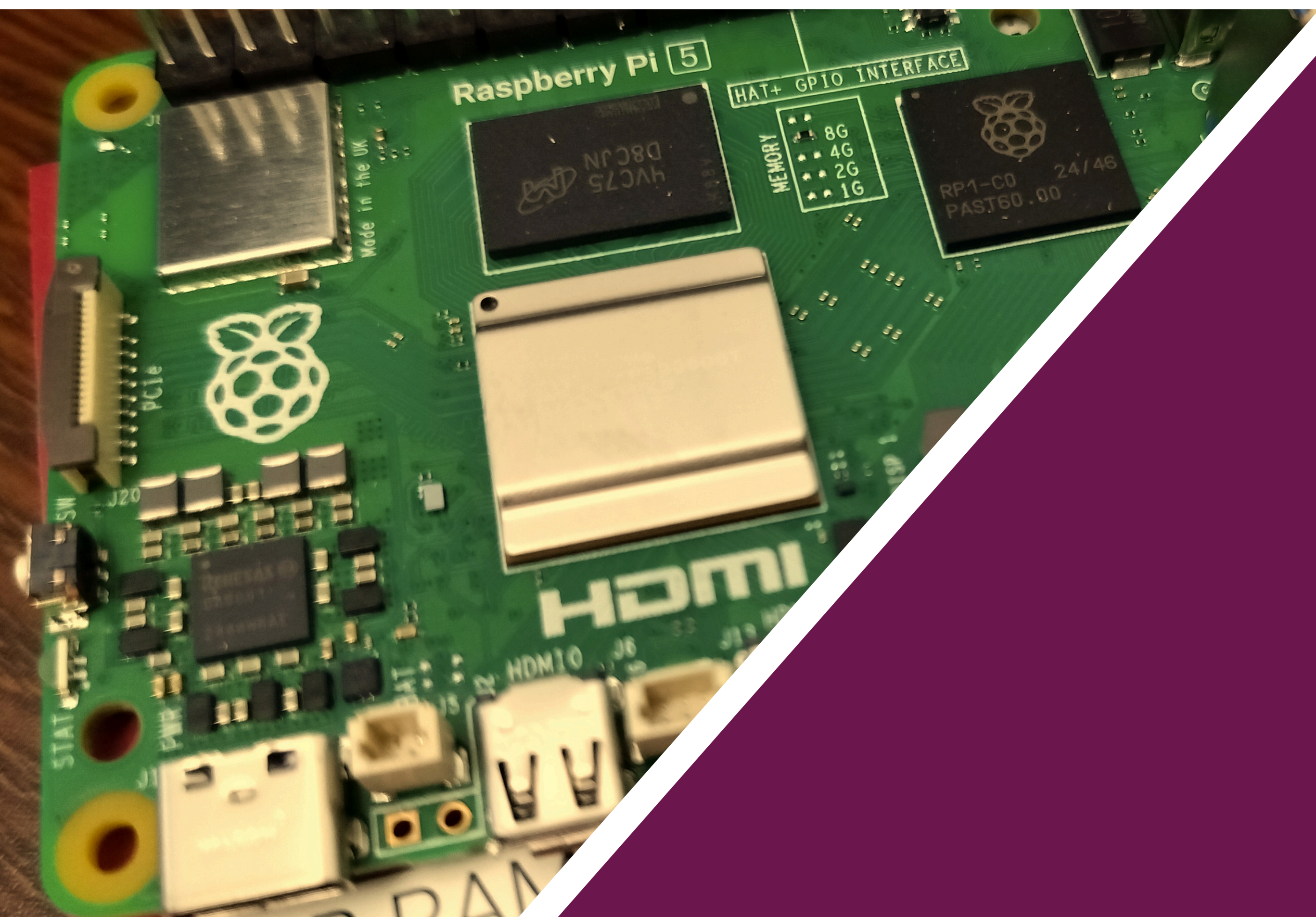




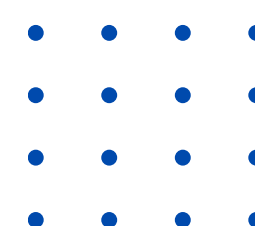
EESEE 2025

10TH ELECTRICAL ELECTRONICS SYSTEMS ENGINEERING EXHIBITION 2025

VOLUME 1



FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
JOHOR BRANCH
PASIR GUDANG CAMPUS



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FOREWORD BY THE PROGRAM CHAIR



Greetings from the Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025).

As the Program Chairs, it is our great pleasure to present this compilation of extended abstracts, showcasing the remarkable projects developed by our final-semester students from the Diploma in Electrical Engineering (Power) and Diploma in Electrical Engineering (Electronics) programs at Universiti Teknologi MARA, Cawangan Johor, Pasir Gudang Campus.

This exhibition marks a significant milestone in our students' academic journey, representing the culmination of years of dedication, perseverance, and learning. It also serves as an essential step toward the successful completion of their diploma studies. The projects featured this year are centered on the theme *Engineering Excellence: Bridging Technology and Life*, reflecting current trends and innovations in the engineering field.

This extended abstract book highlights not only the students' technical expertise but also their creativity, problem-solving skills, and ability to engage meaningfully with peers and industry professionals. Within these pages, you will find a diverse range of projects that embody a unique blend of knowledge, innovation, and practical application.

We warmly invite you to explore this collection, which celebrates the achievements of our aspiring engineers. Welcome once again to the Electrical, Electronics, and Systems Engineering Exhibition 2025. May the insights shared here inspire and pave the way for the next generation of innovative engineers.

Warm regards,

Dr. Fatimah Khairiah binti Abd Hamid

Dr. Atiqah Hamizah binti Mohd Nordin

Program Chairs

Electrical, Electronics, and Systems Engineering Exhibition 2025 (EESEE 2025)



Hybrid Renewable Energy-Controlled System for an Urban Eco Greenhouse

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ABSTRACT

Urban gardening, especially in apartments or townhouses, faces significant challenges such as limited natural light due to scarce windows or surrounding tall buildings. This often hampers the ability of residents to grow healthy plants, which are desired for their aesthetic, air-purifying, and therapeutic benefits. To address this issue, a sustainable system utilizing solar and wind energy is proposed to provide adequate lighting for indoor plants. This technical report documents the design and simulation of an Hybrid Renewable Energy Controlled System for an Urban Echo Greenhouse. The primary of this project are to design a prototype for an Eco Greenhouse system that provide UV light to plant and monitor their condition that incorporates hardware components. The Hybrid Renewable Energy-Controlled System for Urban Eco Greenhouse is an innovative solution designed to enhance the sustainability and productivity of urban agriculture. Utilizing the ESP32 microcontroller, this system integrates multiple sensors and renewable energy sources to create a self-sustaining and responsive greenhouse environment. Key components include an LDR (Light Dependent Resistor) sensor and a PIR (Passive Infrared) sensor, which together enhance the system's security and environmental monitoring capabilities. The LDR sensor ensures efficient UV light provision for plants, while the PIR sensor detects unauthorized movements, triggering alerts through a buzzer and visual notifications on an LCD display. The system is powered by a combination of solar and wind energy, ensuring a renewable and reliable energy source that reduces dependency on conventional power supplies. This multi sensor, renewable energy-based approach provides a comprehensive and adaptable solution for urban greenhouses, promoting eco-friendly practices and ensuring optimal plant growth. The integration of advanced sensor technologies and renewable energy sources not only improves system efficiency but also contributes significantly to environmental sustainability. This abstract encapsulates the core functionalities and benefits of the Hybrid Renewable Energy-Controlled System, highlighting its potential impact on modern urban agriculture.

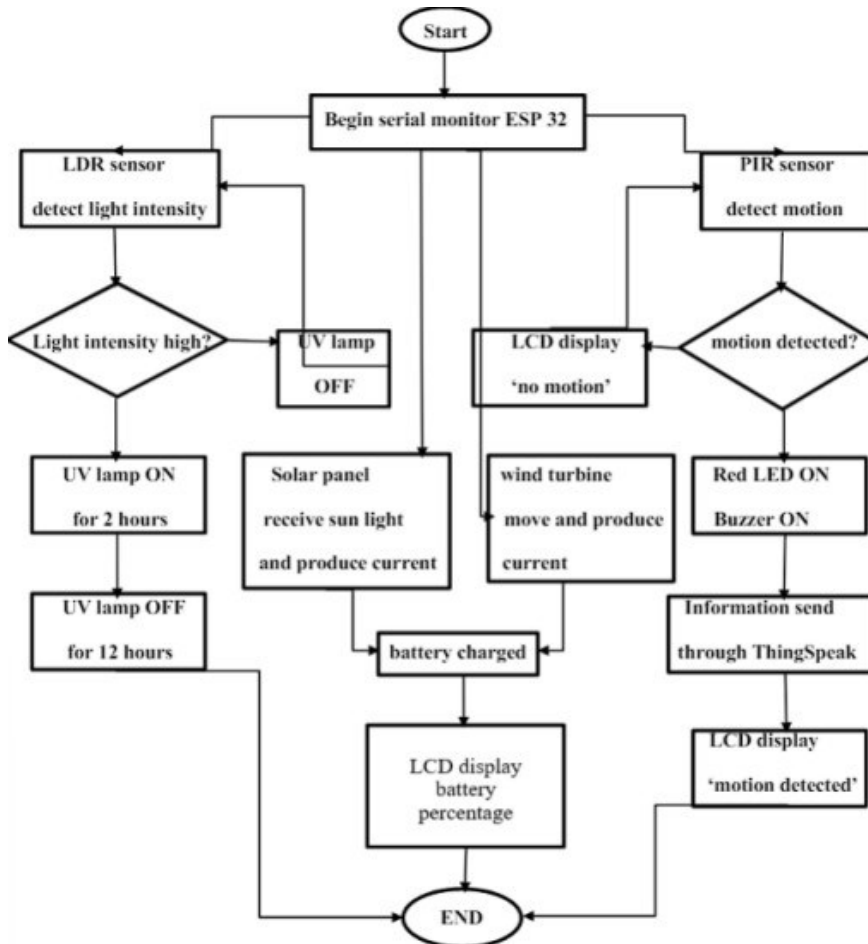
KEYWORDS: Solar energy, wind energy , Urban area, Eco greenhouse safety, ESP 32

PRODUCT DESCRIPTION

The Hybrid Renewable Energy-Controlled System for an Urban Eco Greenhouse is a cutting-edge solution designed to address the challenges of indoor gardening in urban environments, particularly in spaces with limited natural light. This system combines solar and wind energy to power UV lamps that simulate natural sunlight, ensuring plants receive consistent light necessary for photosynthesis and healthy growth, even in low- light conditions. The integration of solar panels and a wind turbine allows for a continuous and renewable energy supply, optimizing energy efficiency and reducing the reliance on traditional electricity sources. The system is equipped with a Light Dependent Resistor (LDR) sensor, which detects insufficient natural light and automatically activates the UV lamps, ensuring optimal lighting for plant health. Additionally, a Passive Infrared (PIR) motion sensor is included to monitor the environment for potential threats, such as intruders or animals, providing real-time alerts to safeguard the plants. With the integration of ThinkSpeak, the system enables remote monitoring, allowing users to track and manage their greenhouse conditions from anywhere. This hybrid system not only supports sustainable energy practices but also helps reduce carbon footprints and electricity bills, making it both environmentally friendly and cost-effective. Combining high-tech automation with renewable energy, the Hybrid Renewable Energy-Controlled System for

an Urban Eco Greenhouse provides an innovative, reliable solution for urban gardeners seeking to maintain a healthy, thriving indoor garden regardless of external weather conditions

PICTURES/ SCHEMATIC DIAGRAMS/ FLOW CHARTS/SCREENSHOTS/ GRAPHS AND OTHER RELATED VISUALS



NOVELTY AND UNIQUENESS

The Hybrid Renewable Energy-Controlled System for an Urban Eco Greenhouse is unique and novel due to its innovative combination of solar and wind energy, which ensures a reliable, continuous power supply for indoor gardening, even during cloudy weather or at night. Unlike many traditional systems that rely on a single energy source, this hybrid approach makes it more robust and energy-efficient. The system also incorporates advanced sensor technology, such as the Light Dependent Resistor (LDR) sensor, which automatically detects low light conditions and activates UV lamps to ensure plants always receive the optimal amount of light for growth. Additionally, the Passive Infrared (PIR) motion sensor enhances security by detecting movement around the greenhouse, alerting users to potential threats like intruders or animals. Another standout feature is its integration with ThingSpeak, which allows users to remotely monitor and control the system, offering real-time updates and alerts for easy management. This combination of renewable energy, smart sensors, and remote monitoring makes it a highly adaptable and sustainable solution for urban gardeners, particularly in spaces with limited natural light. The system's compact and customizable design also makes it suitable for a wide range of users, from individual homeowners to businesses looking to grow their own

plants. Overall, the product's focus on energy efficiency, sustainability, and convenience sets it apart as an innovative solution in the growing field of urban agriculture.

BENEFIT TO MANKIND

The Hybrid Renewable Energy-Controlled System for an Urban Eco Greenhouse offers significant benefits to mankind by promoting sustainable urban living and contributing to environmental preservation. By harnessing renewable energy sources like solar and wind power, this system reduces dependence on non-renewable energy, helping to lower carbon emissions and combat climate change. It provides an innovative solution for growing fresh, healthy plants in urban areas where space and natural light are limited, enhancing food security and encouraging local, sustainable agriculture. Additionally, the system's energy-efficient design lowers electricity consumption, which can reduce household energy bills and help individuals adopt more eco-friendly lifestyles. With the ability to monitor plant health and safety remotely, the system also empowers people to easily integrate gardening into their busy lives, improving access to green spaces and supporting mental well-being. By fostering self-sufficiency in food production and promoting environmental stewardship, this system contributes to a healthier, more sustainable future for urban communities and the planet as a whole reliable energy even at night or on cloudy days.

CONCLUSION

The system uses smart sensors like the LDR sensor, which detects low light and activates the UV lamps to keep plants properly lit. The PIR sensor also improves security by detecting movement around the greenhouse and alerting users to potential threats. With the ThinkSpeak platform, users can remotely monitor and control the greenhouse, receiving alerts for quick action when needed. To make the system even better, adding sensors for humidity, soil moisture, and temperature could help provide a more complete picture of the growing environment. Using predictive technology could also help the system better anticipate plant needs. Conducting trials and gathering feedback from urban gardeners would ensure the system works well in real-life situations. Overall, this system offers a sustainable and efficient solution for urban gardening, combining renewable energy with smart technology to support plant health and promote a greener, more sustainable urban lifestyle.

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