



Movements for Lampshade Designs

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Created by *Peter Lin* on 2021/04/29 10:28.

contributors

- ✉ [Michael Byrne](#)
- ✉ [Peter Lin](#)
- ✉ [Peter Musk](#)

Upon reading about the lampshades element in the Grampus Project, the idea arose of introducing movements to the design possibilities of the lampshades. This would potentially broaden the range of approaches the end user/ participants would be able to utilise, and hopefully add interest for the observer. A variety of movements were explored through prototyping different ideas capable of being used with the basic lampshade design:

- standing or hanging,
- mounted on a hollow tube
- [centrally lit with LEDs](#)
- constructed from cardboard or paper

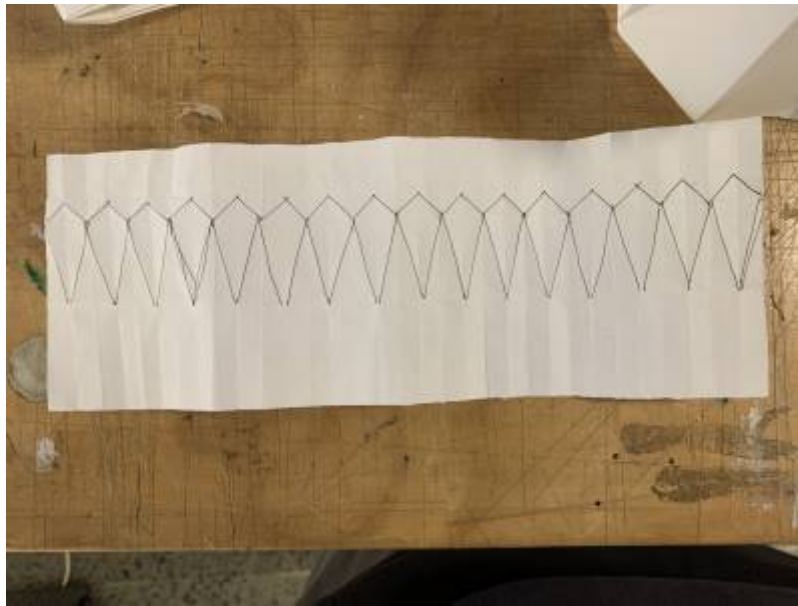
. With these requirements, the ideations/prototypes evolved using similar materials and simple techniques.



Moving Origami Lampshade

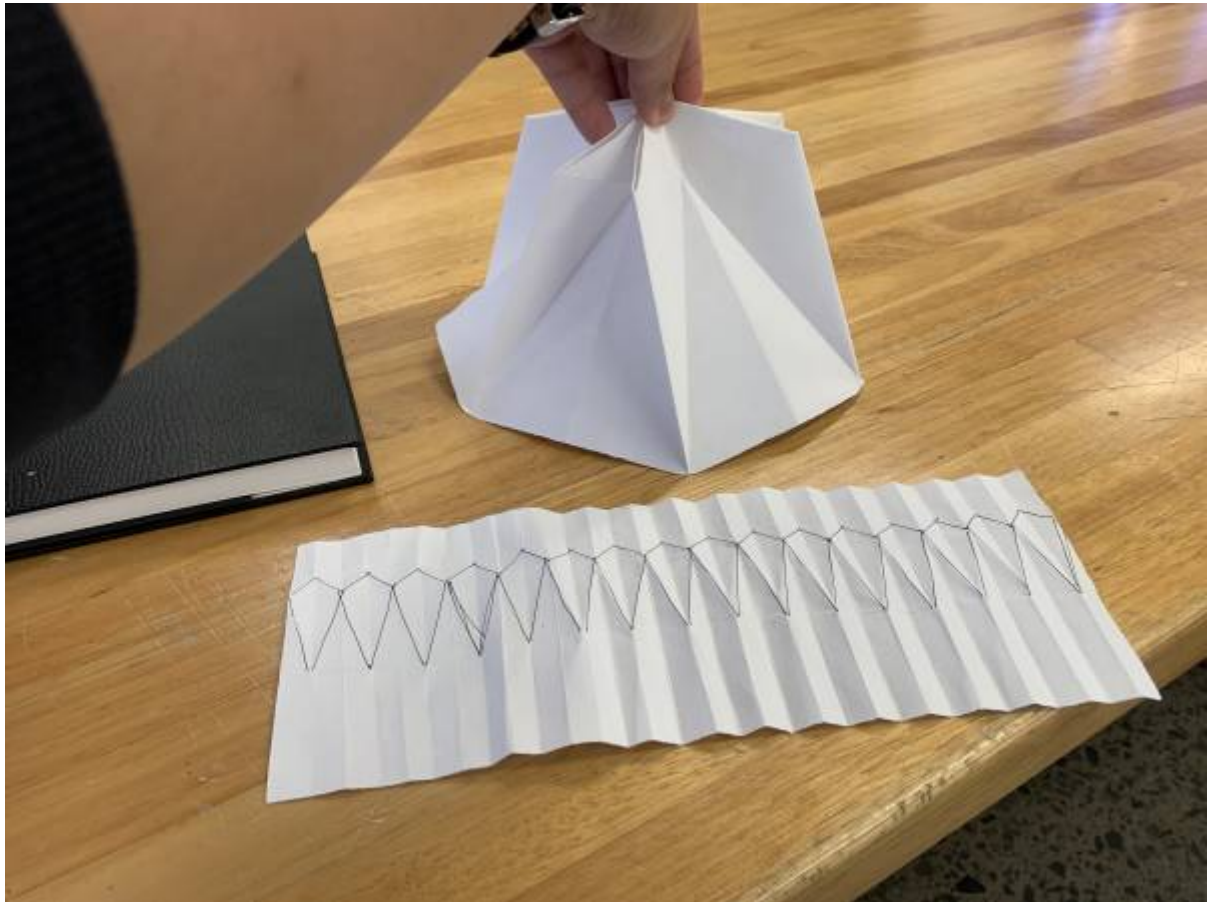
The first concept attempts to introduce movement through the lampshade being able to invert up and

down. This has proven to require more research into how to manipulate paper or cardboard to behave in such manner that would allow the lampshade to move whilst still able to remain intact - flexible joints and a suitable actuator will be required.. This lampshade design uses a pattern similar to a simple origami fan, with angled folds to create a flare in the lampshade profile.



The pattern provides a starting point for some ideas that might utilise this technique of folding papers in a series of mountain and valley folds to create similar result.

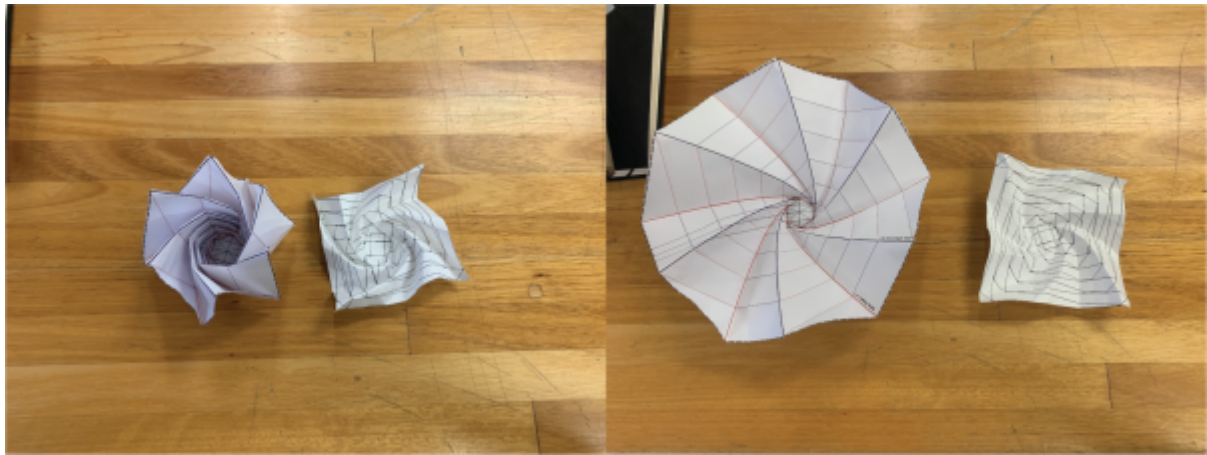
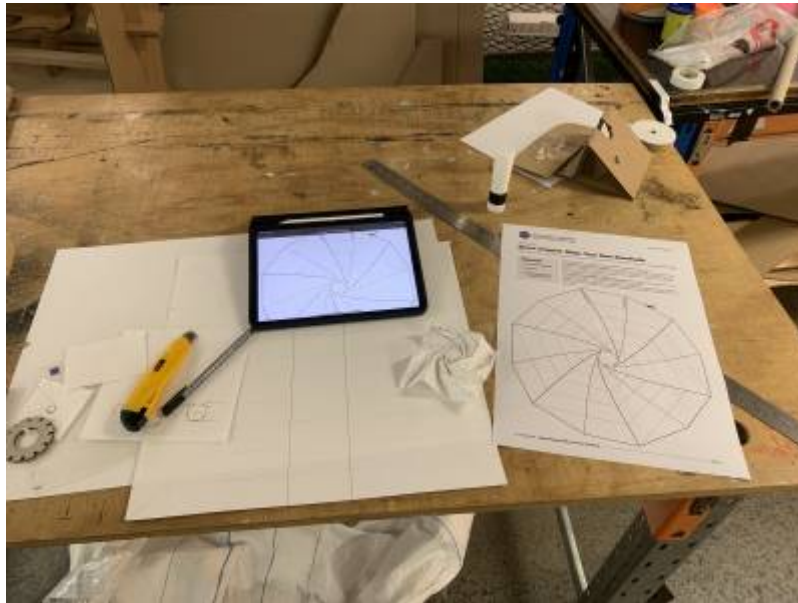




Solar Shade lampshade

A different approach to introduce movement into the lampshade design was using origami patterns that were developed by NASA for use in space. This approach aims to show the application of origami beyond art and into real world application, thus creating interest for the participants. The pattern was acquired through NASA's Jet Propulsion Lab - JPL.

<https://www.jpl.nasa.gov/edu/learn/project/space-origami-make-your-own-starshade/> The problem faced with this approach stems from the sheer amount of complexity behind the pattern acquired. Whilst looking simple, it is hard to reproduce and scale up or down since the mathematical foundation is not easily understood and would probably be too complicated for the scope of this project. Another issue faced when using this particular pattern is the mechanic for opening and closing the shade itself - what could be the driving mechanism?.



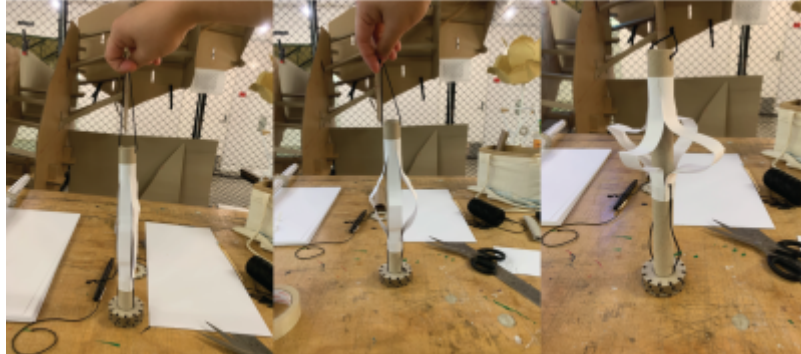
Breathing lampshade

The third concept explored has been the most viable in terms of introducing exciting movement for the lampshade design whilst still being relatively simple to construct.



The lampshade itself was constructed to be expandable and collapsible depending on the location of a central anchor between the top and bottom halves. For the lampshade to be able to move in a

controlled manner, one end of the lampshade was secured to the supporting post using double sided tape, and the central collar is left free to move. Strings are the preferred method to move the lampshade between its different states for it is a cheap and easily accessible material, and strings fit easily through the central cavity of the support. One thing to note when using strings is the tension is critical: if the tension is too loose, there won't be any movement, if too tight, the strings might snap.



Moving forward

Further ideas developed by participants can use some of the examples shown to introduce moving elements into their design. While hopefully making the concept more exciting and fun, this does add a level of complexity and extra manipulations in order to achieve a good result. Possible workshop content that is curated to introduce movements to lampshade design is recommended.

Installation will also require trialling combinations of servos and string to find the most economic and reliable actuator, and a build that is supported by the power available after installation. An enclosure that fits within the footprint of the installation will also be needed, and safety requirements around heat and electrical wiring will need to be explicitly addressed for the approval process .