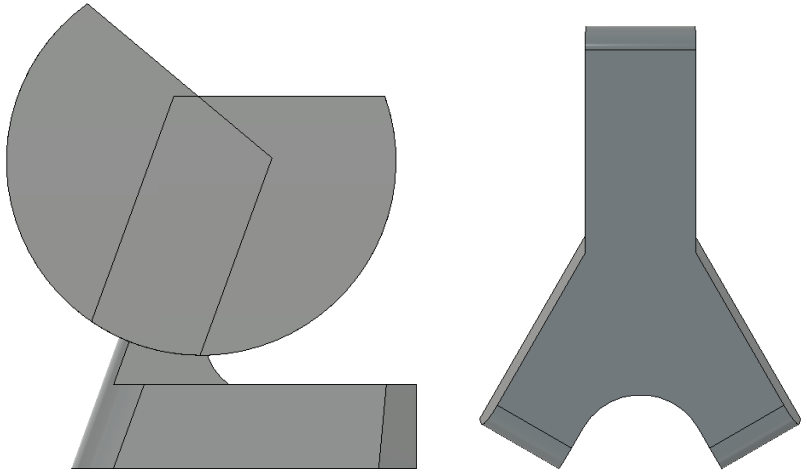
The pivot needs supports to be held up due to the length



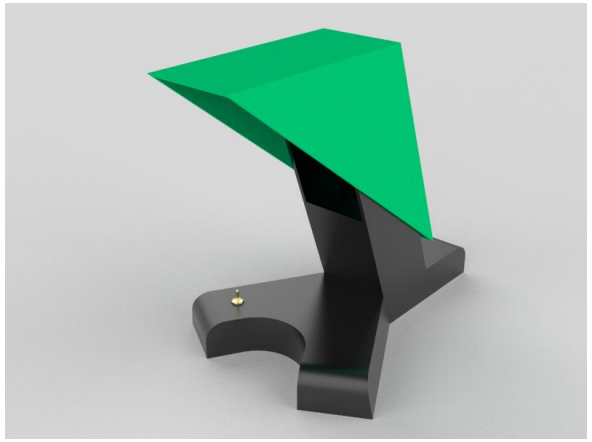
**Base:**

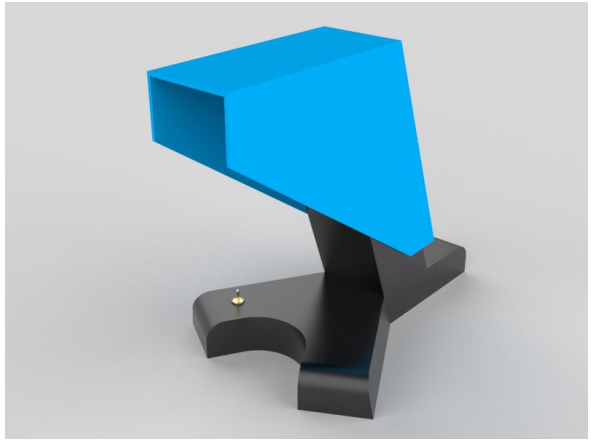
A 110 degree inclination gives the lamp a 70 degree angle upwards

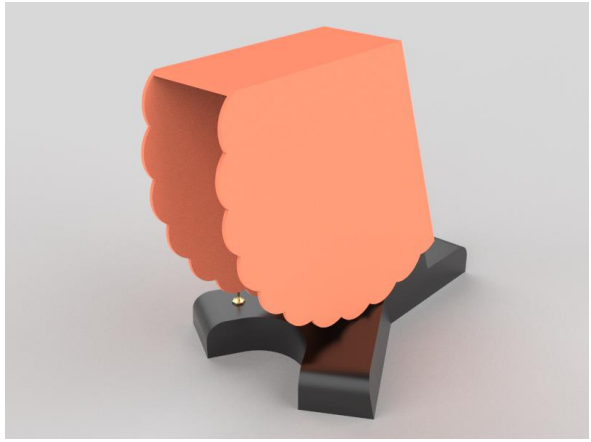
Elongation on the back uses the space used by the lamp while rotating to balance the weight and make sure the lamp always has the room to rotate

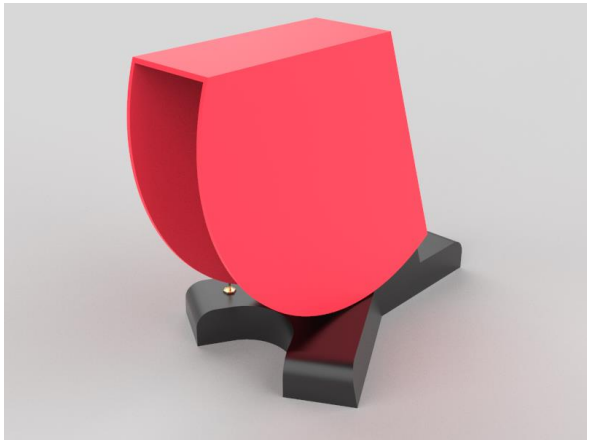


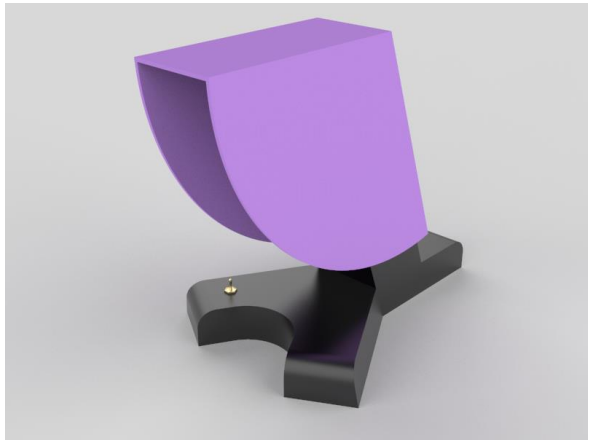
**Lampshade Shape Exploration:**



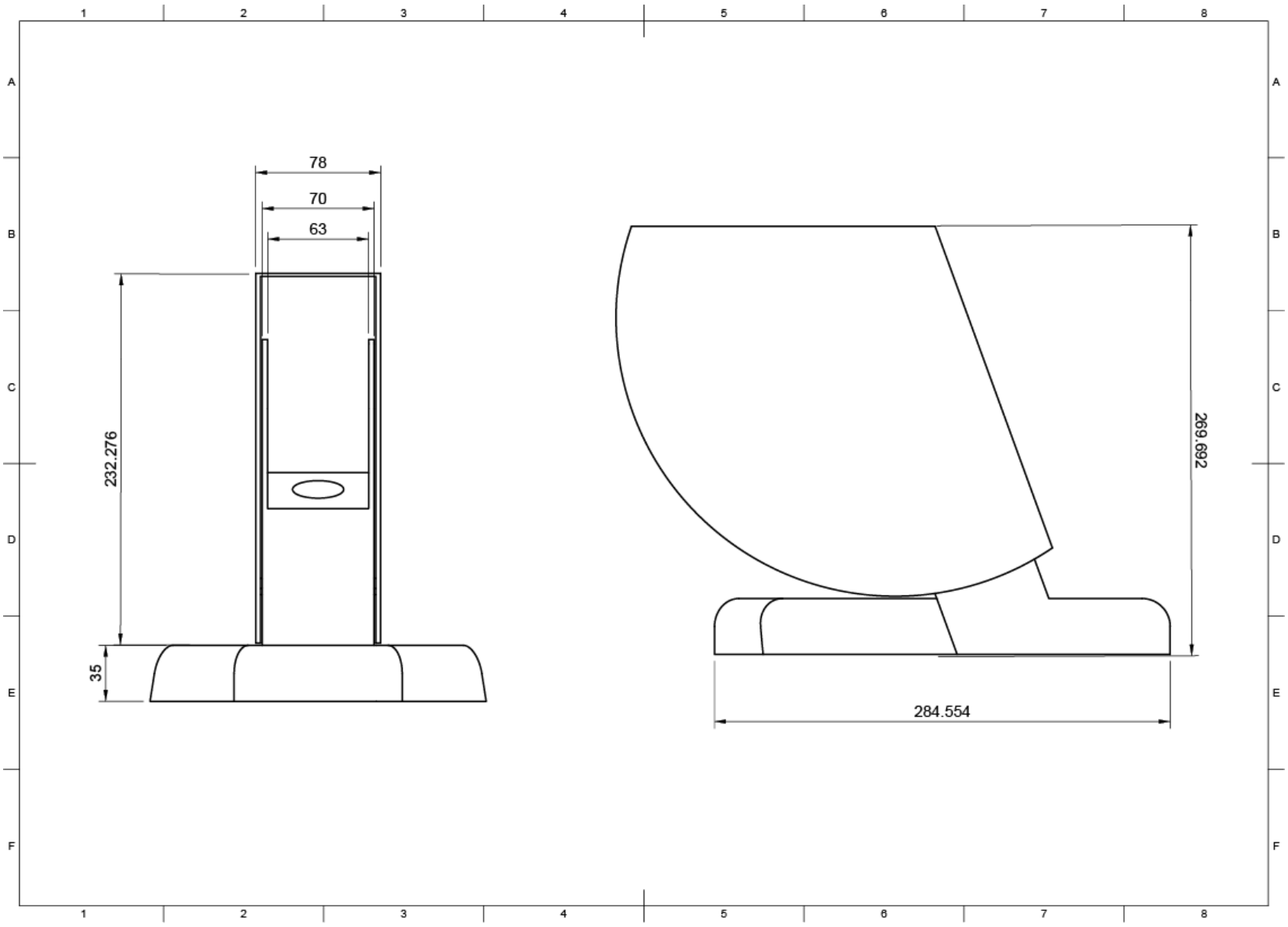


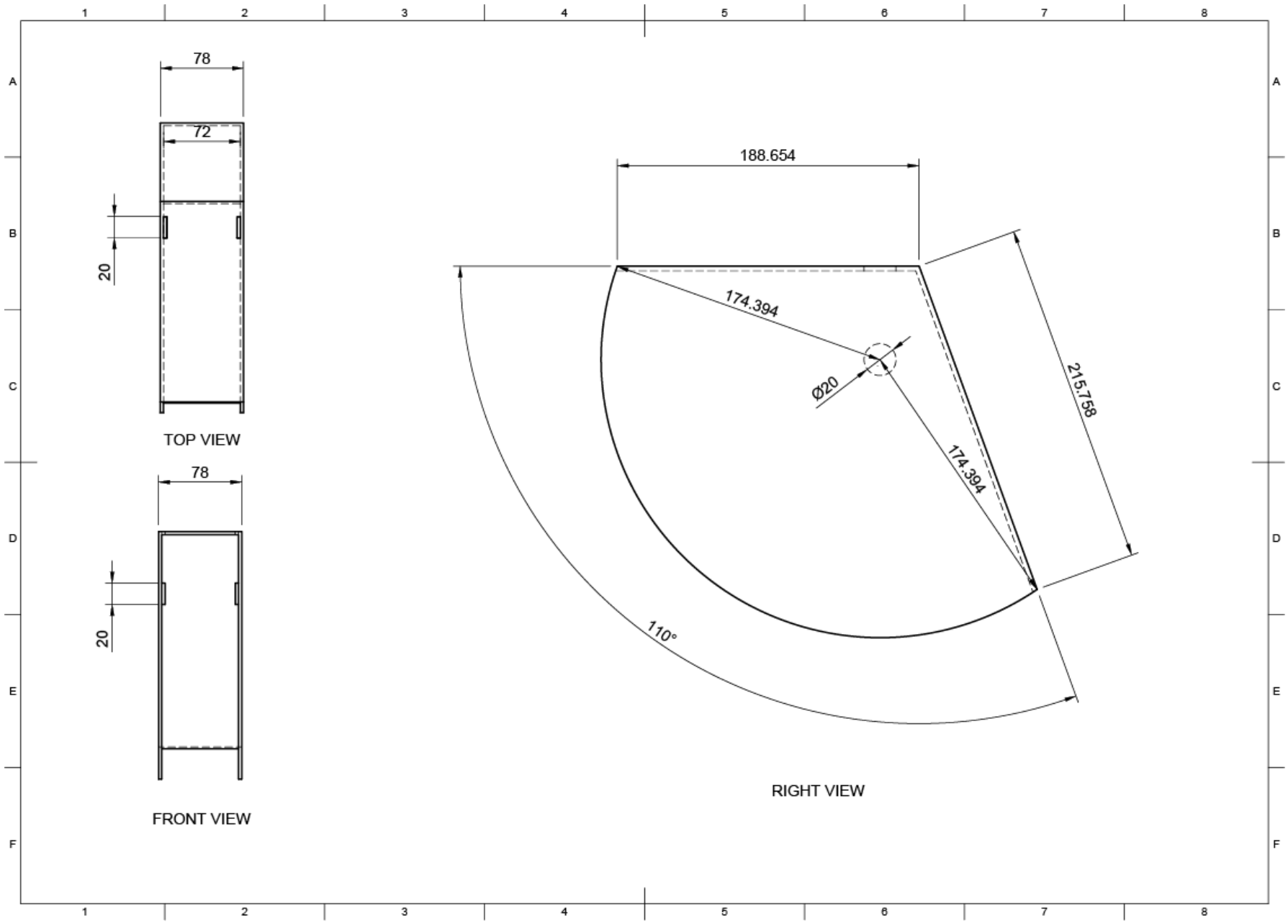


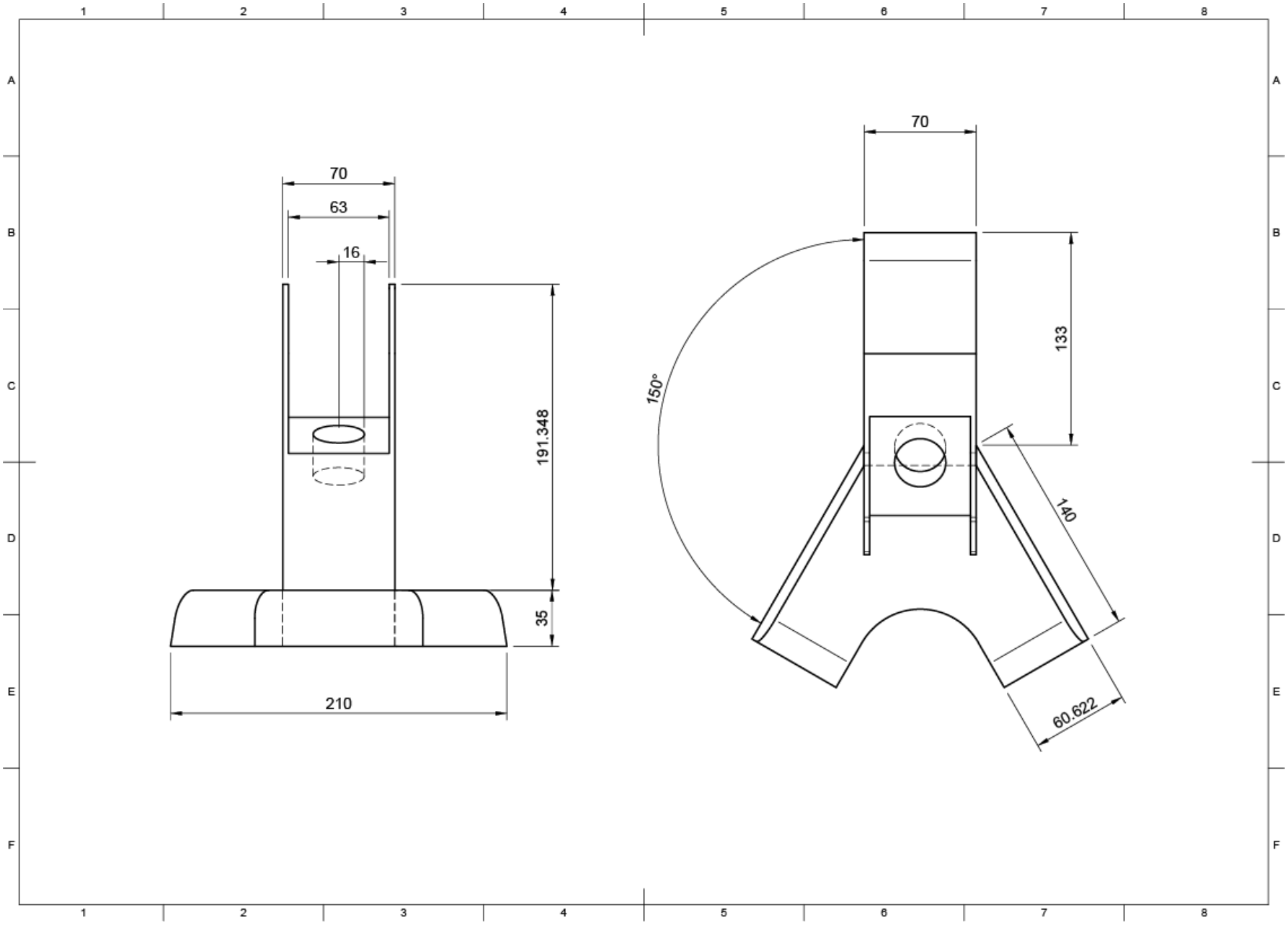


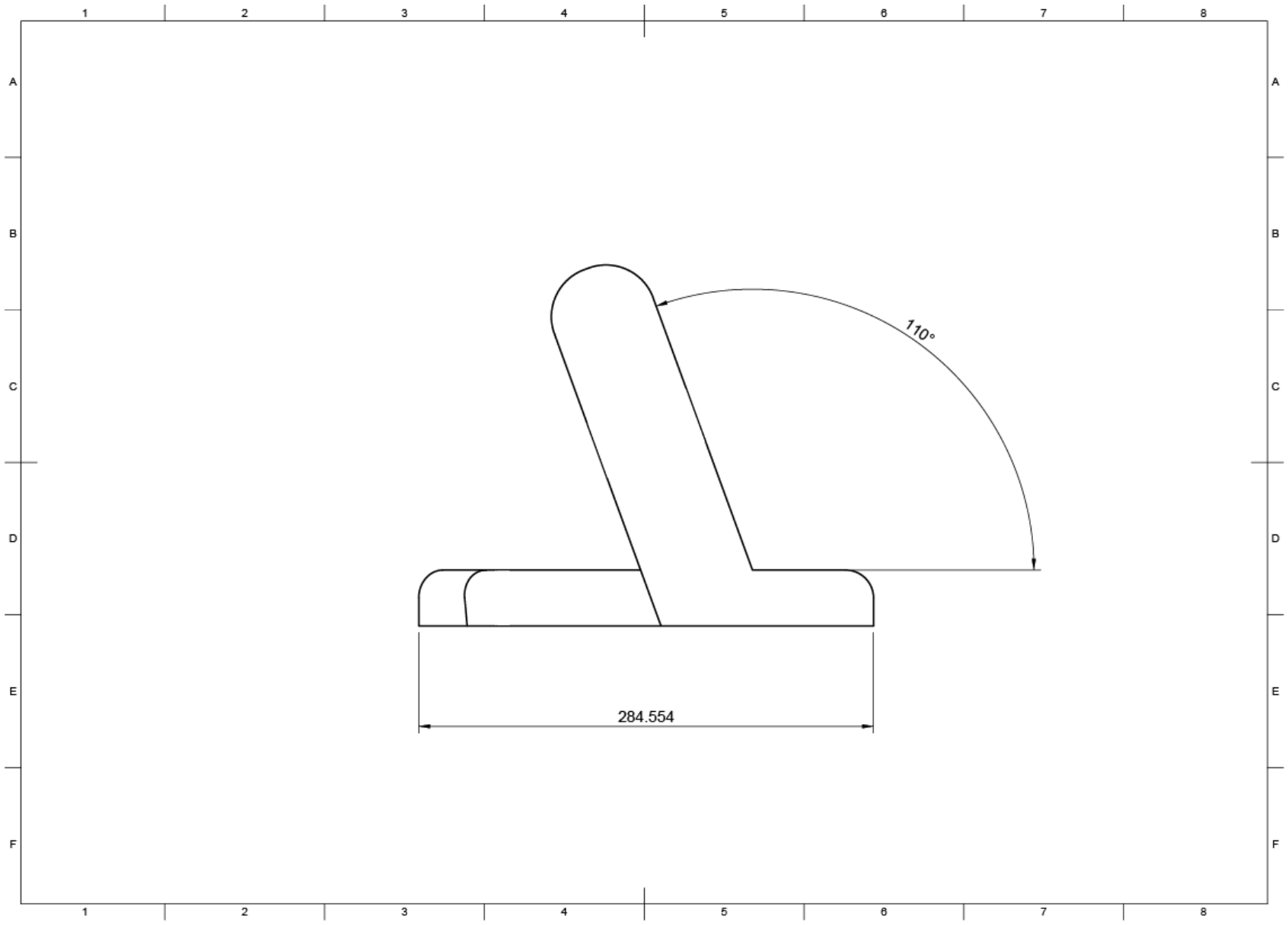


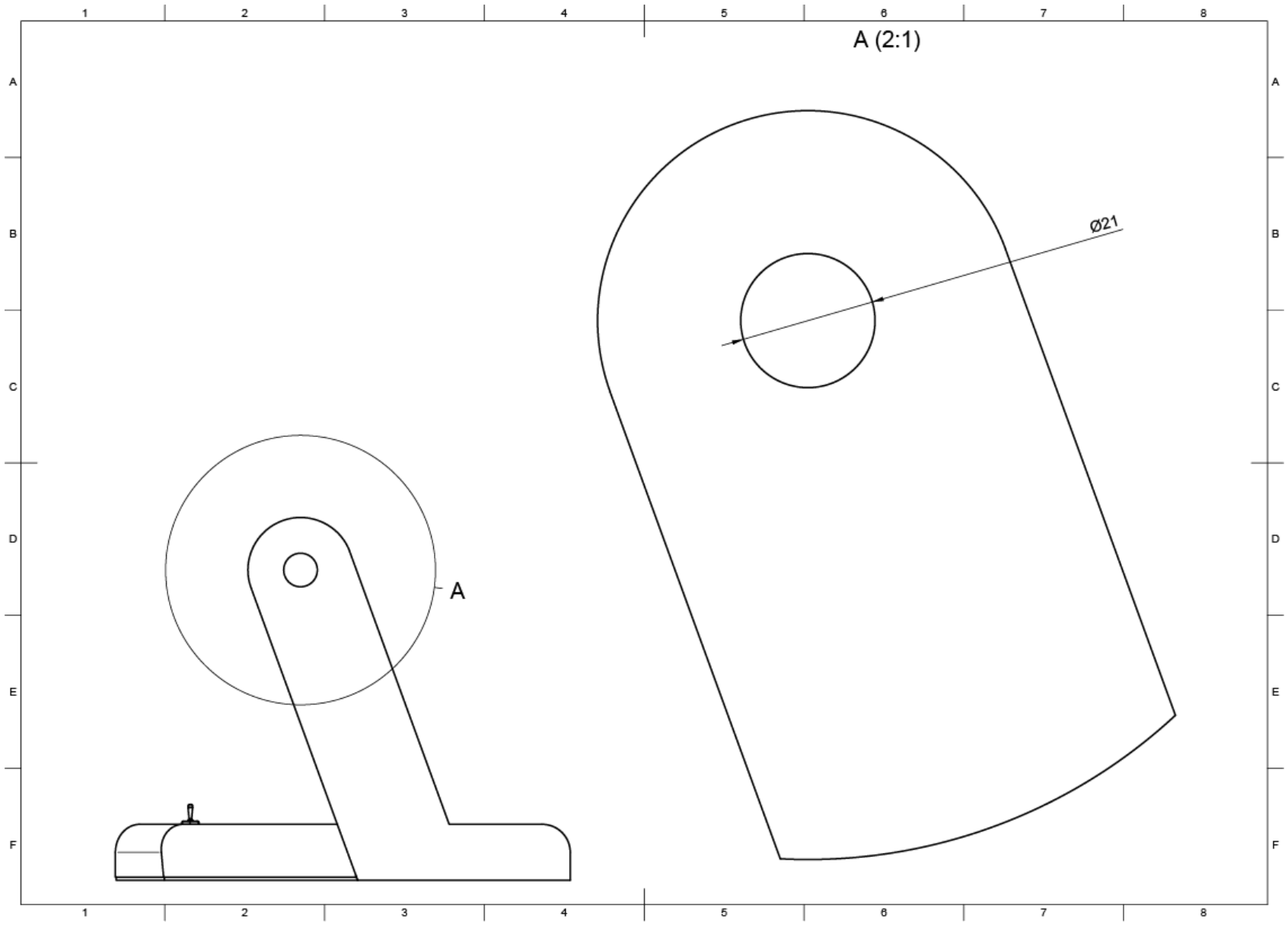
**Dimensions:**

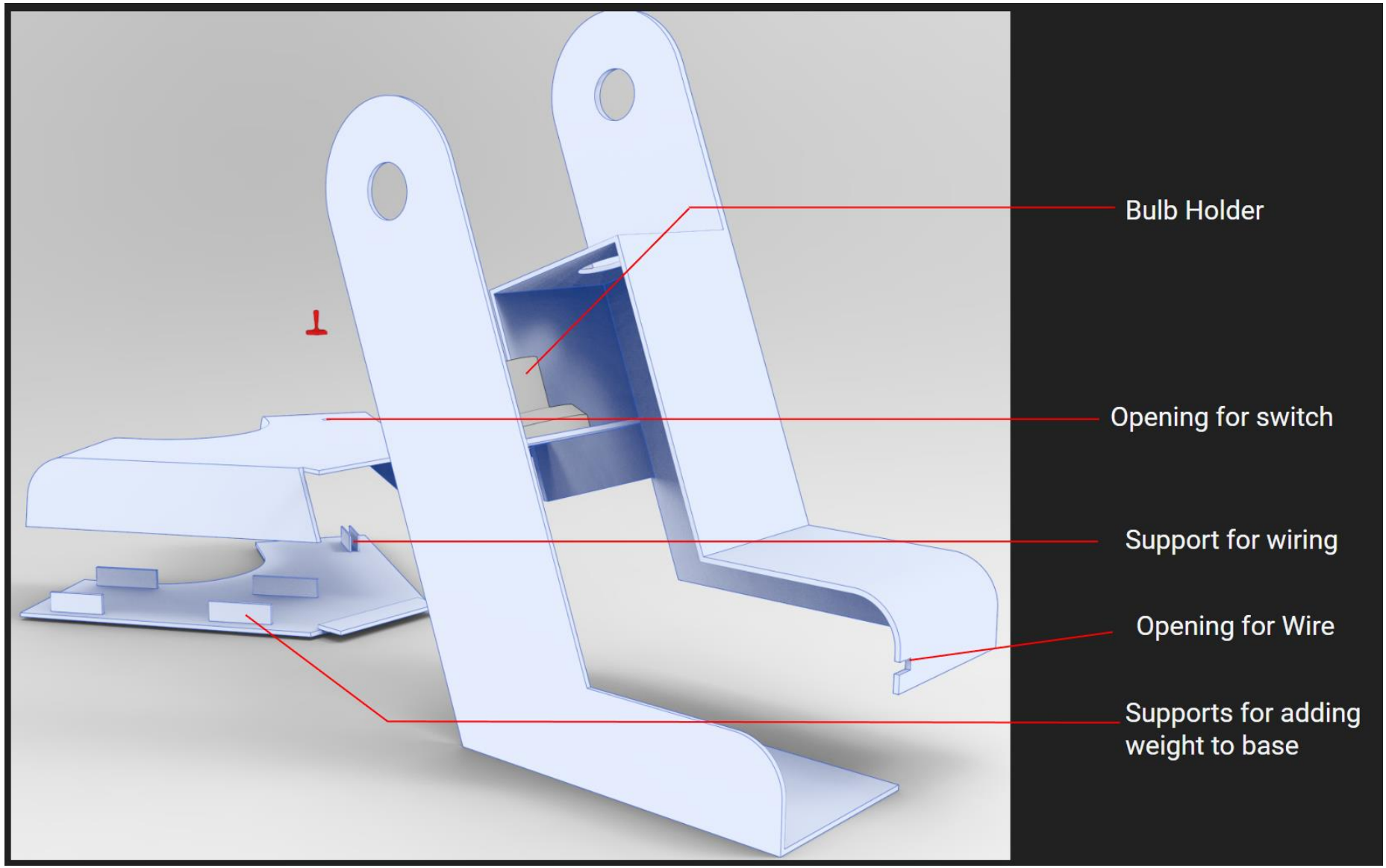


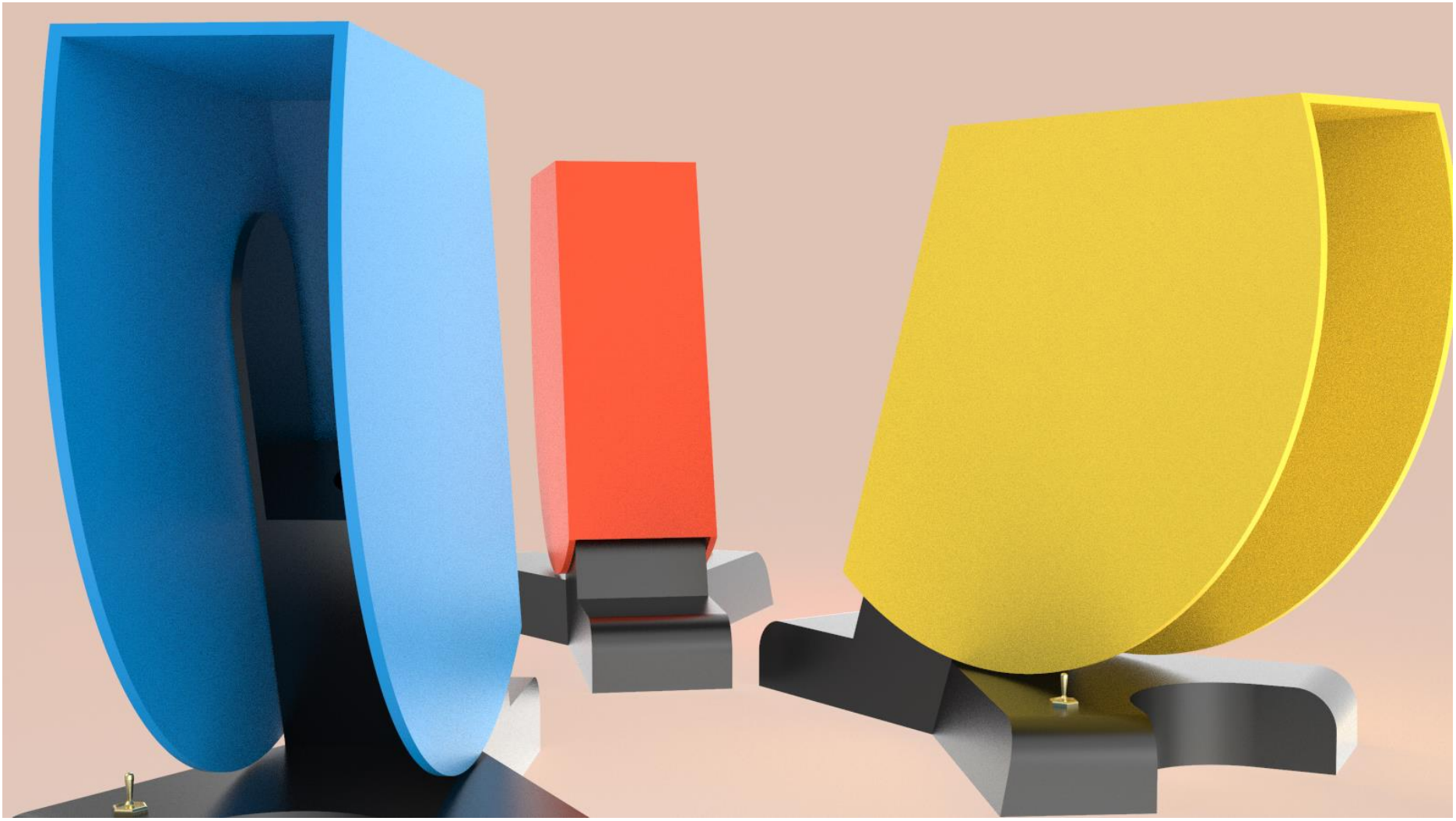

78
72
20
TOP VIEW
78
20
FRONT VIEW
188.654
174.394
Ø20
174.394
215.758
110°
RIGHT VIEW


70
63
16
191.348
35
210
70
133
150°
140
60.622


110°
284.554


A (2:1)
Ø21
A


Bulb Holder
Opening for switch
Support for wiring
Opening for Wire
Supports for adding weight to base



**Conclusion:**

The lines between different types of lamps have thinned down with the generations and there is no norm as to what light should provide what type of lighting, and table lamps can save more energy than conventional lighting making them more versatile. Table Lamps have been marketed as ornamental as well allowing for a larger price range for the items to be placed

**References:**


paign=shopping_feed&utm_content=free_google_shopping_clicks%20_Lighting&gclid=Cj0KCQjw-NaJBhDsARIsAAja6dNXneuuZu4_Y_

B. Knave, Ergonomics and lighting,
Applied Ergonomics, Volume 15, Issue 1,
1984,
Pages 15-20,
ISSN 0003-6870,
https://doi.org/10.1016/S0003-6870(84)90117-0.
(https://www.sciencedirect.com/science/article/pii/S0003687084901170)

9q2s6IX5KiE-MUFTD5SQ_wP7_pdMz27-tM3KhhYhYaAqBREALw_wcB

https://www.alconlighting.com/blog/residential-led-lighting/how-do-i-determine-how-many-led-lumens-i-need-for-a-space/

https://www.lightology.com/index.php?module=prod_detail&prod_id=620967&cat_id=40

https://www.archtoolbox.com/materials-systems/electrical/recommended-lighting-levels-in-buildings.html

https://www.lightology.com/index.php?module=prod_detail&prod_id=56457

https://www.researchgate.net/profile/Miriama-Pinosova-2/publication/308032041_Lighting_Quality_and_its_Effects_on_Productivity_and_Human_Healts/links/57d7b1d008ae601b39ac9854/Lighting-Quality-and-its-Effects-on-Productivity-and-Human-Healts.pdf

https://www.ikea.com/in/en/p/flugbo-table-lamp-brass-colour-glass-20463382/?utm_source=google&utm_medium=surfaces&utm_cam