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Design and Fabrication of Sanitary Napkin Disposal Machine

Naveen T. P., Abyuh T. S., Aswin Jayathilakan, Aswin Raj, Dany Binoy M.

Assistant professor, Dept. of Mechanical Engineering, Vidya Academy of Science And Technology, Thrissur,
Kerala, India

S8 Students, Dept. of Mechanical Engineering, Vidya Academy of Science And Technology, Thrissur, Kerala, India

ABSTRACT: The increasing volume of sanitary waste in India poses environmental and health risks due to improper disposal and the use of non-biodegradable materials. Conventional methods like burning, flushing, and landfilling contribute to pollution and waste segregation challenges. This project aims to design a sanitary napkin disposal machine that ensures hygienic and sustainable waste management. It features automated waste separation, high-pressure air jets for cleaning, and UV sterilization to prevent contamination. Biodegradable waste is safely directed into the drainage system, while non-biodegradable components are compacted for responsible disposal, maintenance alerts, and efficient waste management. By promoting eco-friendly menstrual waste disposal, this innovation supports public health, environmental sustainability, and initiatives like the Swachh Bharat Mission

I. INTRODUCTION

Sanitary napkin disposal in India poses significant environmental, health, and social challenges due to improper handling and the widespread use of non-biodegradable materials. Conventional disposal methods, such as burning, flushing, and dumping in landfills, contribute to land and water pollution, blocked drainage systems, and toxic emissions. Additionally, sanitation workers face infection risks due to unsafe waste handling practices. Addressing these concerns, this project proposes an eco-friendly sanitary napkin disposal machine that utilizes advanced robotics for automated waste separation, high-pressure air jets for cleaning, and UV sterilization for sanitizing non-biodegradable components. The biodegradable waste is safely directed into the drainage system, while the non-biodegradable portion is sterilized and stored for recycling or responsible disposal.

Designed to be compact, energy-efficient, and adaptable for homes, schools, workplaces, and public spaces, the machine features IoT-enabled real-time monitoring for seamless waste management. Users can remotely track its status, receive maintenance alerts, and ensure timely disposal, making it especially beneficial for high-traffic areas. By providing a hygienic, sustainable, and user-friendly solution, the project aligns with initiatives like the Swachh Bharat Mission, promoting cleaner communities and dignified menstrual waste management. It contributes to environmental conservation, improves public health, and helps reduce the stigma surrounding menstrual hygiene, fostering a more inclusive and sustainable society.

II. SYSTEM MODEL AND ASSUMPTIONS

System Model

The sanitary napkin disposal machine is designed to provide an efficient, hygienic, and eco-friendly method for handling menstrual waste. The system integrates multiple automated processes, including waste separation, sterilization, compaction, and disposal, ensuring minimal human intervention. Key components include:

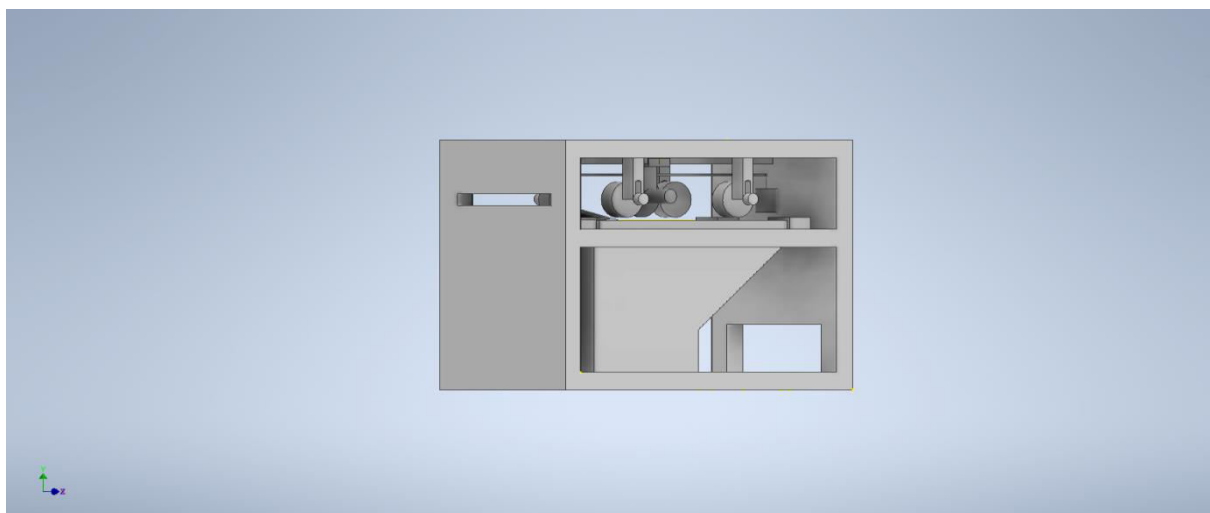
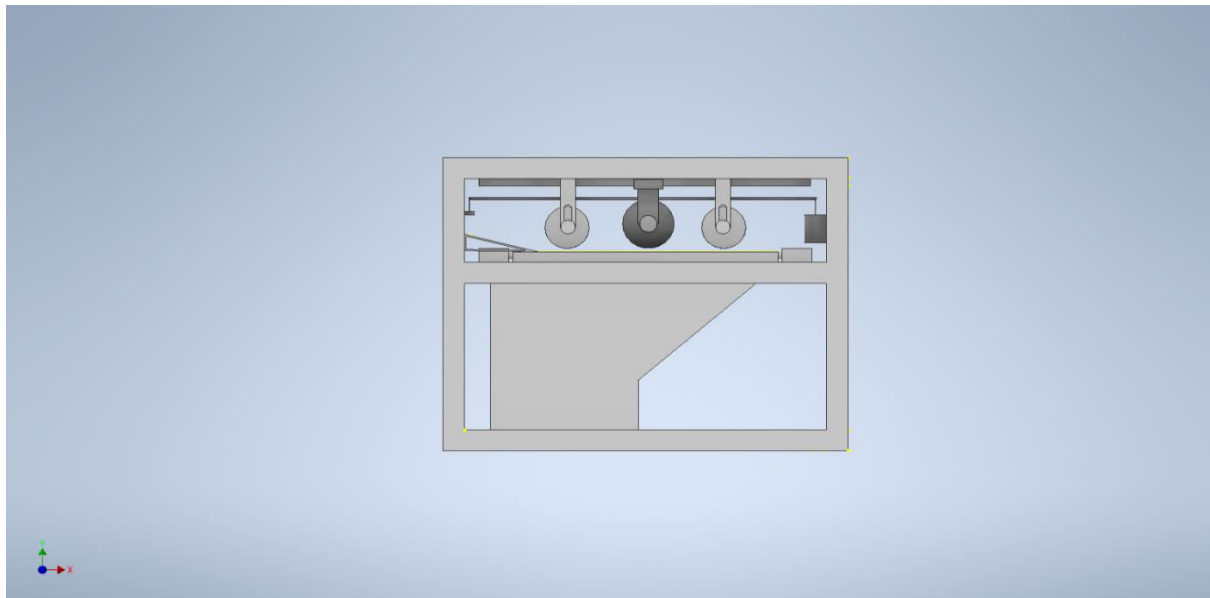
1. **Waste Separation Unit** – Differentiates biodegradable and non-biodegradable materials for appropriate disposal.
2. **Cleaning System** – Uses high-pressure air jets to remove residual contaminants from non-biodegradable waste.
3. **Sterilization Unit** – Employs UV technology to neutralize pathogens, ensuring safe handling.
4. **Compaction Module** – Reduces the volume of non-biodegradable waste, optimizing storage and disposal.
5. **Drainage System** – Directs biodegradable waste into the sewage system, minimizing solid waste.
6. **Storage Compartment** – Securely holds sterilized, compacted waste until disposal or recycling.
7. **Control Panel** – Allows users to monitor and manage operations efficiently.
8. **Assumptions**

To ensure the system operates effectively, the following assumptions are made:

1. **Input Waste Characteristics** – The napkins processed will have standard biodegradable and non-biodegradable components suitable for separation.
2. **Power Supply** – A stable power source is available to support continuous operation of motors, UV sterilization, and control systems.
3. **User Interaction** – The system is designed for minimal manual intervention, requiring only periodic waste removal and maintenance.
4. **Environmental Conditions** – The machine will operate in controlled indoor environments, free from extreme temperatures and excessive humidity.
5. **Waste Disposal Compliance** – The disposal and drainage system aligns with local waste management regulations and plumbing standards.

This model ensures the efficient and safe disposal of sanitary waste while promoting hygiene and sustainability.

III. DIAGRAM

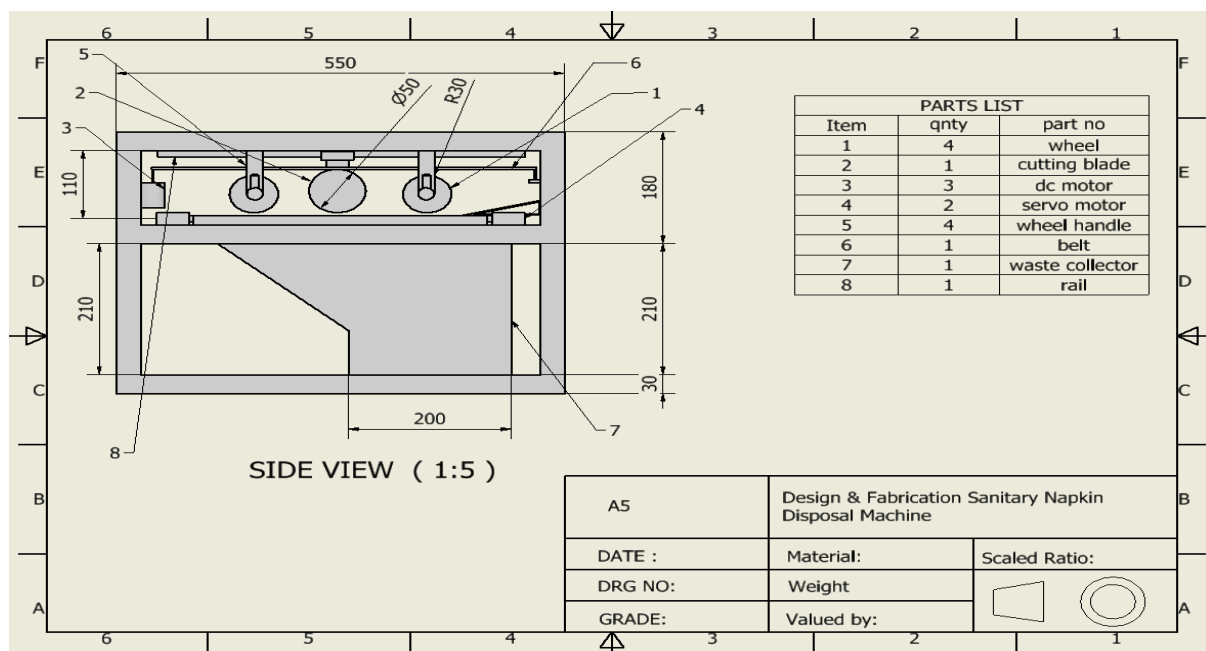


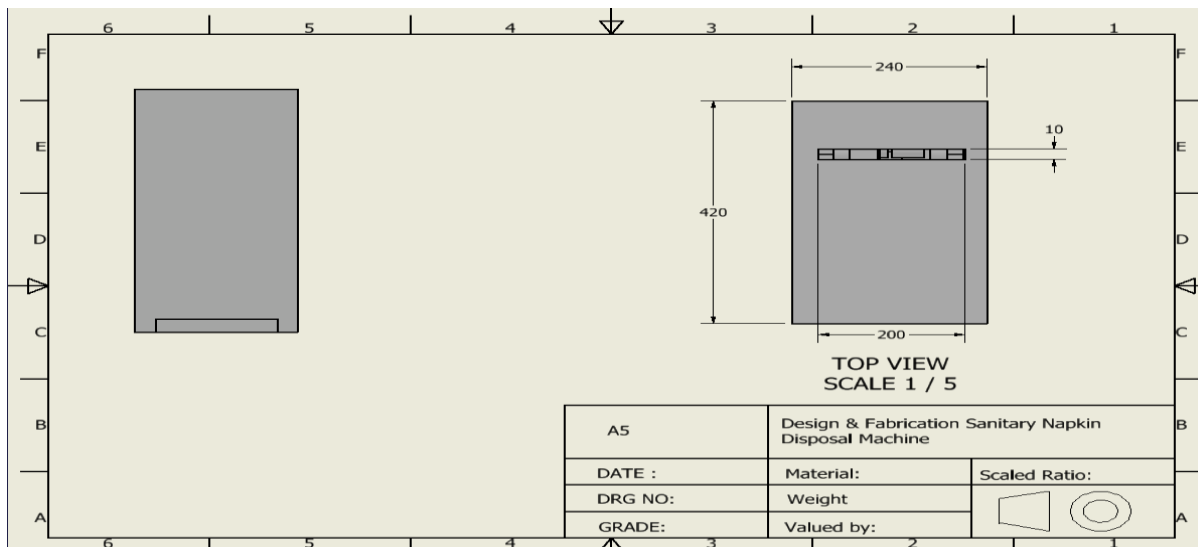
IV. SANITARY NAPKIN MACHINE

Sanitary Napkin Disposal Machine: Key Features

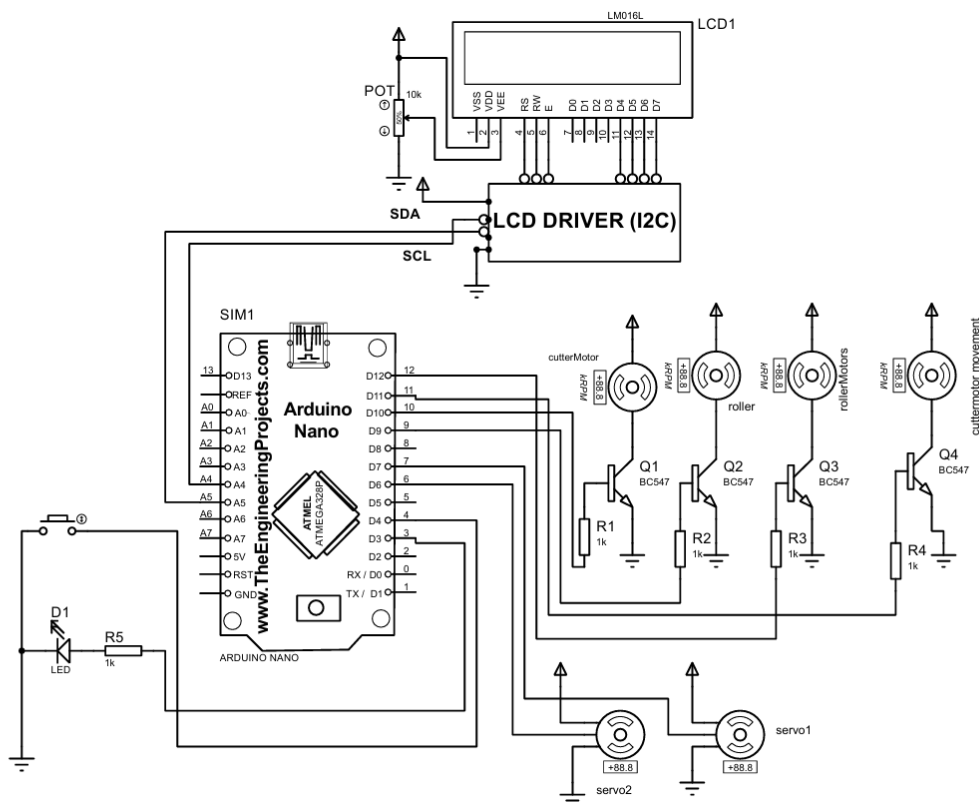
1. High-Pressure Air Jets Cleans non-biodegradable waste by removing contaminants and organic residues. After separation, the air jets target the non-biodegradable parts, ensuring thorough cleaning. This step prevents odor and prepares the waste for safe sterilization.
2. UV Sterilization Unit Disinfects non-biodegradable waste by neutralizing harmful bacteria, viruses, and pathogens. The waste enters a UV chamber, where ultraviolet light effectively eliminates biological hazards. This ensures the waste is safe for handling and storage.
3. Biodegradable Waste Drainage Directs degradable material into the sewage system, reducing solid waste accumulation. The system efficiently disposes of biodegradable waste, preventing blockages. This process makes disposal seamless and environmentally friendly.
4. Automated Compaction Module Compresses sterilized non-biodegradable waste to minimize volume and storage needs. Compaction reduces the frequency of waste removal, especially in high-traffic areas. This improves efficiency and lowers disposal costs.
5. UV-Protected Storage Stores sterilized and compacted waste in a controlled environment to prevent contamination. Continuous UV exposure ensures pathogens remain neutralized. This design helps reduce odors and makes waste removal safer and more convenient.
6. User Control Panel Features a display screen for monitoring machine operations, error alerts, and maintenance scheduling. Users can manually control functions like starting a cycle or adjusting settings. The intuitive interface makes the machine easy to use and maintain.
7. Inlet & Outlet Openings The inlet ensures safe napkin insertion while preventing direct exposure to internal components. The outlet securely collects sterilized, compacted waste for easy disposal or recycling. These openings streamline waste processing and enhance user safety.
8. Internal Railing & Roller Mechanism Facilitates smooth movement of napkins through the machine, ensuring efficient processing. The rollers guide the waste through cleaning, separation, and sterilization stages. This minimizes blockages and optimizes operational performance.
9. Electronics Housing & Power Unit Protects electrical components like motors and control circuits from damage and exposure to waste. This unit ensures stable power supply and energy-efficient performance. The enclosed design enhances the machine's durability and reliability.

1. CAD DRAWING





V. CIRCUIT DIAGRAM



VI. CONCLUSION

The sanitary napkin disposal machine presents a transformative approach to menstrual waste management, ensuring a hygienic, safe, and environmentally responsible disposal process. By integrating high-pressure air jets, UV sterilization, and automated compaction, the system effectively minimizes contamination risks while optimizing waste handling. Its

ability to separate biodegradable and non-biodegradable components further enhances sustainability, reducing landfill waste and promoting eco-friendly disposal practices. Additionally, the system's efficient waste processing mechanisms help to maintain a cleaner environment and reduce pollution.

Moreover, the system's user-friendly interface and durable design ensure long-term reliability and ease of operation. With minimal maintenance requirements and energy-efficient functionality, this machine is a crucial step toward addressing public health concerns associated with improper sanitary waste disposal. The automated control panel and real-time monitoring features enhance user convenience, making it accessible for both individual and public use. The UV-protected storage compartment ensures that sterilized waste remains safe and odor-free until proper disposal or recycling.

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