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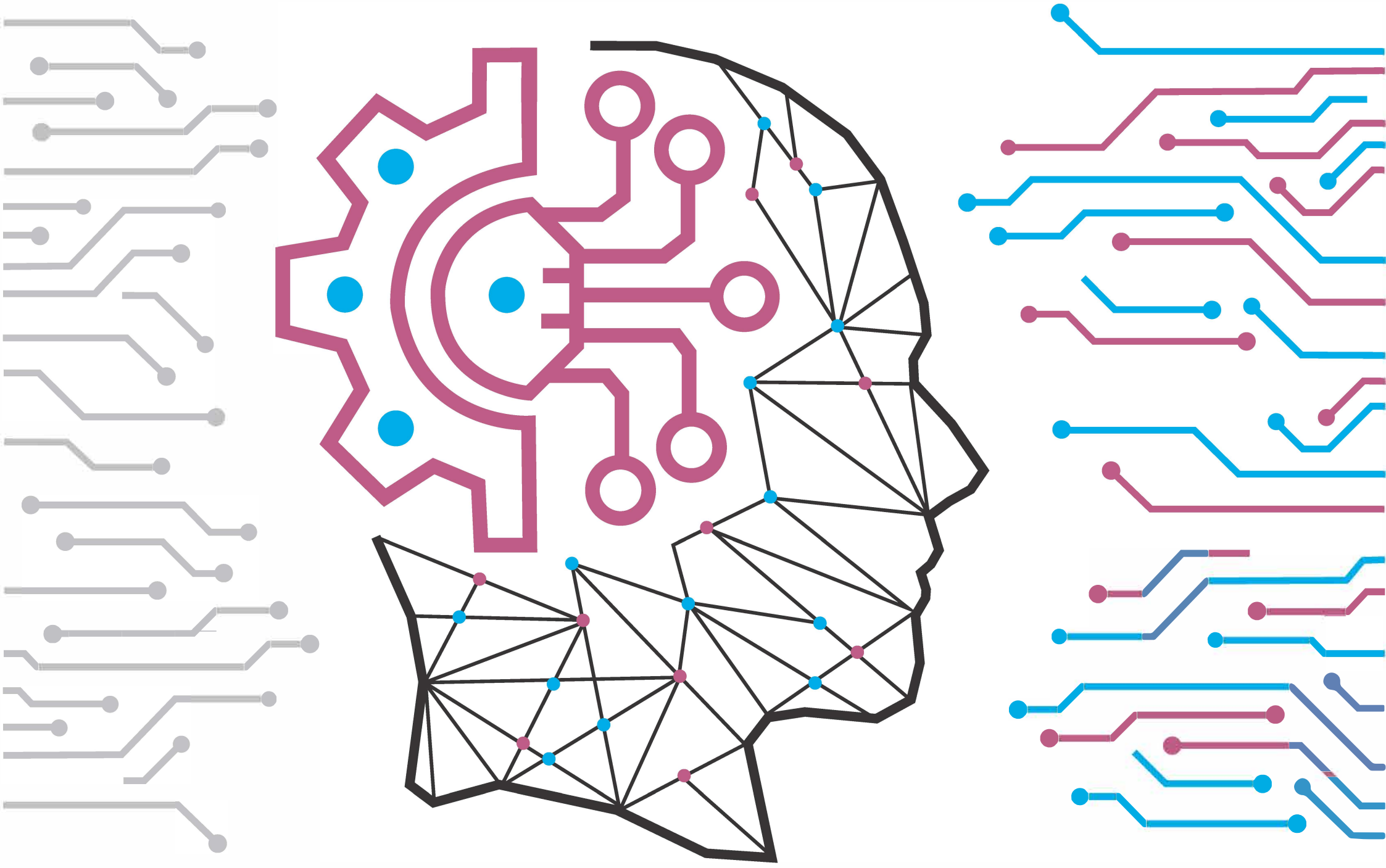

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THE 13TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION 2024

EXTENDED ABSTRACTS

e-BOOK

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THE 13th INTERNATIONAL
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LOW-CARBON LANDSCAPE MANAGEMENT SYSTEM

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ABSTRACT

A low-carbon landscape management system has been developed to assist landscape architects or park managers in managing landscapes with a low-carbon footprint. Effective low-carbon landscape management is crucial for meeting the world agenda in Sustainable Development Goals (SDG) and national low-carbon targets. This innovation consists of three phases of data integration: Phase 1 - planning, Phase 2 – implementation and maintenance, and Phase 3 – low-carbon management. The main objective of this system is to offer complete and integrated data to enhance the value of low-carbon landscapes for plants. This includes providing relevant information such as i) Plant inventory details like plant species, location, size, source, and quantity; ii) Assessing the health and fitness of plants to determine their value; and iii) Calculating the carbon footprint of landscape management to understand plants' contribution to carbon mitigation. Landscape development is vital in mitigating climate change and promoting environmental sustainability by evaluating carbon-saving potential and implementing appropriate landscape development.

Keywords: Low-carbon landscape, Landscape Management, Landscape Maintenance

1. INTRODUCTION

Carbon dioxide, or CO2, is the main gas affecting global warming, negatively impacting the world. Therefore, Malaysia has established the Low Carbon City Framework (LCCF) to address this issue. One of the programs implemented by LCCF is landscape development, such as urban parks, which aim to reduce carbon emissions in urban areas. Parks development is a valuable green infrastructure asset that can benefit communities (Barker et al., 2019; Pristouris et al., 2021). People can improve their health (Nam & Dempsey, 2019) by exercising in parks (Austin et al., 2021). Parks also benefit the environment (Buotte et al., 2020) by reducing the effects of climate change through carbon sequestration by plants (A. Wang et al., 2022; Y. Wang et al., 2021). Ensuring high-quality standards and implementing necessary improvements in urban parks can be challenging. It is crucial to prioritize visitor satisfaction (Hayes & Dockerill, 2020) and effectively manage parks (Machar, 2020), especially regarding the quality of plant carbon sequestration (Liu et al., 2023). Efficient landscape maintenance planning is essential for promoting plant health (Song et al., 2022) and is a vital aspect of park management. Therefore, the Low-carbon Landscape Management System was ideally created to monitor efficient low-carbon landscape performance.

2. METHODOLOGY

2.1 Objectives

The objectives of the innovation are:

i. To help landscape architects implement effective low-carbon landscape development.
ii. To manage and produce quality plants as a source of carbon sequestration.
iii. To reduce the time taken by the park managers to solve plant issues.
iv. To monitor efficient low-carbon landscape performance.
v. To improve the quality of life of communities.

2.2 Innovation: Low-Carbon Landscape Management System

The Low-Carbon Landscape Management System is a technology used to monitor landscape performance by integrating data to enhance the value of low-carbon landscapes. This innovation has three main phases and purposes, which are:

i. Phase 1: Landscape Planning - A comprehensive and systematic database system for plant inventory, including species, location, size, source, and number.
ii. Phase 2: Implementation & Maintenance - Analyzing plants' health by monitoring the growth and maintenance implementation. This allows park managers to identify the factors influencing plant health and vitality and develop strategies to enhance carbon saving.
iii. Phase 3: Low-carbon management - Integrating energy use and petrol consumption in landscape planning and maintenance with the plant growth data to identify the contribution of low-carbon landscape development.

The illustration of the Low-carbon Landscape Management System integration database in Figure 1 shows that each plant in landscape development will have five data components. To keep the database informative and practical, it is recommended that the operator updates the plant data every six months to monitor its progress and identify any potential problems. For low-carbon management, the system uses a carbon calculator from Carbon Footprint Ltd and a tree carbon calculator developed by academic research and the USDA Forest Service. By utilizing the calculator and data from the innovation system, we can estimate the amount of carbon emission produced during the implementation and maintenance phase, the amount of carbon stored, and oxygen generated based on tree age and size. Trees play an essential role in the environment by producing oxygen and serving as a carbon sink, and this tool helps us understand their potential impact.

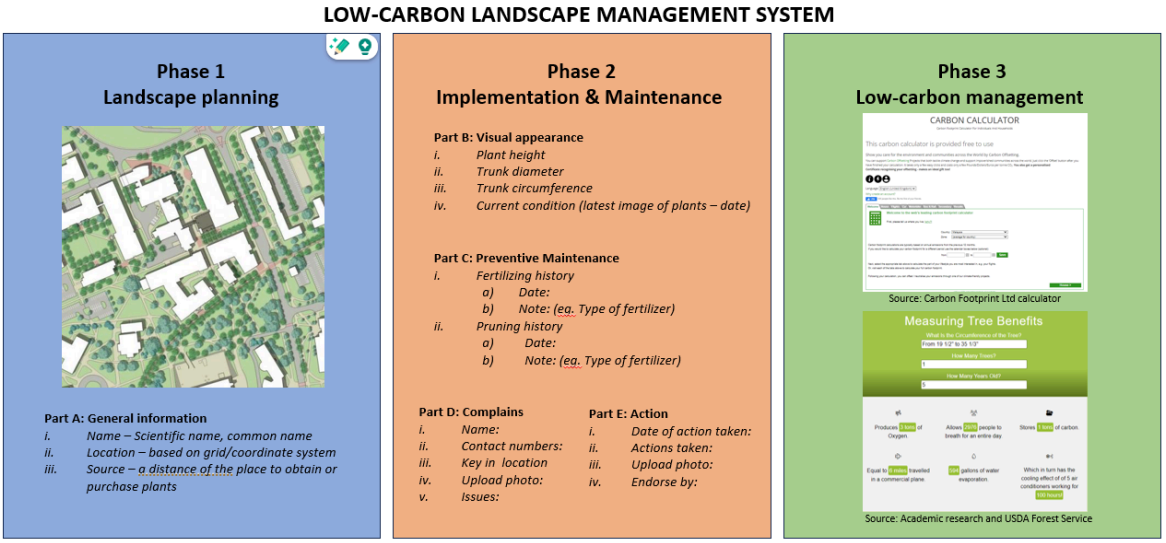

Figure 1 The Illustration of the Low-carbon Landscape Management System integration database.

3. FINDINGS

Following are some advantages of putting the innovation into practice:

i. A systematic database system that records and evaluates plant value in low-carbon landscape approaches.
ii. Park managers can manage, prevent, and solve plant issues effectively.
iii. Improve the quality of landscape development for the community and environment.
iv. Enhance the awareness of low-carbon implementation in community lifestyle.
v. Help to reduce carbon in landscape management and mitigate climate change.

4. CONCLUSION

A low-carbon landscape management system is an integrated system that enhances the beauty of landscape development and provides valuable information about plants. This system is particularly useful for landscape architects or park managers who can efficiently manage their landscape, promote low-carbon development, maintain healthy plants, and enhance the well-being of their communities.

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