EPICS PROJECT : REVIEW - 2

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SMART ECOSORT: WASTE SEGREGATION SYSTEM FOR EFFICIENT WASTE MANAGEMENT

SORT SMARTER, NOT HARDER

GROUP-81

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INTRODUCTION

1. **Rapid urban growth spurs global rise in solid waste.**
2. **Urgent need for efficient waste management in smart cities.**
3. **Manual waste sorting poses health risks for workers.**
4. **Inadequate waste collection fuels pollution in urban areas.**

LITERATURE REVIEW

1.Waste segregation and potential for recycling -A case study in Dar es Salaam City, Tanzania

RR - Reduce, Reuse, Recycle

- **Advantages:** Promotes sustainable waste management practices, conserves resources, reduces environmental impact.
- **Disadvantages:** Implementation may require significant infrastructure and behavioral changes, may face resistance due to perceived inconvenience or cost.

2. Automatic Waste Segregator as an integral part of Smart Bin for waste management system in a Smart City

Advantages:

Addressing a Critical Issue: The paper tackles a significant problem faced by modern urban areas – efficient waste management. With urbanization on the rise, there's a pressing need for solutions like the Automatic Waste Segregator (AWS) to handle the increasing volume of waste.

Disadvantages:

Limited Scope of Evaluation: While the experimental results demonstrate the effectiveness of the AWS system, the evaluation may be limited in terms of the scale and diversity of waste types tested. A broader evaluation encompassing a wider range of waste scenarios could provide more robust validation.

LITERATURE REVIEW

3.Waste Separation Smart Dustbin

Advantages:

Innovative Solution Approach: The proposed waste separation smart dustbin represents an innovative approach to waste management. By integrating proximity sensors, moisture sensors, and a microcontroller, the system offers a technologically advanced solution to automate waste segregation.

Disadvantages:

Sensor Limitations and Accuracy: The testing results reveal limitations in sensor accuracy, particularly in detecting certain waste types using capacitive proximity sensors. This raises concerns about the reliability of the system in real-world scenarios and the need for further refinement or alternative sensor technologies.

4. Smart Bin: An Efficient Waste Disposal and Segregation System

Advantages:

Hands-Free Operation: The automatic door opening system, triggered by ultrasound sensors, ensures hands-free garbage disposal, enhancing hygiene and user convenience.

Disadvantages:

Cost of Implementation: The initial setup and installation costs of the Smart Bin, including components such as ultrasound sensors, microcontroller, and Bluetooth module, may be prohibitive for some users or municipalities, limiting widespread adoption.

RESEARCH GAP

- **Implementation Challenges:** Gap in addressing infrastructure requirements and behavioral barriers hindering system adoption due to perceived inconvenience or cost.
- **Limited Evaluation Scope:** Lack of comprehensive validation in experimental evaluations, especially regarding diverse waste scenarios, restricting the system's effectiveness assessment.
- **Sensor Accuracy Issues:** Concerns about sensor accuracy, particularly with capacitive proximity sensors, impacting reliability in real-world scenarios, necessitating further research on refinement or alternative sensor technologies.
- **Cost-Prohibitive Setup:** Gap in mitigating prohibitive setup costs, including components like ultrasound sensors, hindering widespread adoption, requiring exploration of cost-effective solutions.

PROBLEM STATEMENT

- Develop an intelligent waste segregator system using machine learning.
- Automatically capture waste images and classify them (biodegradable or non-biodegradable) based on visual features.
- Capture waste images using cameras.
- Utilize machine learning to analyze visual features and classify waste.
- Implement segregation mechanism based on classification results.
- Ensure high accuracy to minimize segregation errors.

WHY?

Automates waste separation to reduce health hazards of manual sorting for waste workers.

Enables accurate categorizati on of different waste types to improve recycling and reuse.

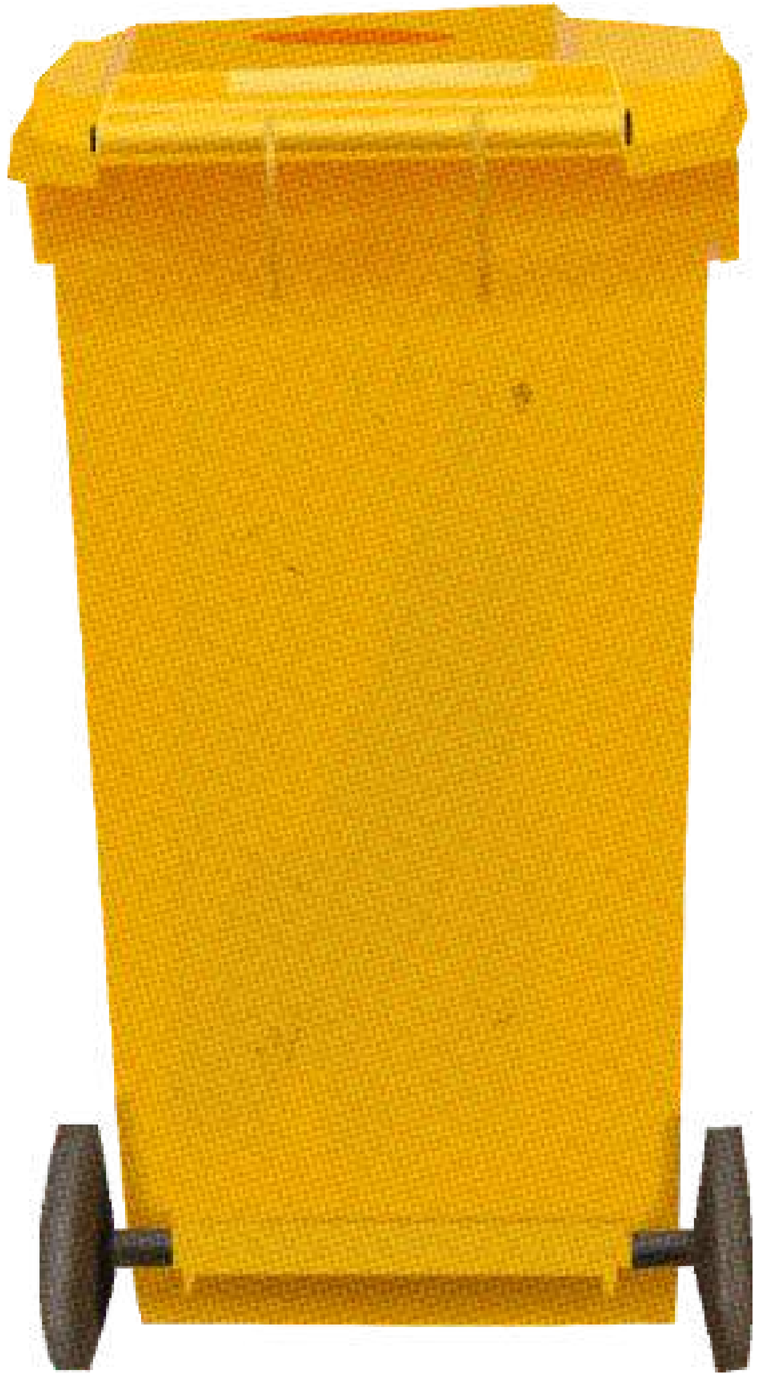
Provides real-time data on waste generation patterns to inform manageme nt policy.

Aligns with smart cities mission by integrating sensor and internet-connected technologies for public services.

PROPOSED SOLUTION

Waste Segregator :

- **Creating a waste segregator.**
- **Utilizing ML and Raspberry Pi.**
- **Garbage will segregate automatically based on its properties such as, Biodegradable and Non-Biodegradable.**



TYPES OF WASTE

ORGANIC

This includes food scraps, yard waste, vegetable peels, and other bio-degradable substances.

RECYCLABLE

This includes plastic, glass, metals, and other materials that can be reprocessed into new products.

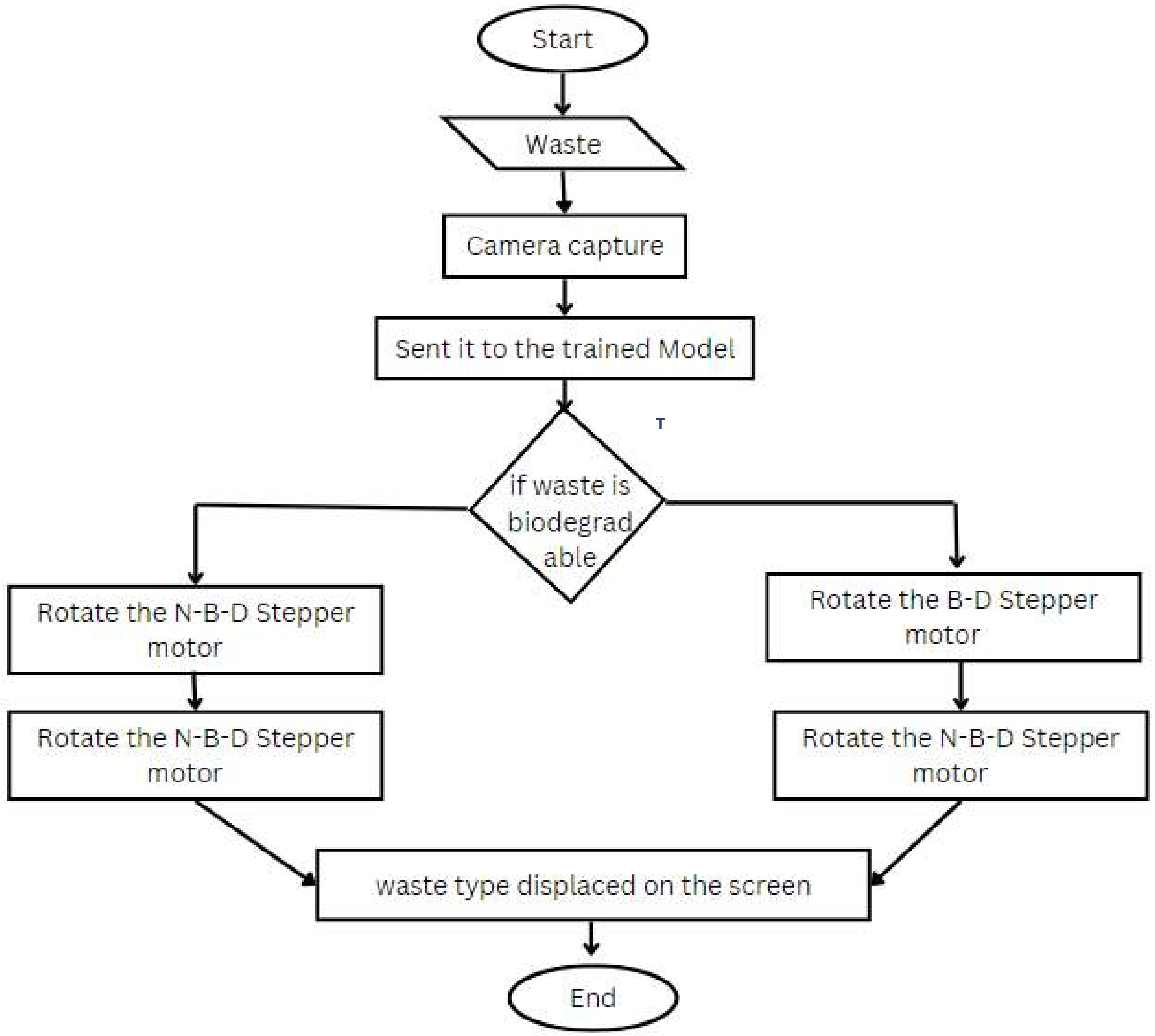
HAZARDOUS

This includes substances like paints, CFL bulbs, electronics, cleaning agents, and others that require special handling.

BIODEGRADABLE (Organic)

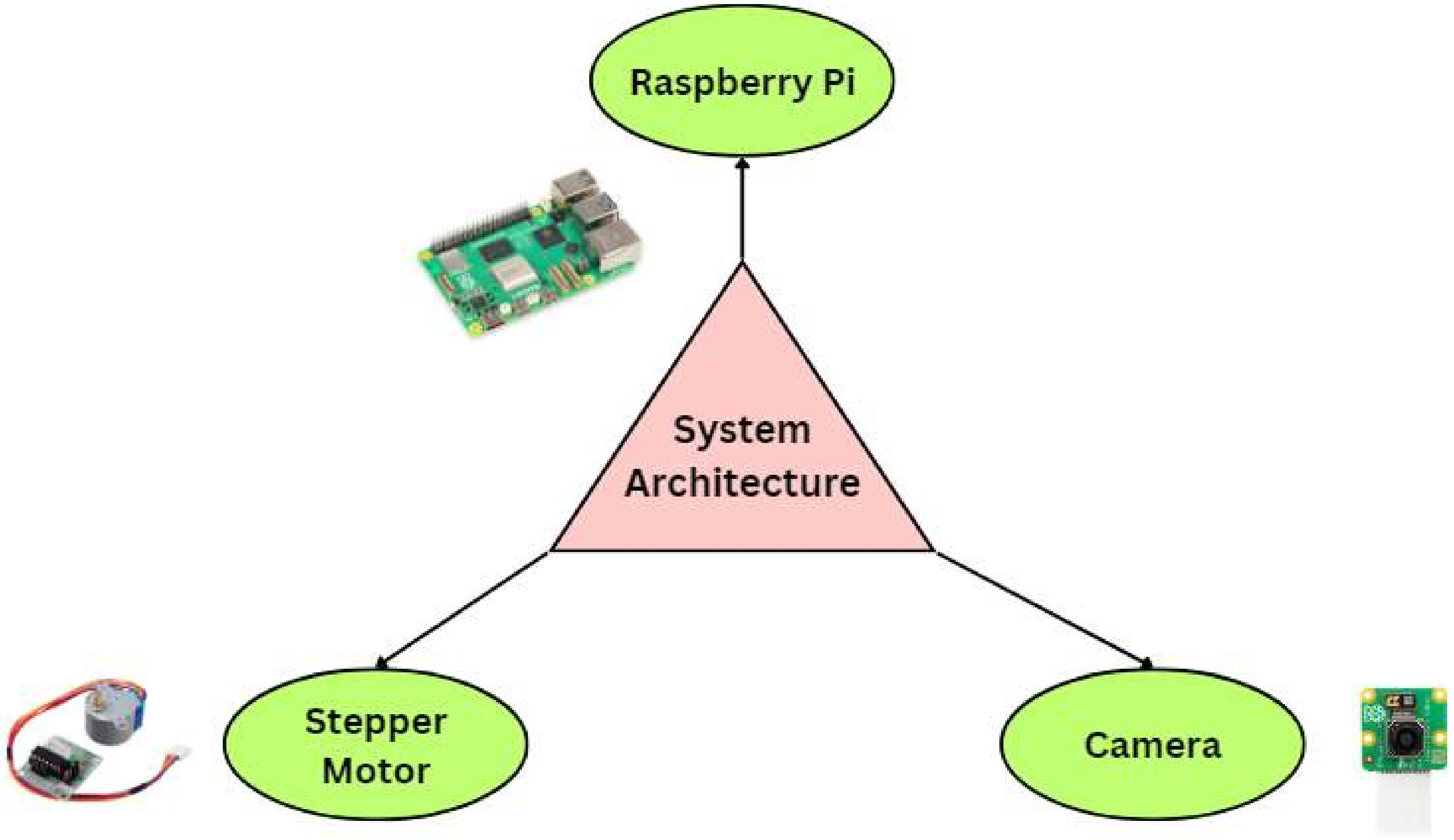
NON- BIODEGRADABLE (Recyclable, Hazardous)

FLOW CHART


Start
Waste
Camera capture
Sent it to the trained Model
if waste is biodegrad able
Rotate the N-B-D Stepper motor
Rotate the N-B-D Stepper motor
Rotate the B-D Stepper motor
Rotate the N-B-D Stepper motor
waste type displaced on the screen
End

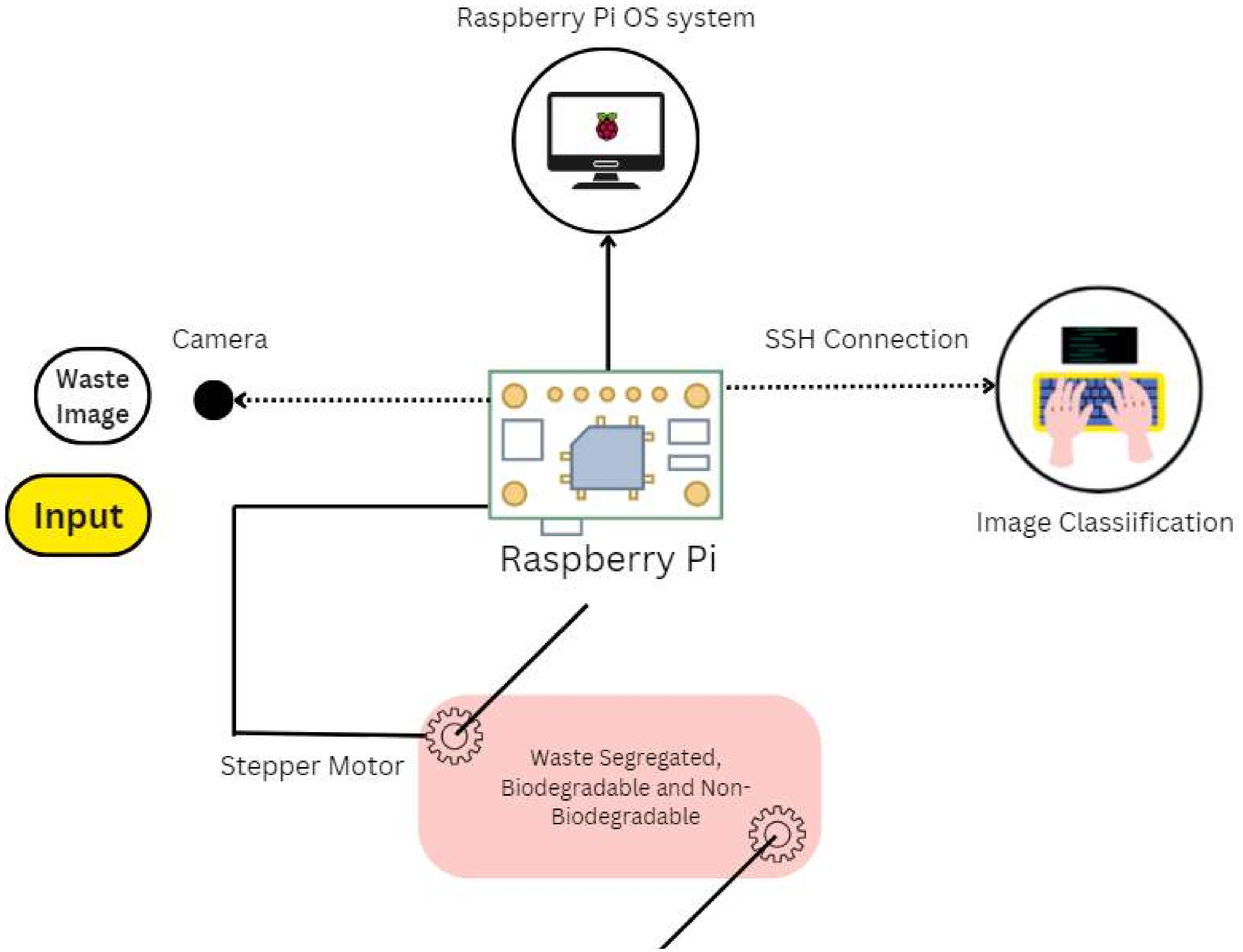
SYSTEM DESIGN

- COST-EFFECTIVE
- LOW POWER CONSUMPTION
- EFFICIENT



WORKING

- Image Capture
- Machine Learning
- Decision time
- Stepper Motor Action



CHALLENGES

- **Image Quality:** Ensuring clear, well-lit images for accurate analysis.
- **Training Data:** Collecting diverse labeled images for effective machine learning.
- **Model Selection:** Choosing the right algorithm and tuning its parameters.
- **Real-Time Processing:** Achieving low latency for quick decision-making.

RESULT

- **Efficient waste management:**
  - Reduced contamination.
  - Increased recycling potential.
- **Improved health and environmental impact:**
  - Less reliance on rag pickers.
  - Proper waste disposal.
- **Economic value realization:**
  - Recycling opportunities.
  - Waste-to-energy possibilities (e.g., syngas generation).

FUTURE SCOPE

- **Smart City Integration -** Smart Waste Management: Collaborate with city authorities to integrate your waste segregator into smart city infrastructure.
- **Public Spaces and Parks:** Install waste segregators in public parks, recreational areas, and tourist spots.
- **Residential Complexes and Housing Societies:** Implement waste segregators in apartment complexes and gated communities.
- **Educational Institutions:** Schools and colleges can adopt waste segregators.
- **Industrial Zones and Commercial Areas:** Factories, warehouses, and commercial hubs generate substantial waste.

CONCLUSION

- Addressing research gaps is crucial for successful waste segregator system development and adoption.
- Overcoming infrastructure challenges and behavioral barriers is essential for seamless implementation.
- Comprehensive evaluations are necessary to validate system effectiveness across diverse waste scenarios.
- Improving sensor accuracy is vital for reliable real-world deployment.
- Efforts to reduce setup costs are necessary for widespread adoption and realizing environmental benefits.

WORKING PLAN

5-Milestones

1 Research & Ideation

2 Finalize Idea & work Distribution

3 **Review 1**

- **Required equipment**
- **Documentation**

4 **60% Hardware till review-2**

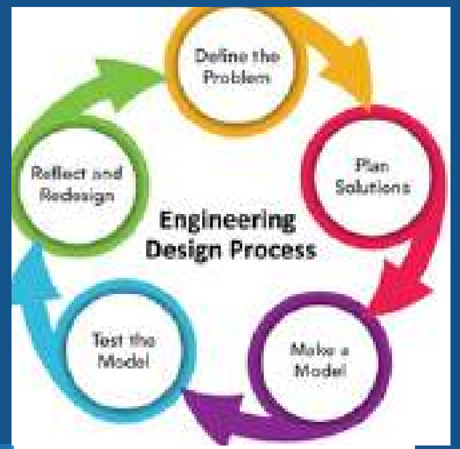
10% WORK END OF THE JAN

30% HW END OF THE FEB

TESTING AND ITERATION

60% HW TILL REVIEW-2

5



100%

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THANK YOU!