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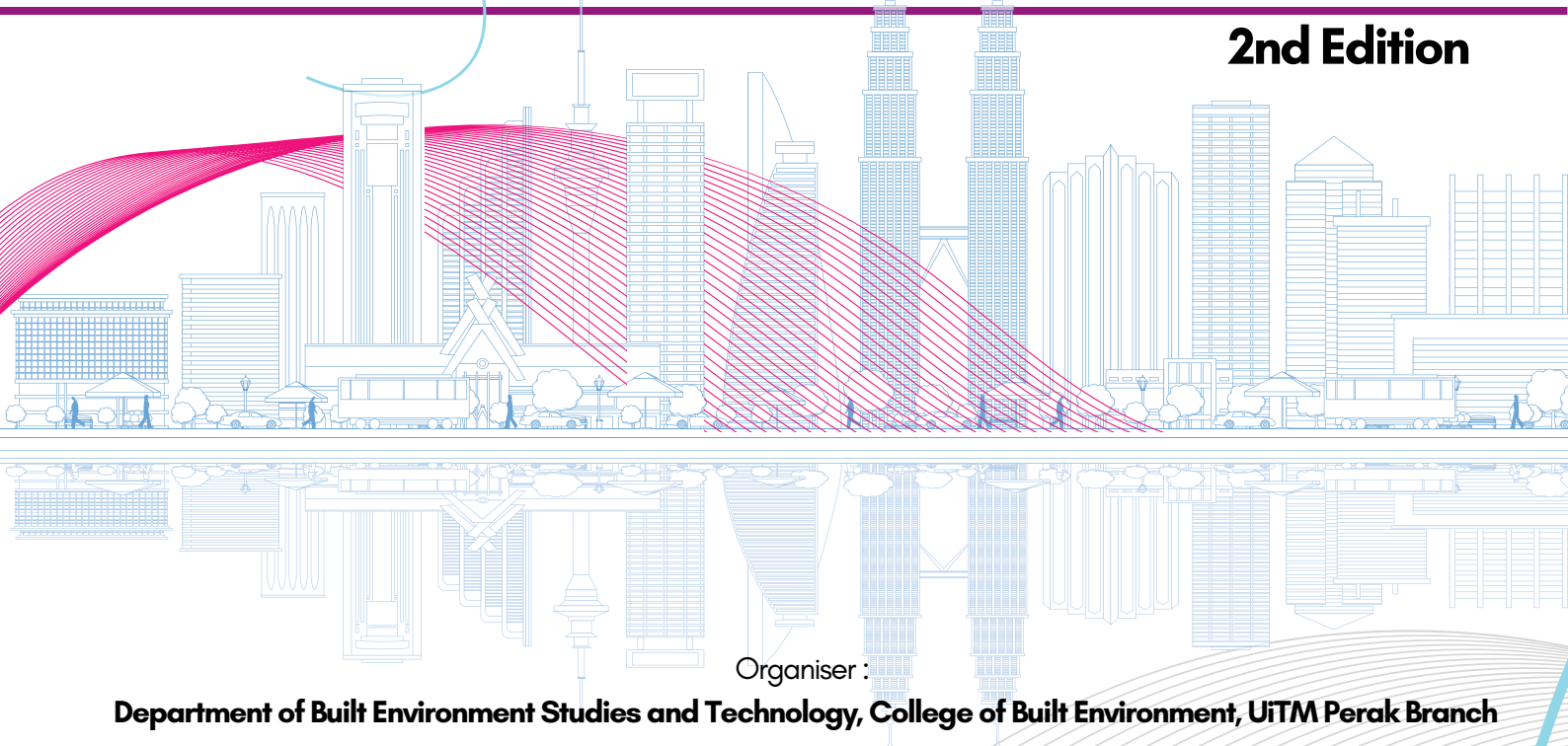
Cawangan Perak

e - Proceedings



Proceeding for International Undergraduates Get Together 2024 (IUGeT 2024)
"Undergraduates' Digital Engagement Towards Global Ingenuity"

2nd Edition



Organiser :

Department of Built Environment Studies and Technology, College of Built Environment, UiTM Perak Branch

Co-organiser :

INSPIRED 2024. Office of Research, Industrial Linkages, Community & Alumni (PJIMA), UiTM Perak Branch

Bauchemic (Malaysia) Sdn Bhd

Universitas Sebelas Maret

Universitas Tridianti (UNANTI)

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Abstract

This magic chair called “chadder” is a versatile piece of furniture that combines the functions of a chair and a step ladder. This innovative design allows the chair to be easily converted into a step ladder by unfolding parts of the structure. This dual-purpose furniture is especially useful in small spaces that values the importance of maximizing utility and space. Made from sturdy materials, it is designed to provide both comfortable seating and reliable support for reaching higher places. The simplicity and practicality of the design makes it an excellent solution for homes, offices, or workshops where flexibility and functionality are needed. This innovation embodies a multifunctional furniture design that seamlessly transitions between a chair and a step ladder. By employing a clever folding mechanism, it optimizes space efficiently without compromising on utility. Constructed from durable materials, it offers a practical solution for environments where versatility is paramount. The dual-purpose nature of the design caters to both seating needs and elevated access, reflecting a blend of ergonomic efficiency and structural integrity. This concept exemplifies the integration of form and function in modern furniture design, addressing the dynamic requirements of contemporary living spaces. This innovative furniture combines the functionalities of a chair and a step ladder into a single, versatile unit. Designed with a focus on practicality and space efficiency, the chair-step ladder hybrid addresses the needs of modern living where space optimization is crucial. Constructed from durable bamboo, known for its strength and eco-friendly properties, the design emphasizes sustainability without compromising aesthetics. The transformation mechanism is both intuitive and robust, allowing users to switch between the chair and step ladder modes effortlessly. The chair mode provides ergonomic seating, ensuring comfort for extended use, while the step ladder mode offers stability and safety for reaching higher shelves or performing household tasks. This multifunctional furniture piece not only enhances the functionality of living spaces but also contributes to sustainable living by utilizing eco-friendly materials and reducing the need for multiple separate items. The chair-step ladder hybrid is a testament to innovative design, blending utility, sustainability, and style in one compact form.

Keywords: *chair, ladder, ergonomic, dual-purpose, aesthetics*






1. INTRODUCTION

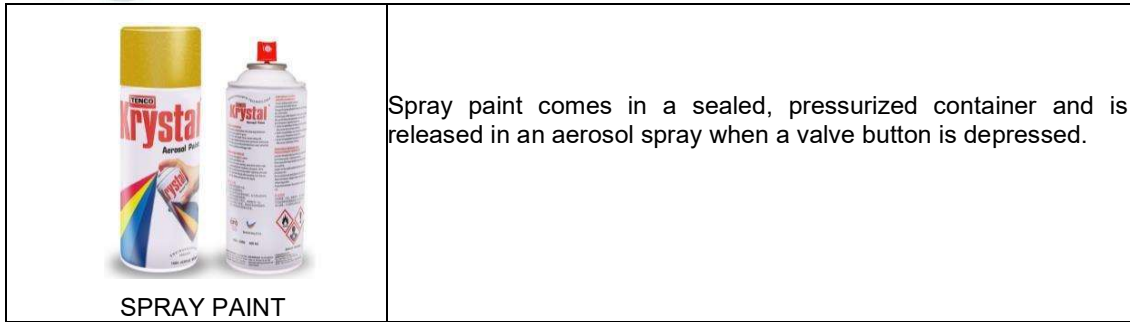
A chair is a seat with a back, intended for one person. It is one of the most ancient forms of furniture, dating from the 3rd dynasty of ancient Egypt (c. 2650–c. 2575 BC). And a ladder. No one knows when the ladder was invented. However, the earliest evidence was traced in Valencia, Spain. The Spider Caves displayed a Mesolithic rock painting of a ladder that's about 10,000 years old. This painting showed two men using a ladder to access a wild honeybee nest, most likely to get honey. The painting shows a flexible ladder that was made up of some kind of grass (Derek Tokarz, 2016).

2. MATERIALS AND METHODS

Table 1 shows the material and description of the innovative product.

Table 1: Material and description of the innovative product.

 <p>HARDWOOD</p>	<p>Hardwood is a type of wood from angiosperm trees. These are typically found in temperate and tropical woodlands with large leaves. They are primarily evergreen in the tropics and subtropics, but predominantly deciduous in temperate and boreal latitudes.</p>
 <p>WOODEN POLE</p>	<p>A wooden pole is the stem of a tree which has the proper natural characteristics to meet the engineering and design standards to support a utility line; and has been harvested, shaped, treated, and certified to meet the need.</p>
 <p>METAL ROD</p>	<p>Metal rods are specially formed pieces of metal and alloy that are shaped into a rod-like aesthetic, hence the name.</p>
 <p>FASTENER</p>	<p>A fastener is a hardware device that mechanically joins or affixes two or more objects together.</p>
 <p>WOOD DOWEL PINS</p>	<p>Wood dowel pins are typically identified as cylindrically shaped pieces of wood. Dowel pins come in various forms and sizes and are most often used to reinforce joints and shelves.</p>



The construction process involves several key steps (Syazni, 2017)

- 1) Planning and Measurement: Detailed drawings and precise measurements are crucial. Standard dimensions are considered.
- 2) Cutting and assembly: the hardwood is cut to the appropriate size to make it comfortable to sit and step as a leader, and the wooden and metal pole is cut to its sizing to support the load.
- 3) Finishing: All surfaces are sanded smoothly and treated with spray paint to protect against weathering and to match the aesthetic.

3. RESULTS AND DISCUSSION

Figure 1 shows a design concept of a chair with a retractable or folding step. The step is integrated into the chair and can be extended or folded when needed, providing additional height or support for someone who might need to reach higher. The arrow in the sketch indicates the direction in which the step unfolds from beneath the chair. The chair-step ladder hybrid is a testament to innovative design, blending utility, sustainability, and style in one compact form.

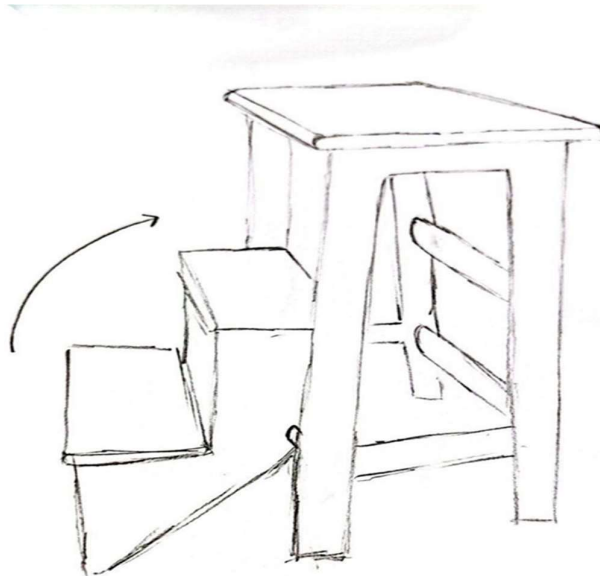


Figure 1. The sketch of the innovative product

Figure 2 and Figure 3 show the elevation view and the front view of the innovation product.



Figure 2 & Figure 3. The elevation view and front view of the innovative product

Meanwhile, figure 4 shows the folded view of the product.



Figure 4. The folded view of the innovative product

4. CONCLUSION

In summary the folding bench, with built-in furniture that serves as both a chair and a step ladder offer a creative solution for enhancing outdoor living areas. Its design maximizes functionality while keeping a footprint making it perfect for settings like small patios, gardens and urban balconies. This project does not only provide a guide on creating adaptable outdoor furniture but also inspires further innovations in space-saving design. The combination of a chair and a step ladder on the bench brings benefits.

Firstly, it enhances the furniture's usefulness by offering seating that can easily transform into a step ladder for reaching spots like shelves, hanging plants or outdoor storage units. This dual functionality is especially valuable in spaces where efficient use of every inch matters more than furniture. Additionally, the bench's foldable and compact design ensures effortless storage and portability making it convenient for those who need to move furniture or have limited storage space. The build quality and considerate design guarantee reliability, for both seating and ladder functions catering to various outdoor activities and tasks.

Future improvements may include incorporating adjustable features such as customizable seating heights or step ladder angles to cater to different user preferences and needs. Additionally, integrating storage compartments within the bench structure may provide even more functionality, offering a space to keep gardening tools, cushions, or other outdoor essentials neatly tucked away yet easily accessible.

Overall, this project highlights the potential of multi-functional furniture to transform outdoor living spaces, making them more adaptable, efficient, and enjoyable. The combination of a chair and a step ladder within a single piece of furniture exemplifies how innovative design can meet diverse needs, promoting a more organized and versatile approach to outdoor living.

5. ACKNOWLEDGMENT

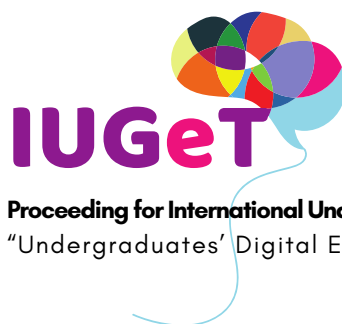
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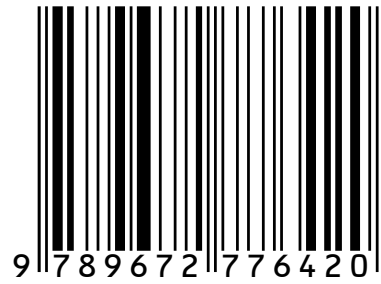
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