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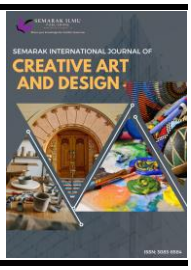

UTBloom: Simpur

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ABSTRACT

Functional sculpture is the combination of both practical application and aesthetic value in the sculpture. To design a concept of functional sculpture that represents Universiti Teknologi Brunei's values, School of Design (Sde) ethos, and Melayu Islam Beraja (MIB) requires extensive research and analysis on the subject itself. A survey was also conducted to gather public feedback and opinion regarding the functional sculpture for UTB's Sde. The design evaluation of the Pugh Methods and House of Quality (HoQ) was used to select the final concept and guide development. The outcome of the final design of UTB's SDe functional sculpture is a combination of the semiotic symbolism of UTB's SDe and Brunei's national flower, Simpur, which is named UTBloom: Simpur.

1. Introduction

1.1 Sculpture

Sculpture is an art form where materials are shaped into three-dimensional objects. The designs may be embodied in freestanding objects, in reliefs on surfaces, or within environments ranging from staged scenes to immersive contexts that engage the viewer. A wide range of materials can be utilised, such as clay, wax, stone, metal, fabric, glass, wood, plaster, rubber, and various "found" objects. These materials can be carved, modelled, moulded, cast, wrought, welded, sewn, assembled, or otherwise shaped and combined [1].

Functional sculpture merges art with practicality. Unlike traditional sculptures meant for visual enjoyment, functional sculptures serve a purpose while retaining artistic value. Examples of functional sculptures are furniture art, lighting design, wearable arts, architectural elements, and public facilities (e.g. interactive street sculpture).

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1.2 Universiti Teknologi Brunei's School of Design (SDe)

Universiti Teknologi Brunei (UTB) is an Engineering and Technology University in Brunei Darussalam, concentrating on specific fields including Engineering, Business, Computing, Applied Sciences and Mathematics, and Design. The UTB's vision is to be a global university of the future, and meanwhile, the mission is to produce towering talents for a sustainable, global, and enterprising society deeply rooted in our national philosophy (MIB) towards realising Wawasan Brunei 2035 [2]. There is also an official mascot named MJ in UTB, which is a robotic figure in purple and grey colour.

Each school under UTB has a unique colour that is used on student ID cards for identification purposes. The Figure 1 below shows the colour identity of schools under UTB.

SCHOOL	COLOURS
Faculty of Engineering	
School of Business (SoB)	
School of Computing and Informatics (SoCI)	
School of Applied Sciences and Mathematics (SASM)	
School of Design (SDe)	
Centre for Communication, Teaching, and Learning (CCTL)	

Fig. 1. UTB's school colour identity

UTB School of Design launched in 2018 with programmes in Architecture and Product Design, providing engineering and creative arts modules using both practical and theoretical approaches. In 2021, the Fashion Design and Technology programme was added. The programmes offered for undergraduate programmes are BSc (Honours) in Architecture, BSc (Honours) in Product Design, and BSc (Honours) in Fashion Design and Technology, and for graduate programmes offered are Master of Architecture, Master of Science by Research, and Doctor of Philosophy (PhD) [2].

1.3 Melayu Islam Beraja (MIB)

MIB has been the way of life for the people of Brunei Darussalam for the last 650 years and is still relevant today. MIB, which stands for *Melayu* (Malay), *Islam*, and *Beraja* (Monarchy), is a concept that was officially introduced in '*Perlembagaan Negeri Brunei 1959*' in 1957 and has since then been the national philosophy of Brunei Darussalam [3]. MIB is also the state and nature of life that is consistent within ethical, political, social, economic, and moral systems that are centred and based on Islam [4].

The examples for visual identity representation through MIB elements can be from Brunei's national flag, *Panji-panji* (emblem), national flower, Simpur, which is featured on the one-dollar note, traditional patterns and motifs such as *Bunga Air Muleh* which is the most recognizable pattern in Brunei's traditional setting, *Kain Tenunan* which is Brunei's traditional textile, Islamic geometric pattern, and also Arabic calligraphy.

Brunei's national flag measures 72 inches long by 36 inches wide, with the State Crest in red at the centre [5]. The flag features four colours, which are red (crest), yellow (trapezium), white (upper parallelogram), and black (lower parallelogram). There are five main components in the national emblem: the flag, the royal umbrella, the wings, the hands, and the crescent moon, and under the crescent moon is a scroll, both of which have yellow Arabic letters inscribed on them. [6]

1.4 Market Research

The market research of a functional sculpture may include the usage of innovative materials such as Graphene, Advanced ceramic, Mycellium, Self-healing materials, Bioplastics, and biocomposites [7]. It can also include interactive elements such as a lighting device that uses motion sensors to turn on and off, a thoughtful and user-centric design in which a survey or feedback and analyses are implemented into the design, and as well as prioritizing sustainable practice to reduce the environmental impact of sculptures and promote a greener future.

2. Methodology

2.1 Survey Data Analysis

An online survey titled "Functional Sculpture for UTB SDe Survey" was distributed on Monday, 3rd February 2025, and closed on Wednesday, 5th February 2025. There are a total of 12 questions and 15 collected responses. The survey aims to gather UTB SDe user feedback about their preference or idea about the proposed Functional Sculpture for UTB SDe that can serve as a guide for the concept idea generation process.

The respondent results indicated that the primary function of the functional sculpture should serve as a decorative purpose, followed by interactive display, and then multifunctional. The respondent also thinks that it is very important for the functional sculpture to reflect both the UTB SDe's values and the MIB principles, as well as the elements of creativity and modern technology. The respondents also favoured the MIB element of *Bunga Simpur* and *Bunga Air Muleh* to be represented in the functional sculpture. The overall emotions or thoughts the respondent would like the sculpture to evoke in those who interact with it is the feeling of excitement, and it can contribute as a space for interaction and collaboration to the UTB SDe's identity.

2.2 Competitive Analysis

Product benchmarking and positioning are carried out to evaluate and strategically place a product within the market to ensure it meets customer needs and stands out from competitors, to identify areas of improvement, and enable strategic development of the product roadmap. A total of 3 products were used to identify strengths, weaknesses, and opportunities for improvement and how the product fits into the market.

2.3 Product Dissection

The selected existing product for dissection is a home décor Arabian incense electrical Bakhoor Oud burner because it can serve not only as a sculpture because of its beautiful aesthetic, but also as a perfume diffuser, which carries the idea of a functional sculpture. This enables better design decisions by studying its components, materials, construction, and functionality.

3. Design Process

3.1 Concept Statement

As the purpose is to design a functional sculpture for UTB's SDe community, the design objectives are to design a visually appealing functional sculpture, integrate the elements of UTB's values, SDe ethos, and MIB, the sculpture is suitable for indoor use and is for a tabletop setting, and lastly, to choose a concept theme and style that is suitable.

3.2 Concept Idea

The first three concept ideas for the functional sculpture are shown in Figure 2 below. The design has subtle differences, but overall shares the same idea of functionality, minimalist aesthetics, and supporting sustainable materials. It is also inspired by the concept of the *Simpur* flower petals' shape, which are then developed into different forms without straying too far from the initial petal shape. The other characteristics of the sculpture are that it has the function of a lighting device where it has 3 layers of acrylic that light up to represent three programme areas offered in SDe, an aroma diffuser, and an NFC scanner to access the infographic of the sculpture, and lastly, it uses wood, which is a sustainable choice of material.

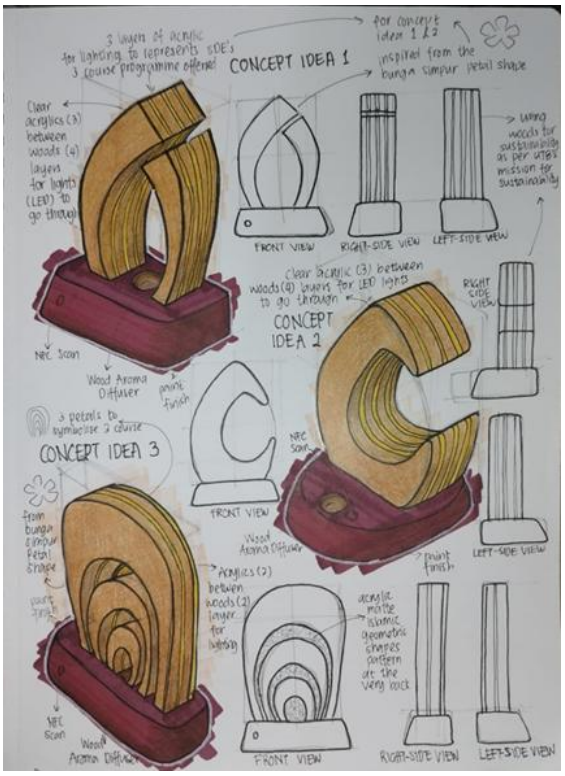


Fig. 2. Sketch 1, 2, and 3: Simpur petal inspired functional sculpture sketches

The next two concept ideas for the functional sculpture are shown in the figures below. The first sculpture in Figure 3 has the function of a bookshelf holder as well as for decoration purposes. It is inspired by the Simpur flower petals, where each petal symbolizes the six faculties in the UTB.

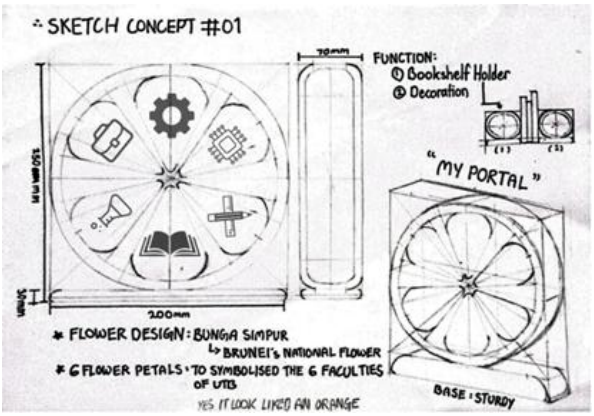


Fig. 3. Sketch 1: Six Simpur flower petals inspired functional sculpture sketches

The second concept idea in Figure 4 below serves as a lighting device with a shade and utilises the UTB official mascot, AJ, for the chosen concept. The sculpture is rotatable, symbolising a world that is always rotating, where the design can also enhance the user experience.

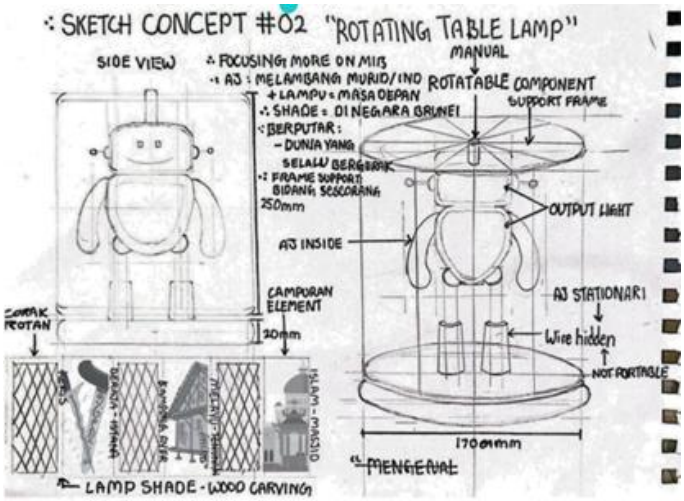


Fig. 4. Sketch 2: AJ inspired functional sculpture sketches

The third concept idea in Figure 5 below has a swirl design and has a hook ball feature with a total of six hooks that represent the six faculties in the UTB. It also has the rattan pattern along the swirl.

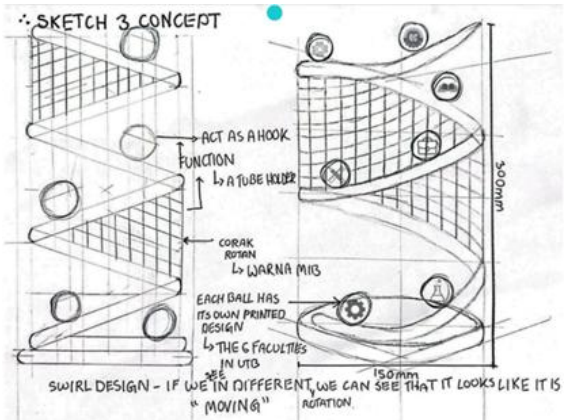
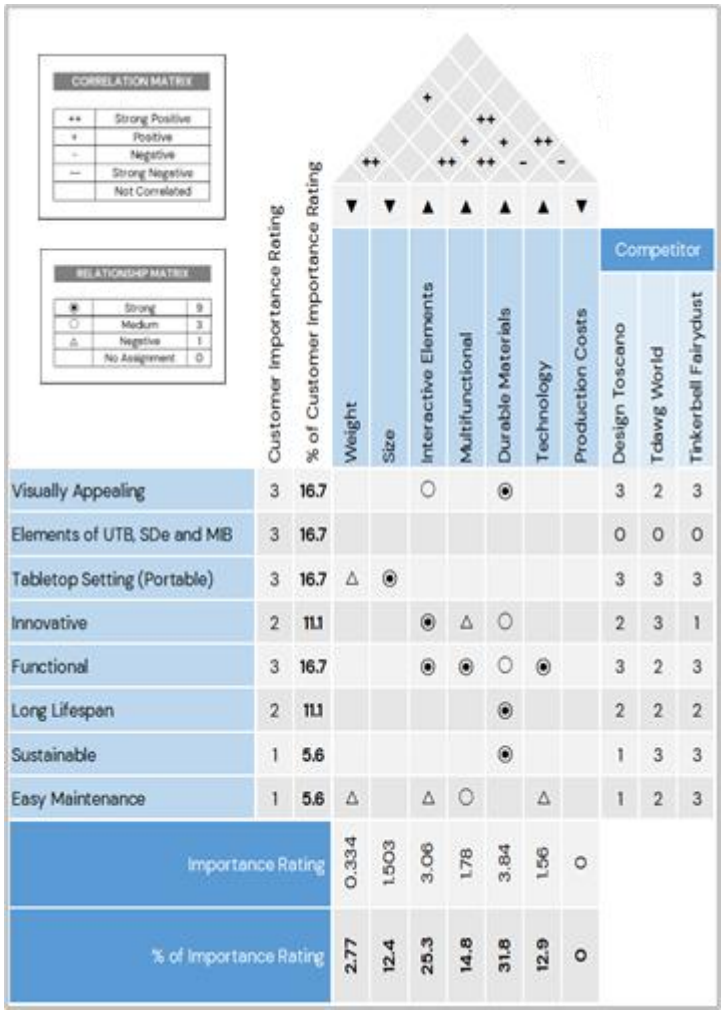


Fig. 5. Sketch 3: Swirl design functional sculpture sketches

3.3 Concept Idea Evaluation

The evaluation methods are using the House of Quality (HoQ) and the Pugh method. Below is the HoQ shown in Figure 6 and the Pugh method shown in Figure 7 for the first three sketches. From the HoQ evaluation, the three most fundamental functional sculpture elements requirements are based on material's durability (31.8%), elements of interactions (25.3%), and are multifunctional (14.8%). And from the Pugh method evaluation, sketch 2 is chosen with a net score of 14 points compared to sketches 1 and 3 with a net score of 13 points each.



CORRELATION MATRIX

++	Strong Positive
+	Positive
-	Negative
--	Strong Negative
	Not Correlated

RELATIONSHIP MATRIX

◉	Strong	9
○	Medium	3
△	Negative	1
	No Assignment	0

	Customer Importance Rating	% of Customer Importance Rating	Weight	Size	Interactive Elements	Multifunctional	Durable Materials	Technology	Production Costs	Competitor: Design Toscano	Competitor: Tdawg World	Competitor: Tinkerbell Fairydust
			▼	▼	▲	▲	▲	▲	▼			
Visually Appealing	3	16.7			○		◉			3	2	3
Elements of UTB, SDe and MIB	3	16.7								0	0	0
Tabletop Setting (Portable)	3	16.7	△	◉						3	3	3
Innovative	2	11.1			◉	△	○			2	3	1
Functional	3	16.7			◉	◉	○	◉		3	2	3
Long Lifespan	2	11.1					◉			2	2	2
Sustainable	1	5.6					◉			1	3	3
Easy Maintenance	1	5.6	△		△	○		△		1	2	3
Importance Rating			0.334	1.503	3.06	1.78	3.84	1.56	0			
% of Importance Rating			2.77	12.4	25.3	14.8	31.8	12.9	0			

Fig. 6. HoQ table 1

SKETCH EVALUATION						
No.	Criteria	Description	Datum	Sketch 1	Sketch 2	Sketch 3
1	Alignment with SDe Values	Represents UTB values, SDe's ethos, and MIB elements	0	+	+	+
2		Reflects creativity and innovation	0	+	+	+
3	Aesthetic Appeal	Visually engaging and can enhances the ambiance of the school environment	0	+	+	+
4	Required Tabletop Size Setting	Dimensions are align with ergonomic and functional needs	0	+	+	+
5	Innovation	Unique and original concept that differentiates it from common sculptures	0	+	+	+
6		Integrates new materials, forms, or interactive elements	0	+	+	+
7		Offers a novel user experience or engagement method	0	+	+	+
8	Functionality	Serves a practical purpose beyond being a sculpture	0	+	+	+
9		Ergonomic and user-friendly design	0	+	+	+
10	Interactivity	Encourages user engagement through touch, movement, or digital interaction	0	+	+	+
11	Sustainability	Uses eco-friendly, upcycled, or biodegradable materials	0	+	+	+
12		Designed for long-term durability and minimal environmental impact	0	+	+	+
13	Material Selection	High-quality and suitable materials for intended use and durability	0	+	+	+
14	Ease of Maintenance	Requires minimal upkeep for cleanliness and functionality	0	-	+	-
		Net Score		13	14	13
		Rank		2	1	2
		Chosen Design		×	√	×

Fig. 7. Pugh table 1

Below is the HoQ shown in Figure 8 and the Pugh method shown in Figure 9 for the final three sketches. From the HoQ evaluation, the three most fundamental functional sculpture elements requirements are based on the elements of interactions (34.5%), are multifunctional (27.6%), and the material's durability (19%). And from the Pugh method evaluation, sketch 2 is chosen with a net score of 10 points compared to sketch 1 with a net score of 8 points, and sketch 3 with a net score of 3 points.

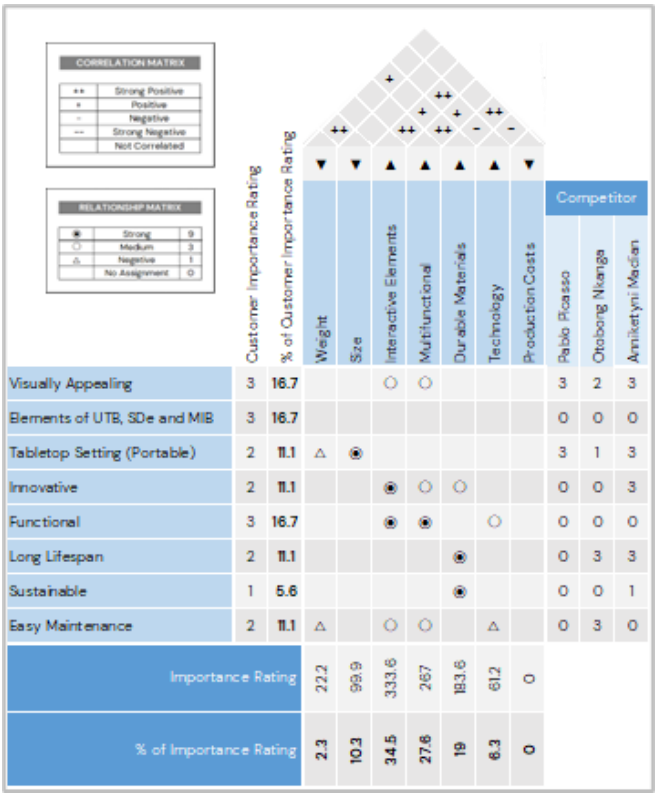


Fig. 8. HoQ table 2

SKETCH EVALUATION						
No.	Criteria	Description	Datum	Sketch 1	Sketch 2	Sketch 3
1	Alignment with SDe Values	Represents UTB values, SDe's ethos, and MIB elements	0	+	+	-
2		Reflects creativity and innovation	0	0	+	-
3	Aesthetic Appeal	Visually engaging and can enhances the ambiance of the school environment	0	-	+	-
4	Required Tabletop Size Setting	Dimensions are align with ergonomic and functional needs	0	+	0	-
5	Innovation	Unique and original concept that differentiates it from common sculptures	0	+	+	0
6		Integrates new materials, forms, or interactive elements	0	-	+	+
7		Offers a novel user experience or engagement method	0	0	+	0
8	Functionality	Serves a practical purpose beyond being a sculpture	0	+	+	+
9		Ergonomic and user-friendly design	0	+	+	0
10	Interactivity	Encourages user engagement through touch, movement, or digital interaction	0	-	+	0
11	Sustainability	Uses eco-friendly, upcycled, or biodegradable materials	0	0	0	0
12		Designed for long-term durability and minimal environmental impact	0	+	0	-
13	Material Selection	High-quality and suitable materials for intended use and durability	0	+	+	0
14	Ease of Maintenance	Requires minimal upkeep for cleanliness and functionality	0	+	0	+
			Net Score	8	10	3
			Rank	2	1	3
			Chosen Design	×	√	×

Fig. 9. Pugh table 2

3.4 Concept Development

By referring to the two chosen concept ideas from previous sketches, two new concept ideas are developed. Both sketches are inspired by the concept of the Simpur flower petals' shape and a rotating element. The functional sculpture serves three purposes: it functions as a lighting device, an aroma diffuser, and includes an NFC scanner for accessing the sculpture's infographic. It also uses wood as a sustainable material choice. The difference between both sketches lies in the overall design of the Simpur petal interpretation and the function of the rotating element, where the rotating element of the sketch 1, as shown in Figure 10, is used for an aroma diffuser and meanwhile the sketch 2, as shown in Figure 11, it functions as a rotating lamp shade.

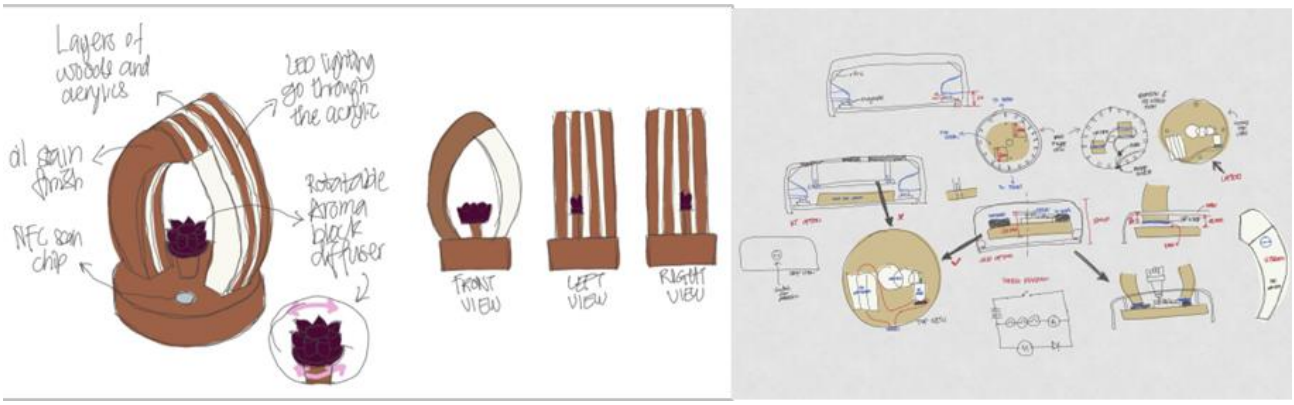


Fig. 10. Sketch 1: Simpur inspired with rotating aroma diffuser functional sculpture sketch

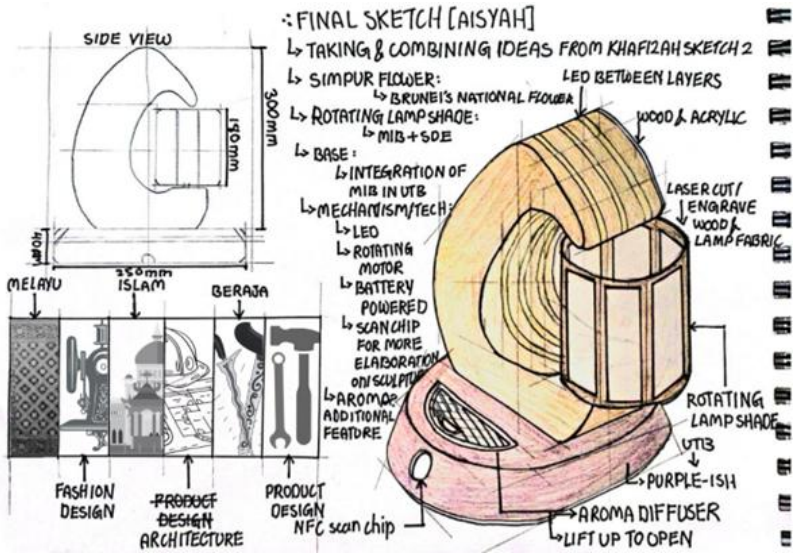


Fig. 11. Sketch 2: Simpur inspired with rotating lamp shade functional sculpture sketch

The evaluation method used is the Pugh method. Below is the Pugh table as shown in Figure 12 for both sketches. From the evaluation, sketch 2 is chosen with a net score of 15 points compared to sketch 1 with a net score of 14 points.

SKETCH EVALUATION					
No.	Criteria	Description	Datum	Sketch 1	Sketch 2
1	Alignment with SDe Values	Represents UTB values, SDe's ethos, and MIB elements	0	+	+
2		Reflects creativity and innovation	0	+	+
3	Aesthetic Appeal	Visually engaging and can enhances the ambiance of the school environment	0	+	+
4	Required Tabletop Size Setting	Dimensions are align with ergonomic and functional needs	0	+	+
5	Innovation	Unique and original concept that differentiates it from common sculptures	0	+	+
6		Integrates new materials, forms, or interactive elements	0	+	+
7		Offers a novel user experience or engagement method	0	+	+
8	Functionality	Serves a practical purpose beyond being a sculpture	0	+	+
9		Ergonomic and user-friendly design	0	+	+
10	Interactivity	Encourages user engagement through touch, movement, or digital interaction	0	+	+
11	Sustainability	Uses eco-friendly, upcycled, or biodegradable materials	0	+	+
12		Designed for long-term durability and minimal environmental impact	0	+	+
13	Material Selection	High-quality and suitable materials for intended use and durability	0	+	+
14	Ease of Maintenance	Requires minimal upkeep for cleanliness and functionality	0	+	+
15	Preference	Which design is more preferred	0	0	+
			Net Score	14	15
			Rank	2	1
			Chosen Design	×	√

Fig. 12. Pugh table 3

4. Final Design

Below are the rendered functional sculptures using both AutoCAD Inventor, as shown in Figure 13, and Enscape software, as shown in Figure 14, where the rendered image using Enscape shows the scale comparison of the functional sculpture to a human model.

Fig. 13. Rendered final design of functional sculpture using AutoCAD Inventor software

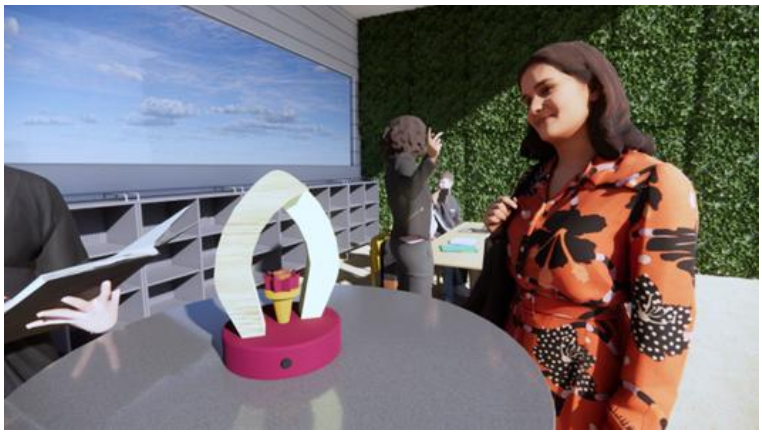


Fig. 14. Rendered final design of functional sculpture using Enscape software

4.1 Design Features

The Figure 15 below is the feature of the final design of the Functional Sculpture for SDe.

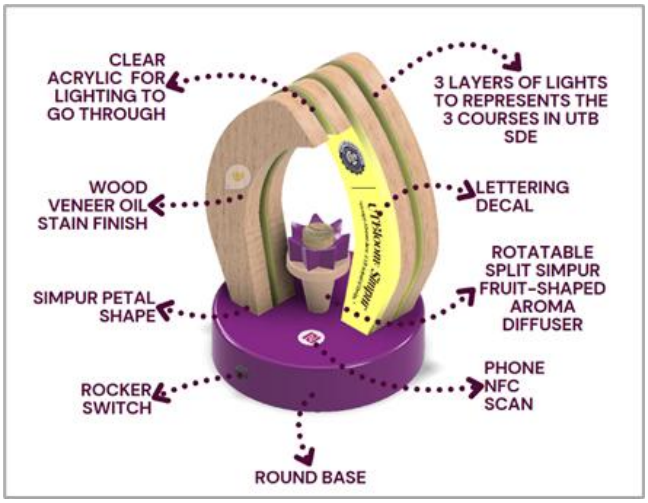


Fig. 15. Design feature

The image inside the NFC can be accessed by tapping the phone onto the NFC logo on the functional sculpture. The Figure 16 below shows the infographic information when scanning the NFC.

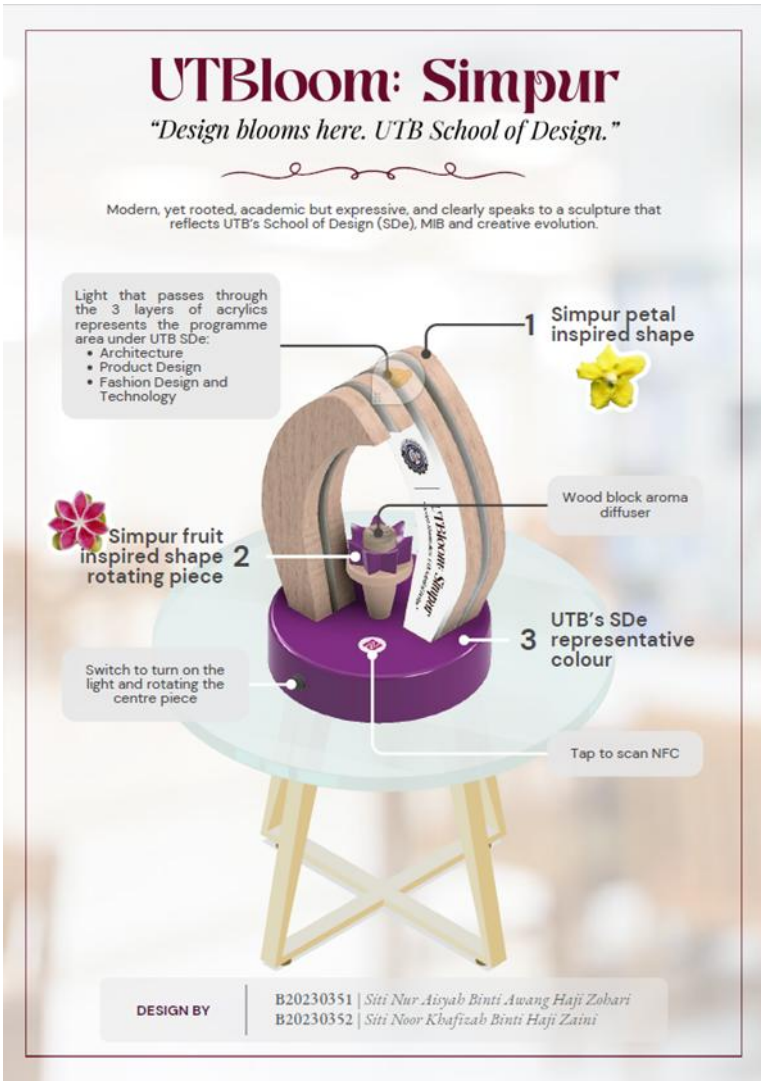


Fig. 16. NFC tap to scan document output

4.2 Design Conceptual Meaning

The design concept for this functional sculpture is both the Simpur flower and the UTB's SDe characteristics. The overall shape is inspired by the Simpur flower petals, which are made using layers of wood and clear acrylic sheets, where each of the clear acrylic sheets that lights up represents the programme area under UTB's SDe, which are Architecture, Product Design, and Fashion Design and Technology. For the rotating piece, the design is inspired by the Simpur fruit, whose seed-filled core sustains birds and other wildlife. This function is reinterpreted in the sculpture through a central block of wood diffuser inside the centre piece that releases scents into the environment. The colour used in the sculpture is Tyrian purple, which is the identification colour code used for UTB's SDe.

The lettering on the functional sculpture as shown in Figure 17 is divided into two which are the name of the functional sculpture, "UTBloom: Simpur", and the tagline "Design blooms here. UTB School of Design." For the sculpture name, the meaning of "UTBloom" is a fusion of UTB and bloom, to tie the university directly to growth, creativity, and nature. Whereas the "Simpur" is linking the concept of blooming to Brunei's national flower and making it meaningful. For the tagline "Design

blooms here. UTB School of Design.", it elegantly reinforces the concept of growth, creativity, and place. "Blooms" echoes the sculpture's nature inspiration, while "here" grounds it in UTB, creating a sense of pride and belonging.

Fig. 17. Lettering of the final design

4.3 Low-fidelity Prototype

The Figure 18 below shows the low-fidelity prototype of the final design functional sculpture that is made using cardboard, plastic sheets, and a fake flower.

Fig. 18. Low-fidelity prototype of the final design

4.4 Final Assembly

For the assembly process, first cut the wood and clear acrylic into the Simpur petal-shaped intended using a laser engraving machine. Then, decal image or use a clear sticker of the lettering onto one piece of the clear acrylic sheet on one side of the acrylic sheet. Next, proceed to spray paint using white colour on the other side of the clear acrylic sheet, and do this for both sides of the remaining clear acrylic sheets. Meanwhile, for the 3D printing the circular base, base cover, and the centre piece using PLA, then fill it with putty and sand it smooth, spray paint with the intended colours and finishes that is tyrian purple for the circular base, base cover, and centre piece (Simpur fruit), light brown for the centre piece (body), and lastly for the wood sheet, use wood varnish.

Then, the laser-cut wood and acrylic sheets are glued together to form the intended assembly and placed onto the slots allocated at the top of the circular base. Next, the 5V LED strip light is

attached at the bottom of each clear acrylic layer using glue, and the switch is placed in the slots at the circular base. For the rotating centre piece, the system uses a mini-DC motor with gears and an aluminium wire mechanism, which are placed on top of circular wood and a 4-AA battery holder at the bottom of the circular wood. Connect all the wirings, screw the circular wood inside the circular base, and glue the magnets onto the allocated areas at the circular base and the base cover. Finally, close the circular base using the base cover to complete the assembly. The Figure 19 below shows the final assembly of the final design functional sculpture.

Fig. 19. Final assembly of the final design

4.5 Testing

A test was carried out on whether the functional sculpture's functionality and appearance were up to the expectations needed. From the test, feedback on several improvements needed to be made to achieve a better outcome. First are the motor problems, which it easily led to faults, and therefore, a high-quality DC motor is required to operate smoothly. Next is the surface of the woods and acrylic sheets at the edges, which is not smooth enough and needs to be sanded smooth to the touch. Finally, the 5V LED light strip is not operated using the 4-AA batteries but uses a USB connection; therefore, a suitable 5V LED light strip is needed to achieve the portable requirement of the functional sculpture.

5. Conclusion

The "UTBloom: *Simpur*" functional sculpture successfully brings together aesthetics and functionality, offering users a visually engaging and interactive experience. Its role extends beyond being just an installation—it serves as a display sculpture and a design showcase that aligns well with the values of the UTB's SDe and MIB. As a result, the sculpture contributes meaningfully to the environment, both in function and form, enhancing the SDe atmosphere even though some improvement is needed.

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The authors would like to express their sincere gratitude to the School of Design (SDe) and the Faculty of Engineering, Universiti Teknologi Brunei (UTB), for their invaluable support throughout the course of this project. Special thanks are extended to the academic and technical staff for their continuous assistance, insightful feedback, and for providing access to the necessary equipment and facilities. Their support was instrumental in both the conceptual development and practical execution of this

work. The authors also appreciate the encouragement and collaborative spirit of all parties involved, which contributed significantly to the success of this project.

References

[1] L. R. Rogers. "Sculpture." *Encyclopedia Britannica*, last modified January 21, 2025.
[2] Universiti Teknologi Brunei**.** *UTB Prospectus 2024.* 2024. Accessed January 27, 2025.
[3] D. M. H. b. M. Melayong**.** "Konsep Melayu Islam Beraja: Perspektif Sejarah." *Media Permata*, 2018. Accessed January 27, 2025.
[4] Melayong, Muhammad Hadi MD. "Melayu Islam Beraja: asas perpaduan hidup bermasyarakat dan bernegara di Brunei Darussalam." *SOSIOHUMANIKA: Jurnal Pendidikan Sains Sosial dan Kemanusiaan* 7, no. 1 (2014): 55-64.
[5] "Flag of Brunei." *Wikipedia*, last modified 2024. Accessed January 27, 2025.
[6] Jabatan Adat Istiadat Negara Brunei Darussalam. "Bendera dan Panji-panji." Accessed January 25, 2025.
[7] M. KD. "Innovative Materials to Know in the Product Design World." *Strate School of Design*, July 30, 2024. Accessed January 29, 2025.