

ENVI SORT

Developing innovative solution for efficient management of waste and conversion to valuable products, Waste to Energy- waste recycling.

ABSTRACT:

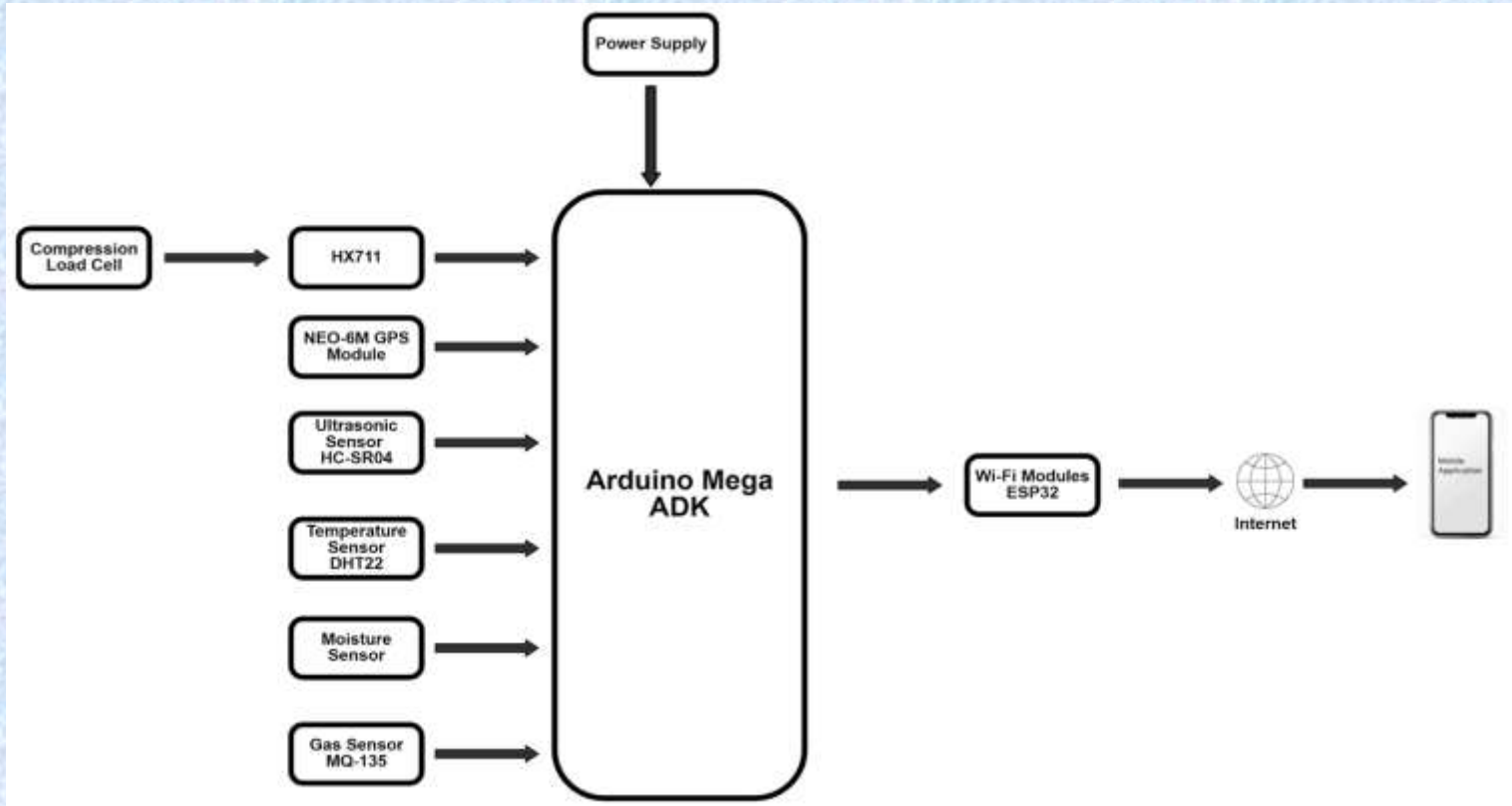
- ❖ The Smart Dustbin is an automated system for efficient waste management that converts biodegradable waste into manure using an electrode-based combustion chamber made of stainless steel. When the biodegradable bin reaches 80% of waste, the waste is automatically transferred to the combustion chamber, where it is processed into mineral-rich ashes.
- ❖ The system is equipped with sensors for fill-level tracking, geolocation, and temperature monitoring. If the temperature exceeds a predefined limit, the system pauses to allow cooling before resuming operation, ensuring both safety and efficiency.
- ❖ **Activated charcoal filters** neutralize harmful gases and odors. The final product is mineral-rich ash, which can be processed into high-quality fertilizer. This approach promotes sustainability, reduces landfill use, and encourages proper waste segregation.

3D Model Video:

<https://t.ly/83gSI>



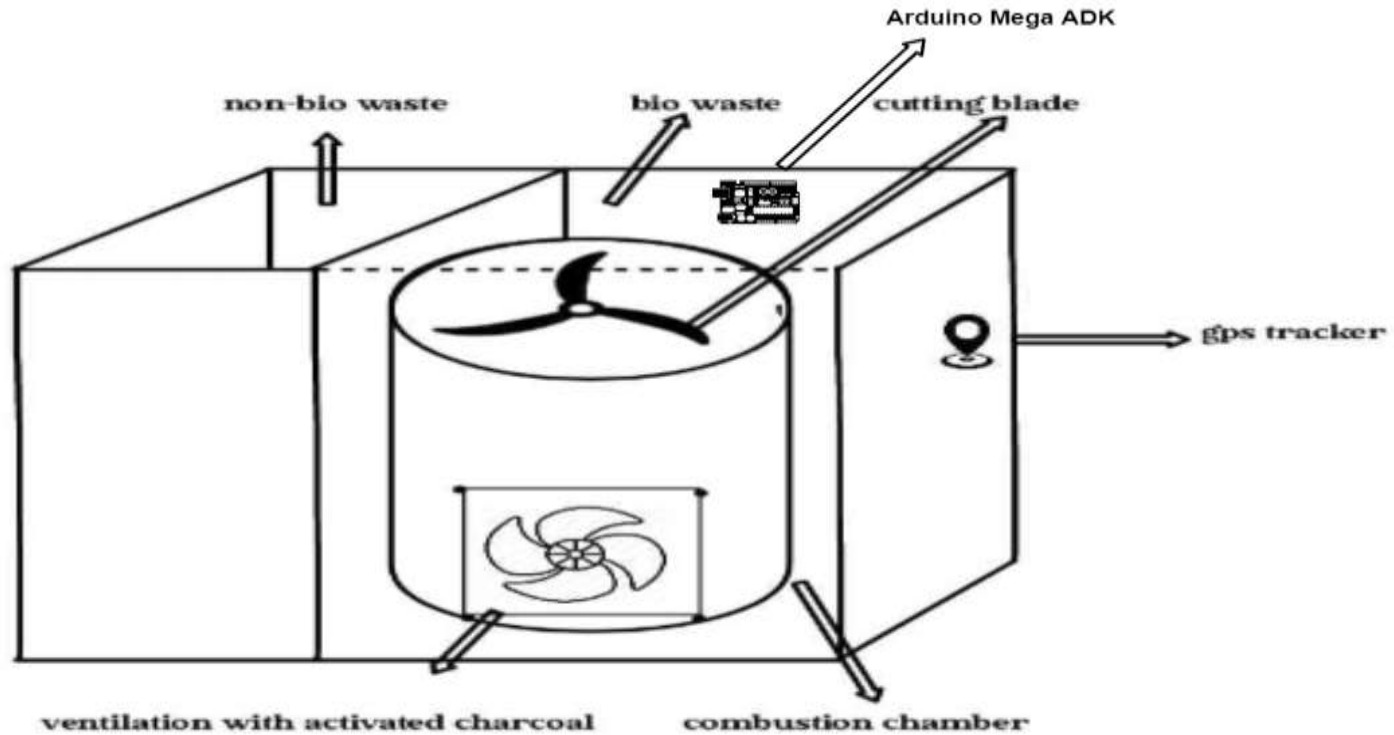
BLOCK DIAGRAM:



FLOW DIAGRAM:



CONSTRUCTION:



BENEFITS:

❑ Financial Viability:

Initial Investment: Lower profits in the first year due to innovative bin technology investment, leading to long-term cost savings and increased profitability.

Long-Term Savings: Reduced landfill disposal costs and extended landfill lifespan.

Revenue Generation: Selling high-quality manure from biodegradable waste.

❑ Social Benefits:

Cleaner Streets: Automated waste collection and segregation.

Public Awareness: Educates communities on waste segregation and recycling.

❑ Operational Efficiency:

Real-Time Monitoring: Enhances waste collection efficiency.

Scalable Solution: Suitable for various urban areas.

❑ Environmental Impact:

Reduces Landfill Waste: Converts biodegradable waste into manure.

Promotes Sustainable Practices: Encourages composting and reduces carbon footprint.

INITIAL PROTOTYPE:



NOVILITY:

- ❖ **Odor Control:** During the decomposition and combustion of biodegradable waste, unpleasant odors are released. Activated charcoal adsorbs these odor-causing compounds, trapping them in its porous surface. This ensures that the surrounding environment remains odor-free.
- ❖ **Neutralization of Harmful Gases:** The combustion process can release gases like methane or volatile organic compounds (VOCs), which are harmful to both the environment and human health. Activated charcoal traps these gases before they can escape into the atmosphere, making the waste conversion process more environmentally safe.
- ❖ **Sustainability:** Since activated charcoal can be regenerated and reused after saturation (by heating it to release the adsorbed substances), it aligns with the Smart Dustbin's focus on sustainability. This reusable nature reduces waste and ensures the system remains efficient in the long run.

Conversion of Biodegradable Waste to Mineral-Rich Ash

In a street with **120 houses**

- **Daily Waste Collection:** 180 kg/day
- **Total Waste Collected in a Week:** 1,260kg/week
- Of this, **60% (756 kg)** is biodegradable waste,

Financial Insights:

- **Selling Price of Ash:** ₹80 per kg.
- **Potential Revenue from Ash Per Bin:**
 1. **Weekly:** 75.6 kg × ₹80 = ₹6,048.
 2. **Yearly:** ₹6,048 × 52 week = ₹3,14,496.

Investment in Waste Management:

- **Cost per Bin:** ₹2,00,000.
- **Implementation of 100 Bins:** Investment of ₹2 crore.
- **Weekly Profit per Bin:** ₹6,048.
- **Yearly Profit per Bin:** ₹3,14,496.
- **Total Profit for 100 Bins:** ₹3,14,49,600.

Maintenance and Additional Costs:

- **Total Maintenance cost per Bin:** ₹36,000.
- **Net Yearly Profit:**
 1. **Total Profit:** ₹3,14,49,600.
 2. **Maintenance Costs:** ₹36,00,000.
 3. **Net Yearly Profit:** ₹2,78,49,600.

Feature	Existing System	Proposed System
Cost	Varies on collection of waste	Initial Setup Cost: \$100-\$200 per bin.\$10 for annual material.
Odor and Harmful Gas Control	incineration significant odors emits bad	Uses activated charcoal to trap harmful gases
Energy Consumption	High Energy Consumption	Solar – powered (3.6-7.2 kWh/m)
Composed Yield	Done externally	41.7% of bio is converted to ash
Ventilation	\$500-\$1000 /bin	\$10 - \$30 per bin
Ease of Use	Complicated for citizens	Citizens only need to place waste in the bin;

Potential areas of application in
Industry/Market:

Commercial Spaces

Useful in malls, offices,
and airports for
sustainable waste
management and odor
control.

Hospitality

Reduces food waste
in hotels and
restaurants while
creating usable by-
products.

Urban Waste Management

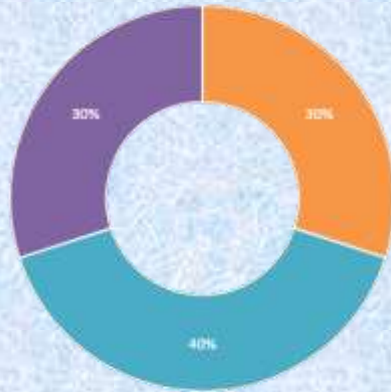
Ideal for public spaces,
reducing landfill use
and promoting waste
segregation.

Agriculture

Converts organic farm
waste into fertilizer,
promoting eco-friendly
farming practices

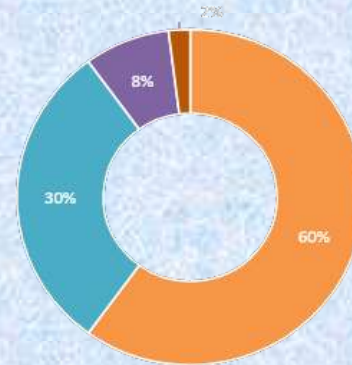
Feasibility & Viability

Feasibility



Proven Technology Efficient Integration Power Source

Viability



Bio-Degradable Waste Final Product Motor Power Consumption Charcol Usage

Research References:

1. Francesca Ferrari, Raffaella Striani , Stefania Minosi, Roberto De Fazio, Paolo Visconti, Luigi Patrono, Luca Catarinucci, Carola Esposito Corcione, “An innovative IoT-oriented prototype platform for the management and valorisation of the organic fraction of municipal solid waste” Esposito Corcione et al., 2019a, Esposito corcione et al., 2019b, Esposito Corcione et al., 2019a, Esposito Corcione et al., 2019b.
2. Igor Tomicic, “IoT-Based Agricultural Compost Monitoring System: Prototype Development and Sensor Technology Evaluation”, This work has been supported in full by the Croatian Science Foundation under the project number 3877, University of Zagreb, Croatia, 2023.
3. Prof. Dr. Mustafa Serdar GENÇ Prof. Dr. Gamze GENÇ Assoc Prof. sukru Taner AZGIN Assist. Prof. Saltuk Bugra SELCUKLU, “POTENTIAL BENEFITS AND DRAWBACKS OF WASTE-TO-ENERGY CONVERSION: A REFLECTION ON THE ENVIRONMENTAL
4. Anurag Gupta, Feasibility Study on Solid Waste to Useful Energy, IOP Conf. Series: Materials Science and Engineering 1116 (2021) 012059, 2021.

THANK YOU