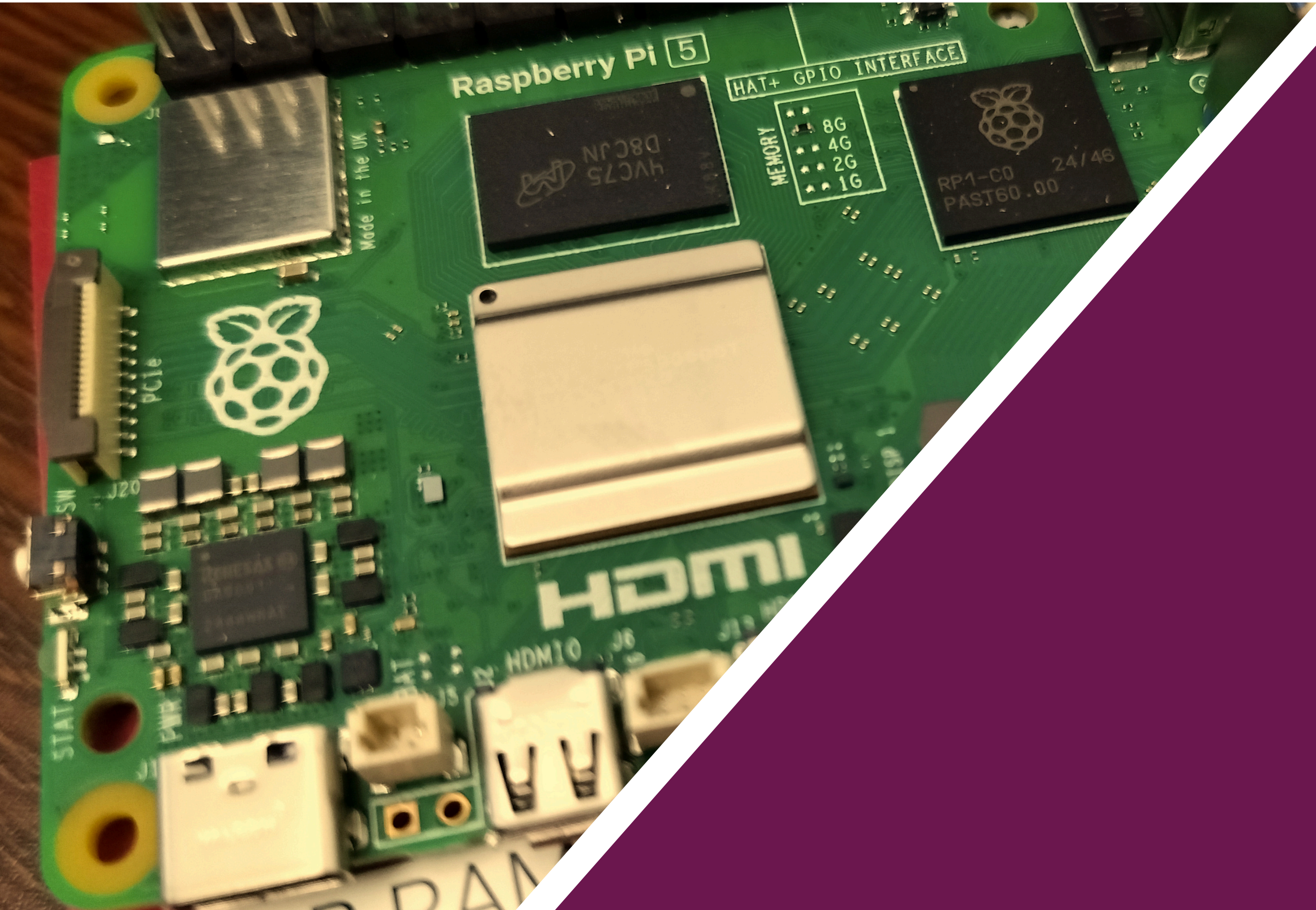




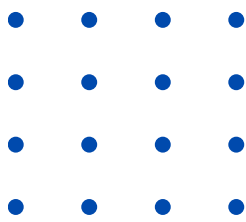
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EESEE 2025

10TH ELECTRICAL ELECTRONICS SYSTEMS
ENGINEERING EXHIBITION 2025
VOLUME 1



FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
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Authors

Noor Hafizah Khairul Anuar, Fazlinashatul Suhaidah binti Zahid, Nor Diyana Binti Md Sin, Zakariah Yusuf, Siti Musliha Ajmal Binti Mokhtar, Hanunah Binti Othman, Khairul Kamarudin Hasan, Masmaria Binti Abdul Majid, Siti Aminah Binti Nordin, Muhammad Asraf Bin Hairuddin, Muhammad Zairil Bin Mohd Nor, Nor Affida Binti M.Zin, Nur Asfahani Binti Ismail, Zahari Abu Bakar, Kamaru Adzha Bin Kadiran, Ezril Hisham Bin Mat Saat, Muhammad Rajaei Dzulkifli, Nur Amalina binti Muhamad, Norbaiti binti Sidik, Rozi Bin Rifin, Zatul Iffah Binti Abd Latiff, Sufian bin Mohamad, Norhalida Binti Othman, Nurul Nadia Binti Mohamad, Norlee Husnafa Binti Ahmad, Fatimah Khairiah Abdul Hamid, Wan Suhaifiza Binti W. Ibrahim, Fadila Binti Mohd Atan, Siti Aliyah Binti Mohd Saleh, Mastura Omar, Rijalul Fahmi Bin Mustapa, Atiqah Hamizah Binti Mohd Nordin, Muhammad Zairil Bin Muhammad Nor, Shakira Azeehan Binti Azli, Siti Hazurah Binti Indera Putra, Suhaili Binti Beeran Kutty.

Editors

Sufian bin Mohamad
Kamaru Adzha Bin Kadiran

Book Graphic Designer

Kamaru Adzha Bin Kadiran



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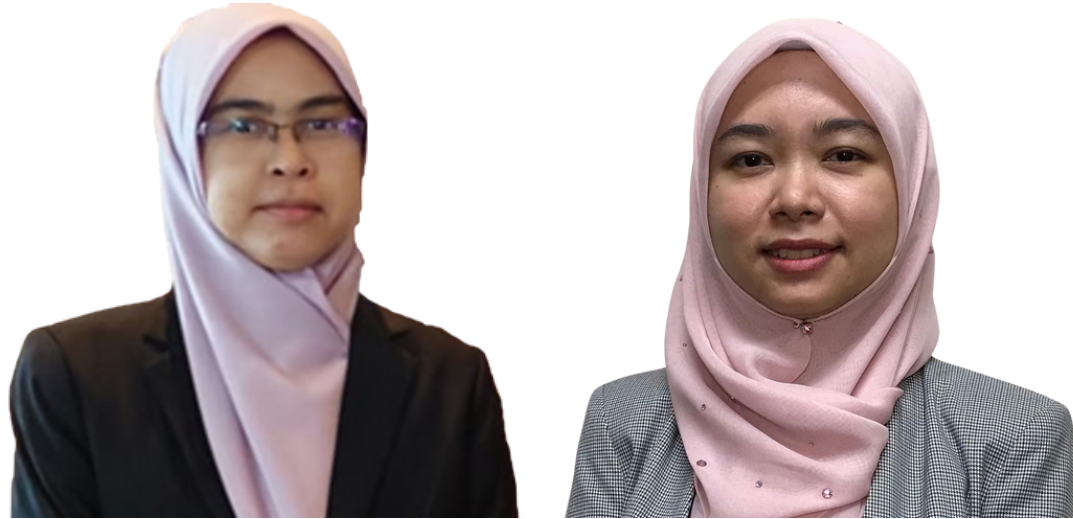
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FOREWORD BY THE PROGRAM CHAIR



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)



GUI PV Model using MPPT Solar Charge Controller and Boost Converter in MATLAB App Designer

Muhammad Luqman Hakim Bin Mohamad Nazri, Dr. Norlee Husnafa Binti Ahmad
Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA, Pasir Gudang, Johor.

2022894846@isiswa.uitm.edu.my

ABSTRACT

This project introduces a user-friendly Graphical User Interface (GUI) designed for a Photovoltaic (PV) system model featuring a Maximum Power Point Tracking (MPPT) solar charge controller and a boost converter. The GUI enables simulation and analysis of the PV system's performance under various environmental conditions. The MPPT algorithm ensures maximum energy extraction from the PV array, while the boost converter regulates the output voltage to meet load demands. Users can input environmental parameters, such as solar irradiance and temperature, to visualize real-time performance metrics, including power output, voltage, and current for both the solar panels and the load. Additionally, the GUI provides educational insights into the system's components and functionality, enhancing the user's understanding of PV systems. This tool is particularly valuable for researchers, educators, and anyone interested in understanding and optimizing solar power systems, offering a powerful platform for designing and improving efficient, reliable PV systems.

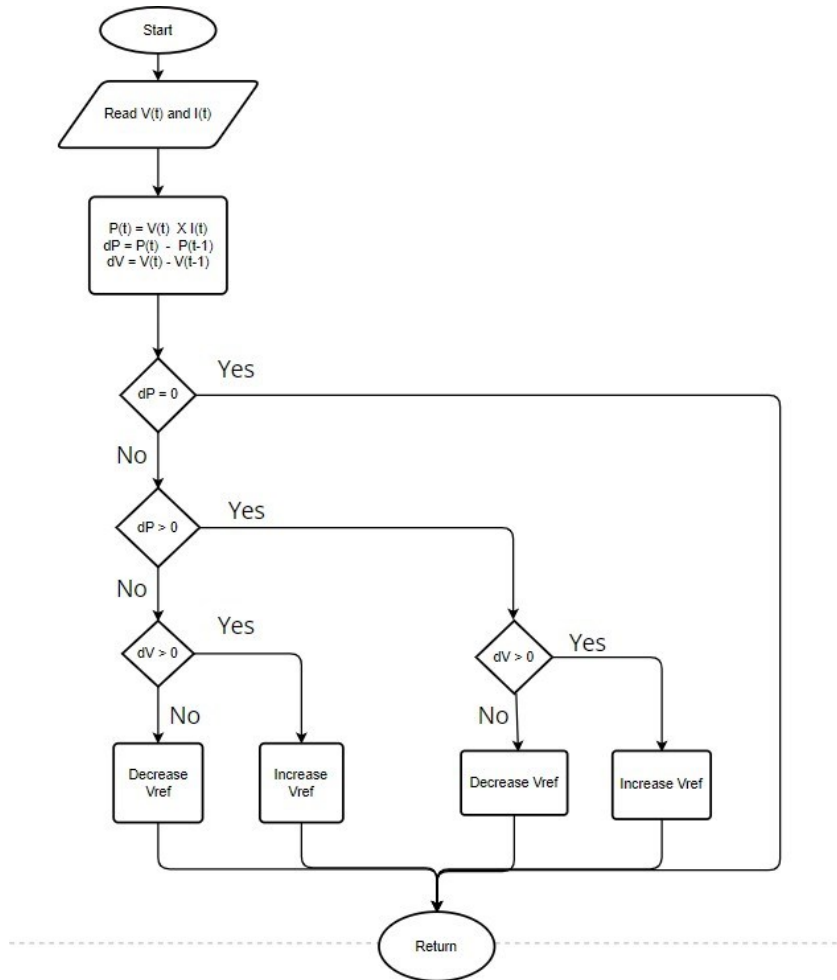
KEYWORDS: MATLAB Interface, MPPT Algorithm, Boost Converter, Perturb And Observe Method, PV Model

PRODUCT DESCRIPTION

The GUI-Based PV System Model with MPPT Solar Charge Controller and Boost Converter, designed using MATLAB App Designer, provides an interactive platform for simulating and studying photovoltaic systems. It combines a PV array model, the Perturb and Observe (P&O) MPPT algorithm for efficient power extraction, and a boost converter for voltage control, all within a user-friendly interface. Users can adjust parameters like irradiance and temperature, visualize real-time plots of system performance, and evaluate behaviour under varying conditions. Perfect for education, research, and prototype development, this tool seamlessly connects theoretical knowledge with practical application, supporting the optimization of renewable energy systems.

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

MPPT Algorithm (Perturb & Observe Method) Flowchart:



NOVELTY AND UNIQUENESS

The GUI PV Model using MPPT Solar Charge Controller and Boost Converter in MATLAB App Designer stands out for its innovative integration of advanced photovoltaic system modeling, interactive visualization, and real-time performance analysis. It provides a user-friendly graphical interface that simplifies parameter adjustment, system monitoring, and results interpretation, making it more accessible than traditional script-based simulations. The model incorporates a highly efficient Perturb and Observe (P&O) MPPT algorithm for optimal power extraction, coupled with a boost converter for voltage regulation, enabling users to study modern solar power management techniques. Its ability to simulate dynamic environmental conditions, such as varying irradiance and temperature, offers practical insights into real-world performance. As a comprehensive tool combining PV modelling, MPPT control, and DC-DC conversion, it serves as a versatile platform for education, research, and prototype development, bridging the gap between theoretical knowledge and practical applications in renewable energy systems.

BENEFIT TO MANKIND

The GUI PV Model using MPPT Solar Charge Controller and Boost Converter in MATLAB App Designer provides valuable educational benefits by offering an interactive platform for exploring and understanding the fundamentals of solar energy systems. It allows users to simulate and analyze the behavior of photovoltaic systems, MPPT algorithms, and boost converters, making complex concepts more accessible. Through real-time visualizations and simulations, users can gain a practical understanding of how solar systems function and how optimization techniques are applied. This tool enhances the learning experience by making theoretical knowledge more tangible, making it a useful resource for anyone looking to deepen their understanding of renewable energy technologies.

COMMERCIALIZATION POTENTIAL

The GUI PV Model using MPPT Solar Charge Controller and Boost Converter in MATLAB App Designer has significant commercial potential in both the renewable energy and education markets. It can serve as an effective educational resource for universities and research institutions, simplifying the understanding of PV systems and MPPT algorithms. The model also offers valuable support for R&D in solar technology, helping companies optimize PV systems and power electronics. It can be marketed to solar energy businesses for improving system efficiency and can be offered as a service or SaaS (Software as a service) platform for energy consultants and installers. Furthermore, integrating the model with commercial software and hardware solutions creates additional opportunities for engineers, generating diverse revenue streams in the expanding renewable energy sector.

CONCLUSION

The GUI PV Model using MPPT Solar Charge Controller and Boost Converter in MATLAB App Designer is a valuable and easy-to-use tool for simulating and understanding photovoltaic systems, with a focus on integrating MPPT algorithms and DC-DC converters. It offers an intuitive platform to explore solar energy principles, system optimization, and power management in practical settings. By bridging theoretical concepts with real-world applications, the model provides significant benefits for education, research, and the advancement of more efficient renewable energy solutions. This tool enhances the learning experience, supports system design and optimization, and contributes to the development of solar energy technologies.

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