

MINI PROJECT PREVIEW

ABSTRACT DESIGN / OBJECTIVE :

Swachh Bharat Mission (SBM) is a national campaign by the Government of India, covering 4041 statutory cities and towns. Main goal of this mission is to promote cleanliness in cities, to have clean streets, roads, and infrastructures. For this purpose an efficient and effective garbage collection, transporting, processing, and disposal infrastructure is essential. different types of wastes are to be collected using separate garbage cans. These cans are placed at designated locations, 'collection points' in the city and the wastes are picked-up in trucks at times to meet certain cleanliness factor/requirement.

COMPONENTS USED:

- 1) ZYBO BOARD
- 2) BREADBOARD
- 3) JUMPER WIRES
- 4) LEDS
- 5) RESISTORS
- 6) SEVEN SEGMENT DISPLAY
- 7) ULN 2003 IC
- 8) BC 177 TRANSISTOR

SOFTWARE USED:

- 1) VIVADO SOFTWARE

INTRODUCTION :

The waste management system consists of three bins allocated for various types of wastes spread across the smart city. The lid of each bin is allocated with a different unique colour depicting the type of waste it will hold.

1. Yellow Bin - Waste that can be recycled.
2. Green Bin - Organic waste.
3. Red Bin - Garbage that cannot be recycled.

Yellow Tin :

This type of garbage can, consists of waste that can be recycled.

This category includes:

- Tins, cans and aerosols.
- Glass bottles and jars.
- Paper and cardboard.
- Cartons.
- Rigid plastic containers

Green Tin :

This type of garbage can, consists of all types of organic wastes found in the neighbourhood.

This category includes:

- Lawn clippings
- Prunings and cuttings
- Flowers
- Leaves
- Food scraps
- Small branches
- Paper towel and tissue
- And many more.....

Red Tin :

As the colour red depicts danger, this type of Garbage Tin, consists of wastes that are non-biodegradable, and non recyclable:

This category includes:

- Soft plastics
- Ropes and hoses
- Broken crockery and glassware
- Old clothes
- Polystyrene
- And many more.....

Each Garbage Tin is smartly designed to detect any abnormality, completion or disturbances thus allowing for a garbage free smart life for the people in the city.

DESIGN OBJECTIVE:

This Garbage Management System consists of three types of cans, sorting the different kinds of wastes among the entire city thus, allowing for the chance of recycle and re-usage of such items thus, fitting the image of a smart city.

Each Garbage is also induced with various kinds of sensors thus helping the collection of the garbage to make it a smooth, well versed methodology. The main objective for the fabrication of this design is to prevent the air and water pollution and keep the city clean and it's inhabitants disease free.

DESIGN:

Numerous garbage tins are spread across the city

Prototype of the Garbage Tin is embedded with various kinds of sensors , implying the level, weight, smell, other troubles caused due to the stagnation of wastes.

The different kinds of sensors used for detections are:

LEVEL DETECTION:

- The IR sensor is used to keep the level of the garbage in the tin under constant detection.
- Whenever the level of the garbage in the tin exceeds a predetermined danger level, the sensor detects it and sends a signal to the management office implying that it should be replaced.

WEIGHT DETECTION:

- The sensor is used to keep the weight of the garbage tin under constant detection
- Whenever the amount of garbage in the tin exceeds a predetermined weight, it implies that the amount of garbage in tin is in abundance and needs to be replaced.

SMELL DETECTION:

- The electronic nose is used to keep the odour of the can under constant detection.
- Whenever there is an unpleasant odour coming from the tin, a signal is emitted thus asking for a replacement

STAGNATION DETECTION :

- Whenever there is a stagnation of any liquid waste, there will be a swarm of insects such a house flies or mosquitoes which leads to occurrence of many diseases.
- Sensors that detect the frequencies of the wingbeats of them are installed in the garbage tin thus indicating the heavy swarming of flies and implies that it should be replaced.

FIRE DETECTION :

- Sensors for fire detection are also installed in the garbage tin, thus preventing the heavy pollution that will be caused due to the burning of such non - degradable wastes.

GPS DETECTION :

- GPS detector is installed in all the garbage tins to have an overview of all the information and its position to make the collection easy.

DESIGN JUSTIFICATION:

The prototype tin designed above are spread across the city in designated locations so that each nook and cranny of the city will be covered. As elaborated above, each tin is installed with various type of sensors for various sensors.

The Garbage Collection system is made up of three kinds of tins to have a regular cleansing of the city and also to have a recycling of the products thus reducing the demand of manufacturing of new products thus helping in the demand for new manufacturing.

All the garbage tins are monitored by the Municipal corporation of the city thus having a complete control and overview of the status of all the garbage tins across the city. Each tin is given its own ID to have a unique identification, thus making the detection easy

The various kinds of signals the municipal corp has to look out for is :

Level detection signal :

The level detector gives out a signal when the garbage level in the tin exceeds 85 percent of it's holding capacity. As soon as the signal is given out, collection measures are started to replace the tins that have given a cleansing signal. The buffer time that occurs for the replacement covers for the remaining 15 percent, thus avoiding overflowing of garbage and having a clean view.

Weight detection signal :

The weight detector gives out a signal when the garbage level in the tin exceeds a pre determined weight limit that is less than the holding capacity. As soon as the signal is given out , collection measures are deployed to replace such tins that have given out a cleansing signal. The buffer time that occurs for the replacement covers for the remaining 15 percent, thus avoiding overflowing of garbage thus emitting the image of a smart city view.

Smell detection signal:

The smell detector gives out a signal when there is any unpleasant odour emitting from the garbage tins. This gives out a cleansing signal and thus collection measures are deployed thus preventing the disturbance caused to the people and also avoiding the harbouring of various animals.

Stagnation detection:

When there is any stagnation of any type of liquid waste, then this would lead to swarming of small insects like mosquitoes, flies etc which would lead to the birth of many disease carriers thus affecting the health of the residents of the neighbourhood. So when there is a heavy stagnation occurring in any garbage Tin. the cleansing signal is sent to the municipal corp which will respond with replacement measures.

Fire detection :

Burning your household garbage is dangerous to your health and our environment, and generally against the law. So to avoid any such occurrence, fire detectors are installed in all the garbage tins. Any occurrence of burning sends out a SOS signal thus helping the municipal corporation deploying the required measures.

GPS:

Every garbage tin is installed with a GPS, which helps in replacing the tins, a quick and swift process.

Once the filled garbage tins are replaced, the yellow tins are used for recycling the waste to produce new products, the green tins are used to produce manure and any such uses for organic wastes and red tins that consists of non-degradable wastes, toxins and hazardous wastes are handled by specialised sanitation departments.

IMPLEMENTATION DETAILS :

We are first going to give the dustbin ID as the input through the zybo board. Then using the circuit designed by utilising the components mentioned above, we do the following operations.

NOTE:

These detections will be done by the detecting sensors. Since we aren't using any, we are only giving the different possible conditions as the input and then obtain the required output

1) LEVEL DETECTION:

In order to detect whether the bin is completely filled or not, we give an input such that 90% of the bin is filled. The garbage system is designed in such a way that the moment the bin is filled upto 90%, an LED light will glow indicating that the bin is almost full and the municipal corporation should send a truck to collect the garbage.

2) WEIGHT DETECTION:

In order to detect whether the bin weight is almost its maximum weight capacity or not, we give an input such that 90% of the entire capable weight is in the bin. The garbage system is designed in such a way that the moment the weight of the bin is 90% of the maximum holding capacity, an LED light will glow indicating that the bin weight is near to the maximum holding capacity and the municipal corporation should send a truck to collect the garbage.

3)SMELL DETECTION:

In order to detect whether the smell from the bin is abnormal or not, we give an input from zybo indicating no smell or abnormal smell. If the LED glows, then it indicates that the smell from the garbage is abnormal and higher than a certain limit and the municipal corporation should send a truck in order to collect the garbage.

4)FIRE DETECTION:

In order to detect whether the bin has caught up fire or not, we give the input as bin ID and give a condition such that fire is caught up near the bin, then an LED should glow indicating that the bin has caught fire. A signal will be sent to the fire station and required action will be taken.

5)STAGNATED WATER DETECTION:

In order to detect the stagnated water is there or not, we give the bin ID as the input and the different kind of possible conditions.If there is stagnated water, the LED corresponding to it will glow and the required output is obtained.

We can solve this problem in verilog by using if- else conditions and for loops.

CONCLUSIONS:

- 1)This garbage system is applicable across a large city where a large number of bins are there.
- 2)The concept of “RRR” is being utilised in this design of the garbage management system thus fitting the image of the smart city.
- 3)We should make sure that the sensors installed in the bins are working well and adequate precautions are to be taken whenever required.

TEAM DETAILS:

GROUP NO: 10

MEMBERS:

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