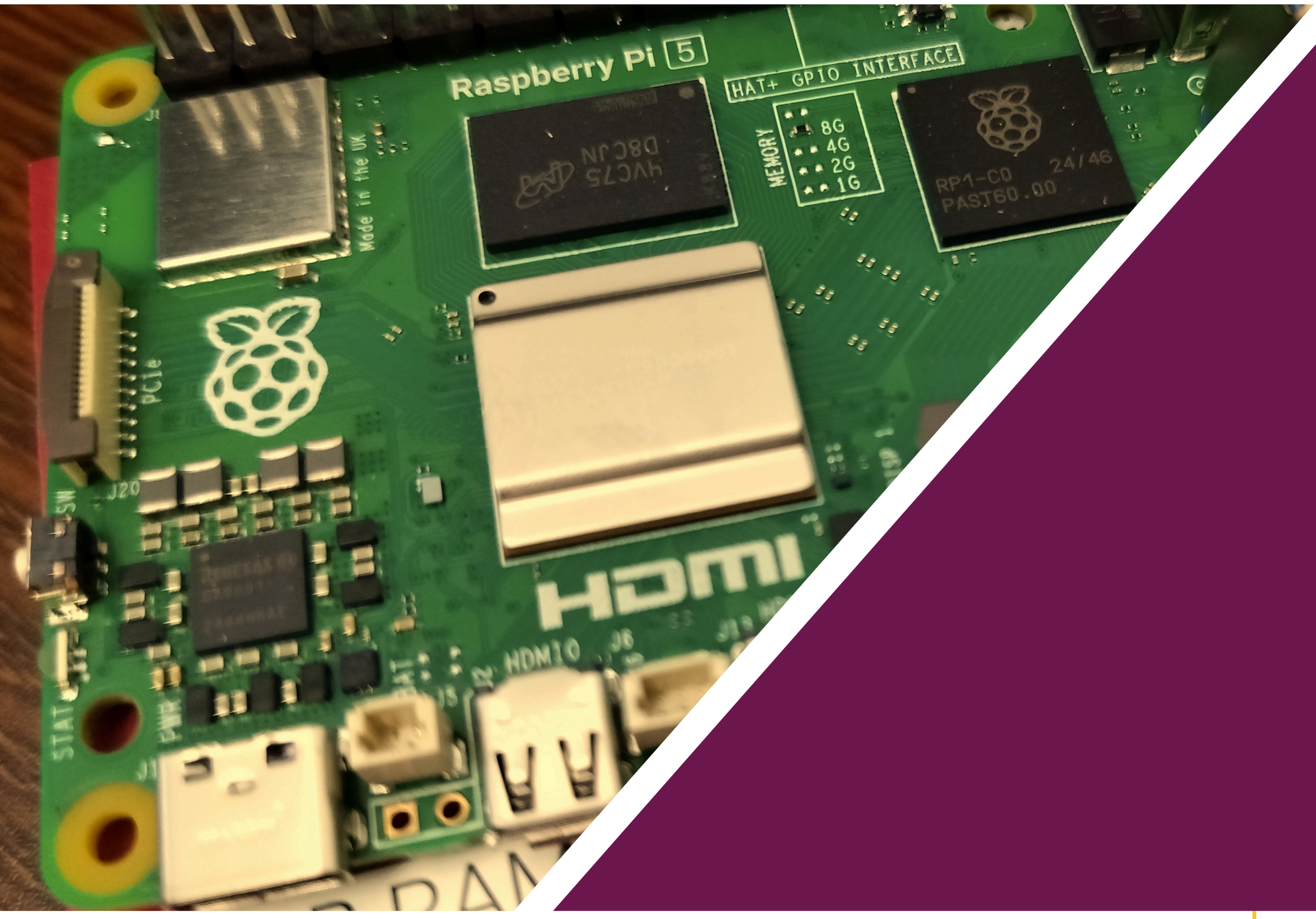
UNIVERSITI TEKNOLOGI MARA

EESEE 2025

10TH ELECTRICAL ELECTRONICS SYSTEMS ENGINEERING EXHIBITION 2025

VOLUME 1



FACULTY OF ELECTRICAL ENGINEERING
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)

Automatic Stray Cat Feeder

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ABSTRACT

This project presents the development of an automated cat feeder system capable of classifying and dispensing food portions tailored to kittens and adult cats based on their weight and height measurements. The system integrates multiple sensors and actuators, including a load cell paired with an HX711 amplifier to accurately measure the cat's weight, an ultrasonic sensor (HC-SR04) to assess the cat's height, and a PIR motion sensor to detect the presence of a cat. A 16x2 I2C LCD is used to display real-time feedback to the user, such as motion detection, cat classification, and feeding actions. The classification logic ensures that kittens receive smaller portions, while adult cats are given larger portions, with additional checks to identify non-cat entities for safety. The system is powered by an Arduino Uno, which acts as the central processing unit to read sensor inputs and control two servo motors for precise food dispensing. The project demonstrates the potential of smart pet care automation by reducing human involvement, ensuring proper feeding schedules, and minimizing overfeeding risks. Designed as a cost-effective and efficient solution, this feeder offers scalability and adaptability to diverse pet care scenarios. The use of load cell technology, combined with ultrasonic sensing and motion detection, provides accurate classification and feeding processes, emphasizing reliability and user-friendly operation.

KEYWORDS: Automated Cat Feeder, Arduino Uno, Load Cell, HX711 Amplifier, Ultrasonic Sensor, PIR Motion

PRODUCT DESCRIPTION

The Automated Cat Feeder is a smart, user-friendly device designed to ensure the proper feeding of stray or domesticated cats. This innovative system utilizes advanced sensor technologies to classify cats into kittens or adults and dispenses food portions tailored to their needs. The feeder is powered by an Arduino Uno microcontroller, ensuring seamless integration of multiple components and reliable operation. Key features include:

- **Weight Measurement**: A load cell with an HX711 amplifier accurately measures the weight of the cat, ensuring precise classification.
- **Height Detection**: An ultrasonic sensor (HC-SR04) evaluates the cat's height, aiding in distinguishing between kittens and adult cats.
- **Motion Detection**: A PIR motion sensor identifies the presence of a cat and initiates the feeding process.
- **Tailored Feeding**: Two servo motors control the food dispensing mechanism, adjusting portions based on the cat's classification.
- **Real-Time Display**: A 16x2 I2C LCD provides instant feedback, displaying information such as cat type, feeding status, and motion detection.

Designed for both simulation and real-world use, the system prioritizes efficiency, accuracy, and adaptability. It minimizes human intervention in feeding stray cats while promoting proper portion control to prevent overfeeding or underfeeding. The device is compact, cost-effective, and scalable, making it suitable for pet shelters, urban areas with stray cat populations, or personal use by pet owners. Whether as a standalone unit or part of a larger pet care system, the Automated Cat Feeder exemplifies the potential of smart automation in addressing everyday challenges in animal care.

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

1. Block Diagram

The block diagram Figure 1 represents an automated cat feeder system using an Arduino Uno microcontroller. The system is powered by a solar panel to ensure energy efficiency and sustainability. The **input section** includes key sensors for data collection: a motion sensor detects the presence of a cat, a weight sensor measures the cat's weight to differentiate between an adult cat and a kitten, and an ultrasonic sensor measures the height of the cat for additional confirmation of its type. These inputs are processed by the Arduino Uno, the system's core microcontroller, which analyzes the collected data. Based on the analysis, the **output section** executes specific actions. The LED indicates the system's status, such as standby, processing, or dispensing. The LCD provides visual feedback to display relevant information, such as the cat type or the food dispensing process. The servo motor smartly controls the feeder mechanism, dispensing the appropriate type and amount of food based on the cat's weight and height measurements. This system ensures tailored feeding for cats of different ages and sizes, preventing overfeeding or underfeeding. The integration of sensors with the Arduino and the solar-powered design makes the feeder both intelligent and eco-friendly, providing a sustainable solution for pet care automation.

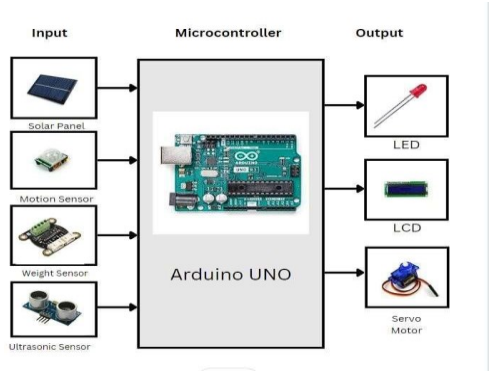

Figure 1. Block diagram of the system

2. Flowchart

Figure 2 represents the flowchart of the designed system. In comparison to conventional feeders, the design specializes in dispensing the proper type and amount of food based on input readings from sensors, including weight and height measurements, ensuring precise feeding tailored to kittens and adult cats. The system begins by absorbing solar energy, making it sustainable and eco-friendly. After initialization, it detects motion to confirm the presence of a cat. Once motion is detected, the ultrasonic sensor measures the height, and the weight sensor records the weight of the cat. These inputs are analyzed to classify the cat as a kitten or an adult. If the measurements match the criteria for an adult cat, the servo motor moves to the right, and the appropriate type and quantity of food are dispensed. Simultaneously, the LED indicator is activated to show the system is operating. If the cat is classified as a kitten, the servo motor moves to the left and dispenses food suited for a kitten. After dispensing, the servo motor returns to its original position, completing the process. This innovative design ensures precise feeding while maintaining energy efficiency and reducing user intervention, making it a smart and sustainable pet care solution.

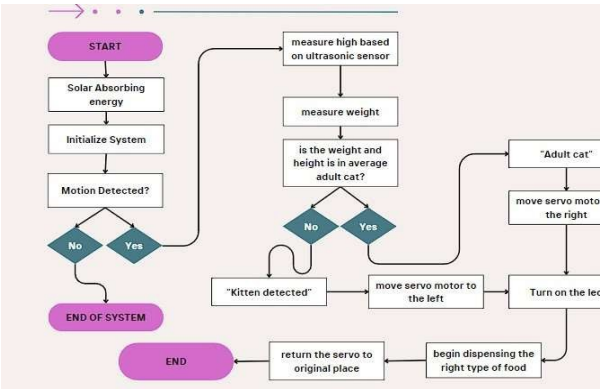

Figure 2. Flow chart of the system

3. Simulation

Figure 3 shows the schematic diagram of the designed system. The Arduino Uno microcontroller interfaces with an ultrasonic sensor, weight sensor, and motion sensor to detect and classify the cat's type. Outputs include an LCD for status display, an LED for indication, and servo motors for dispensing the appropriate type and amount of food.

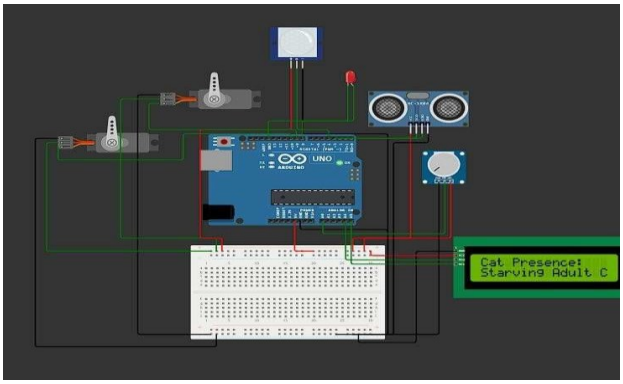

Figure 3. Schematic of the system

BENEFIT TO MANKIND

The Automated Cat Feeder contributes to mankind by promoting humane and efficient care for stray and domestic cats. By automating the feeding process, it reduces the burden on caregivers, allowing them to provide consistent nutrition to animals with minimal effort. The feeder's ability to classify cats based on weight and height ensures that each animal receives appropriate portions, preventing overfeeding or underfeeding. This innovation is particularly valuable in urban areas with large stray populations, as it supports community efforts to manage and care for these animals, reducing food waste and fostering a healthier environment. Additionally, the device encourages responsible feeding practices and raises awareness about animal welfare, inspiring more individuals to contribute to the well-being of stray cats and enhancing the coexistence of humans and animals in shared spaces.

COMMERCIALIZATION POTENTIAL

The commercialization potential of this cat feeder system is particularly promising for addressing the needs of stray cats. Stray cat populations are a growing concern globally, with many cities facing challenges in managing their care and well-being. This automated, smart feeder system can be deployed in areas with high stray cat populations, providing a sustainable way to feed them based on their specific needs, such as weight and size. By incorporating motion sensors, weight measurements, and height detection, the system can ensure that food is dispensed appropriately, preventing overfeeding and ensuring that different types of cats—whether kittens, adults, or nursing mothers—receive the right amount of nutrition. This technology could be integrated into community-led efforts for animal welfare, helping non-profits, local governments, and animal shelters to better manage stray cat populations. Additionally, the system could be used in conjunction with trap-neuter-return (TNR) programs to improve the health and control of feral cat colonies, making it a key tool in humane animal management. With its potential to reduce food waste and support the health of stray cats, this solution could attract both funding and partnerships from animal rights organizations, municipalities, and environmental groups.

CONCLUSION

In conclusion, the automated cat feeder system developed in this project offers a practical and innovative solution to address the growing issue of stray cat populations. By incorporating sensors to detect weight and height, the system can accurately determine the type and nutritional needs of each cat, ensuring that the right amount of food is dispensed without waste. This technology holds significant potential for improving the health and welfare of stray cats, making it a valuable tool for animal shelters, non-profit organizations, and municipalities involved in managing feral cat populations. Furthermore, the system's integration with community-based programs, such as trap-neuter-return (TNR), could contribute to sustainable, humane approaches to controlling and caring for stray cat populations. With its scalable and adaptable design, this project paves the way for a more efficient and compassionate solution to the ongoing challenge of stray cat management, benefiting both animals and communities alike.

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