

I-URIP 2025
**INTERNATIONAL UNDERGRADUATE RESEARCH
INNOVATION, INVENTION AND DESIGN**

**UNDERGRADUATES
PIONEERING
TOMORROW'S
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E-BOOK OF EXTENDED ABSTRACTS

GREENLOOP (KITCHEN COMPOSTER)

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ABSTRACT

The GreenLoop kitchen composter is an innovation in the field of responsible consumption and production. This innovation helped reduce food waste from piling up in landfills. By combining advanced blades, a BioEnzyme carbon filter, a smart sensor, and a built-in digital screen, this product offers convenience to users. With GreenLoop's built-in digital screen and odor filter as the novelty, it stands out distinctly from its competitors. This paper provides a detailed description of the product, including a technology description that explains how the product works, and offers an in-depth explanation of the novelty.

Keywords: *Kitchen Composter, Smart Sensor, Advanced Blade, Built-in Digital Screen, BioEnzyme Carbon Filter*

INTRODUCTION

The originality of the GreenLoop kitchen composter lies in its ability to transform food waste management into a sustainable yet practical lifestyle solution. Conventional composting methods are often considered inconvenient due to their requirement for outdoor space, lengthy decomposition cycles, and frequent manual handling. For many urban households, especially those living in apartments or small homes, traditional compost bins are impractical due to limited space and the risk of attracting pests. In addition, the unpleasant odors and hygiene concerns associated with food waste often discourage users from composting altogether, resulting in increased food waste disposal in landfills. These challenges highlight the need for an innovative solution that can make composting easier, cleaner, and more adaptable to modern living conditions.

GreenLoop addresses these problems with a novel, user-centered design that combines efficiency, creativity, and sustainability. Its advanced motor with optimized blades accelerates the composting process, while the BioEnzyme carbon filter ensures an odor-free experience that eliminates one of the major barriers to indoor composting. The built-in digital screen with multiple modes provides users with the flexibility to choose composting cycles that match their specific needs, whether for gardening purposes, energy savings, or achieving same-day results. Beyond functionality, its sleek and minimalist design blends effortlessly into contemporary kitchens, reimagining composting as an attractive and convenient practice rather than a burdensome chore. By directly addressing the root causes of user dissatisfaction with traditional composting, GreenLoop demonstrates evident originality and uniqueness in its concept, design, and application.

PRODUCT DESCRIPTION

The uniqueness of this product is further emphasised through its built-in digital screen, which enhances usability and sets it apart from other home composters. Users can select between three creative modes tailored to their needs: Dry Mode, which produces soil-ready compost in 3.5 to 6 hours; Eco Mode, which uses 50% less energy than conventional systems; and Rapid Mode, which completes composting within 8 to 12 hours for same-day use. Additional features, such as a temperature display with safety alerts and a composting time tracker, provide real-time control and monitoring, ensuring both safety and convenience.

This integration of innovative technology demonstrates GreenLoop's creativity in merging practical functions with modern innovation.

In addition to smart controls, GreenLoop integrates an advanced motor with optimised blades that accelerate the breakdown of organic waste into fine, nutrient-rich compost. This innovation not only shortens the overall processing time but also ensures higher efficiency in handling various types of food waste, from vegetable scraps to more challenging organic materials. Complementing this is the BioEnzyme carbon filter, made from natural ingredients, which effectively eliminates odors while extending its lifespan to nearly 55 cycles, equivalent to approximately four months of use, compared to the standard 45 cycles of conventional filters. By reducing the frequency of filter replacements, GreenLoop lowers maintenance costs while minimising environmental waste. Through this combination of advanced technology, smart usability, and eco-friendly design, GreenLoop delivers a practical yet sustainable solution for modern households, redefining composting as both efficient and accessible.

PROJECT OBJECTIVES

The objectives of creating this home composter are to promote sustainable living through effective food waste management and to minimize the effort and time required to manage home food waste.

GreenLoop is a highly relevant innovation that addresses two significant challenges in Malaysia's urban landscape including the increasing volume of household food waste and the impracticality of traditional composting methods in high-rise living environments. As urban households face space limitations and growing environmental concerns, managing organic waste becomes difficult. GreenLoop offers a compact and intelligent solution designed specifically for Malaysian food waste types such as rice, spicy leftovers, and fibrous vegetables. Its innovative composting modes, BioEnzyme filtration system, and real-time monitoring features make it an efficient and hygienic alternative that supports national sustainability efforts.

The benefits of GreenLoop extend across multiple sectors and user levels. For individual households, it provides convenience, cost savings, and improved indoor air quality. Property developers can incorporate it into eco-housing packages to enhance market appeal. Urban farmers and gardening enthusiasts gain access to nutrient-rich compost, which reduces their dependence on chemical fertilisers. Educational institutions and community organisations can use GreenLoop as a tool for environmental education and outreach. Government agencies may also find it valuable for pilot programs and public campaigns focused on waste reduction and sustainable living. Its innovative features and modular design enable future scalability in broader applications, such as smart city initiatives.

NOVELTY AND COMMERCIAL POTENTIAL

The feasibility of implementing this eco-minded solution lies in its strong alignment with the growing awareness of sustainability in Malaysia, particularly in urban areas. Kuala Lumpur and Penang serve as strategic markets due to their distinct yet complementary characteristics. Penang's established leadership in waste management and recycling provides an informed consumer base that is receptive to eco-friendly innovations, making it an excellent ground for meaningful product feedback. Meanwhile, Kuala Lumpur, with its larger population density and diverse demographics, offers scalability potential and access to a wide range of eco-lifestyle partnerships. Together, these two regions provide the right mix of readiness, awareness and market diversity to test, refine and expand the kitchen composter bin.

This further strengthens this product's market potential with its innovative technology. The built-in digital screen not only enhances user convenience with multiple composting modes, including Eco mode that reduces energy use by 50%, Rapid mode for same-day composting, and Dry mode for gardening. However, at the same time, it promotes safe and efficient use through real-time temperature and hazard monitoring. Aside from that, GreenLoop produces the BioEnzyme carbon filter, which lasts longer than conventional alternatives, reducing both replacement frequency and maintenance costs. Therefore, making it more affordable and sustainable for households. Lastly, combined with advanced blade technology, the composter ensures faster and finer waste breakdown, reducing landfill dependency while encouraging communities to adopt a zero-waste lifestyle. On a broader scale, these innovations contribute to global

sustainability goals by minimizing household food waste, lowering carbon emissions and promoting greener consumption habits.

RECOGNITION AND INTELLECTUAL CONTRIBUTION

The GreenLoop kitchen composter has emerged as an effective solution to address the increasing domestic food waste problem. This approach has been well-received in academic pitching sessions due to its user-friendly design, affordable price, and potential to contribute to Malaysia's environmental innovation scene. This early recognition suggests its capacity to create substantial value within the regional sustainability and green technology sectors. From a conceptual standpoint, GreenLoop proposes a streamlined composting methodology designed for metropolitan living spaces. The proposed composting solution's user-friendliness and compact design set it apart from competitors. Furthermore, it establishes the foundation for future intellectual property development centered on product architecture and operational procedures through its environmentally conscious approach. These theoretical characteristics position it as a potentially viable environmental solution.

The proposed initiative demonstrates clear correspondence with multiple United Nations Sustainable Development Goals (SDG). GreenLoop promotes cleaner, healthier urban living by providing households with an effective way of handling food scraps, which helps achieve SDG 11 (Sustainable Cities and Communities). It supports SDG 12 (Responsible Consumption and Production) by encouraging waste reduction and turning kitchen waste into reusable compost. It aligns with SDG 13 (Climate Action) by helping to reduce methane emissions that would otherwise come from landfills. This clear connection to the SDGs strengthens their relevance not only as a business venture but also as an initiative that creates social and environmental value. Having established initial concept validation and positive reception, GreenLoop is well-positioned to pursue development opportunities, including innovation competitions, prototype funding, and partnerships with sustainability-oriented organisations. It is a potentially profitable endeavor that could also benefit the environment and nearby communities by fusing creative environmental engineering with realistic financial considerations.

FRAMEWORK AND METHODOLOGY

The development of the GreenLoop kitchen composter was guided by the New Product Development (NPD) framework, which provided a structured and systematic approach to product innovation. The process began with problem identification and research, where the increasing issue of household food waste and the shortcomings of existing composting solutions were examined. This initial stage ensured that the project was addressing a relevant and significant market need. Building on this, research and development (R&D) was carried out to explore sustainable technologies and integrate eco-friendly mechanisms into the design. These early steps established the foundation for a user-centred product that combines functionality with environmental responsibility.

The second stage involved product design and concept validation. Here, the GreenLoop was conceptualized with unique features, including an advanced motor with optimised blades, a BioEnzyme carbon filter, and a built-in digital display. To evaluate consumer perceptions, concept testing was conducted through a structured survey, which was electronically distributed via Google Forms across various platforms, including WhatsApp and Telegram. The survey explored household profiles, awareness, interest, purchase intention, and perceived value. The results offered data-driven insights and recommendations, ensuring that the design aligned with consumer expectations while highlighting areas for improvement before further investment in production.

The final stage of the methodology centered on prototype development, test marketing, and commercialization readiness. A working prototype was built to validate the technical feasibility and usability of the design. This prototype was subjected to test marketing, during which feedback from target users was gathered to assess its real-world acceptance and potential market performance. Iterative refinements were made based on this feedback, ensuring the product was not only functional but also appealing to consumers.

By employing the NPD framework, the project ensured that each stage of product creation was supported by empirical evidence, iterative refinement, and user feedback, thereby enhancing the clarity, soundness, and appropriateness of the methodology in addressing real-world challenges of food waste management.

IMPACT AND SUSTAINABILITY

The GreenLoop Kitchen Composter has strong potential to create a positive long-term impact by mitigating household food waste and providing a more sustainable waste management practice. It reduces the amount of organic waste generated by consumers daily and converts it into nutrient-rich compost. This will prevent a substantial amount of organic waste from ending up in landfills and thus reduce the methane emissions. This promotes a cleaner environment, leading to lower greenhouse gas emissions, improved hygiene in urban areas, and an overall healthier living environment over a prolonged period of usage, especially in high-density residential occupancy areas.

This project aligns with UN Sustainable Development Goal (SDG) 7: Responsible Consumption and Production, by promoting households to consume more sustainably through reducing food waste at the source. With the help of GreenLoop, users can transform unavoidable waste into a useful resource for gardening and urban agriculture, thereby bringing the circular economy to their communities. It encourages users to separate waste with greater mindfulness and utilize resources more sustainably, while promoting conscious household consumption with a reduced environmental impact.

CONCLUSION

In conclusion, the GreenLoop kitchen composter offers an efficient and practical approach to managing household food waste. The integration of an innovative sensor, a built-in digital display, a BioEnzyme carbon filter, and advanced blades offers comprehensive solutions to various waste management challenges. Ultimately, the product aims to support environmental preservation by promoting effective food waste management practices.

ACKNOWLEDGEMENT

The authors would like to express their gratitude and thanks to Universiti Teknologi MARA for funding this research under the Young Researchers Grant Scheme (ENT600).

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