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Smart Dustbins Capable of Distingushing Important Materials from Waste Materials

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ABSTRACT

This paper describes a smart dustbin that can be used to identify waste materials. The present invention more specifically relates to devising a smart dustbin that has the intelligence to segregate the waste materials and important materials using internet of things

Keywords: Solar Panel, 3D Scanner, GSM, LED, Garbage Collection and disposing, Garbage.

1. INTRODUCTION

The government of India is on a mission to transform India's urban cities into Smart Cities. These cities will be powered by advancements in information technology and would possess sustainable real estate and market viability.

When information technology is going to be the driving force, Internet of things (IOT) is going to be the lifeline for smart cities in India.

As a research team with an eye on contributions to the society, we have developed a smart dustbin that distinguishes between waste and important materials, run on alternate energy sources, further allowing the user to customize the said smart dustbin.

Our proposed system provides the user with many advantages such as:

1) Automatic garbage collection
2) Capable of distinguishing between important and waste material
3) Designed to run entirely on alternate source of energy thereby saving the electricity

2. DESCRIPTION

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.

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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.

3. IMPLEMENTATION

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.

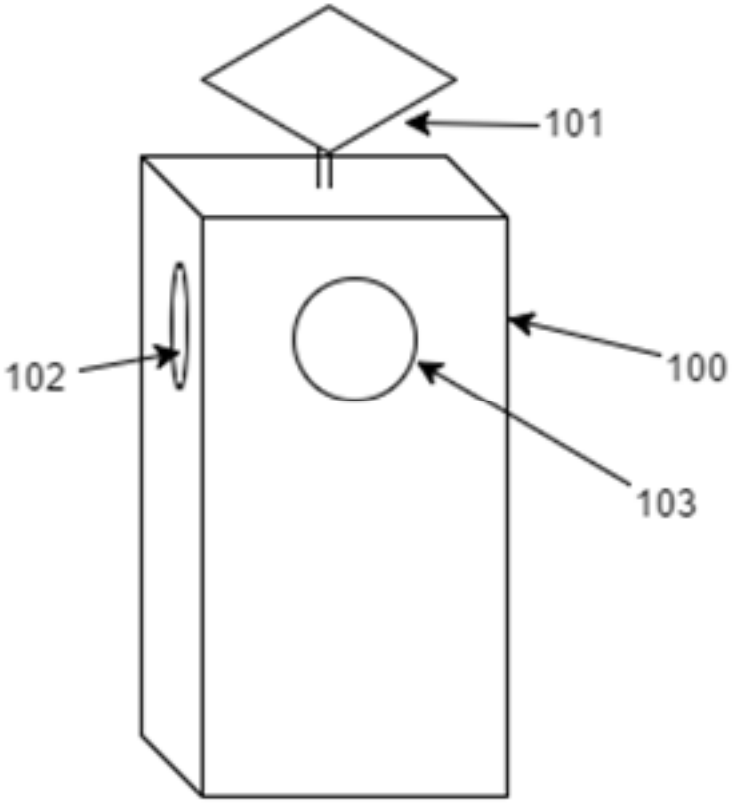

Figure 1: Shows the architecture of proposed system

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.

4. ADVANTAGES

The invention as described in the drawing find applications in the following area:

a. Government-powered cities
b. Home
c. Offices
d. Industries, factories
e. hospitals

5. CONCLUSION

One of the major utilities of our system is that ourgovernment can use this system to make our cities truly smarter. A truly greener system as it runs on solar power, this system if implemented can make sure, we don't lose any valuables as "garbage".

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