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THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025

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EMBUNARA: A SUSTAINABLE, SOLAR-POWERED AROMATIC DIFFUSER MADE FROM RAW STONEWARE CERAMIC

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ABSTRACT

Embunara is a sustainable, solar-powered aromatic diffuser crafted from raw bisque-fired stoneware ceramic. Inspired by traditional reed diffusers and guided by eco-conscious design principles, it eliminates the need for sticks, flames, or external heat sources by utilizing the natural porosity of unglazed ceramic for passive scent diffusion. A detachable solar module powers a low-energy fan to enhance aroma dispersion, while also functioning as a portable power bank. Rooted in Malay philosophical beliefs about the human connection to the earth, *Embunara* integrates cultural narrative, material innovation, and functional simplicity to propose a safer and environmentally responsible alternative to conventional diffusers.

Keyword: Sustainable Product Design, Ceramic Aromatic Diffuser, Solar-Powered Innovation

1. INTRODUCTION

This project introduces Embunara, a sustainable and innovative reinterpretation of the conventional aromatic diffuser. Inspired by traditional reed diffusers and guided by sustainability principles, Embunara addresses safety and environmental concerns through a design that integrates cultural values, modern functionality, and low-energy consumption.

The design reflects the Malay philosophical belief “We come from the soil, and to earth we return”. This philosophy is expressed using earthly, grounded materials and natural forms.

2. METHODOLOGY

Embunara is crafted from bisque-fired stoneware ceramic, intentionally left unglazed to preserve its porous texture. This texture allows the surface to function as a passive diffuser, gradually releasing aroma without the need for sticks, heat, or open flame, providing a safer and user-friendly alternative.

Beneath the main ceramic body is a ventilated compartment housing a detachable solar-powered module. This unit drives a low-energy fan that aids in scent diffusion and functions as a portable power bank. Its modular design allows for easy charging and maintenance, thus reducing reliance on continuous electrical sources and disposable batteries.

The development process explores material behavior, optimal ceramic wall thickness, and the balance between passive and active diffusion systems.

3. FINDINGS

Preliminary tests on the prototype confirm its core functionality. Aroma diffusion occurs consistently through the porous surface, while the fan system enhances the intensity and reach of the scent when activated.

User feedback highlights the product's stability, safety, and aesthetic appeal. Areas for improvement include aroma retention efficiency, solar fan durability, and ergonomic placement of the solar module.

As the physical prototype is still under development, the accompanying visual is an AI-generated rendering intended to illustrate the proposed design concept and material qualities:

Figure 1 AI-generated conceptual visualization of the product design.

4. CONCLUSION

Embunara exemplifies the integration of sustainable material innovation, cultural narrative, and modern functionality in everyday product design. It not only presents an alternative to conventional diffusers but also represents a new paradigm in sustainable product design.

By harmonizing practicality, aesthetic expression, and cultural philosophy, Embunara positions itself as a symbol of ethical, environmentally conscious, and culturally rooted living.

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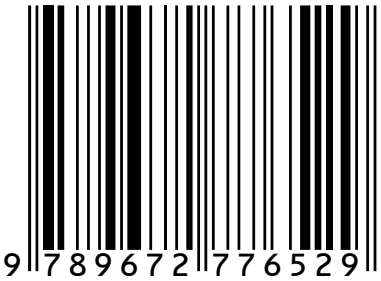

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