

Smart Digital Dustbin

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ABSTRACT

In General, the municipality laid many rules and method to convert the city into pollution free, but we fail to follow those rules due to the improper disposal method of solid wastes. In existing scenario the whole city wastes will be dumped into the empty land and decompose, Later the non-decomposed waste will be incinerated in that same open land. It leads to fouling smell and air gets polluted around the surrounding areas. To overcome this huge problem, we proposed Smart Digital Dustbin (SDD).

INTRODUCTION

Due to the enormous growth of population, lack of public awareness and poor disposal methods, the contamination of air and soil will occur. It leads to various dangers health issues. However the **Incineration** is one of the disposal methods, it also affects the environment when it is done on huge amount of waste. It causes various respiratory problems like Asthma and Chronic Pulmonary Disease (CPD). The whole waste is dumped on only one area. It causes nauseous sensation and fouling smell occurs. So the people living around will be suffering from this nauseous sensation and fouling smell. More than 4 million people are caused from the human diseases and 24 human diseases are caused by the improper disposal of waste. It may leads to death. Christo Ananth et al. [4] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. According to the readings, the authority officer will send the information about the bill to the customer. If the customer doesn't pay bill on-time, the power supply to the corresponding home power unit is cut, by sending the command through to the microcontroller. Once the payment of bill is done the power supply is given to the customer. Power management concept is introduced, in which during the restriction mode only limited amount of power supply can be used by the customer.

Hence, we proposed the solution by creating the **SMART DIGITAL DUSTBIN**. SDD separates the solid waste into Bio degradable, Non Bio-degradable (NBD) and Magnetic waste separately and incinerate the bio degradable waste. The implementation of SDD will prevent the current problems. We can able to create the cleanliness surroundings and healthy city. SDD surely reduce the drawbacks of our existing disposal methods.

PROPOSED SYSTEM

SDD project is mainly concentrating on the separation of wastes, Incineration, and conversion of toxic smoke into non toxic smoke.

(I) SEPERATION PROCESS

Initially, SDD is partitioned into 4-layers or containers. Above which, the movable rotating **Conveyor belt** is running with all types of waste and the **Robotic arm(R)** is fixed near the conveyor belt to pick and drop down the **Non Bio-degradable(NBD)** waste with the help of **IR Sensor**. The **Flex Sensor** is also used in robotic arm to crush the larger solid waste into smaller size. As the conveyor belt moves forward, the **Electromagnetic field** is applied to it. Due to this field, the **Magnetic Waste(MW)** get stacked with the belt and when the belt rotate down, the bio-degradable waste falls down into the brick furnace. The belt continues to move forward with the magnetic waste. As the belt rotate upward, the magnetic wastes get removed from the belt.

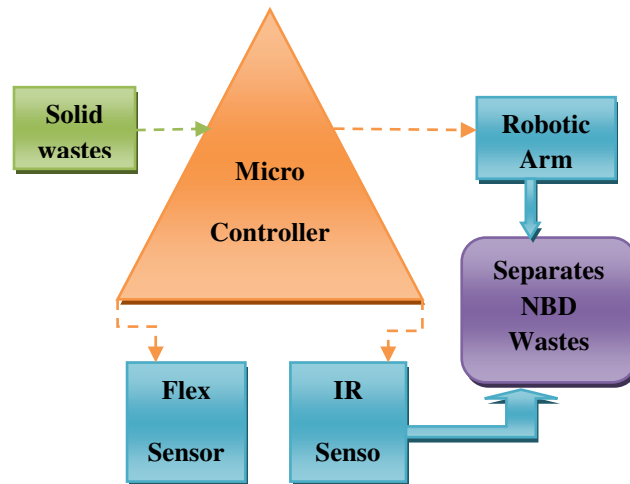


Figure. (I)- Diagrammatic representation of separation process

(II) INCINERATION PROCESS

The bio degradable waste in the brick furnace is carried out into 4-layers. The waste in the first layer is moved to 2-layer for the incineration process for 1st level of stream process and will be burnt at the temperature of 70°-80°c. Due to high temperature, the waste burnt from 1st level is moved to the 2nd level of 3-layer and then moved to 4-layer in an converted ash form. This ash is moved to the 3-layer (or) tray. This tray is removable so that the ash is removed separately.

(III) CONVERSION OF TOXIC INTO NON-TOXIC GASES

While burning the bio degradable waste, it releases the toxic gases. Some of the toxic gases are Carbon Dioxide (CO₂), Carbon Monoxide (CO), Nitrogen Dioxide (NO), Sulphur Dioxide (SO₂) and so on. These **Toxic gases** can be converted into **Non-toxic** by **3-way catalytic converter**. Catalytic converter is a control device that converts toxic gases by less toxic pollutants by using an oxidation and reduction reaction. This catalytic converter controls the

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level of toxicity. For e.g., the 30,000 ppm (parts per million) of carbon monoxide gas will be reduced to 10,000ppm.

1. $2\text{NO}_x \rightarrow \text{XO}_2 + \text{N}_2$ (reduction reaction)
2. $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$ (oxidation reaction)
3. $\text{C}_x\text{H}_{2x+2} + [(3x+1)/2]\text{O}_2 \rightarrow \text{XCO}_2 + (\text{X}+1)\text{H}_2\text{O}$ (oxidation reaction)

WORKING FLOWCHART

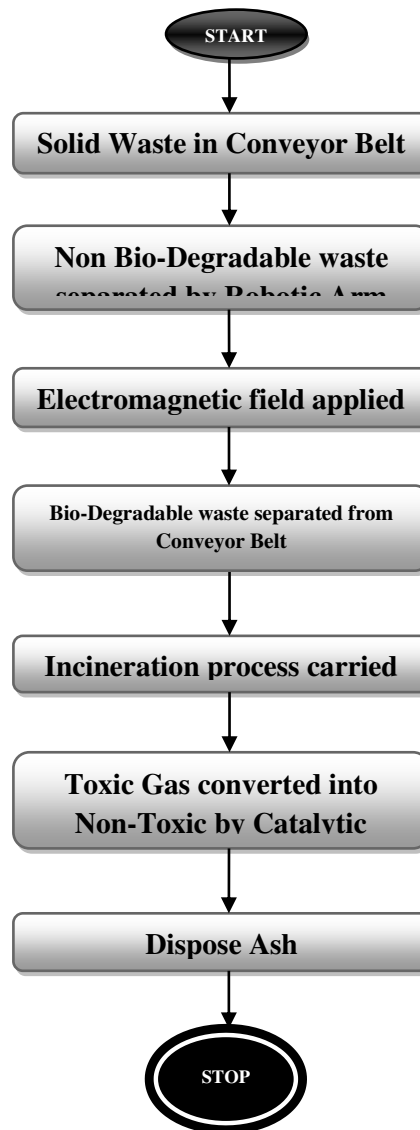


Figure. (II)- SDD Flowchart

SYSTEM ARCHITECTURE

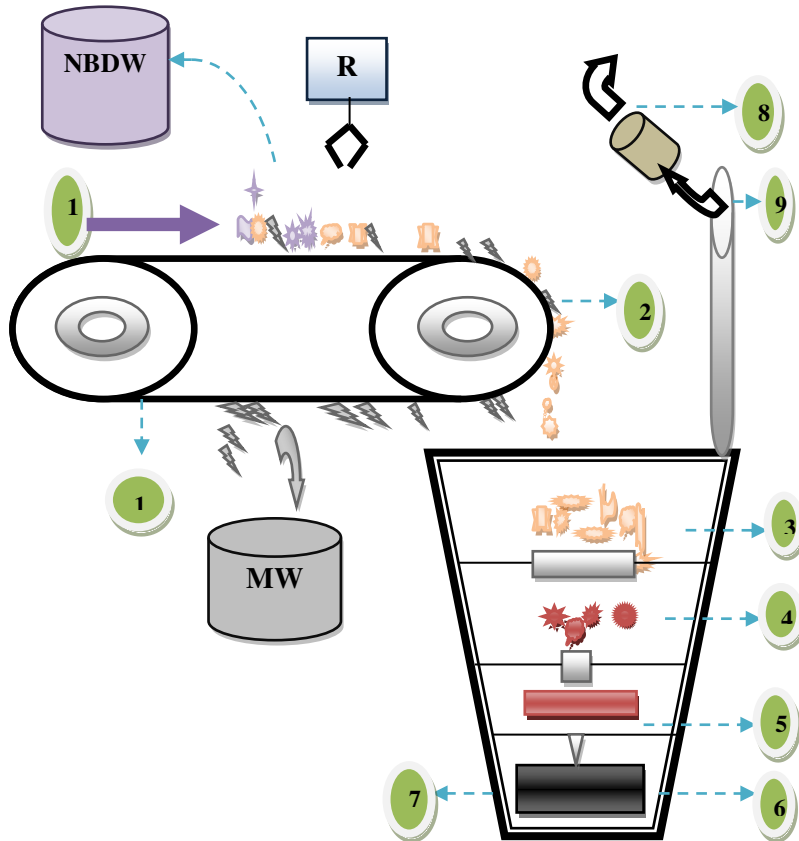


Figure. (III)- System architecture of smart digital dustbin

- 1- Solid Wastes In and Conveyor belt
- 2- Mixture of Bio-Degradable and Magnetic Wastes
- 3- Bio-Degradable wastes stored here
- 4- First level of Incineration process
- 5- Second level of Incineration process
- 6- Removal tray consisting of ash
- 7- Brick Furnace
- 8- 3-way Catalytic Converter
- 9- Gas Outlet



ADVANTAGES OF SDD

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- It reduces the fouling smell and toxicity in the society.
- Prevention of pollution is improved.

SYSTEM REQUIREMENTS

❖ HARDWARE REQUIRED

- ✚ Conveyor belt
- ✚ 3-way catalytic converter
- ✚ Gas outlets
- ✚ Brick furnace
- ✚ Robotic arm
- ✚ Raspberry microcontroller
- ✚ IR sensor
- ✚ Flex Sensor

❖ SOFTWARE REQUIRED

- ✚ Artificial intelligence

CONCLUSION

Since the amount of solid wastes is increasing widely, we need some method to dispose it properly. If we disposed the waste properly, it reduce the spreading of diseases and housefly breeding. The people can able to live in clean society .Hence, we proposed this Smart Digital Dustbin. Through SDD, we can able to separate the solid wastes via bio-degradable, non bio-degradable and magnetic wastes. Further it leads to the incineration process and at last we are converting the toxic gases into non-toxic gases which are coming out from the gas outlets. Later, we will try to make this SDD as wireless technology, online based monitoring and reduce its complexity.

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