

Component 1: Three-dimensional design

Standard Mark: 70

Performance Levels 5: Confident and assured

	AO1	AO2	AO3	AO4	Personal Study
Mark	14	14	15	15	12
Performance Level	5	5	5	5	4

Moderator Commentary

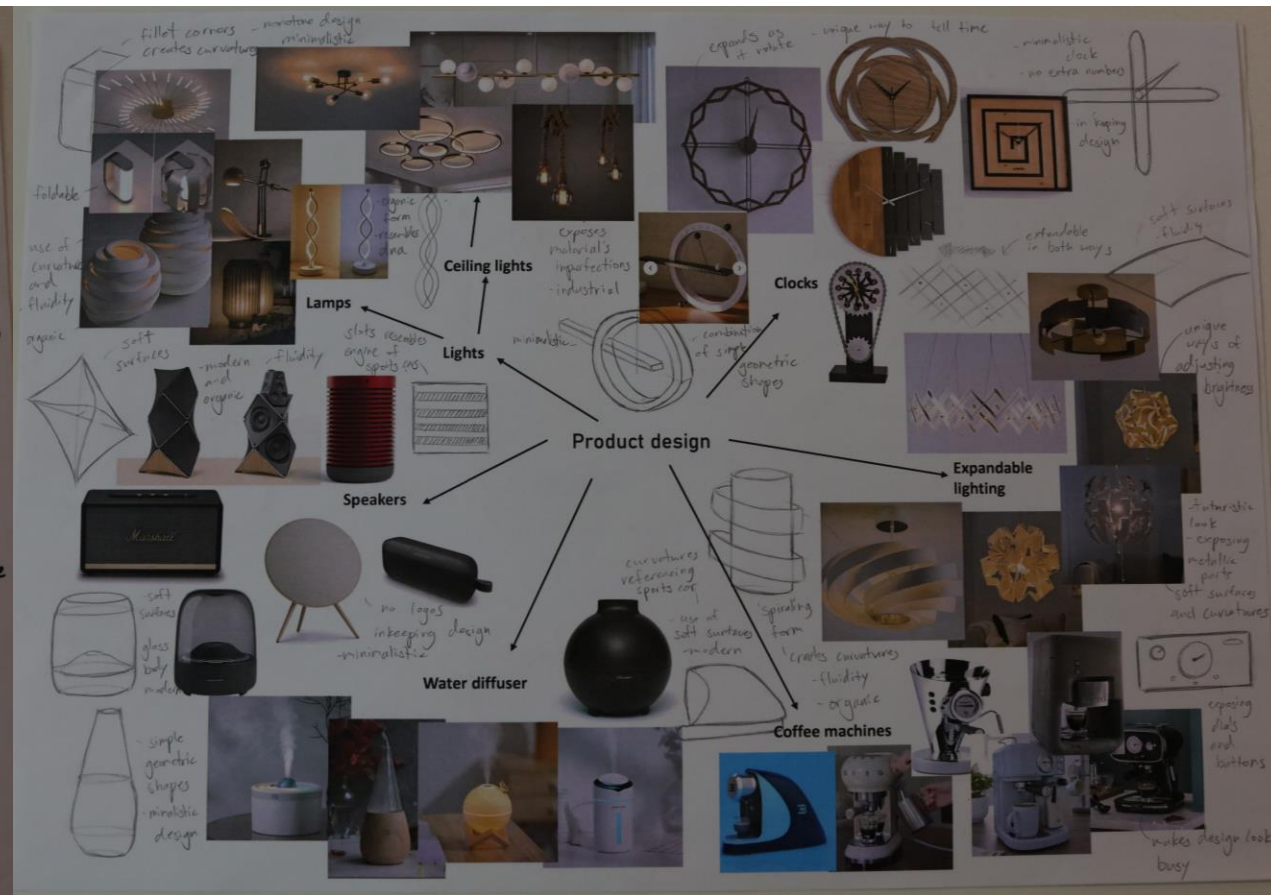
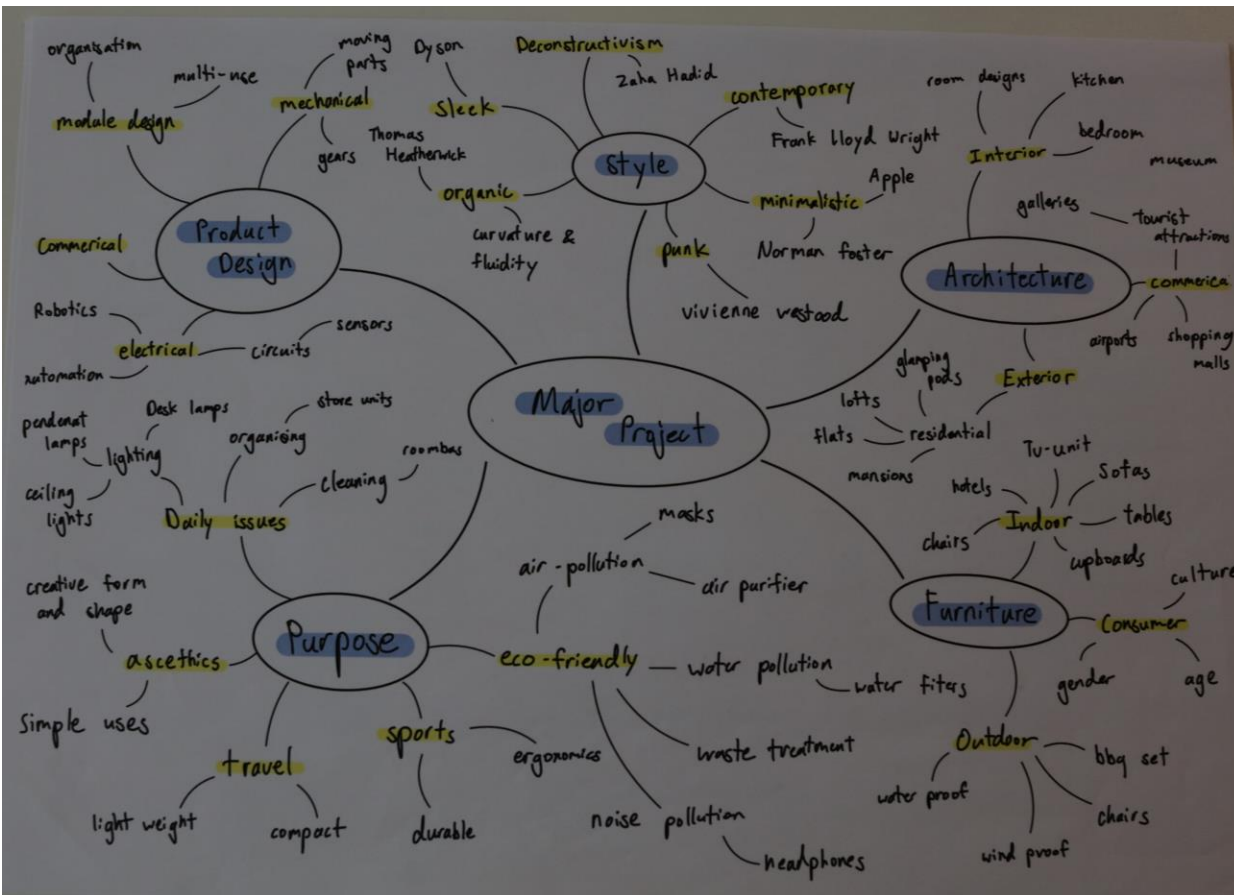
Davey has produced a comprehensive and coherent body of work within the Three-Dimensional Design title, focusing on the creation of a light fitting. The project demonstrates a clear understanding of both form and function, supported by extensive contextual research. Davey has thoughtfully analysed a range of existing light fittings, including products freely available and these effectively inform their own design development. The work follows a structured and logical progression, responding directly to the project brief. Each stage of the design process is clearly documented, showing a strong grasp of design principles and practical considerations. The technical detail included at each stage ensures that the object could be successfully made, and the creative process is well-evidenced throughout. The quality of the design work is consistently high, with thorough exploration of form and careful attention to function. The presentation of ideas demonstrates a mature approach to problem-solving and design communication. While the project is sophisticated in nature, and technically adept, it does progress in a somewhat linear and predictable manner. There is less evidence of risk-taking or exploration of alternative concepts that might push the work to a more innovative or experimental level. Nonetheless, the outcome is beautifully executed and meets all assessment criteria for this level. Overall, the student's performance is strong, demonstrating advanced technical ability, sound design reasoning, and a comprehensive understanding of the process. This work achieves a high standard within Level 5 of the performance calculator.

Davey - Component 1 Three-Dimensional Design

Standard Mark 70

Performance Level 5 : Confident & Assured

A01	A02	A03	A04	PS	TOTAL
14	14	15	15	12	70



Component 1 Personal Study

How do the Designers James Dyson and Torsten Valeur Allow the Function of a Product to Impact its Form

James Dyson, the founder of Dyson, revolutionised vacuum cleaners with his bagless invention. But as the head of the Royal College of Arts, Dyson is also known for his practical and modern designs. He often exposes internal mechanisms to display the technology inside, along with the sleek outer shell that gives the product its form. Dyson designs with the aim to “improve the experience for the user”,¹ which is a key selling point of their products. In contrast, Torsten Valeur, known for his minimalistic design, conceals all the mechanisms to distill his products to their most essential form. He believes that a product’s purpose “must be as clear as the benefits it offers”, which he achieves with simple shapes and details, making his designs “instantly recognisable”.² His designs often focus on the craftsmanship and material while keeping the product contained with its purpose, which makes his product luxurious and high quality. While both excel in their own respective field, their approaches to blending function and form differ significantly, resulting in two distinct designs. For my own project, this research will provide a better understanding on the different methods of how function and form blends into a product. By analysing the effectiveness of the two designers’ methods, I hope to gain insight on the approach I’m going to take when trying to incorporate a moving mechanism into my ceiling light.

James Dyson: Vacuum cleaner

James Dyson’s most famous product is his vacuum cleaners, because it revolutionised the vacuum cleaner industry when it first came out. Before Dyson launched his product, every vacuum cleaner needed a bag to attach to it for dust collection, as shown in figure 1.



Fig 1. Vacuum cleaners needed bags to hold the dust

¹ <https://medium.com/@wattsupjamie/james-dyson-4fbd9ab2112d#:~:text=In%20essence%2C%20this%20is%20user,the%20experience%20for%20the%20user>

² <https://valeurdesigners.com/approach/>

This poses inconvenience on the users as they had to frequently change and clean this bag, and it was not durable enough. James Dyson noticed this issue amongst the users and decides to solve it with his invention: a bagless vacuum cleaner. This illustrates that Dyson’s design are always user-centred, and it is one of the key selling points of all his products. Dyson was able to achieve the “bagless” effect because he implemented the technology seen in farm silos onto the dust collection system.³ It is called the “Dual Cyclonic system”, where the air spirals into a cone shape column, and the dust gets thrown into the collector because of the centrifugal force generated by the spinning air.⁴ Dyson chooses this feature as the central focus of the whole design and allows this function to fully impact its form. The clear acrylic casing around the dust collector exposes the internal mechanism of dust collector making it stand out. This can be seen in figure 2.



Figure 2. Dyson’s cyclonic dust collector technology

He also exposes the air pipes dust collector, mimicking the pipes seen in an industrial factory. This is shown in figure 3.



Figure 3. Air pipes are exposed on the outside to look more functional

³ <https://www.theguardian.com/culture/2016/may/24/interview-james-dyson-vacuum-cleaner>
⁴ <https://home.howstuffworks.com/vacuum-cleaner.htm>

However, he makes the design sleek and modern by coating the whole section in a smooth dark grey colour and using the curvature of the air pipes to enhance the form’s fluidity, so it fits better into modern day interior designs. This method wouldn’t be an effective method for my own project due to the nature of my designs. My ceiling light includes two major functions: changing form and lighting up the room, so this would cause issues if I were to blend function and form by highlighting the function entirely. By highlighting the two functions at once, my design loses a central focus to the user, and it wouldn’t create a nice blend between the function of its form. With this in mind, I’ve decided to rule out the “expanding pulley mechanism” as a potential mechanism used for my project.

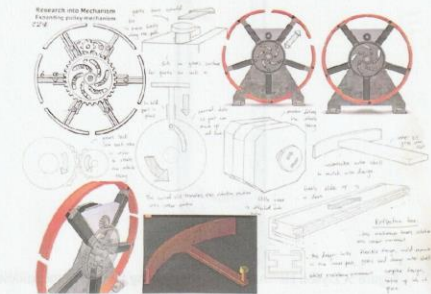


Figure 4. Research page on the “expanding pulley mechanism”

The flaw with this mechanism is that it introduces numerous moving parts, which many of them must be exposed during the expansion. For example, the poles connecting the individual plates, and the gear which has to be in the middle of all the panels. This will likely mean that most of the user’s attention on the moving mechanism. As a result, the ceiling light’s design focus would shift towards the moving mechanisms rather than the lighting function, making its design less effective and visually unbalanced.

James Dyson: Blade-less fan

The blade-less fan is also heavily user focused. It is similar to the vacuum cleaner in that it solves an issue in its own market; the dangers of the fast-rotating blades and the noises caused by them. To tackle this issue, Dyson invented his own technology: the “Air Multiplier” technology. The air gets sucked in at the bottom of the fan by the whirling blades hidden at the base. Once it reaches to the top, it gets blown out through the slits. Carrying the air in the hollow part of the fan, the air then “multiplies” with the result of a smooth and constant air stream.⁵ Similar to the vacuum cleaner, Dyson allows the function to fully affect its form by making the function the central focus of the design. The difference lies in how he

⁵ <https://electronics.howstuffworks.com/gadgets/home/dyson-bladeless-fan>.

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achieves this effect. He uses minimalism instead of exposing mechanisms and relying on sleeker forms. This is because the central focus of the design is the “blade-less” nature of the fan, as show in in figure 5.



Figure 5. Dyson HP7A purifier, showcasing the gap in the middle

Because the focus of the design is a large empty gap, it automatically makes it minimalistic. Dyson takes advantage of this and uses it throughout the whole design. This can be seen in the base of the design (figure 6.)



Figure 6. Closeup view on the base of the fan

It has a simple geometric shape as the general form with clean edges to create a minimalistic effect. The uniform material choice and smooth matte finish also emphasises this. In contrast to the vacuum cleaner, Dyson uses the minimalistic nature of the function and blends it with the form by following the same style for the rest of the design. This makes the function the central focus of the whole design and successfully presents itself as “user-centred”. This method is really effective in blending in function and form, and it should be used for my project. My ceiling light design will be able to change form incorporating a futuristic element

in it. Therefore, making the form futuristic will not cause conflict with the function, allowing function and form to blend together.

James Dyson: Hair dryer

The Dyson hair dryer uses the same technology as the blade-less fan and the same approach when blending function and form. With the minimalistic nature of the gap in the middle of the hair dryer tunnel being the highlight, as shown in figure 7,



Figure 7. Dyson Supersonic hair dryer

Dyson makes its body minimalistic, trying to keep the form as simple and clean as possible. The difference with this design and the blade-less fan design lies within its more “user-centered” functions. Because it is a hair dryer, which is something a customer must interact with on a daily basis, it is designed to be convenient to use. This is presented in the buttons that are ergonomically designed to be easily reachable with only the thumb. This is shown in figure 8.



Figure 8. Showcasing the buttons on the hair dryer up close.

With all the switches on the main body, the form becomes more practical and functional, similar to the vacuum cleaner. However, Dyson follows the minimalistic theme on each individual button by making them smooth and circular. The grooves on the edges of the buttons makes them sit more flush on the main body, reducing its attention. Its circular shape also references the cylindrical head and main body, so it doesn't introduce any new elements to the whole design. This can be seen in figure 9.



Figure 9. Close up view of the switches.

The hair dryer is also extremely lightweight, weighing at about 0.795kg⁶. This can effectively increase the users experience, as it can be more portable and produces less strain when holding it for a long time. Learning from this, the switches for mechanism in my own project should also be placed and designed ergonomically in order for the user to use my light with ease. An example of this, is the potential pulley mechanism that could be a part of my design. The knob at the end of the string would have to be just big enough for a palm to grab, as shown in figure 10.

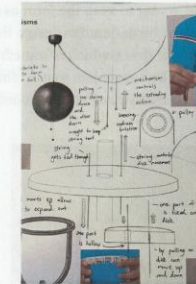


Figure 10. A pulley mechanism inside the IKEA expandable light

⁶ <https://www.dyson.co.uk/hair-care/hair-dryers/supersonic/fuchsia-iron>

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The string would also have to be at the correct length, and the light would have to be placed at the correct height for the user to have easy access. The light should also contain minimal parts in order to reduce the overall weight of the weight. This can effectively decrease the stress felt on the ceiling and the attachments poles, making a safer product.

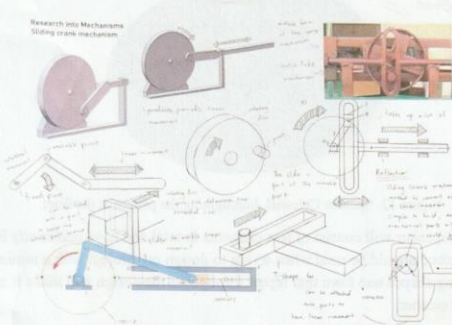


Figure 11. Picture of the "sliding crank mechanism".

With this in mind, my ceiling light project will try use the "sliding crank mechanism for movement, as this contains the least amount of part out of three that was researched. This can effectively reduce the weight, therefore making the ceiling light safe to use.

Torsten Valeur: Celestial

The Celestial is an extremely minimalistic speaker that is built into the ceiling. Torsten Valeur designed this speaker with the intention to produce background noise for a room, so it is meant to be unseen. As a result, Torsten Valeur takes the minimalistic approach and incases all mechanisms within ceiling, hiding away the function entirely. He supports this by choosing a circle as the general form because it can fit into the "most progressive interiors".⁷ It is a clean shape that does not have any sharp edges, meaning it can fit into any environment without standing out too much. Torsten Valeur also focuses on the details in order to make the product more minimalistic. He implements this design by referencing "the circle" throughout the product. For example, the pattern of the speaker starts off with a semi-circle, then it

⁷ <https://valeurdesigners.com/work/celestial/>

ripples its way to converge with the straight line of the logo. This is shown in figure 12 below:

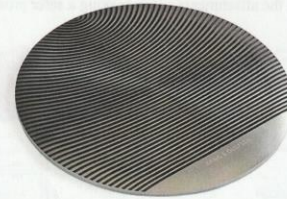


Figure 12. Speaker Celestial, highlighting the pattern at the front.

In doing so, the speaker will consist of less elements in total and have uniformity in the design. This method should be used when trying to design my project with a minimalistic approach. Having shapes and form that repeat throughout the design will make it more memorable and cleaner.



Fig 13. A picture of my developed idea. This design is too simple and has no uniformity.

Since my product's purpose is different to the Celestial speaker, my use of minimalism on the ceiling light will be different. Minimalism should be used to make my design more uniform and suitable for all environments, instead of hiding and blending itself into the room.

Torsten Valeur: Beosound 2

The Beosound 2 is another minimalistic speaker with an elegant and luxurious feel. Similarly to the Celestial it has all the speaker drums incased inside the speaker, reducing the visual elements of the design. The top cap of the cone is a whole dial knob that the users can turn to adjust the volume as well, showing how Torsten Valeur blends the functionality into the form.



Figure 14. The dial on the top of the speaker.

It also uses a similar material choice: aluminium with a uniform colour scheme, to match the minimalism created from the clean and smooth form. On a closer view, the material is coated with a "microscopic pattern of horizontal ridging". On the physical aspect, it provides a smoother surface for the hands to interact, but on the visual aspect, this pattern gives a quality matte finish onto the surfaces. This allows the reflected light from the speakers surfaces to run down the side of the cone in an unobtrusive manner. In fact, these linear streaks of light directly correspond to the linear gaps Torsten Valeur has left for the sound, making the functionality of the design blend into its environment. This is shown in figure 15.



Figure 15. Picture of the light reflections on the surface.

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This approach of considering environmental light reflections should also be applied to my project. The ceiling light should have a matte surface finish in order have streaks of light running down the product, making it more presentable and uniform with the linear flow of the central tube.

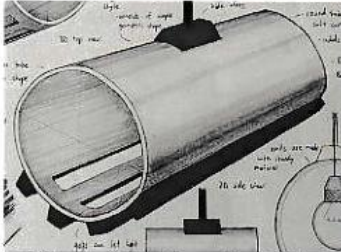


Figure 16 Showcasing the how a cylindrical shape with a reflective surface finish will produce linear streaks of light.

Torsten Valeur: Beolab 18

The Beolab 18 is one of Torsten Valeur's recent designs. The highlight of this design is the thin aluminium drop that seamlessly connects the speaker to its base. This is shown in figure 16.



Figure 16. Beolab 18's base, emphasizing on the drop like shape of the supporting beam.

Compared to a simple geometric form, this product uses natural flowing curves to demonstrate a more complex form. As a result, the speaker stands out inside its environment like an art piece. This type of geometry wouldn't be applicable to my ceiling light, because having a complex geometry and form means it would be harder to fit into the surroundings. This would decrease the user's satisfaction of the product, causing less people will buy the product. Similarly, this speaker tries to hide the mechanism like the rest. The only mechanism that is exposed outside is the acoustic lens, as shown in figure 17 below:



Figure 17. Close up view on the upper body of the speaker, showing the acoustic lens.

The speaker then has linear lines which created by panels of wood so the design can flow from the top to bottom. The gaps that are created between them serve as sound gaps, and the walnut wood can efficiently project the noise across room. This is another example of how Torsten Valeur blends the function of the product into the form. In this case, the sound panels can direct the sound to places in the room, while also increase the fluidity of the whole product.

Comparison: James Dyson vs Torsten Valeur

James Dyson and Torsten Valeur have two distinct design philosophies. Dyson believes that the purpose to design to solve practical problems through "technology and ingenuity"⁸. His products all focus on the function and performance that it can provide to the user. However, Torsten Valeur follows a different philosophy. He believes that a design should be simple and direct, so that it can sit in an environment unobtrusively. This is further reflected in the two designers use of minimalism on a product. Dyson uses minimalism to serve as the basis of how he showcases his "technology and ingenuity"⁹. He often highlights the function with a sleeker form and eye-catching colour scheme, as shown in figure 18.

⁸ <https://careers.dyson.com/en-gb/who-we-are/>
⁹ See footnote 8



Figure 18. The use of colour and sleek shapes to highlight the air pipes and dust collector.

In order for this to be the centre of the design, he makes the rest of the design minimalistic, by using simple shapes and colours. Not only does this illustrates Dyson's design philosophy to the user, it can also enhance user experience. The user can experience the convenience of the technology and the stable performance of the product, but also see it visually. This is drastically different to Torsten Valeur's use of minimalism. Rather than using minimalism to highlight a product's function, he uses minimalism to reinforce the harmony created between the environment and the product's function. His design style uses simple geometry like circles, and cones, triangles, so that the design can be "easily understood by the user"¹⁰.

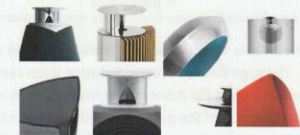


Figure 19. A collage of some of the speakers designed by Torsten Valeur.

As a result, Torsten Valeur has to hide all the mechanisms of the product in order achieve uniformity on the overall design style. This is crucial because it is impossible for a conflicting product to blend into its environment, as functional components are too complex and it produces conflict with the minimalistic form. Following on from the comparisons, I will follow Torsten Valeur's approach when trying to combine the function and the form of my ceiling light. This is due to the nature of a ceiling light and how a user interacts with it. A ceiling light is suppose to be apart of the environment, so exposing mechanisms and making it stand out would not be suitable. Instead, using minimalistic forms and shapes is more effective.

¹⁰ <https://valeurdesigners.com/approach/>

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Conclusion

James Dyson and Torsten Valeur are two different designers that use two different approaches when designing products. James Dyson designs with a function driven mindset and likes to expose and put on display the technology and high performances of the products. He does this through his minimalistic and sleek design and sometimes physically exposing the mechanism. Torsten Valeur employs a different approach because he tries to balance form and function more. He also uses a minimalistic and basic forms to create non-intrusive and aesthetically pleasing designs, whilst blending in the function amongst the form. This creates a direct design where the user can easily use the product. Through detailed analysis and evaluation on works from both of the designers, this essay has successfully confirmed the future direction of the project in terms of its function and form, and how both of them should impact each other. I have determined that the "sliding crank mechanism" is the best option to achieve movability in my ceiling light, as mentioned previously. The form of the project should also be consisted of minimalistic shapes, so the ceiling light can create harmony with the environment. The function and the form should exist in unison on the product, rather than letting one impact the other one fully. This will be possible if all mechanisms are hidden, and if the design style can match with the function. To achieve all of this, more research on futurism design, and a function model of the mechanism will be required.

Bibliography

- Approach* (2018) *Valeur Designers*. Available at: <https://valeurdesigners.com/approach/> (Accessed: 13 September 2024).
- Beolab Celestial* (2021) *Valeur Designers*. Available at: <https://valeurdesigners.com/work/celestial/> (Accessed: 13 September 2024).
- Beosound 1 and 2* (2020) *Valeur Designers*. Available at: <https://valeurdesigners.com/work/beosound-1and-2/> (Accessed: 13 September 2024).
- Dyson Supersonic™ Hair Dryer: Iron/fuchsia*: (no date) *Dyson*. Available at: <https://www.dyson.co.uk/hair-care/hair-dryers/supersonic/fuchsia-iron> (Accessed: 13 September 2024).
- Hall-Geisler, K. and Chandler, N. (2009) *How the Dyson Bladeless Fan Works*, *HowStuffWorks*. Available at: <https://electronics.howstuffworks.com/gadgets/home/dyson-bladeless-fan.htm> (Accessed: 13 September 2024).
- Harris, T. (2001) *How vacuum cleaners work*, *HowStuffWorks*. Available at: <https://home.howstuffworks.com/vacuum-cleaner.htm> (Accessed: 13 September 2024).
- Watts, J. (2018) *James Dyson, Medium*. Available at: <https://medium.com/@wattsupjamie/james-dyson-4fbd9ab2112d#:~:text=In%20essence%2C%20this%20is%20user,the%20experience%20for%20the%20user> (Accessed: 13 September 2024).
- Who we are* (no date) *Dyson Careers*. Available at: <https://careers.dyson.com/en-gb/who-we-are/> (Accessed: 13 September 2024).

Component 1 Three-Dimensional Design

Secondary research – inspirational products



This product inspires me with its **origami design**, and its **graphic indicators**. The origami design can save space and attracts the user's eye. The graphic indicators gives out clear instructions on what the product is used for.



This product inspires me with its **form**. This design has a simple **spherical shape** as it's basic form, with the **spiral container** circling around it. The **curvatures** on this design flows in one general direction, which makes this product look **organic**.



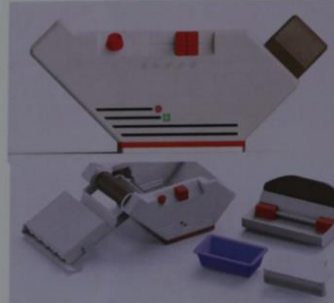
This product inspires me with its **colour choices** and its **reusable design**. The colour choices makes the design stand out, and the green and blue portrays itself as a **sustainable and 'healthy' product**. The reusable nature means it can be more **affordable** for everyone, and it's **eco-friendly**.



This product inspires me with its **module design**, and its **minimalistic form**. The buttons on the design are **inkeeping**, and the design uses **simple colours** along with a simple shape as it's form, making it **minimalistic**. The module design means it can be easily manufactured with efficiency. It also means that the design can be **cleaned separately**. The minimalistic design will also appeal to consumers more since it will look clean and suit the environment more easily.



This product inspires me with its **foldable design** and its **purpose**. It's foldable design makes the product **easy to carry around**, which will encourage more students to buy it, since it will be easier for them to carry it around school. The **monotone design** and **concealed** organisation pockets makes the design **minimalistic**, which it suit more students. The green and red lights on the back is a good touch to the design, as it can indicate whether a student is busy working or relaxing.



This product inspires me with its **purpose** and the **form**. This product applies wax on the bottom on skis, but collects the excess and reuses it. It **saves the cost** from purchasing wax and it also **eco-friendly**. The colour and the form makes the product look **retro**, which will visually appeal to consumers more. The use of **colours**, the **simple combinations** of shape, and the clean, smooth lines makes this design **minimalistic**, which will attract consumer more.



This noise detector inside a school inspires me with its **futuristic** and **minimalistic** look. The **curved slots** on the bottom and the opaque LED lights on the top makes the design look **futuristic**. The simple general shape with almost no logos and the **concealed buttons** makes the design look **minimalistic**. Its combination between hardware and software is also inspirational. The reward system that comes with an app is also a highlight to this product, since it will make it more **targeted to its market**. The quieter students are, the more points they gather, and together they can grow a garden together with the points.



This product inspires me with its **colour choice** and its **minimalistic style**. It has no logos, and concealed buttons, making the design **minimalistic**. This can encourage more users to wear it, since it can fit most people's taste. It's clean bold lines with the curvatures increases the **fluidity** of the design, which makes the design look **futuristic**. The **simple combinations of colour** makes the design more pleasing to the market, and it will encourage consumers to use it more.

Secondary Research – Loughborough University degree show

Secondary Research – Loughborough University degree show

- ergonomically designed handle to fit the size of the palm
- Soft and Curved lines for fluidity and streamline
- soft curved edges
- whole lamp
- Soft cap
- soft colours
- ascetics
- uses curved edges to make a smooth and stream-lined design
- fillet corners
- edges can fit phones at an angle that is easy to hold
- Whole design flows from the top to the side with clean lines
- curved goggles makes design look futuristic
- ergonomically designed Ear muffs
- colour schemes is bright suitable for kids
- uses colour as the basic form
- simple minimalist design
- smooth finish on product
- slated opening for a practical design
- water can be poured out easier
- made design easy to clean
- bright orange reminds user the product is used for emergency
- bottom cap has edges for better grip
- ring
- lines add fluidity and a retro design style
- rounded fillet corners
- simple and retro design
- acrylic can diffuse light for a better lighting effect

Component 1 Three-Dimensional Design

Analysis on existing products - IKEA

Introduction to IKEA:

IKEA is a company that designs products based on the users. They make their product affordable, accessible, and sustainable. To achieve this, IKEA follows a minimalist and functional style. In order for their furniture to fit into every single home, they also focus on the transporting, so most of their products are flat packed, which also can save the manufacturing cost.

Smooth curvatures and simple shape and form - minimalist style

smooth curvatures on the lamp shade - focus light - increases fluidity

use of colours like black and bronze to create an industrial style

exposing of filament - industrial style

minimalistic shapes

combinations of complex shape - fit in any environment

Simple curvatures

Simple hanging stand so consumer can put attention on lamp

adjustable light intensity with mechanism

fillet corners increase fluidity

exposing of metallic inner structure is industrial futuristic design

Reflections:

- Design has to be minimalist in order to fit into most homes
- curvatures are needed to increase the aesthetics and fluidity
- considering transportation, flatpacked design can save cost and space.

foldable design allows product to be flat packed

shiny material can increase lighting effects

Introduction to the project:

What is the problem:

The lighting system in my family's dining room is very uneven and doesn't create a soothing atmosphere. The lighting is too concentrated in some areas of the room, but it is dark in other areas of the room. This will affect our vision in the room and overtime will also cause damage to our eyes. I'll be designing a lamp to solve this issue for my family and others who have the same similar issue.



Type of lighting:

The type of lighting will be a hanging pendant lamp. Depending on the brightness level, there will be one or several bulbs. The hanging ceiling lights can provide a good light source for the entire room easily, and will also not take up space in the room, which is ideal for a dining room.



Weight and sizing of design:

The weight of this product has to be light, because it has to be hung onto the ceiling. This means that the internal structure has to use the least amount of material as possible to achieve the expanding and shrinking effect. The sizing of this design can vary due to the mechanism, but also considering the weight, it cannot be too big or else it cannot be hung. The size should be just enough for a light to light up the room.

Targeted market:

The targeted market will be families and residents living inside houses. A lighting system is a necessity for all houses, and the goal is to attract consumers with the lights unique appearance, along with its functional abilities. Furthermore, this is also suitable for families who want to save money from buying multiple lighting systems in the room. With this lighting system, you would only need one light source in the room, since it is multifunctional and can create multiple lighting environments. It can also illuminate the entire room, whilst also focusing on one area when you need it. The lighting system will be designed to be affordable for most families, and can be fitting in any surroundings.



Location/Environments:

This product can be used in dining rooms, studies, bedrooms, and living rooms. The ability to create multiple lighting environments allows the product to be placed in several different scenarios, which will attract consumers more.



The solution:

Rather than sticking to the traditional circuit systems with a dial that can adjust the brightness level, I'll be designing a mechanism inside lighting system that will cause it to change shape. Making it expand or shrink, it can control the amount of light it lets out. It can also protect the user from bright lights shining directly in their eyes. The lights will reflect off of the material and scatter across the room, making the room bright all around. This mechanism not only is an effective way to change the brightness level of the room without using electricity, it can also attract consumers with its unique shape and interactions.



Use of material:

The use of material in this product will be mainly wood or metal for the internal structure and mechanisms, and plastic for the outer layer. The internal structure has to be durable and have a good strength to weight ratio, so birch-faced ply and aluminium is a good choice. The outer layer will consist of complex shapes, so considering the manufacturing process, PLA plastic will be a good choice, since it can be 3D printed. The material used should also be as eco-friendly as possible, in order for it to be more sustainable, and a better sell in the market.



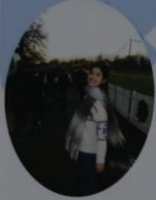
Style of design:

In order to fit into most environments and families, the style of the design will be minimalist. The design will also have lots of curvatures to make it a fluid design so it can highlight the fluidity of the moving parts. To achieve this, the surfaces will have to be smooth, soft, and monotone. The edges have to be curvature around the form to the design more dynamic.



Component 1 Three-Dimensional Design

Clients Introduction



Client #1: Chatchawan Wisedphanid (TG)
 -student studying at Uppingham
 -works in her study and the library
 -relaxes in the living when she's with her family
 -eats and dines with the family in the dining room
 -needs proper lighting when studying, reading, makeup

Client #2: Jan Willem-Verkade

-student studying at Uppingham
 -works in his study and dining room
 -use notebooks and laptop to study
 -works in the dining room during the evening
 -likes to relax on his bed before going to sleep
 -needs proper lighting for for relaxing, studying, and eating



Client #3: Aqua Lee

-student studying in Uppingham
 -works in her study room
 -uses laptop to study on her tables
 -works on art portfolio on the table
 -eats and dines in boarding houses with everyone else
 -needs proper lighting for painting, studying, doing makeup



Client #4: Gabriel Diego-Castro

-student studying in Uppingham
 -works in study bedsits
 -uses laptop to study on his desk
 -eats and dines in boarding houses with everyone else
 -needs proper lighting when studying and eating



Q and A:

How often do you need to use the lights in the room?

TG: "I think lighting is a necessity for everyone, I use it everyday."

Gabriel Diego-Castro: "Every single day to complete preps and other tasks."

Q and A:

Are you satisfied with the lighting in your room? I.e. Is it bright enough, does it light the room up evenly, does it help with the task that you are doing?

Aqua Lee: "No, it's hard to draw properly with the lighting in my room. Sometimes I can't tell the colours properly in my room, and it messes up the whole painting."

Jan Willem-Verkade: "The lighting in my room makes my eyes tired after awhile of studying."

Q and A:

What design style would be suitable for a ceiling lights?

Gabriel Diego-Castro: "I prefer a more modern and minimalistic design, but I think it's down to personal preference."

Aqua Lee: "I would want a pretty eye catching light for my future house, but the design has to be simple and modern."

Q and A:

Would an adjustable ceiling light benefit you?

TG: "Yes it would, I always need more light when I'm doing makeup, but I would like less light for reading."

Gabriel Diego-Castro: "Yes it would, I think the environment in the dining is currently poor for eating, and the lighting in my room is too basic for the tasking I'm doing."

Aqua Lee: "Yes I think it would, as I need a more focused light for when I'm doing my art pieces. However I also need a dimmer light for when I'm about to go to sleep."

Q and A:

What are your thoughts about an ceiling light that can physically change form?

Gabriel Diego-Castro: The idea sounds cool and innovative, it is something I would definitely pay for. The only issue is I wouldn't want the switches to the light to be too complicated to use.

TG: It sounds like a good design concept, but I'm just worried about the safety of the light. I wouldn't want any moving parts to fall down and injure my family on accident.

Secondary research - Aria: Designed by Gabriela Saadia

Reflections

- curvatures and fluid forms makes design look like it is floating and organic
- no exposing wires is crucial for minimalistic design
- contrasting modern elements with natural forms
- Use of simple geometric shapes
- no exposing cables or nails/bolts
- minimalistic design

uses curvatures and natural forms
 -organic
 -looks like pearls in a seashell
 -contrasting natural elements and modern style

led bulbs have the tendency to roll forwards
 -produces more fluidity and dynamics
 -expand/shrink by rolling sphere

ideas of securing LED bulbs
 -square fillet corner

rod wrapping around the sphere
 -more curvatures

bulb sits in between rods
 -suspension makes design look like floating
 -no exposing wires
 -bulbs hides all bolts away

clean led lines modern
 -minimalistic as main body

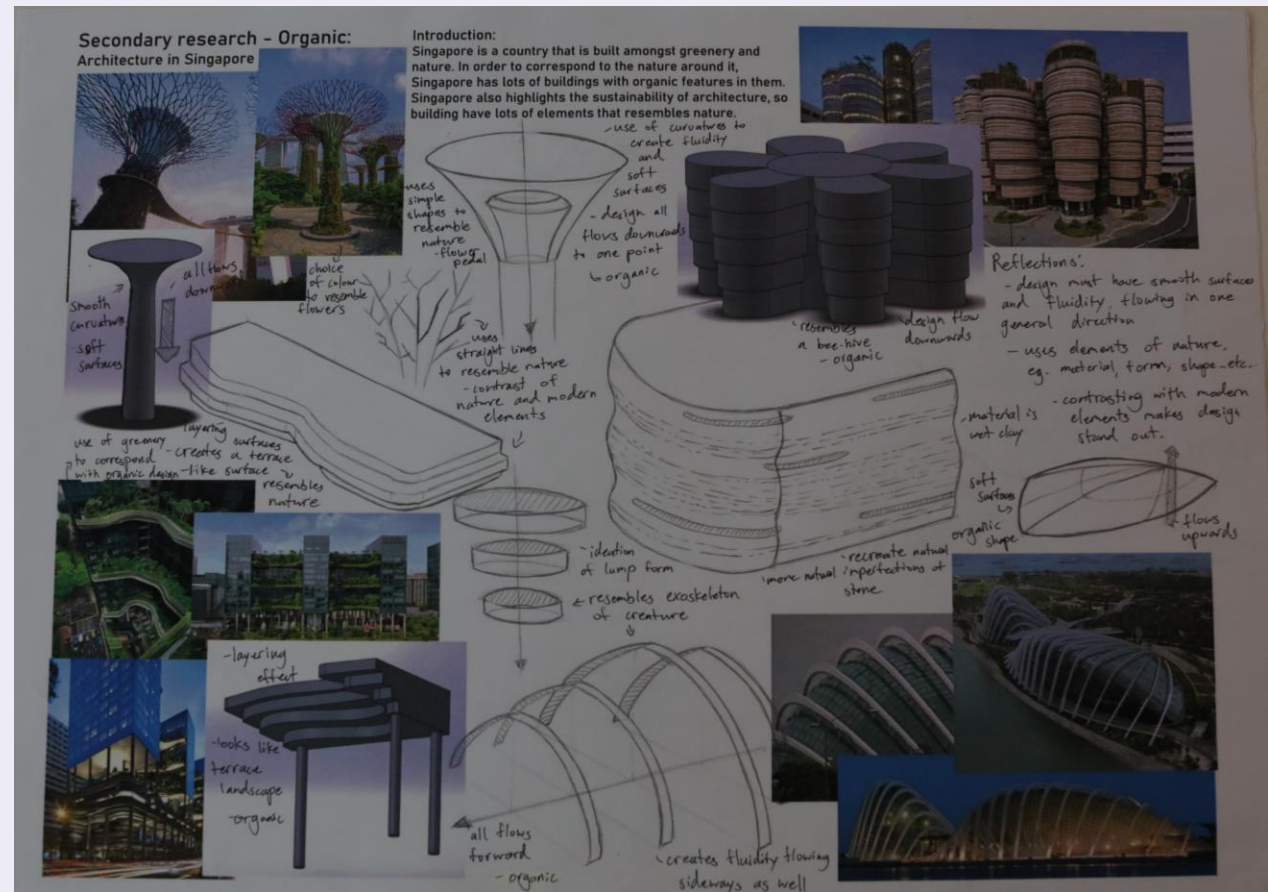
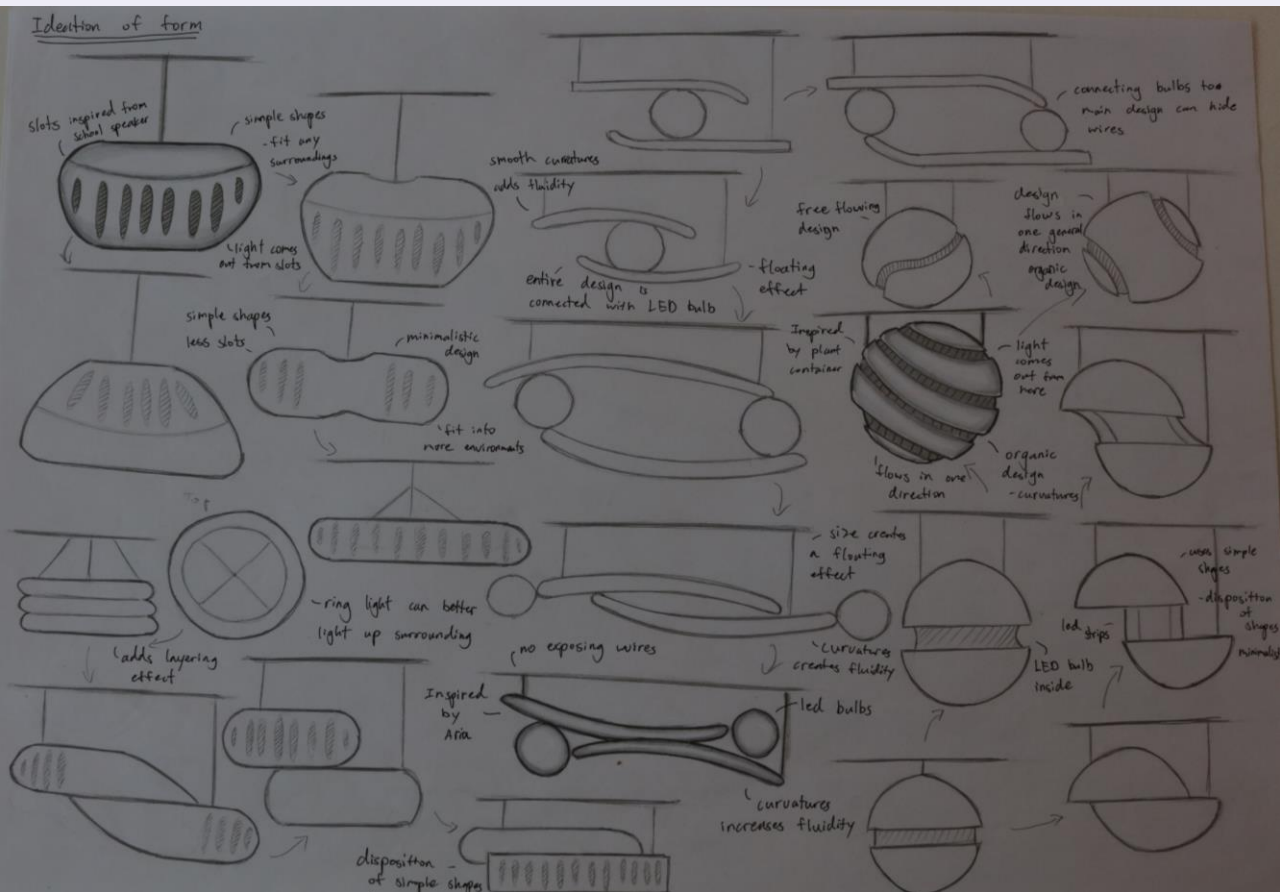
entire design has no straight lines
 -design flows in air

steel tubes -curvatures adds fluidity for more durability
 -natural forms

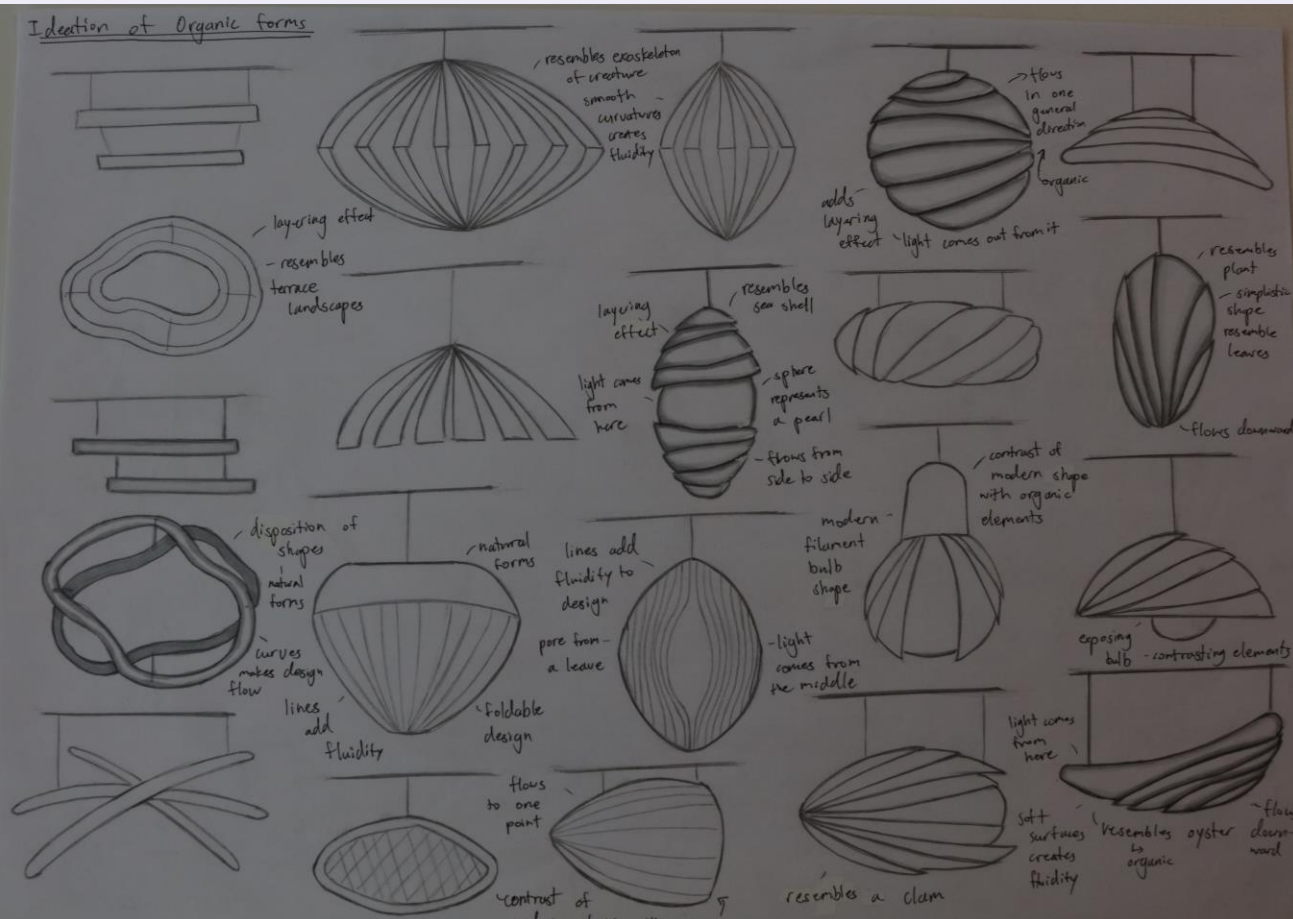
natural organic shape
 -contrast to modern element
 -increases depth of shape
 -sphere sits in between rods
 -multiple curved lines

Interior design

Component 1 Three-Dimensional Design



Component 1 Three-Dimensional Design



Research into ergonomics

What is Ergonomics?
Ergonomics is the study of designing and optimizing environments that prioritizes a human's wellbeing, safety, and performance. It is implemented into a product or design so that it can fit with the user more efficiently to reduce discomfort.

1. Light Intensity

The light intensity of a ceiling light plays a crucial role in whether the light is comfortable to use. The light intensity of a light varies to the environment it is in. For example, the recommended lumens needed for a kitchen is **3000-4000 lumens**, but only **1000-2000 lumens** is recommended for a bedroom.



This project aims to design a light that can be fitted into all environments, ie. Dining rooms, living rooms, bedrooms. In order to satisfy all the environments, the light intensity should be around **2000 lumens**. This gives the ceiling light the ability to fit into all environments. By setting the light intensity in the middle of the two environments, the light will be able to fit into all environments by changing the light distribution.

2. Size

The size of the light will affect comfort of the user inside a room. The light shouldn't be too big so that it takes up most the room. The light shouldn't be obstructing anything as well.

For this lamp, it will mainly be hung above a table, so the size and placement of this will be affected by it. For the lamp to be able to fit into most homes, the lamp's length will be defined by 1/3 of the standard rectangular table. Following this rule, the lamp should be at **0.7m fully expanded** to match with a dining table, and **0.5m half expanded** to fit with a study table.

3. Light distribution

The light distribution can affect the comfort of a user as well. The scale of light distribution also changes to the environment similarly to light intensity. For a work place, the light needs to be more concentrated onto the table in order for the user to focus. For a bedroom, the light will need to be more evenly spread out so the user can see, and it doesn't cause any discomfort before sleep.



The light distribution of this lamp will change however, so it is important to set the limits of the light distribution when it is changing to match the environment. When the light is fully expanded and extended, it should have a light distribution to light up a **4.9 x 4.6 meters standard room**. When the light is focused, it should be enough to light up a **1.2 meter study table**. When the light is extended midway, it should be enough to light up a **1.5m dining table**. The light distribution of this lamp will be controlled by the **changeable gaps of the lamp**. The dimension of these gaps will be tested until all three of these conditions are met.

4. Placement

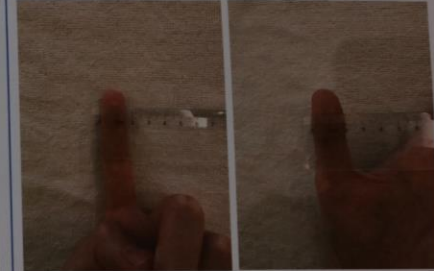
the placement of the lamp determines whether it will obstruct anything. For this, I took measurements of my house's ceiling light for the dining table, because the lighting effect is good and it doesn't obstruct anything.



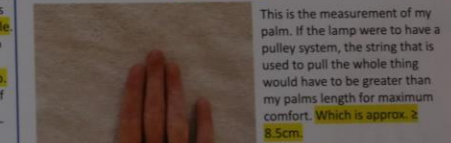
The measurements are around **0.9m** above the table. This ensures it doesn't obstruct anything, and makes sure it can light up the whole table.

5. Switches dimension

If the lamp were to have any mechanisms, the switch to that mechanism (ie. A pulley system) has to be fitted according to a human's hand.



These were the measurements of my index finger and thumb. These two fingers are used to open little switches, so it is important to make the switch big enough for both of their sizes. From the measurements, the switch would have to be **≥ 2cm in length**.



This is the measurement of my palm. If the lamp were to have a pulley system, the string that is used to pull the whole thing would have to be greater than my palm's length for maximum comfort. **Which is approx. 28.5cm**.

This is an experiment of my hands pulling on a string to mimic the pulley system. Through testing, I've found that a **≥ 4mm diameter string** would be the most suitable to grip onto. Any less than that it would be too thin for me to pull on it. For a better fitting design, a ball should be added onto the bottom of the strip so there would be a better grip.

Component 1 Three-Dimensional Design

Research into materials used for lighting



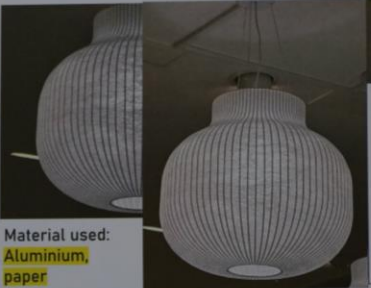
Material used: brass
Brass is not commonly used for lighting specifically, but here it is used as the main body of the ceiling light. The shiny gold surface adds a decorative element to it, but it also reflects lights. When it is used to hold a light bulb, the surrounding light will be reflected onto the surface below. This light has a dome shape, which means the light coming out from the top of the light bulb will be reflected onto the table underneath it.

Material used: paper, plastic

This lamp also uses paper to diffuse light and have a white natural leather-like finish to it. But it also uses plastic to hold up the paper and have an outer frame next to it. The plastic gives the design a smooth finish, whilst also being sturdy and lightweight.



Material used: acrylic
This lamp uses acrylic as the main body. It consists of multiple square panels held together by steel tubes, which has the wires hidden inside of it. The advantages of using this material is that it can come in different colours, and hence producing different colours. The acrylic can also diffract some of the lighting, making the light not as intensive, so it can create a comfortable environment. Another advantage is that acrylic is lightweight, so it is a suitable material to be used to make ceiling lamps.



Material used: Aluminium, paper
This lamp uses paper as the main body of the lamp. Apart from making the lamp have a natural white colour finish, it also diffuses the light inside and makes the lamp more evenly lit up. The whole lamp is held up with an aluminium skeleton, which makes the lamp extremely lightweight. It can also be folded up, making it easy to transport and pack. However paper is extremely fragile, and it is easy to rupture it with a sharp object.

Material used: paint coated steel

This lamp used steel with a painted coat as the main body. Steel allows the lamp to be sturdy and durable, whilst the paint coat gives the lamp a smooth and clean finish and protects the material itself from scratches and rust. However, the paint coat sacrifices on the ability to reflect light, as this lamp doesn't give sufficient light for the room. This means to have enough light for the table, the light bulb needs to be exposed, which gives very intense and focused light in one area, but weak and dim light around the room.

Material used: steel, aluminium
This lamp using steel tubes as the main body. It can hide the wires inside, and also increase the structural integrity of the light. The disadvantage of it is that it will be too heavy for a ceiling light. The light is shone through the little gap between the aluminium ball and the socket. It is also reflected by the shiny surface of the sphere, but the light is not enough to fill up the room. This light is used more as a decorative element.

Material used: acrylic, steel

This light uses acrylic to diffuse the light for greater effect, and steel tubes to hold everything together. It might be too heavy to suspend for some roofs.

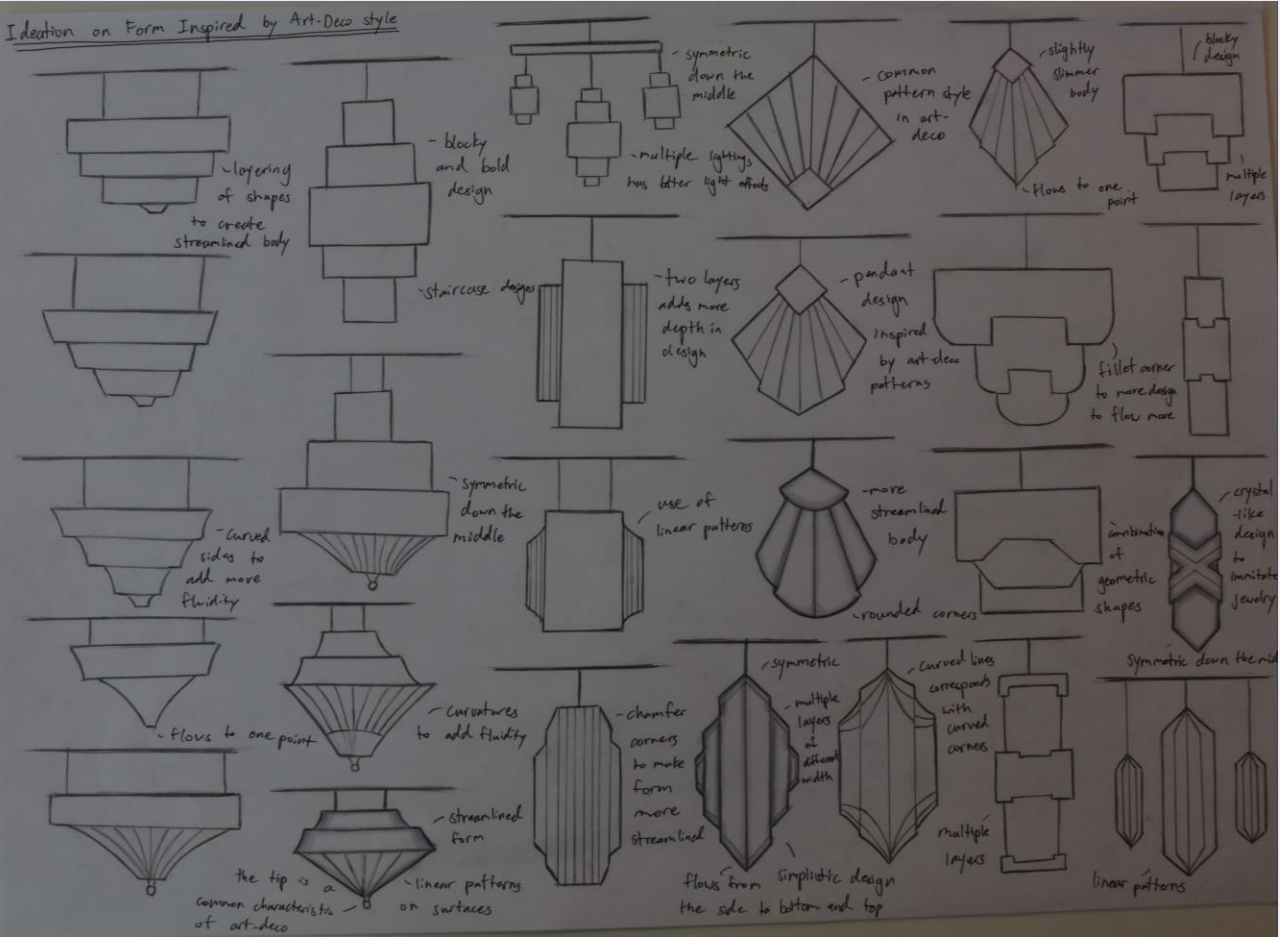
Secondary Research – Art Deco

Architecture examples

Annotations:

- golden colour - art deco style
- straight linear patterns - blocky design
- curvatures creates fluidity
- stair case design
- stair case to add depth
- Overall streamlined form
- uses pillars to add depth
- stair case design - flows downwards
- triangles resembles the sun
- patterns on stair case - blocky and bold design
- symmetrical shape
- stream-lined body
- Layering panels - creates depth
- use of geometrical patterns on walls
- straight and linear patterns
- flows upwards to one point
- multiple layers on the main body - making the design streamlined
- whole floor flows to one point
- multiple layers on the main body
- Reflections:
 - use of geometric shapes in general form
 - having streamlined and sleek bodies
 - designs are mostly always in symmetry
 - use of geometric patterns on walls and surfaces.
- night difference creates layering effect
- flows upwards to a point
- layering of semi-circles - streamlined design
- triangular design

Component 1 Three-Dimensional Design



Specification

Purpose

- The product must be able to **emit enough light** to lit up a standard dining/bedroom (approx. 4.9 meters x 4.6 meters)
- The product must be able to **adjust its own brightness level** to create different lighting environments, such as working, dining, sleeping, or relaxing
- the product must be **eye catching** in the room so people would want to use it

Form

- The product must be **non-intrusive**, and uses simple shapes to achieve a minimalistic style so it can **fit into** along with other furnitures
- the colour of the product should be **basic**, ie. White, black, natural wooden colour, so that it can fit it with more colour schemes of the room
- the product must have a **smooth and matte finish** so that dust can be **easily cleaned off**, and the material surface can be **easily maintained**
- the product should have a **modern design** to appeal to the market and match with the uprising in more modern products

User requirements

- the product should have a mechanism that is **intuitive to use**, such as a clear pulley system with two dangling strings to pull on
- the product's mechanism should be **easily accessible and reachable**, and it should be **indicated with bright colours** as to where the switch/mechanism is

Designer link

- the product should have **non-intrusive design** similar to Bang and Olufsen speakers
- the product should have **another style** (organic, art deco, sleek) to be eye catching in the room and appeal to more customers

Safety

- the product shouldn't be heavy (**<3kg**) so that it wouldn't have the risk of falling from the ceiling and harming the users, and so it can be safely installed onto the ceiling
- the product **shouldn't have any sharp edges**, so that it wouldn't accidentally cut the user
- the product should have all **electricity components insulated** with rubber coating or other insulators
- the product should have **all wires contained within the product** so it wouldn't accidentally shock the user
- the cables should be tested beforehand to make sure it can withstand the weight of the lamp

Design brief

I intend to design a ceiling light that both consists of function and form. The biggest selling point of this light is that it can adjust its physical shape in order to change the brightness level in accordance to the environment needed. Most ceiling lights on the market cannot do this, and it causes discomfort when the light intensity is too high/low to match the activities that the user is doing. The majority of the lights that can adjust lighting levels just have an electrical circuit that can increase/decrease the light intensity via dial or remote control. What makes this ceiling light unique is that it solves this issue in a creative and eye-catching way. It will have a mechanism inside that can allow physical change in the form to allow the brightness level to be adjusted. Not only does this increase the range of the target market, because it can adjust to multiple room's lighting requirements, it can also serve as the highlight in a room's interior design, which can increase the appeal to customers.

Function

- the product must have a **lighting system fully incased inside**
- the product should have a lighting system that is **connected to the main circuit** of the house, so it can be controlled with a switch on the wall along with the other lights
- the product must be able to have mechanisms to **allow physical movement** to adjust the brightness level of the lamp

Materials

- the material of the product should be **lightweight** so that it can match the weight requirement, (ie. ply veneers, acrylic, TPU)
- the material should be applied with a **smooth outer covering**, so that the product has a quality finish (ie. danish oil, wax)
- the material encasing the light areas should **diffuse the light**, to light up the room more evenly (light diffusing acrylic)

Sustainability

- the product should use materials that are **eco-friendly and easily recyclable**, such as mdf.
- the product should use **minimal parts that are plastic** or other non recyclable materials to be eco-friendly
- the product should be durable to **withstand constant use**, such as plywood, and so it could have a longer lifespan

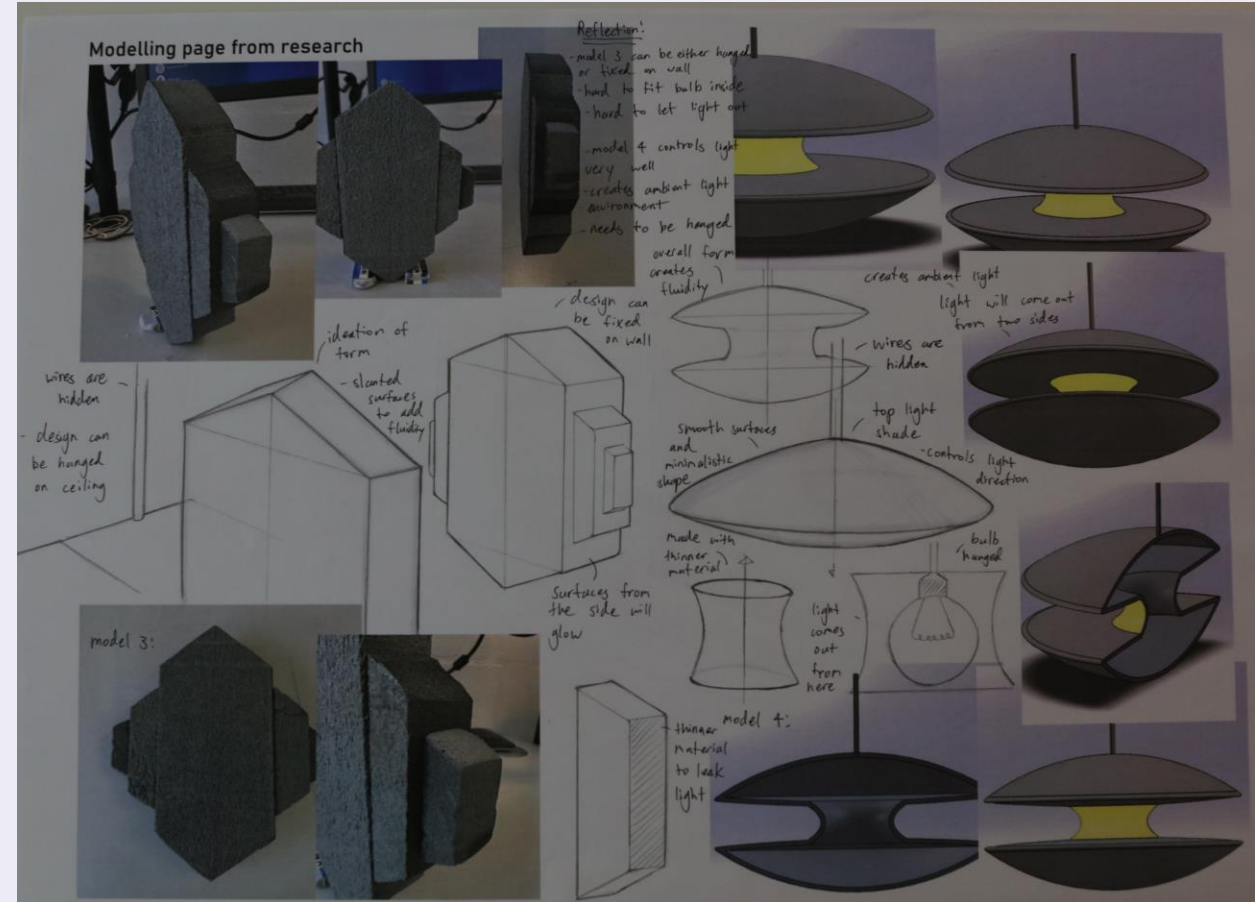
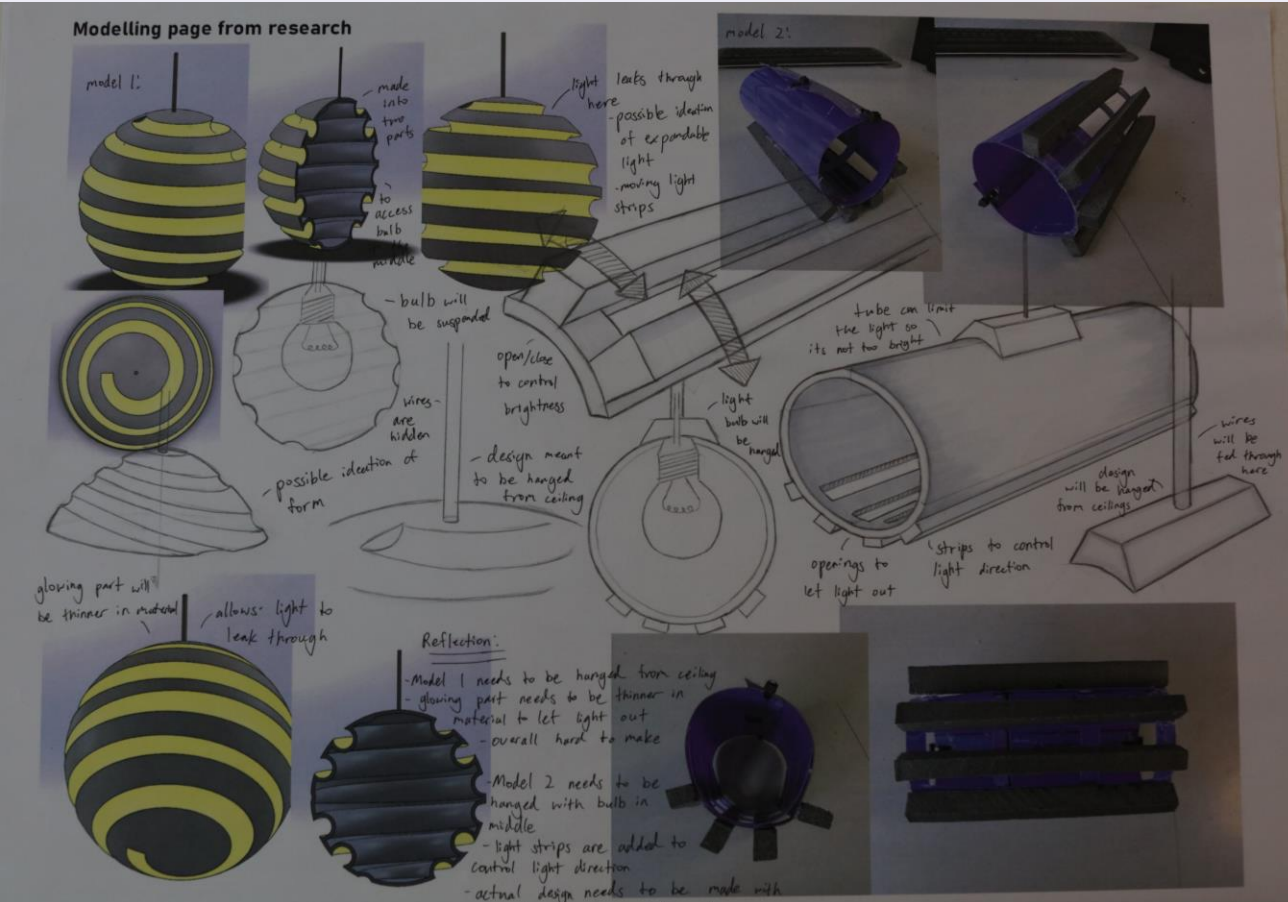
Cost

- the cost of manufacturing of the product **shouldn't exceed £100** so that most families can afford it

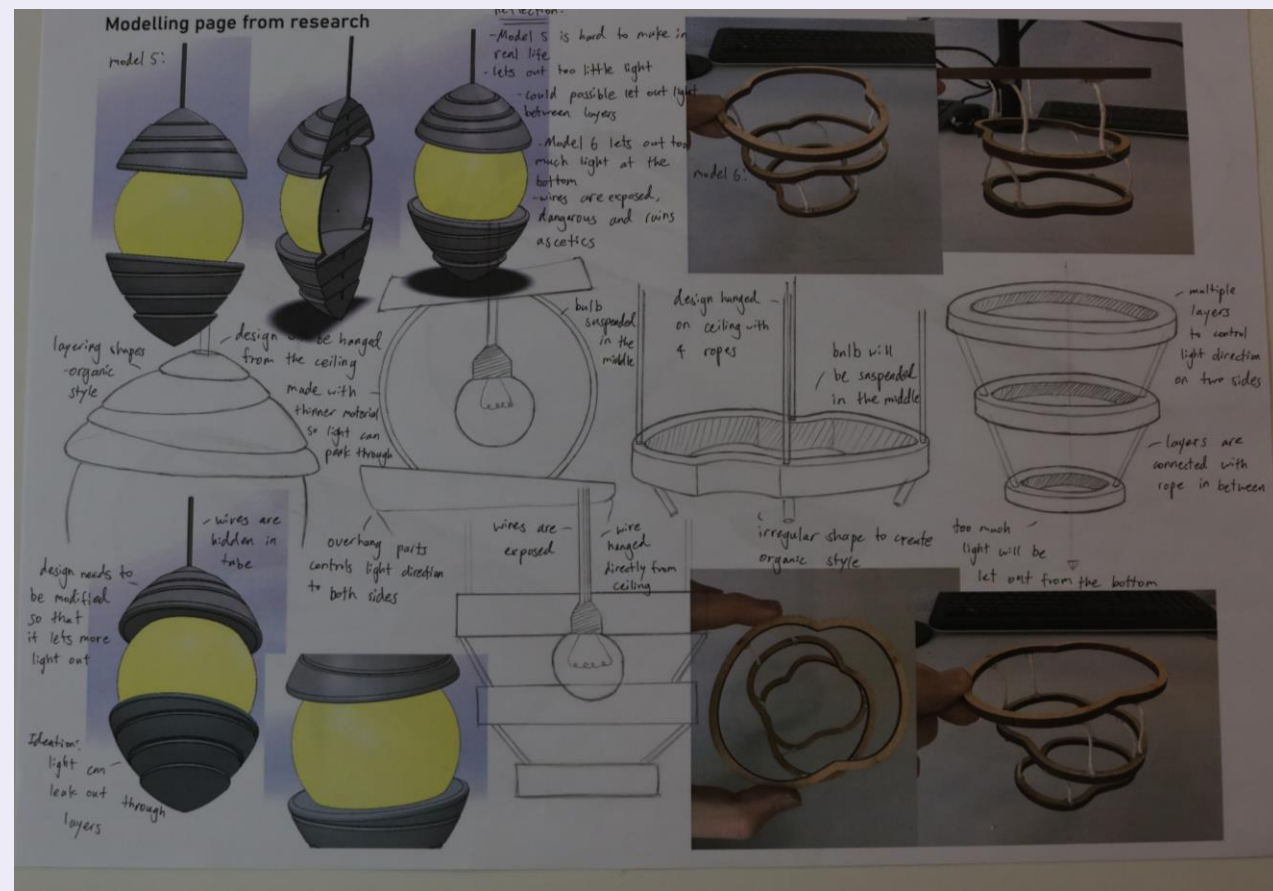
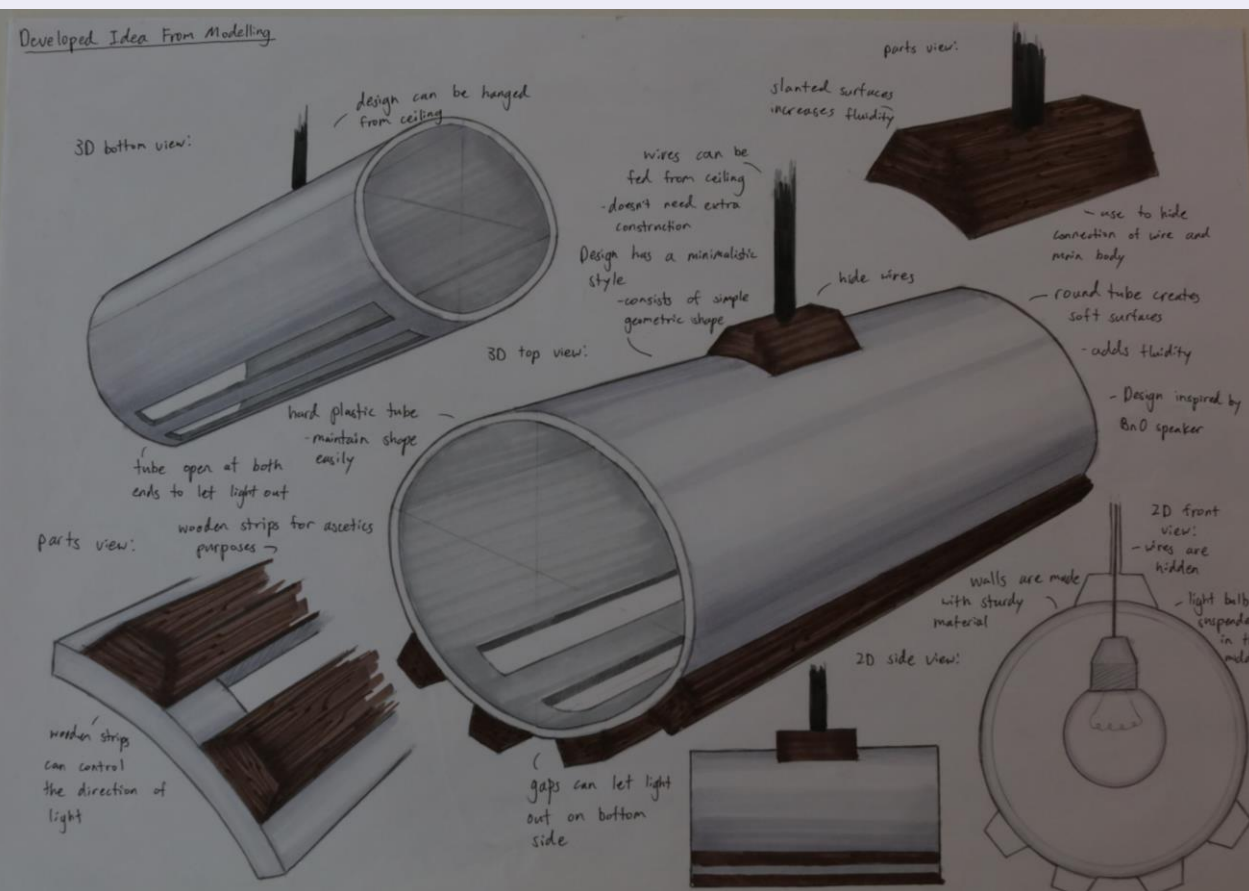
Ergonomics

- the switches to the mechanism should be **> 2cm in length**
- the light should have a size of **70cm - 50cm** in length
- the light should hang at around **90 cm above the table**
- the light intensity should be around **2000 lumens** to emit enough light

Component 1 Three-Dimensional Design

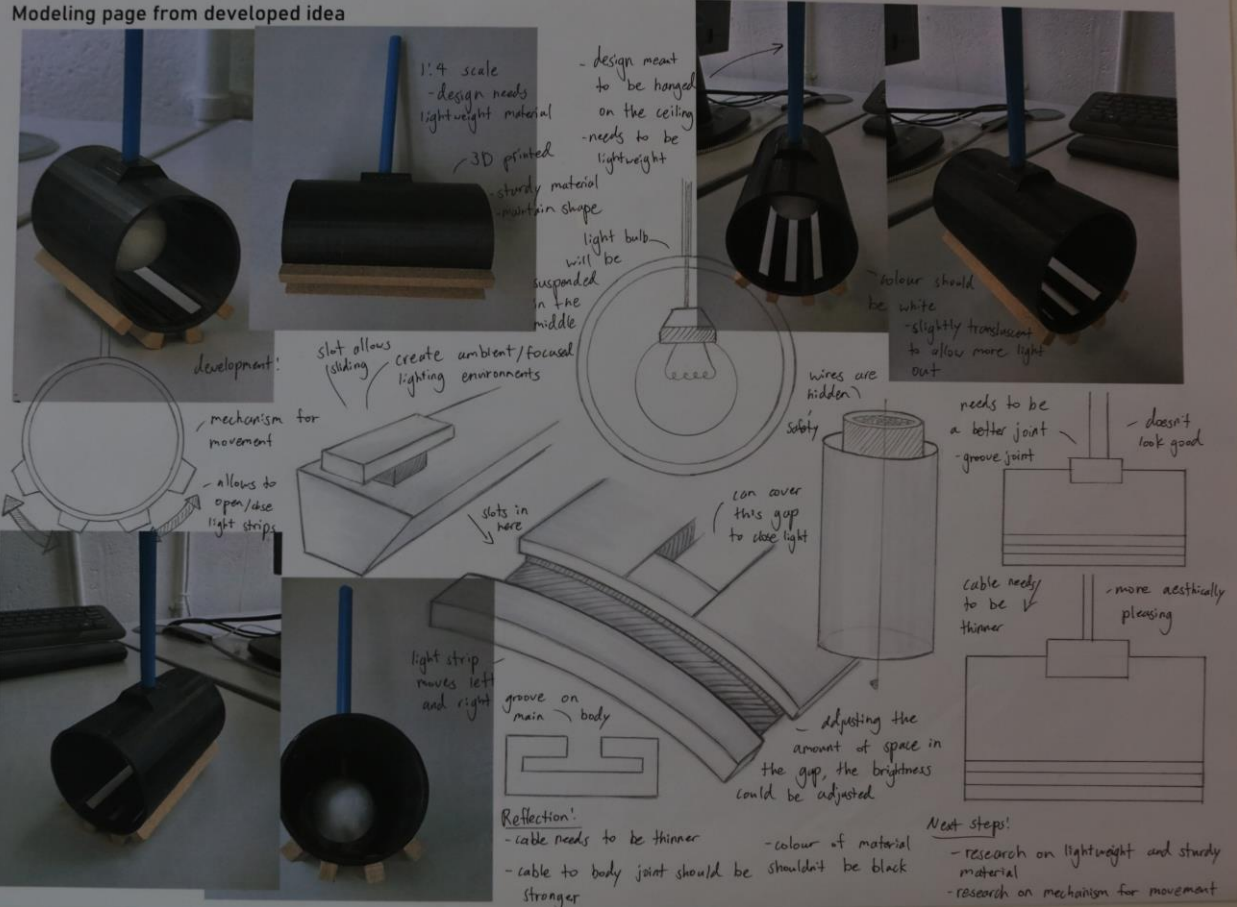


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Component 1 Three-Dimensional Design



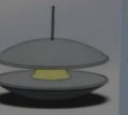

Modeling page from developed idea



Final renders of developed model

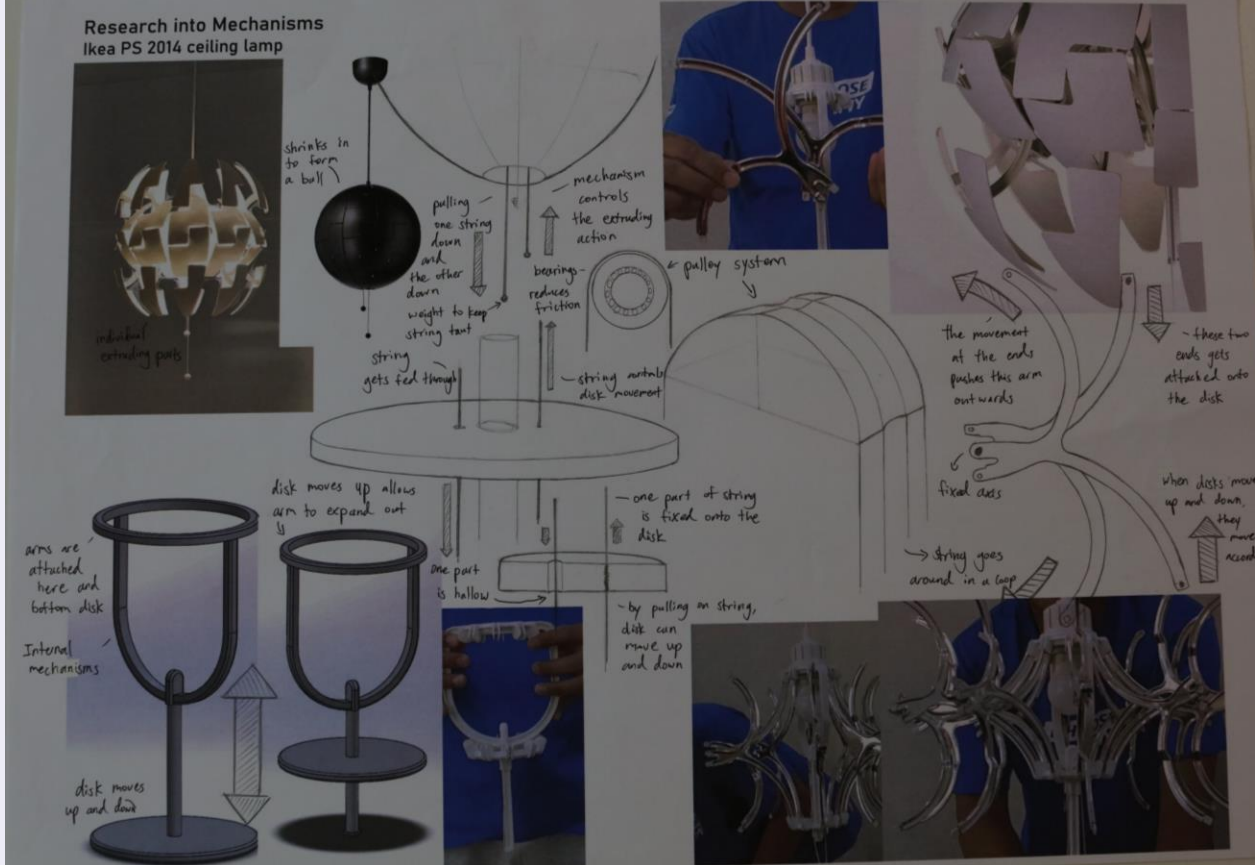


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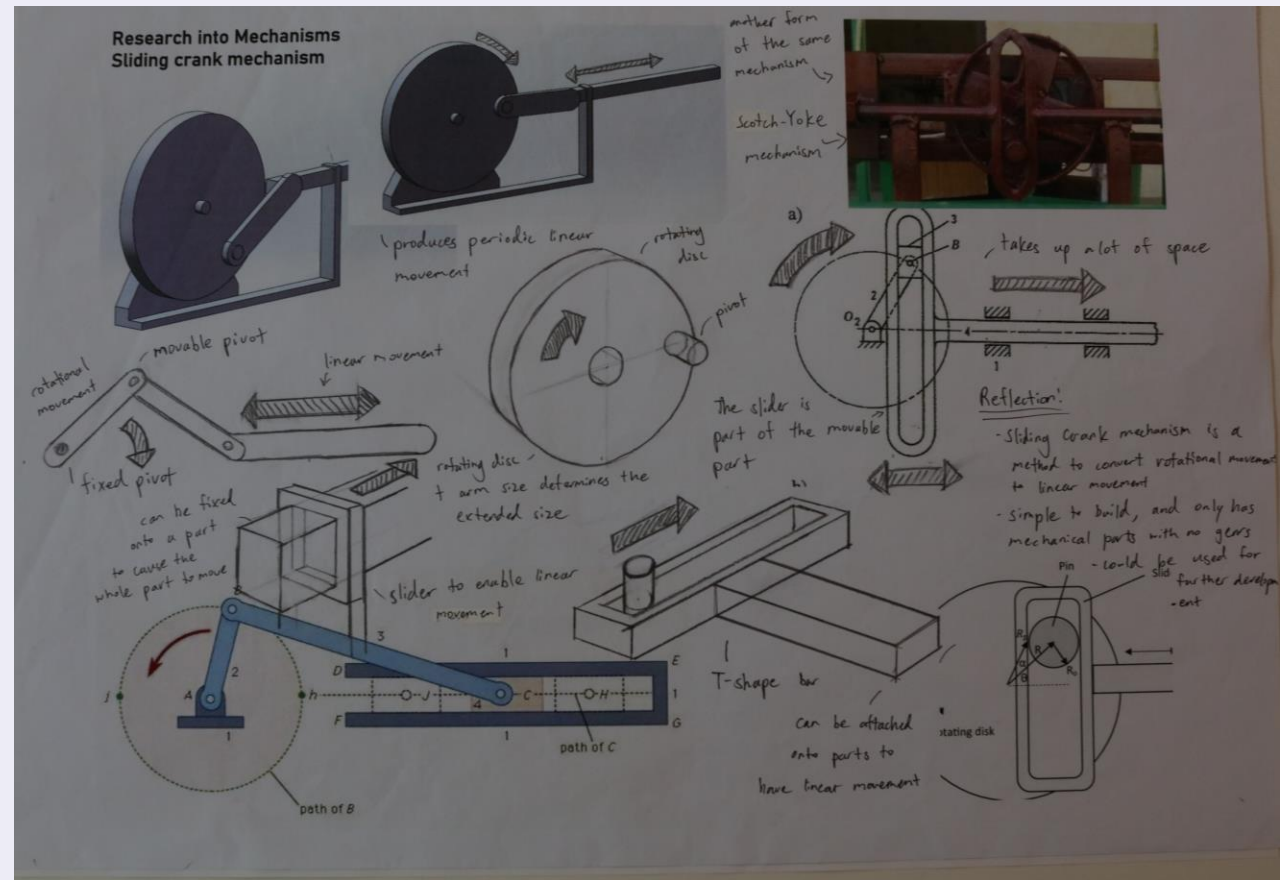
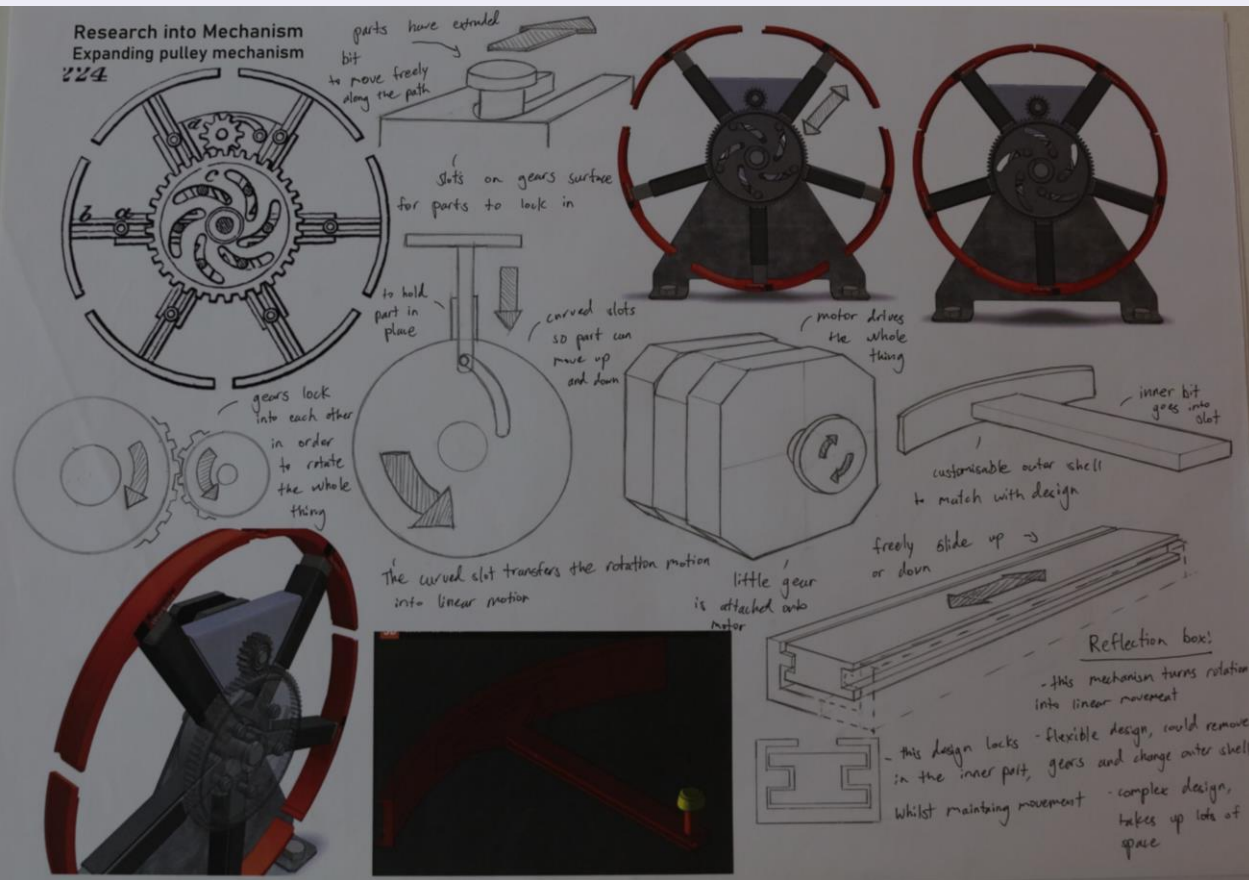
Review of concepts	Form	Functionality	Specification link	Designer link	Likes and Dislikes	Third party feedback
	<ul style="list-style-type: none"> -simple geometric sphere as the basic form -minimalistic design to match any environment -slits that spiral downwards to produce an organic style lighting -mimics the curvatures and fluidity in nature 	<ul style="list-style-type: none"> -light will shine through the slits, and it will light up the room around it -the bulb and the wires will be hidden in the middle -the slits are made with thinner material so that the light can pierce through 	<ul style="list-style-type: none"> -the design matches the specification in that it has a minimalist design so that it can fit into more rooms -it matches the specification in that it has all electronics incased, and no sharp edges for safety -the design doesn't match the specification because it doesn't have potential for movement mechanisms 	<ul style="list-style-type: none"> -this spiral design is inspired from the organic style presented in architecture in Singapore -minimalistic form is inspired from the light orbs "Aria" designed by Gabriela Saadia 	<ul style="list-style-type: none"> -I like the form of the design and how the gaps create an organic style -I like how the light shines through the gap of the material -I don't like how this lamp is hanging on the ceiling, I think it would look better if it was attached onto the wall 	<ul style="list-style-type: none"> "I like the idea, but I think the lighting effect might make me a bit dizzy" -Aqua "This design is cool, although it looks like it's a bit hard to make" -TG
	<ul style="list-style-type: none"> -simple tube shape body as the general form -wooden strips add linear fluidity -minimalistic design so it can fit into any environment -mixes and match simple geometric shapes to make a contemporary style 	<ul style="list-style-type: none"> -the wooden strips can control the light direction -the openings will absorb some light so that the light going out of it won't be too bright -the bulb will be suspended in the middle -doesn't produce even lighting -the bulb is exposed from the side, produces too bright of a light 	<ul style="list-style-type: none"> -the design matches the specification because it has a non-intrusive design that can fit in with most rooms -the design doesn't match the specification because it has parts of the electronics exposed -the design matches the specification because it has simple colours -the design matches the specification because it has potential in movement 	<ul style="list-style-type: none"> -the design is inspired from the Bang and Olufsen speaker BEO-lab 28 -the linear wooden strips are used in the BEO-lab 28 to redirect sound -entire minimalist shape is inspired also from B and O 	<ul style="list-style-type: none"> -I like the minimalist style created by the linear lines -I like the potential of movement mechanisms of the wooden strips in the design -I don't like how the bulb is exposed from the side -I don't like the general form, its too simple to draw attention in a room 	<ul style="list-style-type: none"> "The wooden strips are a nice touch to the design" -Gabriel "I don't like how the light will be like strips when its shined onto the table" -Jan Willem Verkade
	<ul style="list-style-type: none"> -minimalistic and sleek design -middle curved surface will be transparent so that it will light up 	<ul style="list-style-type: none"> -will only produce light from the side -not enough lighting for an entire room -bulb and wires will be hidden inside 	<ul style="list-style-type: none"> -the design matches the specification because it has a minimalist and modern design -the design doesn't match the specification because it can't light up the entire room 	<ul style="list-style-type: none"> -the disc shape is inspired by the Bang and Olufsen speaker Beosound A9 -the entire design is modern and sleek, which is adapted from the minimalist forms of the B and O speakers 	<ul style="list-style-type: none"> -I like the sleek design of the light -I like how the light shines through the side of the lamp -I don't like how there isn't any light that comes out from the bottom 	<ul style="list-style-type: none"> "The design is a bit futuristic, but its too simple." -Aqua "I hate when the light shines straight down in my room, so this design is good, because the light shines sideways" -TG
	<ul style="list-style-type: none"> -layering of non-symmetric rings connected by strings -creates natural curvatures and organic style 	<ul style="list-style-type: none"> -design leaks out too much light from the outside -light will be too bright when viewing from the bottom -bulb and wires are all exposed 	<ul style="list-style-type: none"> -the design doesn't match the specification because it has all electronics exposed -the design doesn't match the specification because it can't adjust the lighting level for different room environments 	<ul style="list-style-type: none"> -the form is inspired from the architecture in Singapore -the layering of organic shapes mimics a terrace field, and this feature can be found in the architectural design of the Park Royal collection Hotel in Singapore 	<ul style="list-style-type: none"> -I like the organic style of the light's form -I don't like how the bulb and the wires are exposed -I don't like how there isn't a main body to the light -I don't like how all the light will come out from the sides and the bottom 	<ul style="list-style-type: none"> "This design looks simple and fancy, it would look better when it's a bit more refined" -Gabriel

Conclusion:
 Design idea 2 has the most potential to be developed into a product that satisfy the specification. It has a minimalist main body that has room for other designing styles. It also has the most potential for adding a mechanism inside. For development, the form needs to be redesigned with another style included along with a mechanism inside to allow movement. Mechanism needs to be considered with priority, as it is one of the highlight of the product. After a mechanism is chosen, this design needs to be developed with the mechanism inside, along with another chosen design style to produce the final design.

Research into Mechanisms Ikea PS 2014 ceiling lamp



Component 1 Three-Dimensional Design



Component 1 Three-Dimensional Design

Combining Function and Form: How do the Designers James Dyson and Torsten Valeur Allow the Function of a Product to Impact its Form

This poses inconvenience on the users as they had to frequently change and clean this bag, and it was not durable enough. James Dyson noticed this issue amongst the users and decides to solve it with his invention, a bagless vacuum cleaner. This illustrates that **designing user experience** is one of the key selling points of all his products. Dyson was able to achieve the "bagless" effect because he implemented the technology seen in farm silos into the dust collection system. It is called the "Dual Cyclone system", where the air spirals into a cone shape column, and the dust gets thrown into the collector because of the centrifugal force generated by the spinning air. Dyson chooses this feature as the central focus of the whole design and allows this function to fully impact its form. The clear acrylic casing around the dust collector **exposes the internal mechanisms of dust collector making it readable**. This can be seen in figure 2.

Dyson likes to expose internal mechanisms, so that the user's attention can be on the function of the product.



makes the product visually more "functional"

Figure 2. Dyson's cyclone dust collector technology. He also exposes the air pipes dust collector, **making the pipes visible as an industrial feature**. This is shown in figure 3.



Figure 3. Air pipes are exposed on the outside to

The string would also have to be at the correct length, and the light would have to be placed at the correct height for the user to have easy access. **The light should also contain minimal parts in order to reduce the overall weight of the lamp.** This can effectively decrease the stress felt on the ceiling, and the attachment points, making a safer product.



Figure 11. Picture of the "sliding crank mechanism". With this in mind, my ceiling light project will try use the "sliding crank mechanism for movement, as this **exposes the least amount of parts out of those that are researched**. This can effectively reduce the weight, therefore making the ceiling light safe to use.

Dyson focuses on the human centered aspect in each design. This is one of the reasons why Dyson is so successful, therefore this approach could be replicated into my own design.

However, he makes the design sleek and modern by coating the whole section in a smooth dark grey colour and using the curvature of the air pipes to enhance the form's fluidity, so it fits better into modern day interior designs. **This method wouldn't be an effective method for my own project due to the nature of my design.** My ceiling light includes two major functions, changing form and lighting up the room, so this would cause issues if I were to blend function and form by highlighting the function entirely. **By highlighting the same functions at once, my design loses a central focus to the user, and it wouldn't create a nice hand between the function of its form.** With this in mind, I've decided to rule out the "expanding pulley mechanism" as a potential mechanism used for my project.



Figure 4. Research page on the "expanding pulley mechanism"

The flaw with this mechanism is that it **introduces numerous moving parts**, which many of them must be **exposed during the expansion**. For example, the poles connecting the individual plates, and the gear which has to be in the middle of all the panels. This will likely mean that most of the user's attention on the moving mechanism. **As a result, the ceiling light's design focus would shift towards the moving mechanisms rather than the lighting function, making its design less effective and visually unbalanced.**

If I were to highlight the functions of my light, it would create a **conflicting and visually unbalanced design, as there are two functions: changing form and lighting, so I would have to choose one.**

When this effect, he uses minimalism instead of exposing mechanisms and relying on sleeker forms. This is because the **overall focus of the design is on the sleek and modern look**, as shown in figure 5.



Figure 5. Dyson IPT's IPT 001, showing the gap in the middle. Because the focus of the design is a large empty gap, it **effectively makes a minimalist design**. Dyson takes advantage of this and uses it throughout the whole design. This can be seen in the base of the design (figure 6.)

In order to **not lose a central focus to the design**, the expanding pulley mechanism would **not be used**. It would expose too much mechanisms.

It has a simple geometric shape as the general form with clean edges to create a minimalist effect. The uniform material choice and smooth matte finish also emphasizes this. In contrast to the vacuum cleaner, Dyson uses the **minimalistic nature of the function and blends it with the form by following the same style for the rest of the design**. This makes the function the central focus of the whole design and successfully presents itself as "user-centred". This method is really effective in blending in function and form, and it should be used for my project. **My ceiling light design will be able to change form incorporating a futuristic element.**

A **future design revision will be required**, as this design style **relies on the function of the ceiling light**.

By considering the **weight of the light and the safety of the product**, the final mechanism to be used inside the project is the **sliding crank mechanism**.

This approach of **considering environmental light reflections** should also be applied to my project. The ceiling light should have a **matte surface finish** in order have streaks of light running down the product, making it more presentable and **combine with the linear flow of the central tube.**

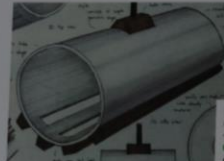


Figure 16. Showing the how a cylindrical shape with a reflective produce linear streaks of light.

It also uses a similar material choice: aluminium with a uniform colour scheme, to match the minimalism created from the clean and smooth form. On a closer view, the material is coated with a **matte surface finish**. On the physical aspect, it provides a **matte surface finish to the speaker's surface**, but on the visual aspect, this pattern gives a quality matte finish onto the surfaces. This allows the reflected light from the speakers surfaces to run down the side of the cone in a unobtrusive manner. In fact, these linear streaks of light **directly correspond to the linear gaps**. Torsten Valeur has left for the sound, making the functionality of the design blend into its environment. This is shown in figure 15.



Figure 15. Picture of the light reflections on the surface.

applies its way to converge with the straight line of the legs. This is shown in figure 12 below:



Figure 12. Speaker Celestial, highlighting the pattern at the front.

In doing so, the speaker will **combine these elements in one and have consistency in the design**. This method should be used when trying to design my project with a minimalist approach. Having shapes and form that repeat throughout the design will make it more **memorable and clean**.



Figure 13. A picture of my developed idea. This design is too simple and has no uniformity. Since my product's purpose is different to the Celestial speaker, my use of minimalism on the ceiling light will be different. **Minimalism should be used to make my design more uniform and suitable for all environments**, instead of hiding and blending itself into the room.

Further evaluation on my old design. It is **not a uniform design**, and therefore it will **not be suitable for all environments**.

Here I've decided to use **Torsten Valeur's approach** when trying to **combine function and form**.

Conclusion

James Dyson and Torsten Valeur are two different designers that use two different approaches when designing products. James Dyson designs with a **function driven mindset** and likes to **expose and put on display the technology** and high performances of the products. He does this through his minimalist and sleek design and sometimes physically exposing the mechanism. Torsten Valeur employs a different approach because he tries to **balance form and function more**. He also uses a minimalist and basic forms to create **non-intrusive and aesthetically pleasing designs**, whilst blending in the function amongst the form. This creates a direct design where the user can easily use the product. Through detailed analysis and evaluation on works from both of the designers, this essay has successfully confirmed the future direction of the project in terms of its function and form, and how both of them should impact each other. I have determined that the **"sliding crank mechanism" is the best option to achieve movability in my ceiling light**, as mentioned previously. The form of the project should also be **consisted of minimalist shapes**, so the ceiling light can create harmony with the environment. **The function and the form should exist in unison on the product**, rather than letting one impact the other one fully. This will be possible if all mechanisms are hidden, and if the **design style can match with the functions**. To achieve all of this, more research on futurism design, and a function model of the mechanism will be required.

NEXT STEPS!

- futurism design research
- making design model and website
- producing a futuristic mechanism prototype
- manufacturing
- testing functions



Figure 18. The use of colour and sleek shapes to highlight the air pipes and dust collector. In order for this to be the centre of the design, he makes the rest of the design **minimalistic**, by using simple shapes and colours. Not only does this illustrates Dyson's design philosophy to the user, it can also enhance user experience. The user can experience the convenience of the technology and the stable performance of the product, but also see it visually. This is drastically different to Torsten Valeur's use of minimalism. Rather than using minimalism to highlight a product's function, **he uses minimalism to reinforce the harmonious relationship between the environment and the product's function**. His design style uses simple geometry like circles, and cones, triangles, so that the design can be "easily understood by the user".



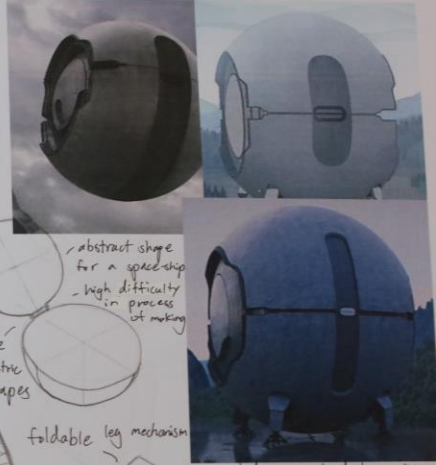
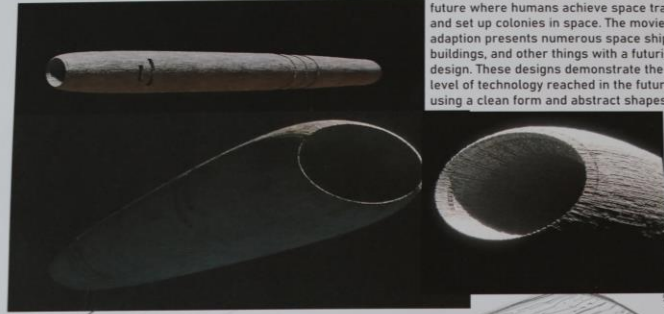
Figure 19. A collage of some of the speakers designed by Torsten Valeur.

As a result, Torsten Valeur has to hide all the mechanisms of the product **underneath and use a very small design angle**. This is crucial because it is **impossible for a user to see the mechanism** and **combine it with the minimalist design**. Following on from the comparison, **James Dyson's design approach** when trying to combine the function and the form of my ceiling light. This is due to the nature of a ceiling light and how a user interacts with it. A ceiling light is suppose to be apart of the environment, so exposing mechanisms and making it stand out would not be suitable. **Research using minimalist forms and shapes to create effects.**

Component 1 Three-Dimensional Design

Secondary Research – Futurism: Design in Dune the movie

Introduction:
Dune is a scientific-fiction novel written by Frank Herbert. The story is set in the distant future where humans achieve space travel and set up colonies in space. The movie adaption presents numerous space ships, buildings, and other things with a futuristic design. These designs demonstrate the high level of technology reached in the future, using a clean form and abstract shapes.



clean simple minimalist shape

Streamlined body to mimic the fluidity of "sandworm" body

- minimalist + organic design

mimics the texture of skin on sandworms

clean lines outlines the shape

organic pattern on the outside

Reflection:
- design demonstrates a high difficulty in the process of making
- shapes and form are simple and clean to present the high level of refinery
- streamlined bodies with fluidity

abstract shape for a spaceship
- high difficulty in process of making

simple geometric shapes

foldable leg mechanism

highly metallic look

design is hard to make, needs high level of technology to achieve

smooth surface shows the high level of refinery

combination of simple geometric shapes

clean lines

minimalistic shape

geometric forms

'slices of spheres'

a big sphere + sm sphere

Functional Model

Can attach a pulley wheel for easy access

groove to allow string to move

rotational movement to linear movement

smooth surface up using wheel/oil

needs more tolerance

+0.3mm or above

smooth surfaces avoiding friction

mechanism has lots of resistance at the end

double holding slots to avoid twisting or turning

has the tendency to move sideways

Reflection!
- ideal mechanism for light movement
- can fit into the light and be fixed
- parts that has resistance needs to be smoothen up and + tolerance

2D side view

fixed light main body

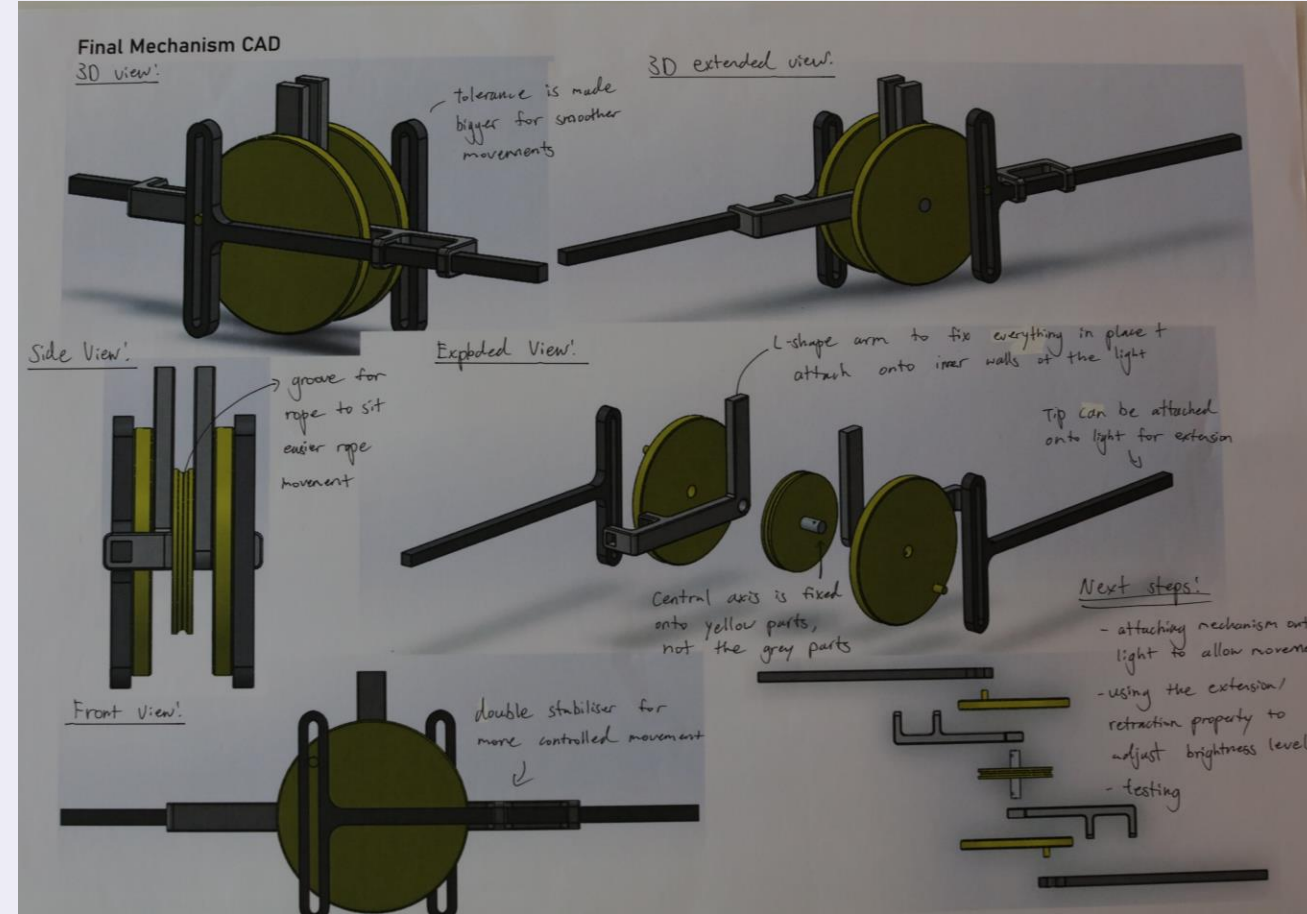
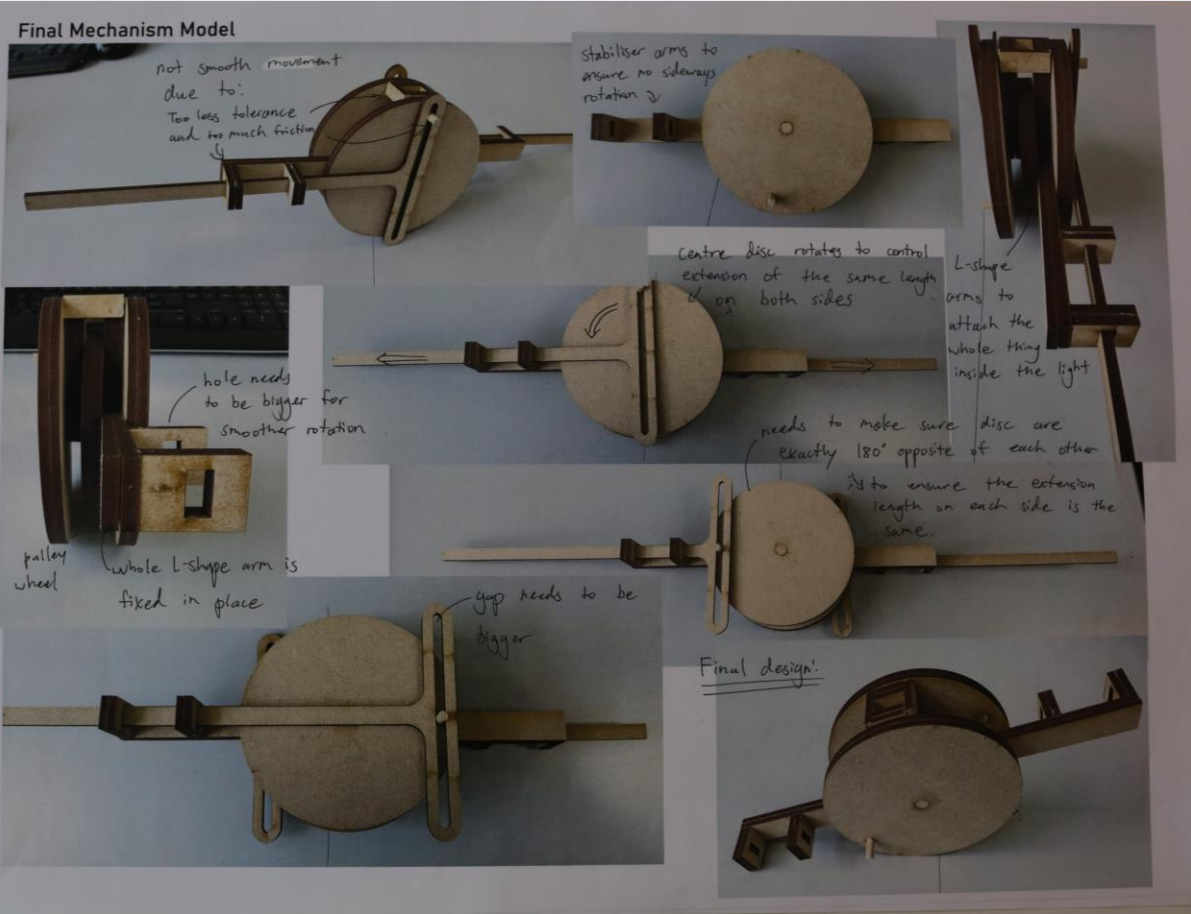
- This mechanism will be suspended in the middle of the light

pulley strings hanging from below the light

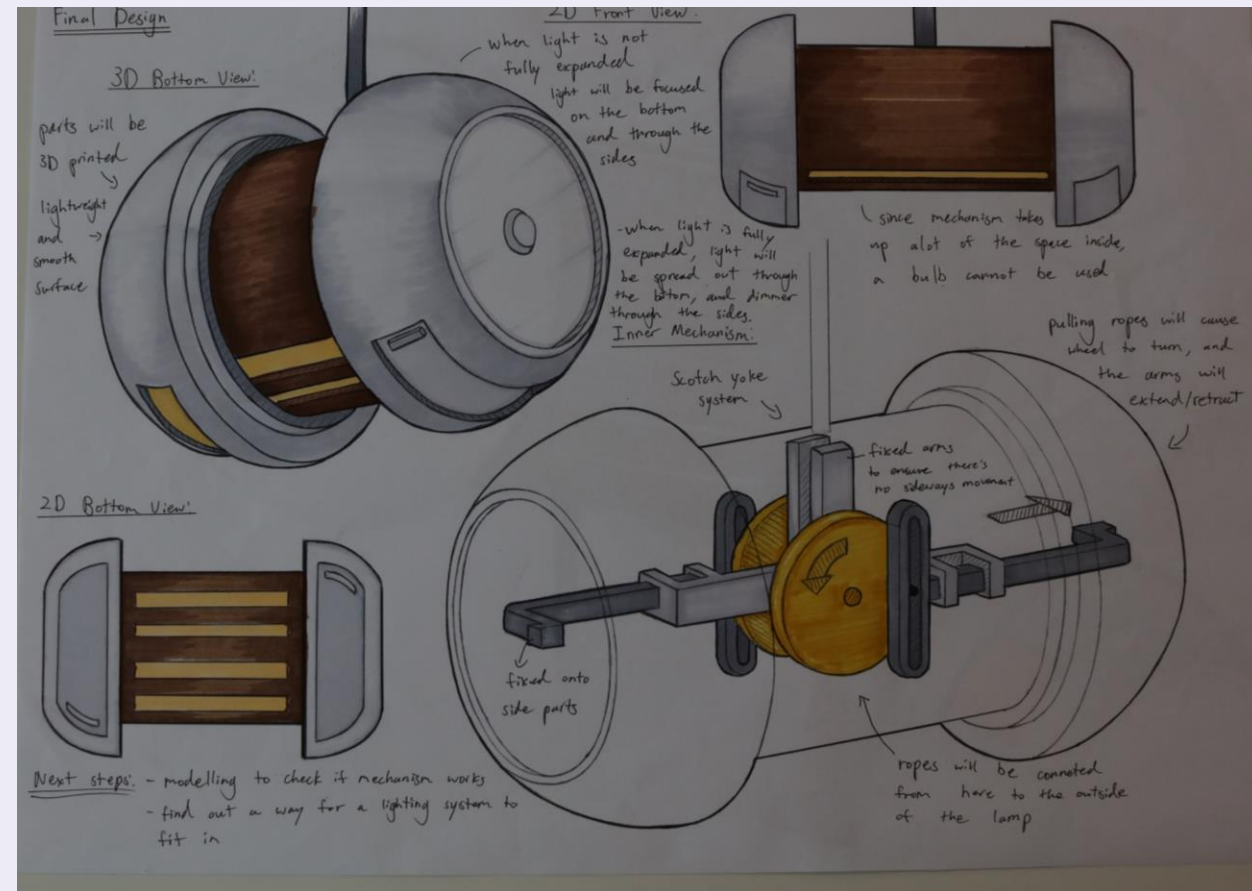
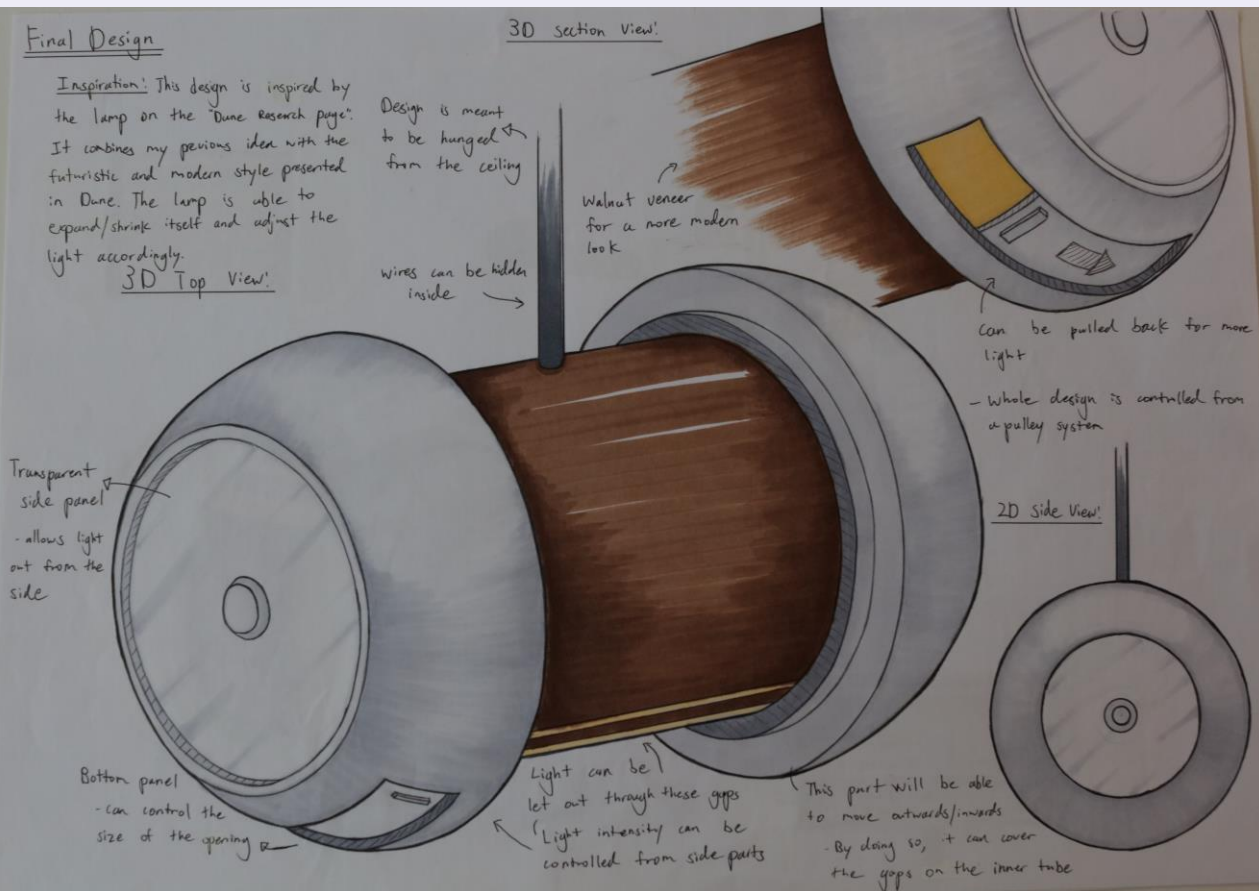
distance from centre of wheel to pin = extension length

- needs double holding parts to avoid twisting

Component 1 Three-Dimensional Design

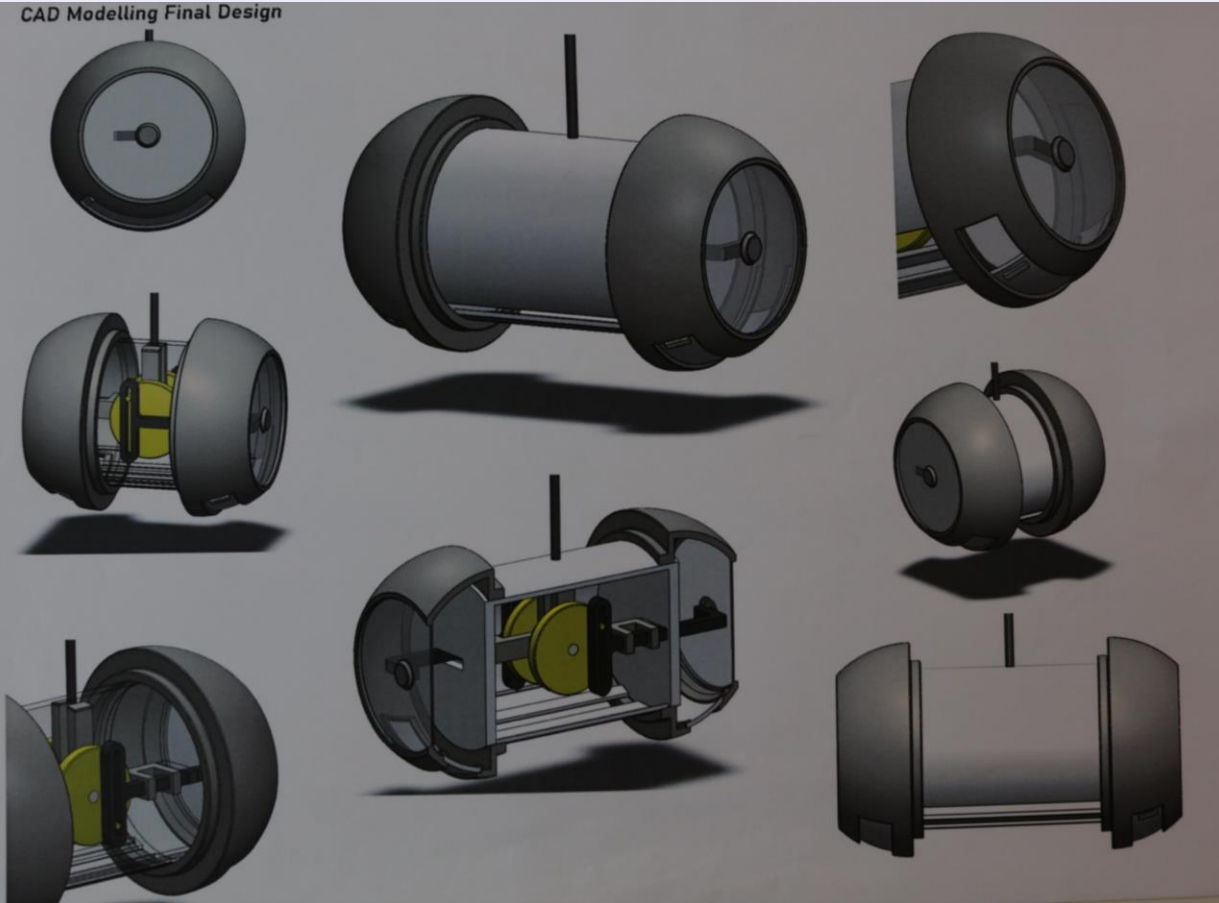


Component 1 Three-Dimensional Design

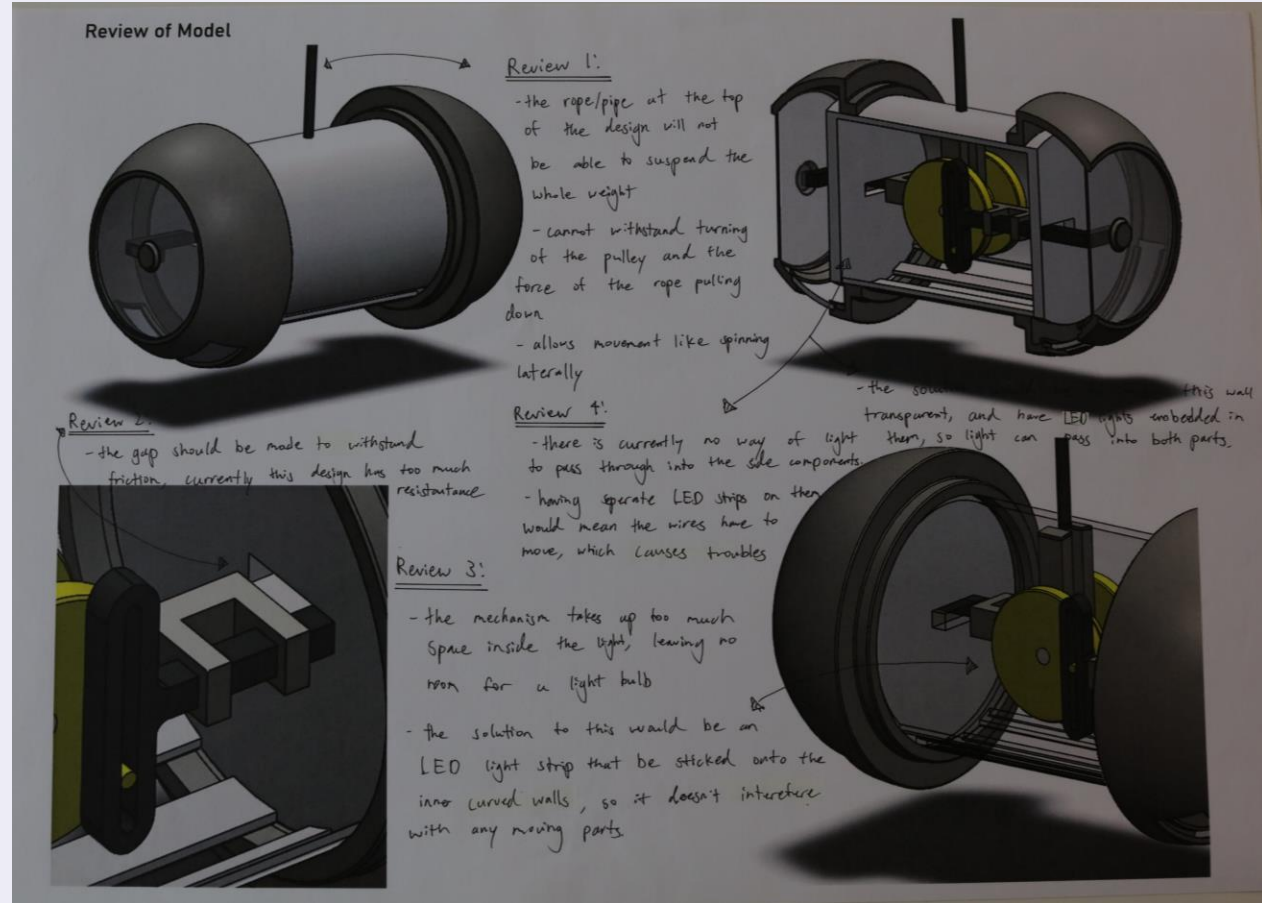


Component 1 Three-Dimensional Design

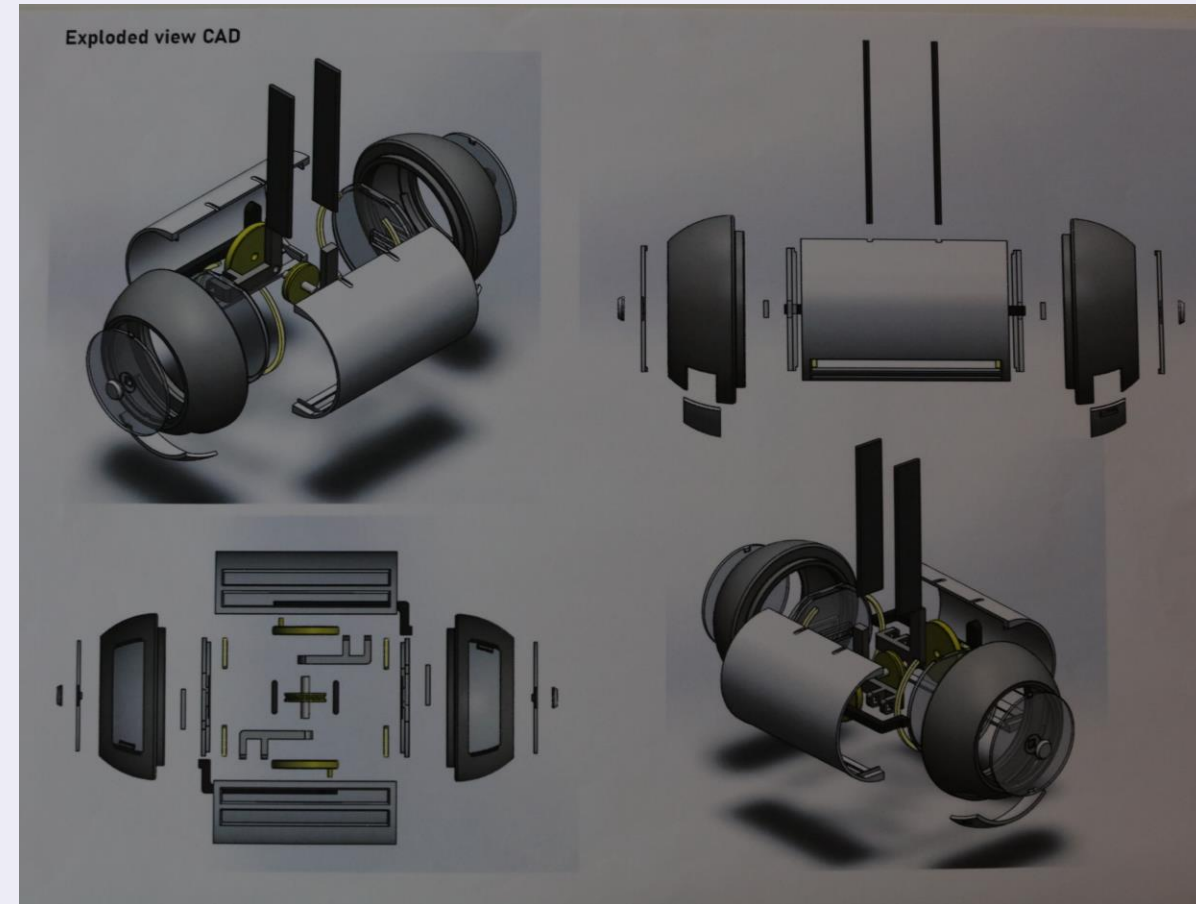
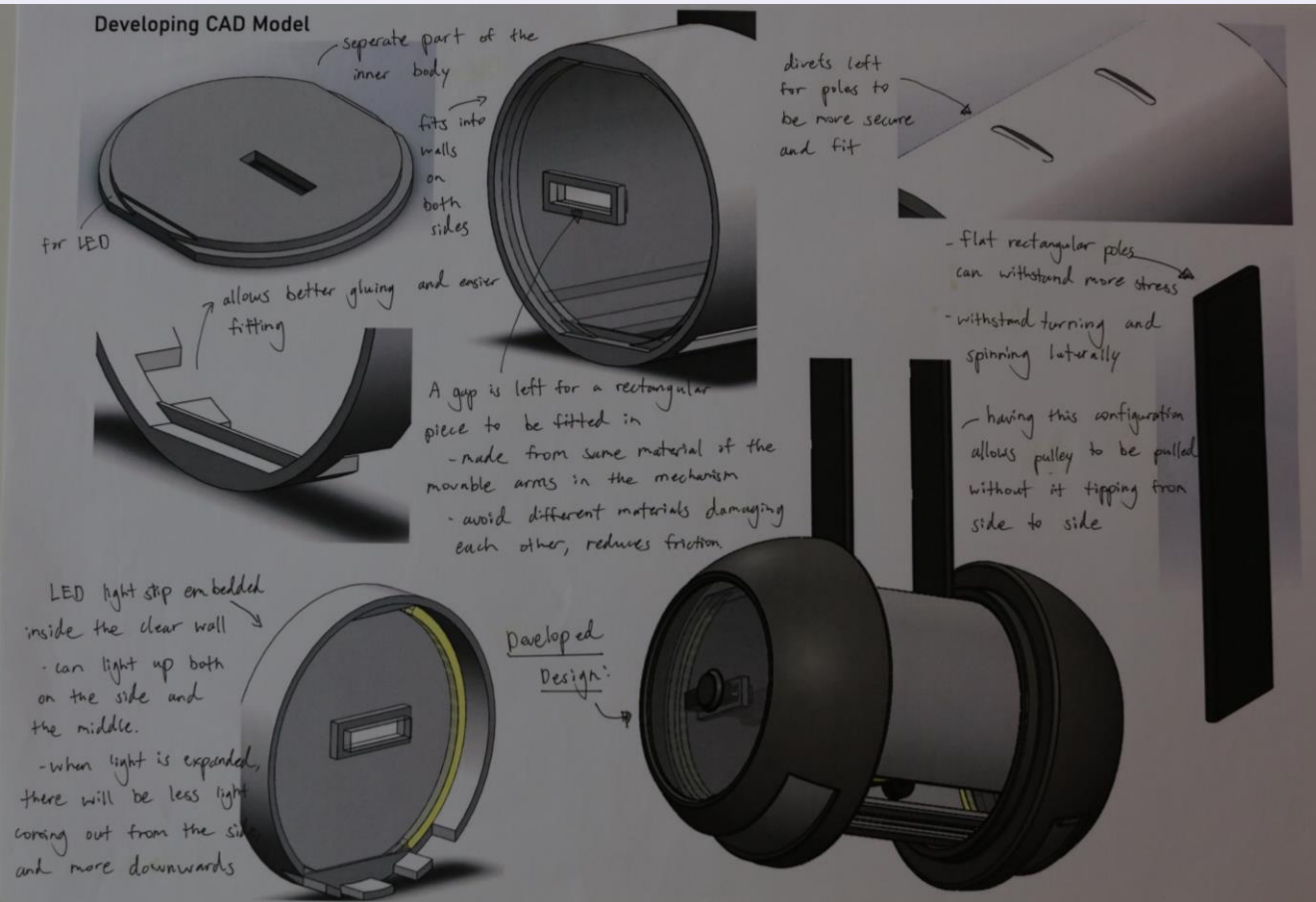
CAD Modelling Final Design



Review of Model

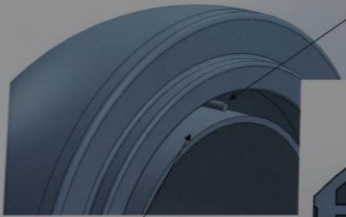


Component 1 Three-Dimensional Design



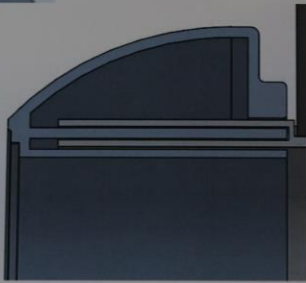
Component 1 Three-Dimensional Design

Manufacturing - Outer changes

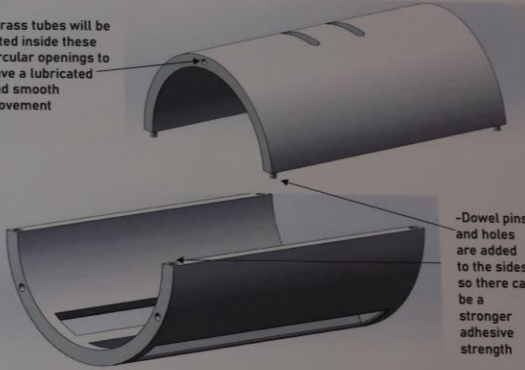


-a outer covering was added to go underneath the inner body's wall
-this prevents light from leaking out from the side gap, as it is hard for light to travel through this shape

-Tubes and rods are added to the side components and inner body to ensure no twisting will occur when expanding and smooth movements



-brass tubes will be fitted inside these circular openings to have a lubricated and smooth movement



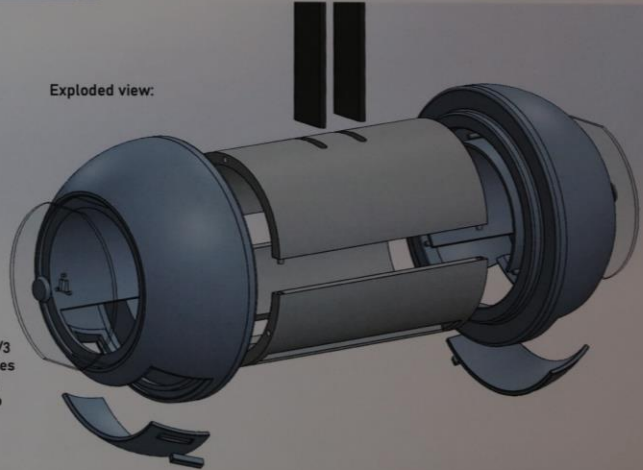
-Dowel pins and holes are added to the sides so there can be a stronger adhesive strength



Modified side component:

-brass rods are placed in a triangular configuration for maximum security

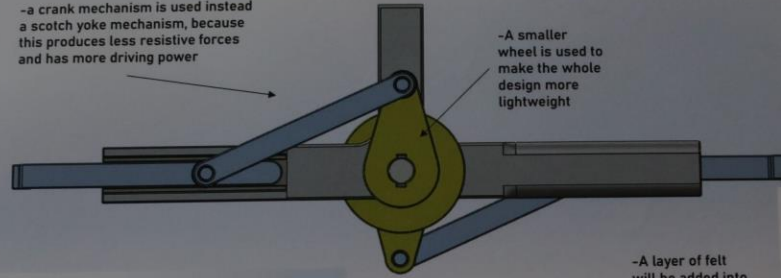
Exploded view:



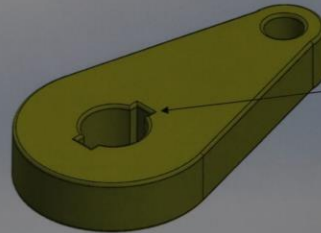
-the whole plate wraps around for 2/3 of a circle so it leaves the bottom opening clear for the light to pass through

Manufacturing - Inner Changes

-a crank mechanism is used instead a scotch yoke mechanism, because this produces less resistive forces and has more driving power

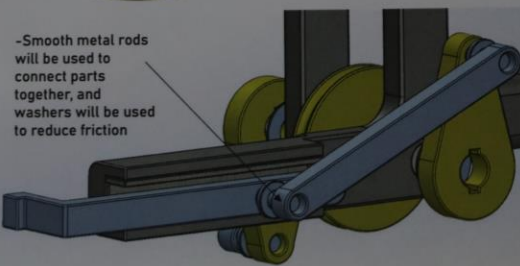
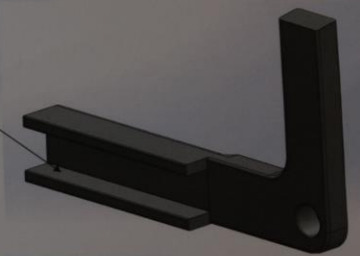


-A smaller wheel is used to make the whole design more lightweight



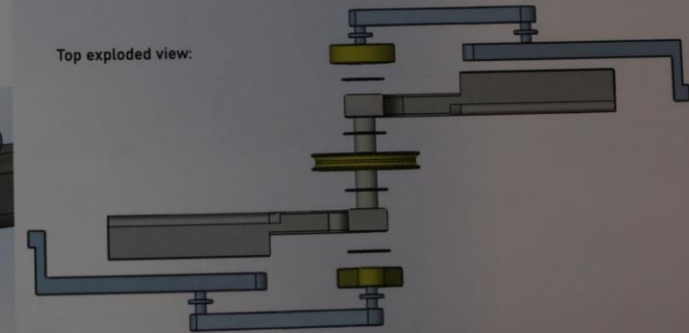
-A small cut out on the wheel is added so it locks onto the centre axis better. This also ensures that the two wheels are always opposite of each other.

-A layer of felt will be added into the sides of the guider to ensure smooth movements

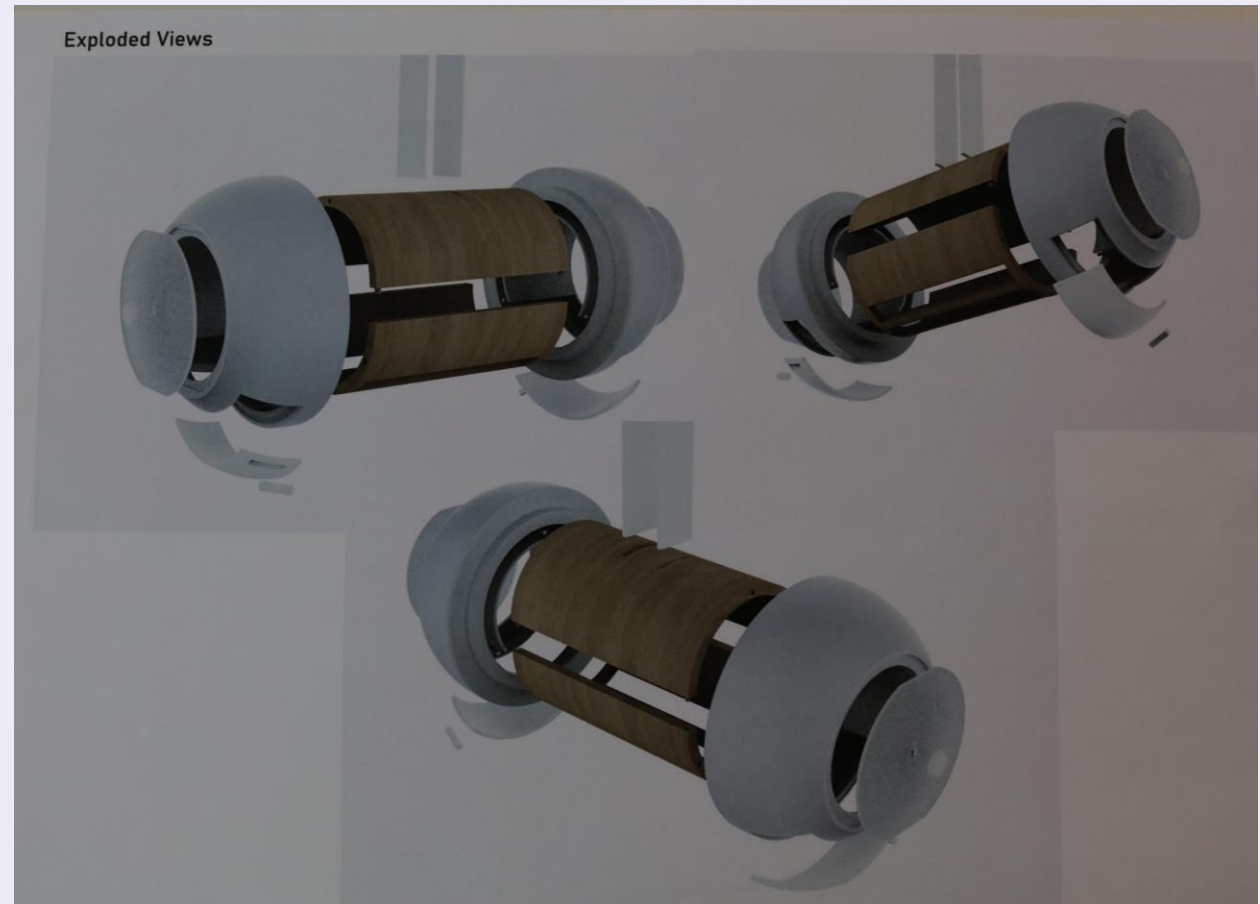
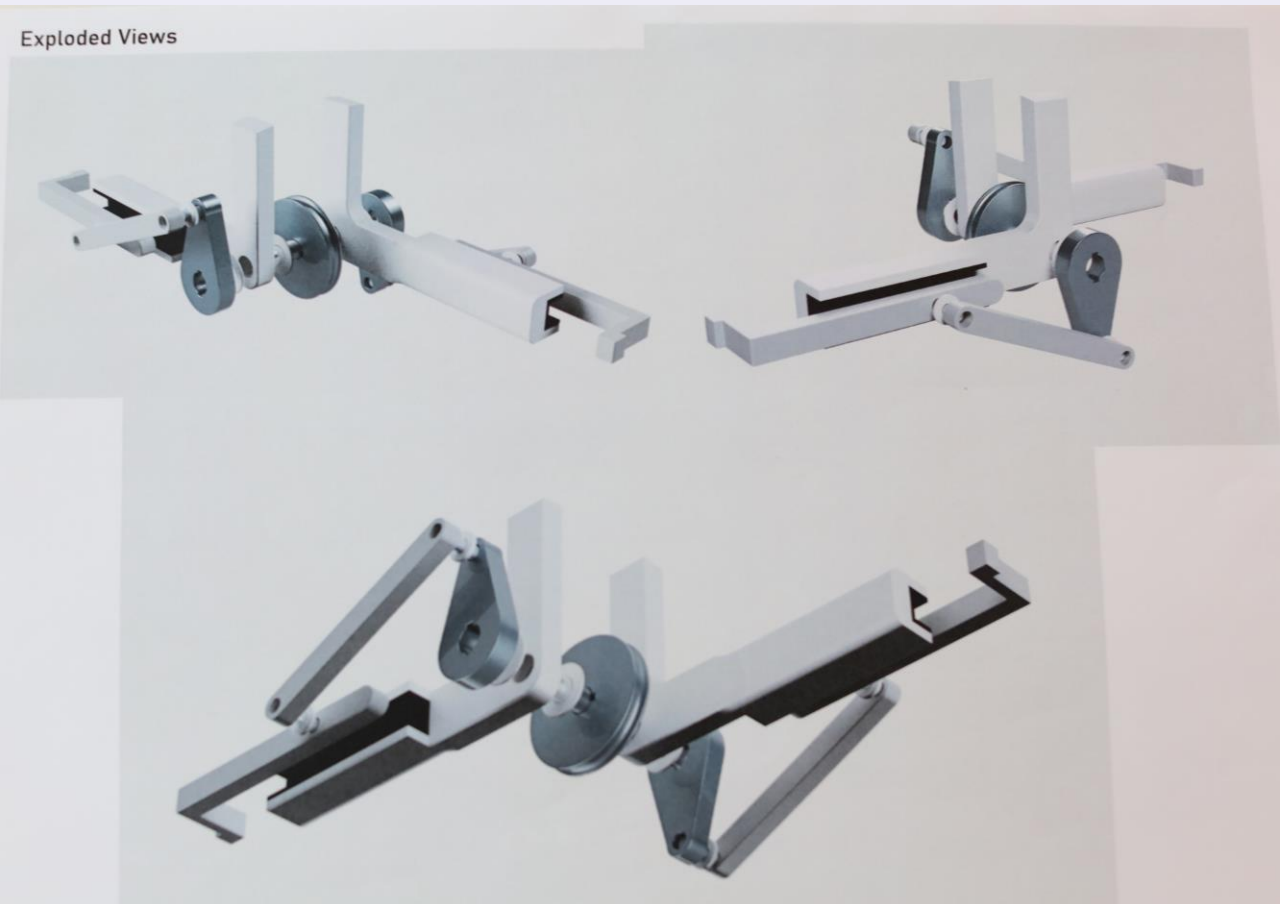


-Smooth metal rods will be used to connect parts together, and washers will be used to reduce friction

Top exploded view:

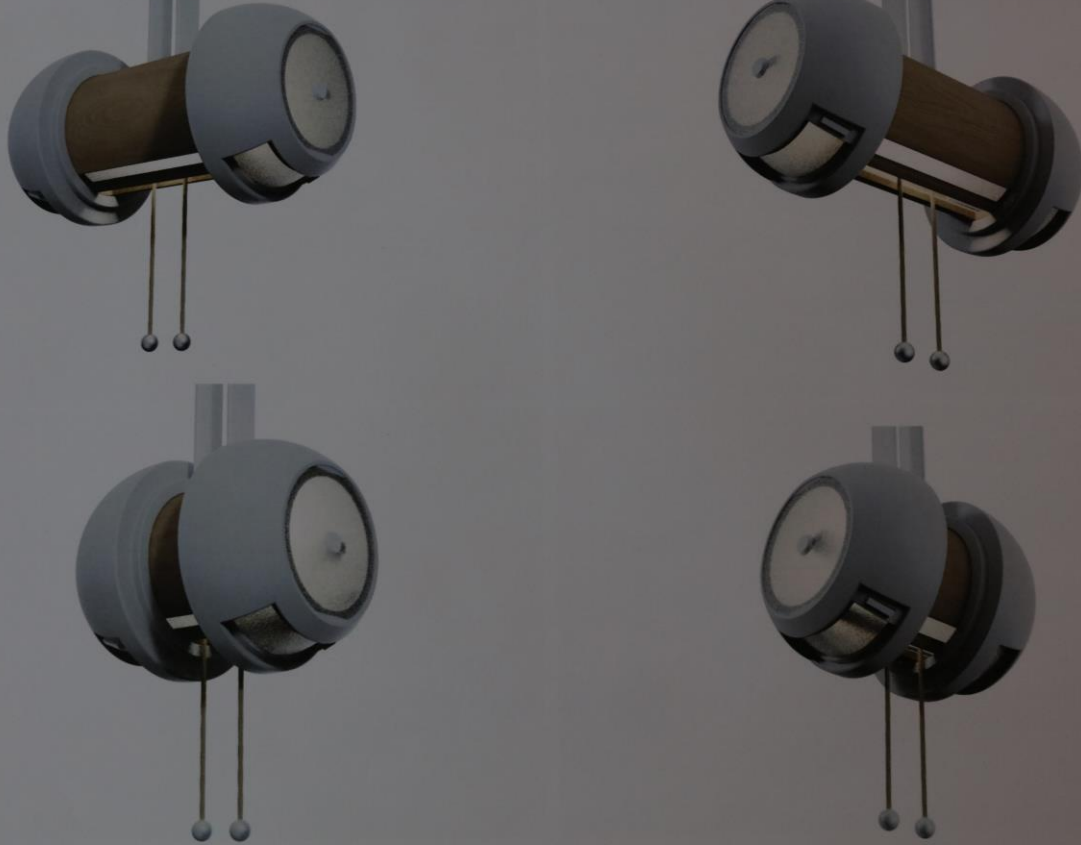


Component 1 Three-Dimensional Design



Component 1 Three-Dimensional Design

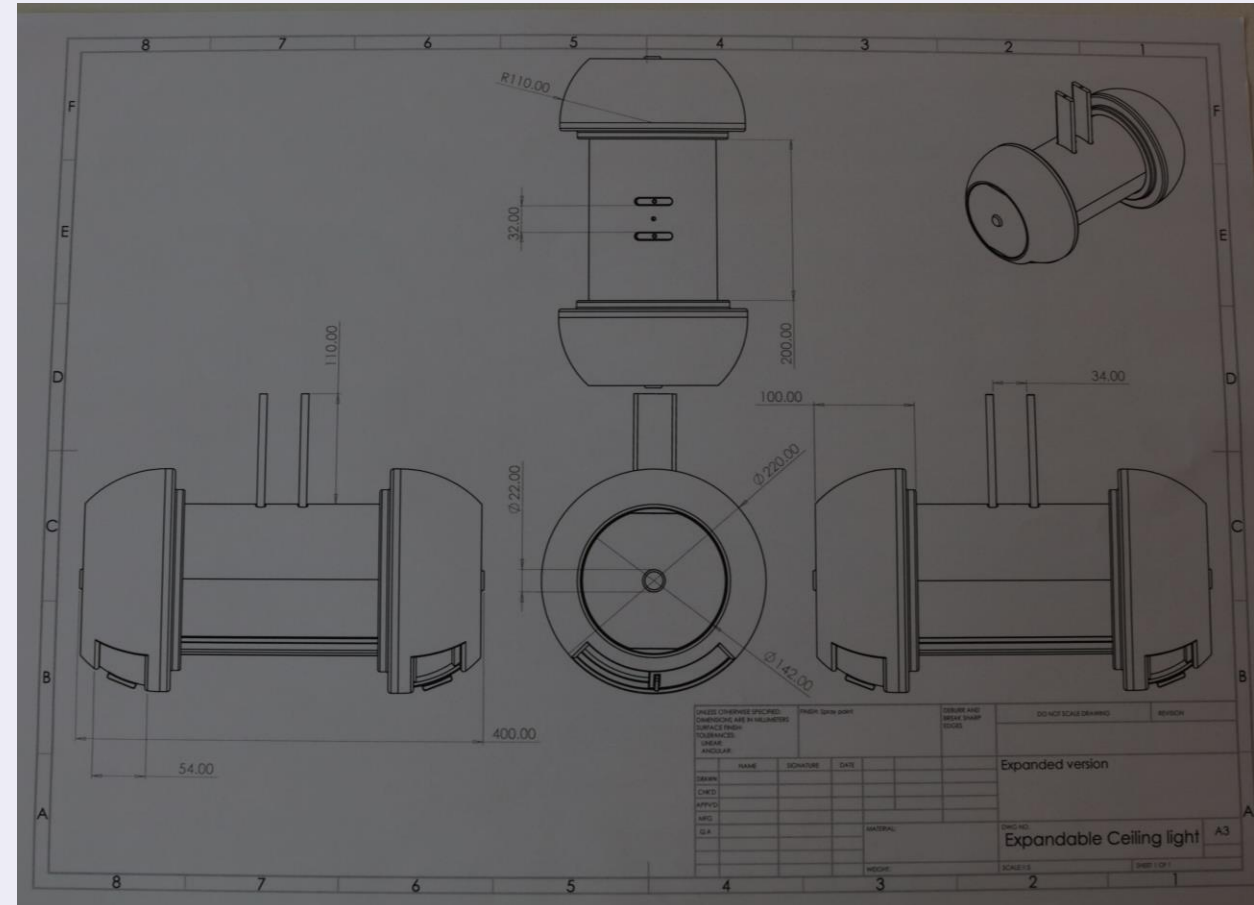
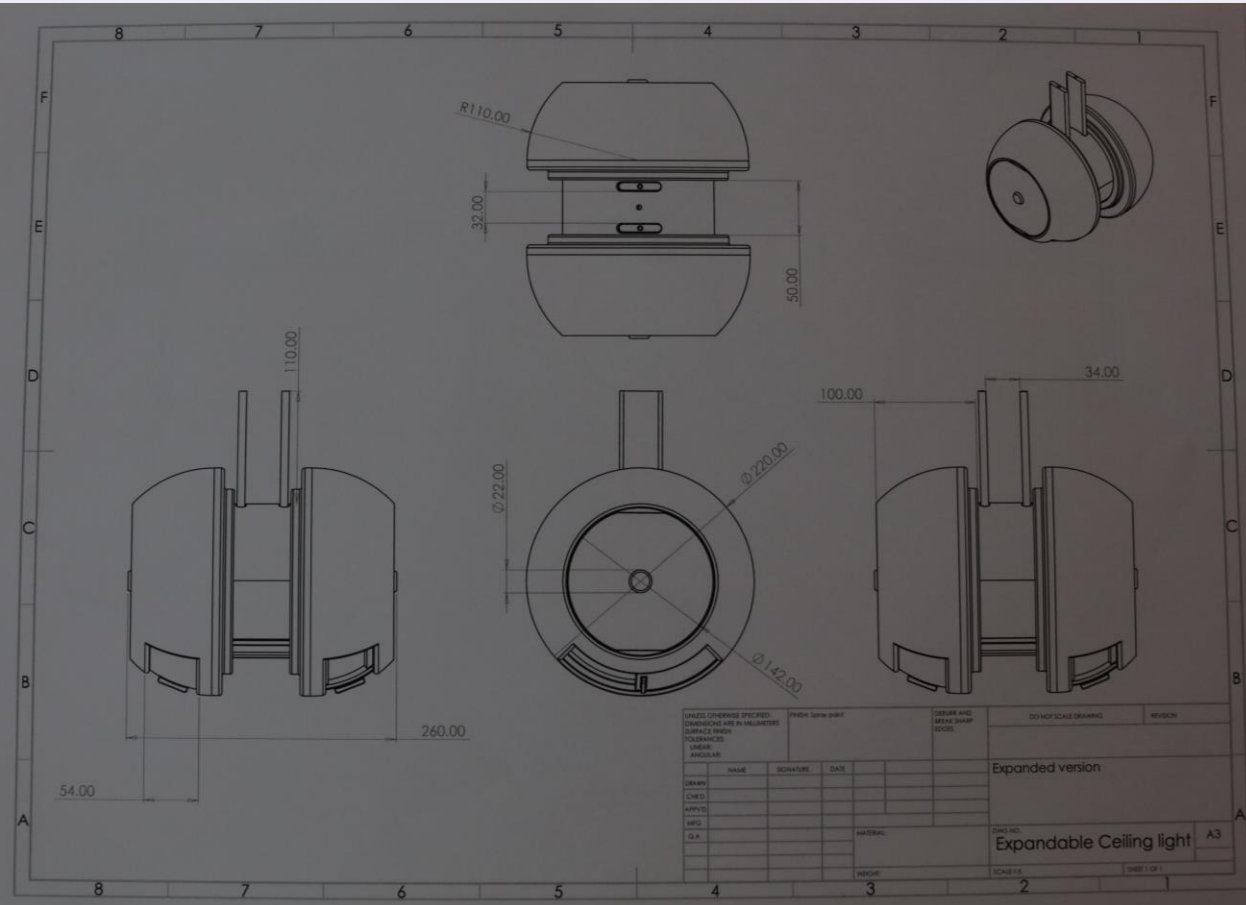
Keyshot Renders



Keyshot Renders in the Dark

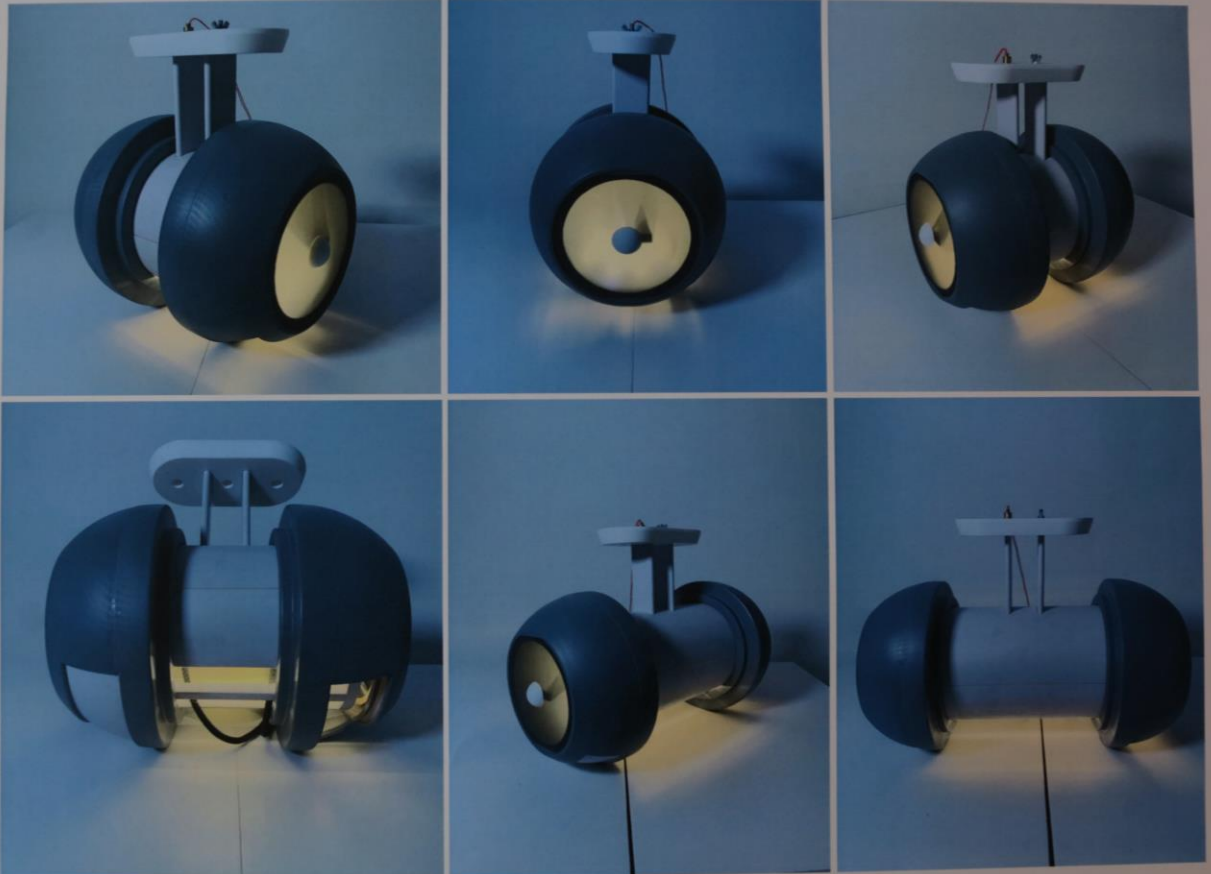


Component 1 Three-Dimensional Design



Component 1 Three-Dimensional Design

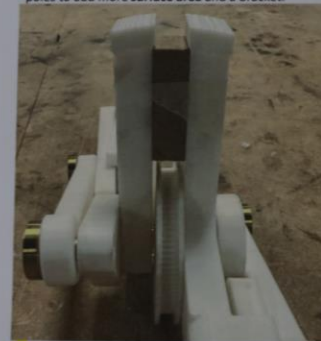
Final Model Photographs



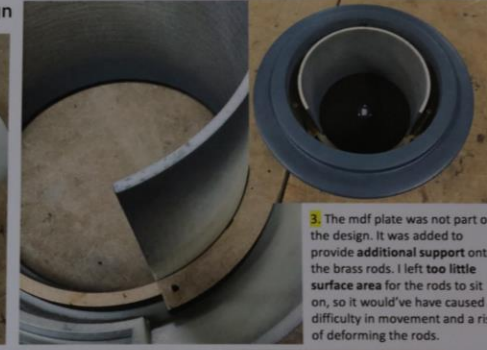
Evaluation of Manufacturing and Design Process



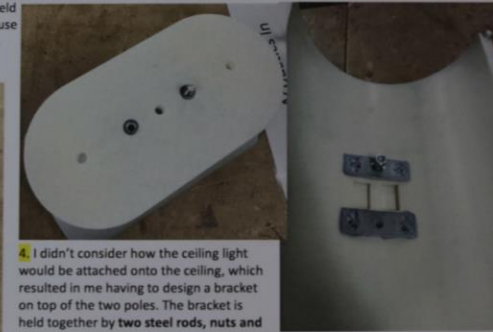
1. Originally the poles at the top was a flat butt joint held together by glue. This wouldn't have worked out because it wouldn't be able to bear the load of the entire light. Instead, I had to open the two holes and redesign the poles to add more surface area and a bracket.



2. The mechanism holder was two separate parts at first, which made it difficult to glue it in all squared. Instead making a bridge like shown above would be better in a second prototype. This can increase the surface area for the glue, and also act as a stopper for the rope to slide out.



3. The mdf plate was not part of the design. It was added to provide additional support onto the brass rods. I left too little surface area for the rods to sit on, so it would've caused difficulty in movement and a risk of deforming the rods.



4. I didn't consider how the ceiling light would be attached onto the ceiling, which resulted in me having to design a bracket on top of the two poles. The bracket is held together by two steel rods, nuts and bolts.

Conclusion: Overall, the 3D printed dimensions and tolerance levels were good, with the internal mechanism working really smoothly. Issues came up when assembling everything and considering about stresses on each component. For a future prototype, I cannot rely on glue for the bigger components. Instead I should design more physical supports and use nuts and bolts to hold everything together. When there is a part that needs glueing, I would need to increase the surface area for the glue to sit.

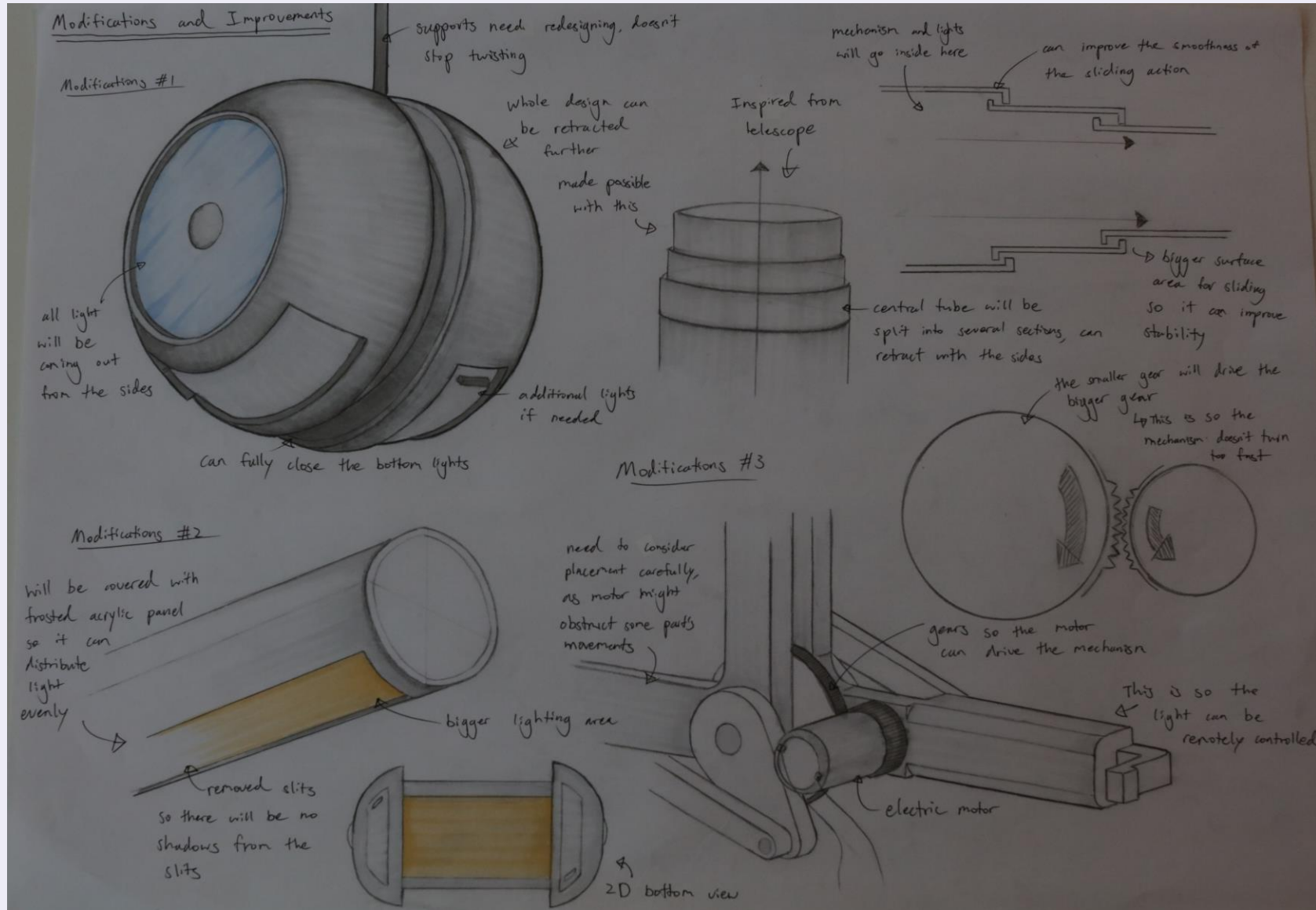


5. The original pulley wheel was smooth, which didn't bite into the rope when I was pulling it. So I added teeth onto the wheel to provide more friction for more driving force of the mechanism. For further evaluation, the wheel should be wider, so that I can wrap the rope twice around the wheel to provide more friction.



6. I sprayed painted the inner component to be white, and the outer component to be gray, which caused scratch marks on the surface. To avoid this I should adjust the tolerance level and also switch up the colors.

Component 1 Three-Dimensional Design



» Pearson

