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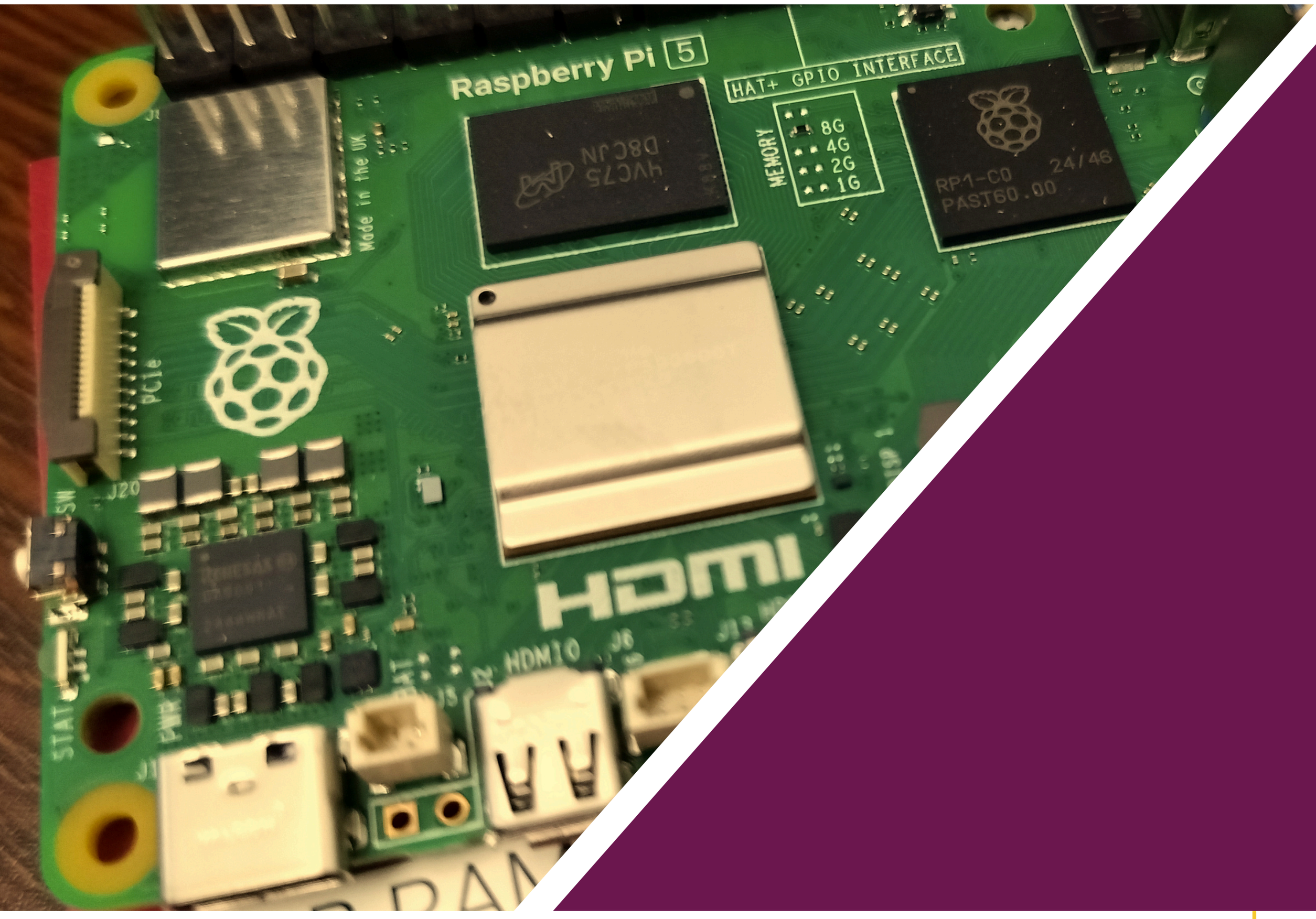
10TH ELECTRICAL ELECTRONICS SYSTEMS ENGINEERING EXHIBITION 2025

VOLUME 1



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UNIVERSITI TEKNOLOGI MARA
JOHOR BRANCH
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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)

Solar Powered Self-driven Grass Cutter

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ABSTRACT

Solar Powered Self-driven Grass Cutter is an innovative and eco-friendly approach for lawn maintenance, aimed at reducing human labor and environmental impact. The device harnesses solar energy through a solar panel to charge its batteries, making it a sustainable alternative to conventional gas or electric-powered mowers. It is equipped with a motor-driven cutting mechanism and operates autonomously using a programmed navigation algorithm, ensuring systematic and even grass-cutting. Safety and precision are enhanced with an ultrasonic sensor, which detects obstacles and adjusts the device's path accordingly. The user interface is designed for simplicity and includes buttons for control, an LCD screen for battery status updates, and LED indicators for alerts. Unlike traditional mowers, this device eliminates the need for continuous manual operation, making it especially beneficial for individuals with limited physical mobility or busy lifestyles. The project addresses the growing demand for sustainable solutions in everyday life by combining renewable energy and autonomous technology. The absence of IoT integration ensures privacy and simplicity, appealing to users seeking straightforward functionality. This project shows the potential of green technology in transforming routine tasks and contributes to the wider goal of reducing carbon footprints in residential and community spaces.

KEYWORDS: Autonomous lawnmower, Solar-powered, Ultrasonic sensor, Renewable energy.

PRODUCT DESCRIPTION

The Solar Powered Self-driven Grass Cutter is a compact, efficient, and sustainable device designed to revolutionize lawn care. It integrates a solar panel that charges the device's batteries, ensuring an uninterrupted power supply during daylight hours. This sustainable energy source reduces dependency on conventional electricity or petroleum, promoting environmental conservation. The device autonomously navigates a lawn by following a predefined algorithm, ensuring even and systematic grass-cutting. Safety and accuracy are maintained by an ultrasonic sensor, which detects obstacles in its path and dynamically adjusts the mower’s direction to prevent collisions or damage. A user-friendly interface enhances the device's usability, incorporating physical buttons for operational control, an LCD screen displaying status updates such as battery level, and LED indicators to provide visual alerts. This straightforward interface eliminates the complexity of IoT-enabled systems, focusing instead on reliable, accessible technology. The device is best suited for small to medium-sized lawns and is an excellent choice for homeowners seeking a hands-free, eco-friendly lawn maintenance solution.

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

Figure 1 represents the block diagram of the complete system. Arduino Uno is used as the microcontroller because it has the required amount of pins, and the cost is adequate. The input part consists of an ultrasonic sensor for obstacle detection, a push button to start the system, and a voltage sensor to measure the power consumption by the overall system operations. Moreover, the outputs section consists of a DC motor to move and control the movements of the tires, LCD, and LED. Both the LCD and LED are used for interface purposes. The system is powered by batteries that are charged with solar panels.

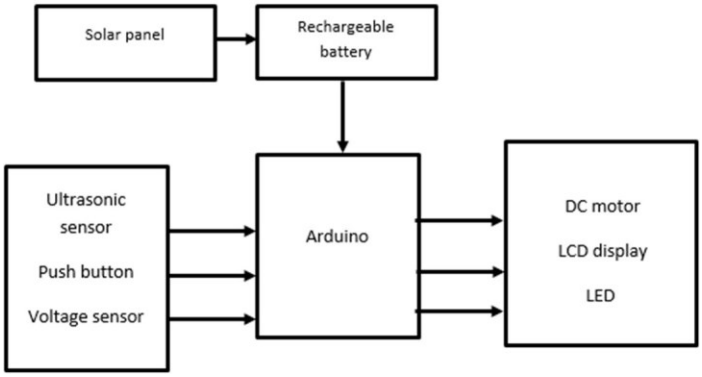

Figure 1: Block diagram of the complete system.

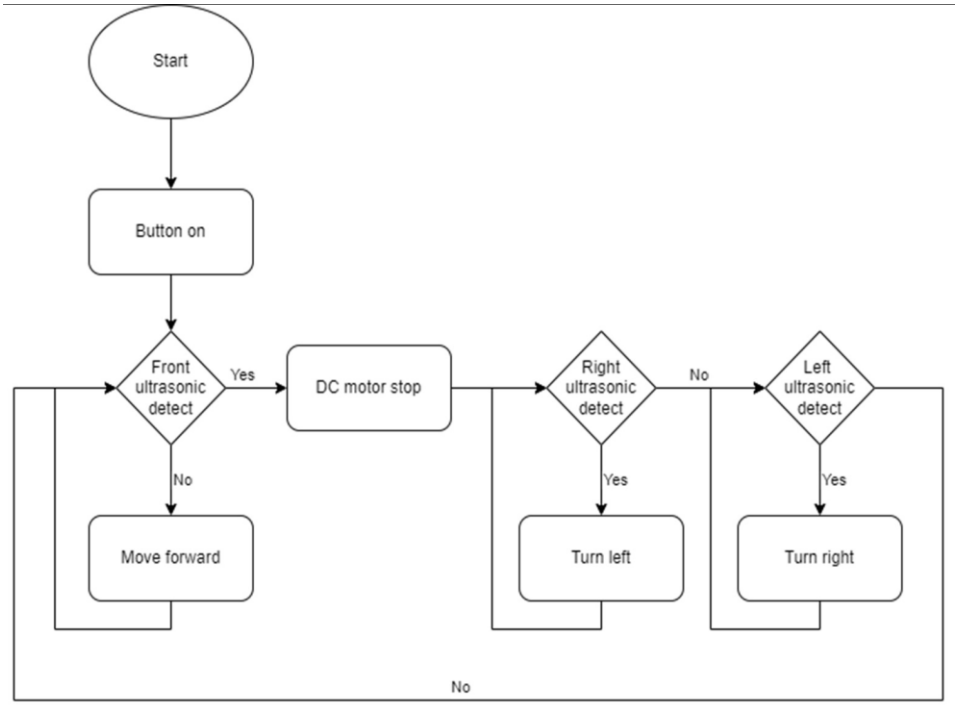

Figure 2: Flow chart of the Solar Powered Self-driven Grass

Figure 2 shows the flow chart of the driven algorithm for the grass cutter. The system begins with the user pushing the button and the system will start to operate. Then, if the ultrasonic sensor detects any obstacle within 30 cm length of the machine body, the DC motor controls the wheel and blade to stop and turn left or right based on the detection of both side ultrasonic sensors.

NOVELTY AND UNIQUENESS

The Solar Powered Self-driven Grass Cutter is distinguished by its combination of renewable energy and autonomous operation, offering a practical and environmentally friendly alternative to traditional lawnmowers. Its innovative design incorporates solar energy for power, eliminating the reliance on petroleum and reducing greenhouse gas emissions. Additionally, the autonomous navigation system is programmed to follow an efficient cutting algorithm, ensuring systematic grass trimming without human intervention. Unlike IoT-based devices, this grass cutter emphasizes simplicity with its intuitive interface, consisting of buttons, an LCD display, and LED indicators, making it accessible to users of all technical backgrounds. This design prioritizes sustainability, operational efficiency, and ease of use, setting it apart from conventional and modern alternatives alike.

BENEFIT TO MANKIND

This grass cutter offers significant benefits to individuals and society. Its solar-powered operation reduces reliance on non-renewable energy sources, contributing to environmental sustainability by lowering carbon emissions. The autonomous functionality eliminates the physical labor associated with manual lawn mowing, providing convenience and time savings, especially for individuals with mobility challenges or busy schedules. The device is cost-effective in the long term, as it requires minimal maintenance and uses renewable energy. Its simplicity and intuitive interface make it accessible to users of all ages and technical expertise, enabling widespread adoption. By promoting green technology in household applications, this project contributes to the global shift toward sustainable living.

COMMERCIALIZATION POTENTIAL

The Solar Powered Self-driven Grass Cutter demonstrates substantial potential for commercialization across multiple markets. It is particularly well-suited for residential applications, offering an eco-friendly and labor-saving solution for homeowners with small to medium-sized lawns. The device can also be utilized in maintaining community parks and gardens, where its autonomous and sustainable features would reduce the need for manual labor and external power sources. In rural areas with limited access to electricity, the grass cutter's reliance on solar energy makes it an ideal alternative to conventional mowers. By prioritizing simplicity, sustainability, and affordability, the device appeals to a broad consumer base, ensuring strong market potential and adaptability to diverse environments.

CONCLUSION

The Solar Powered Self-driven Grass Cutter combines the principles of renewable energy and autonomous operation to offer an innovative, efficient, and sustainable lawn maintenance solution. Its integration of solar panels, ultrasonic sensors, and a simple user interface demonstrates a practical application of green technology in everyday tasks. The device addresses key environmental and labor challenges, making it a valuable tool for both individuals and communities. Future improvements could include refining the navigation algorithm for greater efficiency and optimizing the design for expandability to take in larger lawns. This project highlights the transformative potential of sustainable technologies in creating a greener and more convenient future.

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