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EFFICIENT GARBAGE DISPOSAL SYSTEM IN METROPOLITAN CITIES

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ABSTRACT

The ugly sight of the garbage dumped on the roadsides, sometimes overflowing drains or floating on the river surface, these are not uncommon for us. We all know garbage problem is a serious matter and it's not about finding a right technology it's all about how to integrate the technology with proper level segregation. With rapid increase in population there is an improper waste management system balance. Often it is mistake of Indians and their regular practice on waste disposal, they just dispose the garbage in empty lands and do not care about symptoms. To solve this problem, we will introduce a modified E dustbin. These dustbins will be placed on every street which will reduce the effort of labors. The dustbin will have the capability to distinguish and store garbage based on wet or dry disposal, and once the Dustin is full it notifies the concerned management office and they can collect the garbage. A microcontroller and will be used to control they whole system, and sonar will be used to detect the level of garbage filled.

Keywords: *waste management, E dustbin, Microcontroller, Sonar.*

I. INTRODUCTION

Waste is defined as any material which is not useful and represent no economic value. The garbage waste is categorized based on solid, liquid and gases.

The waste management involve financing, planning and construction and even operation facilities for the transportation, construction, and recycling and final disposal. If we closely map the data for how rapidly the garbage disposal is increasing day by day we notice that every year there is hike in 12%. The growth of population and with it increasing waste disposal rate cannot be stopped but we can find and implement solutions for safer disposal and how to recycle waste in efficient way.

Nearly 0.1 million tons of solid waste is generated every day in India, if we calculate this annually it reaches up to 37 million tons. From all the garbage collected around 94% is dumped on land and oceans and remaining are composed. India ranks number 3 for generating garbage. Many Indian fall sick due to lack of proper waste disposal and diseases and sickness is caused more in slum areas due to unhygienic and improper waste disposal.

We have designed a solution for segregating the waste and reducing the man labor required. In this digital era where humans trust machine more than any other human and all the problem is tired to solve using technology it is time to bring technology to solve the problem of waste disposal.

We will solve the problem of waste disposal by designing a efficient e waste dustbin which segregate dry and wet solid and later notifies area responsible management to collect it and then dump all the dry waste to Green machine which is capable of gathering mixed recyclables ad sorting them into various groups and then send it to respective recycle company to recycle. To give a better example let us consider that the dry waste consists of bottles paper and hard papers and sheets, all these dry wastes are separated and sent to respective company like the bottles are sent to bottle recycle company and paper to paper industries and so on.

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II. RELATED WORK

Some paper [1] shows the measure to maintain the cleanliness of city and one such example given is establishing dustbins in regular distances for convenience of public.

A paper [2] discusses on solving the problem using wireless Sensor Networks (WSN) using VANET's inside the garbage collecting vehicles for effective communications.

III. PROPOSED SYSTEM

Fig 3. Image of the prototype models

The diagram shows the prototype design of E dustbin. This will be designed to overcome all the weather forces like rain etc. The prototype will have a small container and two huge
to identity what type of waste is been dumped whether it is dry or wet and based on that it will dump the garbage in respective trash can. The can will consist of many sonars to display the level of garbage inside the trash can.

To improvise the level of identification of the waste type first it will be check for the water or moister content (wet waste) after that we will have smart machine learning algorithm to identity what item is it based on that also we can divide the waste.

Many sonars will be added vertically to measure the level of waste or garbage filled in the trash can. These sonars will be placed at top, center and bottom every sonar will be connected to a led, if the trash is filled till half then the middle-led glows this way we can know the level of trash inside without physically looking into it.

The lid of the upper container will be closed and will automatically open when it detects any human approach to the trash can. The lid will be operated using a high-power servo motor

We will be adding a GSM module with the microcontroller; this GSM module will be used to send SMS to the respective waste management department (regional wise). This way whenever the trash is filled it notifies them to come and collect all the garbage and then dispose it respectively, like the dry solid waste goes to industries for recycling and wet waste is buried underground.

This way it will decrease the man effort for picking all garbage house to house and collecting and putting it into the trash can.

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IV. SYSTEM ARCHITECTURE

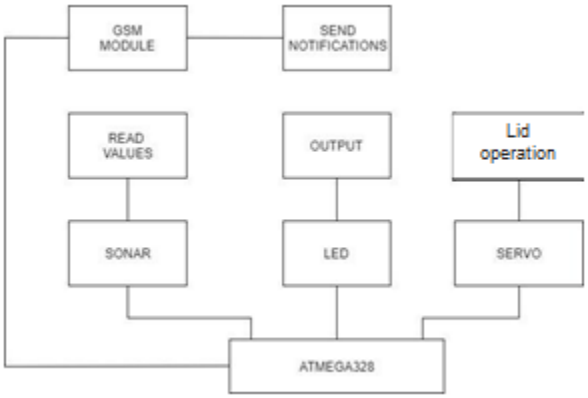

Fig 7. System Architecture

The Architecture is as shown, all the sensors and components will be driven by a Atmega 328 microcontroller. The sonar will read values and send it to the microcontroller and simultaneously based on the sonar reading the led will glow. This glowing of led shall indicate the level of garbage filled inside the trash can.

The servo motor driven by the Atmega will be used of opening and closing of dustbin lid. This can residue the risk of water dropping into the can and other material.

The Gsm module will be also controlled using the Atmega which will be used to send notification to the garbage disposal department alerting the trash can is full and need to be emptied.

V. SYSTEM MODEL

A. Sonar

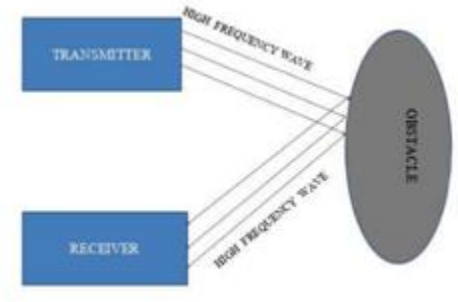

Fig 4. Block diagram for working of sonar

The Sonar consists of two core parts, the transmitter and the receiver. The transmitter in the Sonar sends out a high-frequency waves and the receiver at the other end receives this high-frequency waves. Now the distance of the object is calculated based on the time taken by the wave to reach the receiver.

This can be given as,

Distance = (T/2) * S
Where, T- denotes the times taken by the wave to reach the receiver.
S- denotes the speed of light

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B. LED

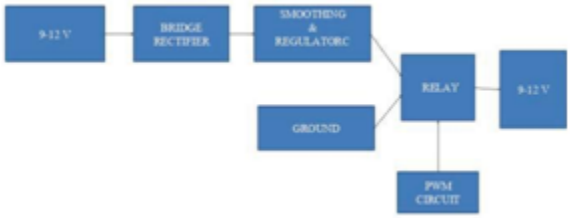


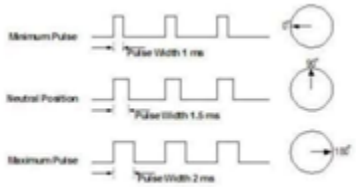
Fig 5. Block diagram to demonstrate working of led

The led consists of two lead semiconductors source, it is p-n junction diode which emits light when it is activated. When a desired voltage is applied to the leads, the electrons are able to recombine with electrons and holes this interns result is glowing of light. The advantages of using these led are that they use less voltage compared to other light emitting components, the device does not need any heating and warm time, and it is cost effective.

C. Servo Motor

Fig 6. Block diagram representing working of servo motor

The servo motor is controlled by sending electrical pulse of variations width or in short PWM (pulse width modulation), using control wires. There is a maximum and minimum pulse. The servo can usually rotate only max 90 degree. The PWM is sent to the motor which determines the position of the blade.



Variable Pulse width control servo position

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VI. FLOWCHART

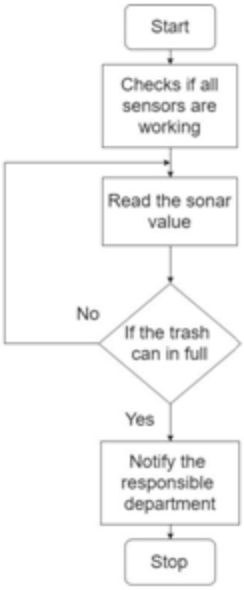

Fig 8. Flowchart for the flow of process

The flowchart shows the flow of process, at first it checks if all the components and sensors are working and responding at same baud rate. Once it receives confirmation on the working of all components then it starts to read the values from the sonar**,** every time it reads the value from sonar it calculates the amount of garbage filled in the trash and if it exceeds the threshold value then it turns on the led indicating that the can is full. And once it crosses the threshold then it alerts the department to come and collect the garbage as the trash is full.

VII. RESULT

Waste is present in various forms such as plastic, metals, wood, vegetable peels etc. if these wastes are not separated as dry and wet waste, they combine in landfills and produce methane which is highly inflammable and causes contamination of water resources which is a serious threat to health. Waste that is segregated can be reused and recycled very efficiently. And introduction to technology for this field reduces work pressure of labors. And these techniques reduce the spreading of diseases to both human and animals.

The proposed e-dustbin in the paper will be having 83% of waste separation efficiency (which will be increasing as the later version will be implemented) and it can accommodate up to 45kg of garbage and it can vary based on the requirement and surrounding needs.

VIII. CASE STUDY

When we have a deeper study about the garbage disposal and the techniques, we come across many points which causes heavy impact on the nature and living being health.

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Fig 1. Graph showing the waste management revenue opportunity

Source- netscript-based on 2015 waste management market research

Based on above chart we can say that there is also market for waste management and recycling. The revenue increases very year because of population increase and because of population increase in the waste disposal.

Now if we compare the rate of garbage generated verses garbage collected verses garbage treated,

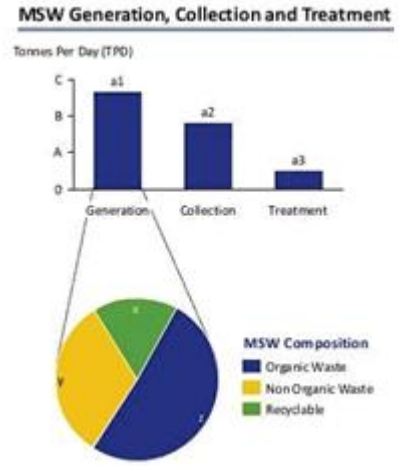

Fig 2. Table showing MSW generation, collection and treatment

Source- netscript-based on 2015 waste management market research

If we consider the above graph we notice that the rate of garbage generated is more and then the amount of garbage collected is very less and then the garbage treated is quarter of collected, in short, the garbage disposed is not collected completely nor is been treated. It is due to this fact that we see many empty land used to dump.

We need a solution to collect all the garbage disposed and then treat it safely dispose it without harming the nature and living beings

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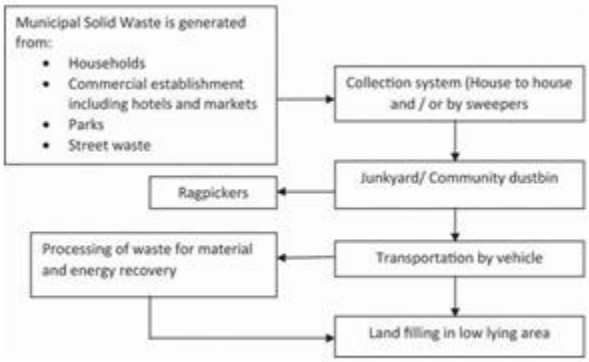

IX. CONCLUSION

This product will help and improvise the way the garbage is been collected and been disposed. In this generation where machine is performing all complex task and with higher efficiency, it is better to find a solution to overcome these problems also.

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