

SMART WASTE MANAGEMENT SYSTEM

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Abstract: Due to increasing problem of waste the environment is getting affected day by day. Irregular management of waste typically domestic waste, industrial waste and environmental waste is a root cause for many of the human problems such as pollution, diseases and has adverse effects on the hygiene of living beings.[1] To overcome these problems the author has given some solution to make environment clean and hygienic.

Keywords: Arduino, ultrasonic sensor, Bluetooth module, servo motor, DC motor, relay.

I. INTRODUCTION

The traditional way of manually monitoring the wastes in waste bins is a complex, cumbersome process and utilizes more human effort, time and cost which is not compatible with the present-day technologies.[2] Here smart dustbin is designed which will separate dry and wet waste on its own. The plate inside the dustbin will detect whether the waste is wet or dry automatically using current mechanism, and according to that it will through the waste in dry or wet section. The whole system works on Arduino. When dustbin gets full it will send alert message to AMC office in the application which is designed by us. These will save fuel and time of the workers. By processing the wet waste further will decrease the direct contact between the waste and users, hence these will reduce the skin disease problems to users caused due to unhygienic waste.[3]

II. BLOCK DIAGRAM

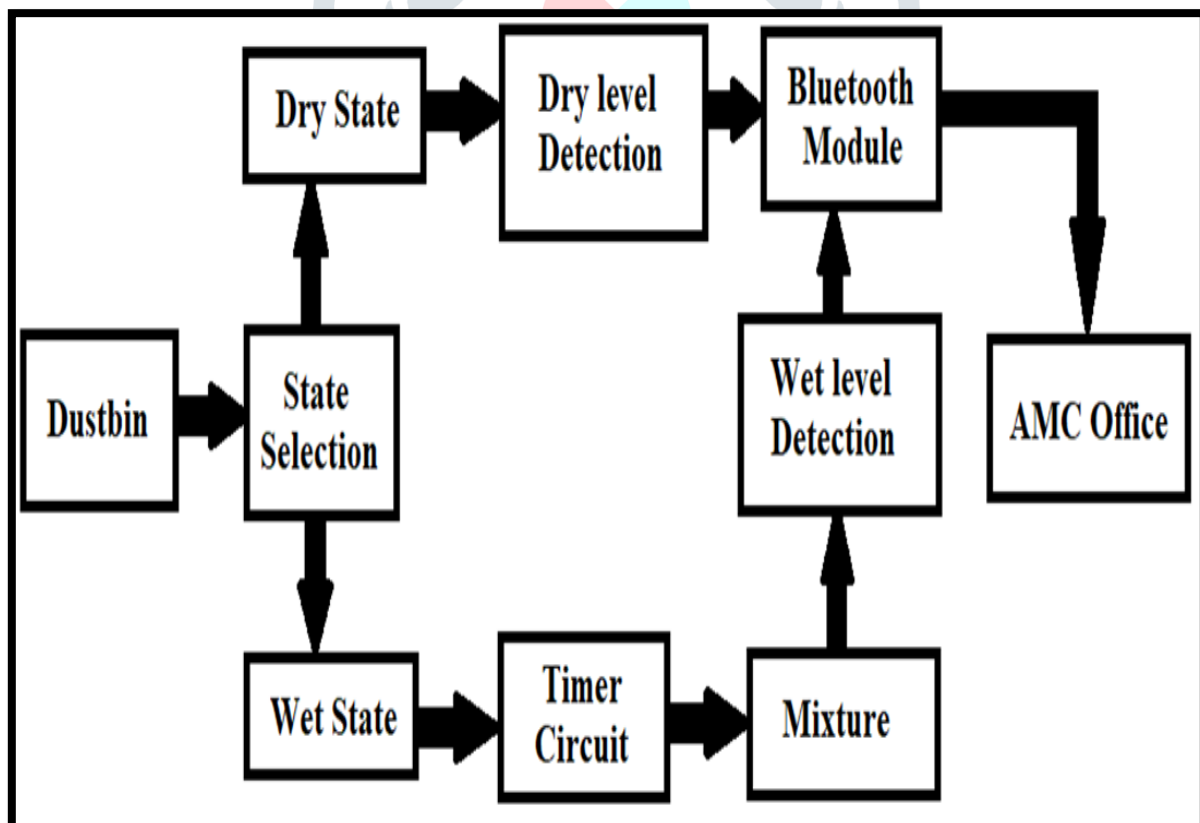


FIG 1: Block diagram

III. BLOCK DIAGRAM DESCRIPTION

Block diagram shows that when garbage is thrown in the smart dustbin firstly the state selection of waste will be done, whether the waste is dry or wet. After selection of state the waste will be thrown in the particular section, if the waste is detected as a wet than it will be thrown in the wet section and if the waste is detected as dry than it will be thrown in the dry section. In wet section natural fertilizer will be made with the help of blades and timer circuit. The alert message will be sent to the AMC through our designed application when bin gets fill up to pre decided level.

a) **State Selection:** When waste will fall on the plate the plate will detect whether the waste is wet or dry by using current mechanism. The current will pass through the plate, if the waste is wet the current will pass through the waste because all the wet waste will have some amount of moisture in it and hence, the waste will be detected to be wet and plate will tilt towards wet section. If the waste is dry than no current will pass through it and hence, it will be detected as dry waste and wiper will wipe out the waste towards dry section. In these ways the detection of waste will take place.

b) **Servo Motor:** The use of two servo motor of 180 degree is done for throwing the waste in the particular section. One servo motor is used to tilt the plate towards wet section when waste is detected to be wet, the plate will tilt and when the waste on the plate gets thrown into the wet section the plate will come to its original position. Second servo motor is used for wiper to wipe waste towards the dry section, if the plate doesn't get tilt with in the 10sec than wiper will wipe out the waste towards dry section. Both the servo will move up to 90 degree and then it will come to 0 degree (to its original position).

c) **Level Detection:** Level detection means to detect the level of something. Here level is pre-determined manual in it. These makes ones work easy as one does not need to keep watch on it. When bin will get fill up to the pre decided level it will give message to the user. Here we have used ultrasonic sensor for detecting level. Ultrasonic sensor can measure the distance to an object by using sound waves.[4]

d) **Timer Circuit:** Using timer circuit the blade is rotated for specific time period using DC motor and after few seconds of rotation the motor will stop. These will make motor to start when it is required which will result in power consumption. We have used Arduino and relay as a timer circuit. Relays control one electrical circuit by opening and closing contacts with another circuit. When a relay contact is open (NO), there is an open contact when the relay is not energized. When relay contact is Closed (NC), there is a closed contact when the relay is energized. Relays are generally used to switch smaller currents in a circuit.

e) **Mixture:** Mixtures means mechanically blending or mixing of elements without any chemical reaction so the physical properties of a mixture might change. Here we are mixing wet waste with soil to convert it into natural fertilizer. We have kept blades vertically, so that it becomes easy to mix wet waste with soil.

f) **Bluetooth Module:** We have used HC06 Bluetooth module to connect dustbin with the application for notifying the status of the dustbin. When level of waste in dustbin will reach up to pre decided level the alert message will be send to AMC office.

g) **Arduino:** The whole system works on the Arduino. The required power to the relay, Bluetooth module, ultrasonic sensor and current mechanism for the plate will be provided through Arduino.

IV. WORKING

The whole system comprises of two section with different working, one is dry section and second is wet section. Using Arduino detection of waste is done on that basis waste is thrown in the section which it belongs to, these makes our dustbin smart and unique.

A. Working of wet section

Firstly, when waste is thrown on the plate through which current will be flowing and every wet thing have some moisture in it due to which current will pass through waste which means the waste is detected as wet waste. After detection of waste as wet the servo motor will get active and which will tilt the slab towards the wet section. When waste will fall towards the wet section on sensing the waste relay will get active and which will rotate the blades inside the bin. The blades will cut the wet waste into small pieces. The waste will get mix with soil and will get converted into natural fertilizer. Ultrasonic sensor will detect the level of the waste, when it will get fill up to pre decided level it will send alert message to AMC office.

B. Working of dry section

If current does not pass through the waste the plate will not get tilt due to which the ultrasonic sensor which is fixed in such a way that it faces towards plate and little bit above the plate will sense the waste. After sensing the waste, the servo motor which is connected with wiper will get active and wiper will rotate 90 degree and then comes to its position. When dustbin will get fill up to certain level ultrasonic sensor will sense it and using Bluetooth module the alert message will be send to the AMC.

V. . ADVANTAGES

1. keeps the environment clean and Fresh.

2. Reduces Environmental pollution.
3. Waste management will help You to earn money.
4. The Wet type garbage will help to produce fertilizer which can be useful for growing plants.
5. Transportation cost is Low.

VI. APPLICATIONS

1. Smart dustbin can be used at different public places like hospitals, gardens, offices, railway stations, bus stops etc.
2. Support government in making smart city.
3. It can be used at big waste dumping yards.

VII. WORKING PROTOTYPE



FIG 2: Working prototype



FIG 3: Working prototype

VIII. CONCLUSION

Smart dustbin is a solution for today's waste segregation process. It separates the waste automatically which is far better than today's manual method of separating waste. It keeps the environment clean and healthy. It is also a one step towards Smart City. It can be used at any place and it is affordable. The fertilizer which is made from the wet waste can be sale and user can earn money from it.

IX. REFERENCES

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