

Futuristic Dustbin using Arduino

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Abstract—This undertaking a highly clever solution that will keep our cities clean is the smart rubbish bin system. Although there are dustbins available for public use in many metropolitan locations, the lack of efficient waste management is a major contributor to environmental contamination, which is ruining our environment day by day and having serious negative impacts on humankind. The rubbish used to be manually collected under the old method. As a result, that time is used. This initiative has the potential to effectively cut down on their time and effort. Today, automation is the most wanted feature. Smart dustbins are the best solution for this reason. This initiative has the potential to significantly cut down on their time and effort. The most popular feature today is automation. Smart dustbins are the most effective strategy for this. Creating a smart, eco-friendly city will be beneficial. For this, we need to create an automatic smart trash can that can first determine the trash can's current condition before sending the information to the driver of the garbage collection vehicle. They can empty right away. In the end, it aids in maintaining cleanliness.

Index Terms— Arduino, microcontroller, IOT, circuitry.

I. INTRODUCTION

The rate of increasing population in our country rapidly has increased garbage which has created environmental issues. Dustbin is a container which collects garbage's or stores items which recyclable or non-recyclable, decompose and non-decompose. It is used usually in homes, offices etc., but in case of full, no one is there to clean it and the garbage usually spills out. The surrounding of a dustbin is also conducive for increasing the pollution level. Air pollution due to a dustbin may produce bacteria and virus which produces life harmful diseases for human. Therefore, we have designed an ECO-BOT using ARDUINO UNO, ultrasonic sensor which will sense the item to be thrown in the dustbin and open the lid with the help of the motor. It is an IOT based project that will bring a new and smart way of cleanliness. It is a decent gadget to make our home clean, due to practically all offspring of home consistently make it grimy and spread litter to a great extent by electronics, rappers, and various other things. Since the ECO-BOT is additionally intriguing and children make fun with it so it will help to maintain cleanliness at home. It will be applied on various type of waste. Dustbin will open its lid when object is near at some range then it will wait for given time period after that it will close automatically. Here lid will close when it will not in use and it will only open when it required.

II. LITERATURE SURVEY

In this Review Paper we have proposed the idea of smart automated dustbin using various sensors and Arduino

board, we have also implemented new technology to overcome the daily problems. We will attach an ultrasonic sensor to an Arduino board. The dustbin's lid opens by the servo motor when an ultrasonic sensor detects a person. The lid will open for ten seconds before closing on its own. In this method, a proximity sensor is employed to determine whether the trash bin is filled with trash. The proximity sensor is mounted at the top of the bin and measures the separation between the top of the bin and the rubbish by establishing a threshold value that is appropriate for the size of the bin. The red light will turn on and sound an alert for 30 seconds if the distance is smaller than this threshold value, indicating that the bin is full with trash. If the distance exceeds this threshold value, the red light will turn off, the waste level status is displayed on the screen. The technology uses a proximity sensor to continually check the trash on the screen. To move the trash Bin in our Arduino-based unique system, we attach a camera that is Bluetooth-linked to your mobile device and a DC motor to the bottom of the bin that is attached to the wheels of the trash can. It is much simpler for housewives, office employees, and students since we can move the trash can anywhere, like. In this study, we are trying to implement a moving smart dustbin and waste management system employing an Arduino-based bin is presented. We will also implement the concept the UV light for sterilization of the waste to kill the bacteria virus growth.

III. ABOUT SENSORS

Servo Motor: Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware, or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with 3 horns (arms) and hardware.



Fig .1 Servo Motor

Ultrasonic Sensor: An Ultrasonic Sensor is a non-contact type device that can be used to measure distance as well as velocity of an object. An Ultrasonic Sensor works based on the properties of the sound waves with frequency greater than that of the human audible range. Using the time of flight of the sound wave, an Ultrasonic Sensor can measure the distance of the object (like SONAR). The Doppler Shift property of the sound wave is used to measure the velocity of an object.



Fig .1.1 Ultrasonic sensor

Double Shaft Geared Motor: Dual shaft geared motors are useful in robotics applications. Shaft on both sides allows the user to use a Wheel and an Encoder simultaneously. Not only this, the user gets enough headroom for the orientation of the motor and can be used in any orientation as per the application is required. It is a plastic based geared Dual shaft DC motor operating between a voltage range of 3V to 9V and has a torque of 0.8 Kg/cm with an RPM of 100 which is decent for most of the applications. It is recommended to use this motor with more than 5V to have optimum torque in working condition.

Buzzer: An Arduino buzzer is also called a piezo buzzer. It is basically a tiny speaker that you can connect directly to an Arduino. You can make it sound a tone at a frequency you set. The buzzer produces sound based on reverse of the piezoelectric effect.

Arduino UNO R3: Arduino Uno is the most popular and widely used development board. It is powered by an ATmega328P microcontroller. It is the most popular choice among the community because it's, cheap, easy to learn and use, and also a variety of premade modules are available for this which makes it easier for developing new projects or prototypes. It consists of 14 Digital I/O out of which 6 pins are 8-bit PWM pins, 6 pins are 10-bit Analog inputs, and basic communication ports like SPI, I2C, and UART. Now, there are many different types of Arduino UNO boards available across the global market, but most of these boards are the clone or copy version of the original UNO board that you see above. Hence the color or the appearance of the board might be different than what is shown above.



Fig .1.3 Arduino UNO R3

Moisture sensor: Moisture sensor is an electronic device which is used to detect moisture we will use a sensor to detect moisture in the garbage and use it to segregate the dry and wet waste in the dustbin.

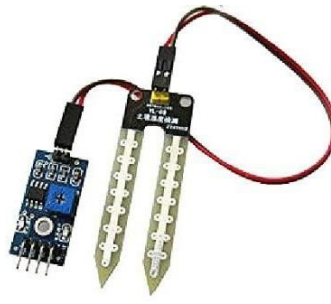


Fig .1.4 Moisture sensor

The above schematic diagram shows the ECO- circuitry BOT's. The AT Mega 328 P microcontroller is a key component of the Arduino Uno board. Other parts, including a power supply, an ultrasonic module, and a servo motor, are included in this component. Digital pins D8 and D9 are used to link the ultrasonic sensor's echo pin and trigger pin, respectively. The ground pin of the Arduino Uno board is linked to the GND pin, while the +Vcc pin is connected to the +5V supply. The servo motor's control (PWM) pin is linked to the Arduino's digital pin D9. As a result, a servo motor is employed to open the dustbin cover. The predetermined threshold of distance between the dumpster and the hand is specified at 40 cm for this project and the components utilized. Sensor using ultrasound: This sensor is used to measure the distance between the ECO-BOT and any approaching hands or objects. Sonar waves serve as the foundation for measuring obstacle distance. Only when the Trigger pin receives a strong pulse lasting more than 10 μ s does it identify an obstruction. This sensor begins to deliver an eight-cycle ultrasonic burst at 40 KHz when it detects the presence of a hand (or other obstruction), and it then waits for the reflected ultrasonic signal. A two-drum ultrasonic sensor module. The ultrasonic pulse is transmitted using one of the drums, while the ultrasonic signal is received using the other drum. The echo pin of the module is high when an item is detected or sensed using ultrasound. The placement of the obstruction has a complete impact on how long the reflected pulse waits. Once we get the echo signal, we can use the following calculation to determine the distance: Distance (in centimeters) equals $(\text{time}/2) / 29.1$. Circuit diagram in Fig. The servo motor initially switches the dustbin cover back to the closed (zero-degree) position. The controller continues to keep an eye on the signal that the ultrasonic module sends. When an obstruction is detected by an ultrasonic module, the controller determines if it has travelled farther than the threshold distance specified for opening the dustbin cap. Below is a schematic displaying the ECO- circuitry. BOT's An essential part of the Arduino Uno board is the AT Mega 328 P microcontroller. A power source, an ultrasonic module, a servo motor, and other components are included in this component. The digital pins D8 and D9 are linked to the ultrasonic

sensor's echo pin and trigger pin. The +Vcc pin is connected to the Arduino Uno board's +5V supply, while the GND pin is connected to the ground pin. The control (PWM) pin of the servo motor is linked to the Arduino's digital pin D9.

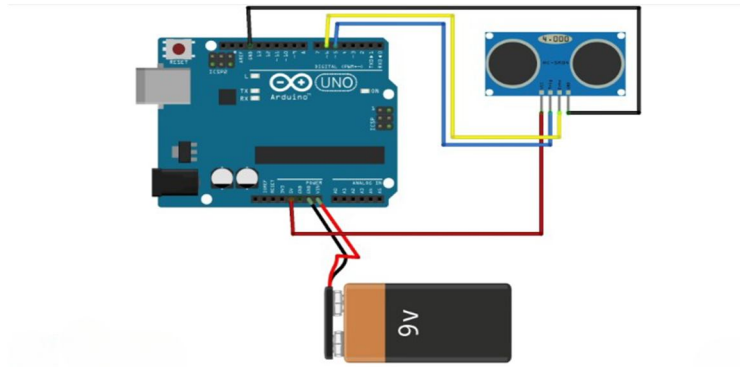


Fig .2 Circuit Diagram

IV. Market Analysis: Market Study

Growing demand of the technology in this emerging world has led the way to smart dustbin which led to cut down of the labor cost for waste management in many geographical regions. The Easley accessible of the bins worldwide is an important factor contributing to the smart trash bins. Due to low cost and maintenance user demand for thenormal dustbins and whereas the smart trash bins dueto its slow speed and range can affect the market and the cost of training the staff to use the trash bins can become the hurdle in the market growth of the dustbins.

Important players in the global smart trash bin market

Some of them are mentioned below-

- EKO USA
- Envoy Oy
- Home Depot, Inc.
- Honey-Can-Do International
- I Touchless Housewares &
- Products, Inc

>RESEARECH PERFORMED RESULT:

Global Smart Trash Bin Market, by Capacity

- 8 to 13 Gallon
- 14 to 23 Gallon
- Above 23 Gallon

Global Smart Trash Bin Market, by Shape

- Oval
- Rectangular
- Round

Global Smart Trash Bin Market, by Price

- Low
- Medium
- High

Global Smart Trash Bin Market, by Application

- Residential
- Commercial

Global Smart Trash Bin Market, by DistributionChannel

- Online
- Offline
- Specialty Stores
- Direct Sales

- Others (Departmental Stores, Individuals etc.)

V. IMPACT OF COVID -19 ON SMART DUSTBIN GLOBALLY

The pandemic has raised the awareness about cleaning the environment to overcome the disease this pandemic has uplifted the concept of social distancing and therefore the idea and concept of smart trash bins emerged and several businessmen adopted the smart trash bins for smartly waste management in this covid period this marked the growth and major use for the society of the smart trash bins. In April 2020, a start-up supported by IIT created a "smart bin system" to stop the COVID-19 virus from spreading through garbage produced in hospitals, clinics, public areas, and quarantine zones.

Asia-Pacific Regions are contributing a big share to the smart dustbins:

During the forecast period, the Asia Pacific regions had significantly contributed in the larger scale for the growth of the smart dustbin due to the large population of India and the high demand scale is significantly contributing to the rise in the smart trash bins growth and educating for smarter waste management. Even the government is taking the initiative to uplift the smart dustbins by his various policies "Swachh Bharat Abhiyaan" for proper waste management towards clean environment. For instance, the Steel Authority of India Ltd (SAIL) introduced smart stainless steel trash cans in March 2019.

VI. SURVEY CONDUCTED

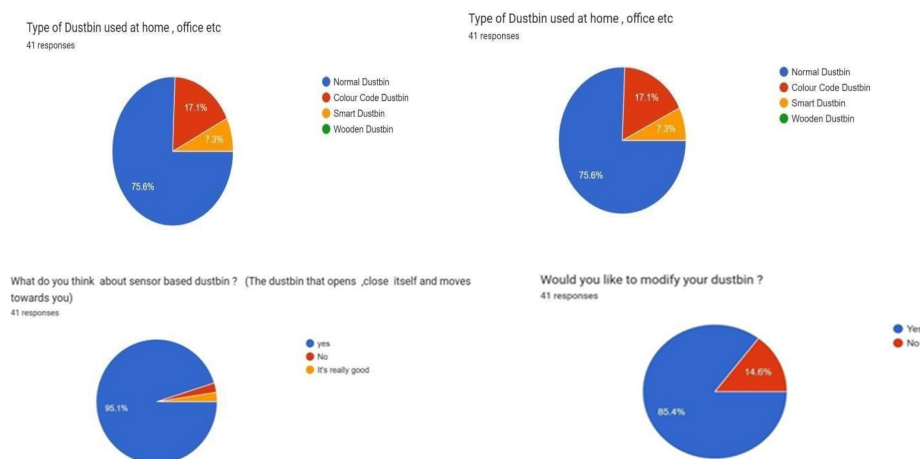


Fig .3.1 Survey Conducted

VI. CONCLUSIONS

We are contributing towards the cleanliness of the environment in a smarter and a better way. Waste management can be easily be achieved through Eco-Bot and this device makes cleaning the environment interesting and fun. We have used Arduino board, Ultrasonic Sensors, Servo Motor and various other sensors to achieve this concept of smart dustbin, in the future plan we are planning to add up segregator, UV light and a concept through which you can view your dustbin where actually it is and move to your desired location where you want by using your smart phone, implementing these concepts for a better dustbin for the future generations then the prevailing smart trash bins in the market.

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