Intelligent Dustbin to Detect and Identify Materials

S. Ravichandran*

ABSTRACT

This paper describes a system an intelligent smart dustbin. In the present fast world due to increase in the human population, the amount of materials being consumed has surged. Along with this the amount of waste material being generated is increasing rapidly. At certain places the garbage bins are filled up and noone to supervise the situation. The smart dustbin in the present invention address this issue. The bin further identifies the important materials from waste materials like the device has its own memory to identify.

Keywords: Smart Dustbin, Internet of Things, Memory, Garbage, Waste Material, 3D Scanner, LED, Vacuum Cleaner

1. INTRODUCTION

The present invention relates to the field of Internet of things (IOT) in identification of waste materials using a smart dustbin.

The goal of this research is to develop a smart dustbin that is able to detect, identify and differentiate between garbage materials and importantmaterials. The recent advancements in the area of IoT has provided solutions for garbage management. This paper discusses on the efficient management of waste materials and providing solutions for environmental problems related to garbage deposition.

Our research team has developed a smart dustbin that challenges the current system and provides the following advantages for differentiating,identifying and detecting waste materials.

1. 3D scanner to scan the materials lying on the surface of the dustbin,

2. A GSM module on the left side at the ear position of the dustbin to trigger the cleaning process of the dustbin,

3. A solar panels projected on top of the dustbin to charge the batteries from the sun light

4. More than two small LEDs placed at different heights inside the bin to indicate/inform about the waste material dumped inside the dustbin

5. Set of wheels at the bottom that allows the smart dustbin to move in all directions inside the application area with an aid of obstacle detection system

6. A memory to store all the user feed images of important document based on the areas it is used to clean.

7. A vacuum cleaner fixed at its bottom, to suck/clean the floor has a vacuum cleaner at its bottom

The implementation and description of the smart dustbin would be discussed in the preceding sections of this paper.

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*   Research Scholar, Vice Chancellor, St. Peter's Institute of Higher Education and Research, Avadi, Chennai, India, *Email: drravis@gmail.com*

2. DESCRIPTION

The paper discusses in detail on a smart system that is capable of reducing the garbage that is littered in and around the application area by collecting the garbage at regular intervals of time.

The smart dustbin 100 has on its top surface a solar panel 101 that is used as to power it. Solar panels generate voltage which is stored inside the batteries (not shown in the figure) of the smart dustbin. The smart dustbin is designed in a manner to consume less quantity of electricity. Further, these batteries can be charged by main power supply as an additional power source.

The smart dustbin in the initial stage has to be trained by the user according to the application area. The smart dustbin has preinstalled images inside its memory of few items such as monetary notes and coins of various countries, certain important documents such as PAN card, driving license debit and credit card etc.

The smart dustbin as mentioned above has to trained by the user according to the application area and this phase is termed as training phase. During the training phase, the user can customize it by inserting various images into the memory of the smart dustbin. There is an option on the right side at the ear position to enter into the customization mode 102. The user can enter into this mode at any point of time.

3D scanner 103 is incorporated into the smart dustbin which serve as the eyes of the smart dustbin. With the aid of this sensor the smart dustbin scans the material lying on the surface. The smart dustbin has a level sensor (not shown in the figure) inside the smart dustbin that consists of small LEDs placed at different heights inside the bin. Each LED indicate a particular height level. The materials are cleaned using the vacuum cleaner present at the bottom of the smart dustbin (not shown in the figure).

The smart dustbin further has a GSM module present on the left side at the ear position, that can be used by the user to trigger the smart dustbin to clean the area. The smart dustbin has a vacuum cleaner at its bottom. Further it has wheels at the bottom that allows the smart dustbin to move in all directions. The dustbin further has obstacle detection system that allows it to manoeuvre inside the application areas without hitting any objects present in that areas.
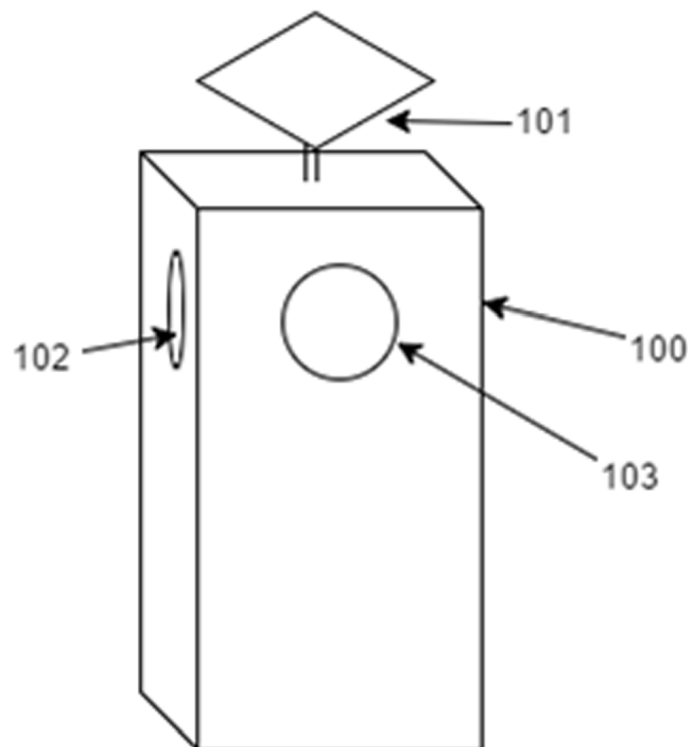

Figure 1: The smart dustbin

There are placed four LEDs inside the smart dustbin, with the first LED positioned at h/4 of the smart dustbin, with the subsequent LED positioned at a height of h/2 and 3h/4 (where 'h' indicates the height of the smart dustbin from the bottom). When the waste inside the smart dustbin reaches the top most LED positioned at 9h/10 (indicating 90% of the height of the smart dustbin)a message is sent to the user/cleaner using the said GSM module.

The smart dustbin as mentioned above allows the user to trigger it to start cleaning the area. The smart dustbin further has an option to automatically start cleaning the application area based on the time set by the user in advance. The user further has the option of setting the frequency i.e. the number of times it is required to clean the area with the setting to set time to start the cleaning process. This process is entirely customized by the user and they can save such cleaning sessions inside the memory of the smart dustbin and assign a name to it for e.g. Cleaning profile 1, 2 etc. This allows the user choose from a number of options assigned by them.

As the smart dustbin is trained according to the application area during the training phase, the 3D image scanner scans the documents which the smart dustbin encounters while cleaning, compares it with the images inside the memory, then takes a decision to whether vacuum it inside or not.

As mentioned above, the 3D scanning system acts like the eyes of the smart dustbin. During the initial training phase, various images are fed into the memory of the smart dustbin according to the application area. Consider the office area, the important materials can be but not limited to monetary notes, coins, bank documents etc. When the images of such documents are fed into the smart dustbin, these documents are considered as exception and are refrained from being vacuumed in by the smart dustbin. When such materials are found, the smart dustbin informs the user using the GSM module present on the smart dustbin with an additional alarm being raised regarding the same.

3. IMPLEMENTATION

The present invention and its advantages can be implemented as described below.The smart dustbin finds application in many areas like home, office, industries, hospitals to name a few.

The smart dustbin disclosed in the present invention provides the user with many advantages such as automatic garbage collection, distinguishing between important and waste material, runs on alternate source of energy thereby saving the electricity.

Now-a-days, due to increase in the consumption of materials with increase in human population, the amount of garbage and waste has significantly increased. Due to such a surge in the quantity of waste being generated from various areas, the users need to have a proper personal disposal system that allows them keep the ambience in their vicinity clean and hygienic. Thus, the present disclosure presents a smart dustbin which can be used at numerous places starting from a small home to large industries.

The smart dustbin comprises of memory that can store information regarding the important documents such as monetary notes, coins, plastic money cards, cheques etc. Further, the smart dustbin uses alternate energy such as solar energy which is stored inside the batteries. The batteries can further be charged by connecting it to the main supply. The smart dustbin has an image scanner that scans the image of the materials lying down before disposing them.

In addition to it, the smart dustbin can be customized by the user according to the application area by inserting the images of important materials into the memory of the smart dustbin.

The smart dustbin manoeuvers inside the application area to collect the garbage and the frequency and timings of such an action can be set by the user that can be saved as cleaning profiles. Further the smart dustbin has a level indicator that informs the user in case the bin is full and needs to be emptied.

4.   APPLICATIONS

The invention as described in the drawing finds applications in Home, Offices, Industries, Factories,

Hospitals and Public places

5.   CONCLUSION

The present invention provides a solution for waste management system using a smart dustbin hat has memory and enables the reduction of risks associated with the environmental pollution.

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