Concept behind Smart Dustbin Using ARDUINO

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Abstract - Mostly in our daily life we encounter dustbins that are excessively full and garbage spilling out of them. This kind of situation is neither good for our environment nor for our advancement. This problem leads to huge number of diseases as large number of insects and mosquitoes breed on the waste accumulated in this garbage. Hence, we developed a project to control the overfilling of the dustbin by making the dustbin smart enough to notify itself for its cleaning. In this project the smart dustbin management system is built on the microcontroller based system having ultrasonic sensors on each of the four dustbins that will show the current status of garbage on the LCD screen as well as on the mobile.

Keywords -. ATMEGA328P, Ultrasonic Sensor, ESP8266, IR Sensor, PIR sensor

I. INTRODUCTION

The main concept behind the Smart Dustbin using Arduino project is Object Detection. I have already used Ultrasonic Sensor in **Object Avoiding Robot**, where upon detecting an object, the Robot will change its course of direction.A similar methodology is implemented here, where the Ultrasonic Sensor is placed on top of the dustbin's lid and when the sensor detects any object like a human hand, it will trigger Arduino to open the lid. In this project, I will show you How to Make a Smart Dustbin using Arduino, where the lid of the dustbin will automatically open when you approach with trash. The other important components used to make this Smart Dustbin are an HC-04 Ultrasonic Sensor and an SG90 TowerPro Servo Motor.
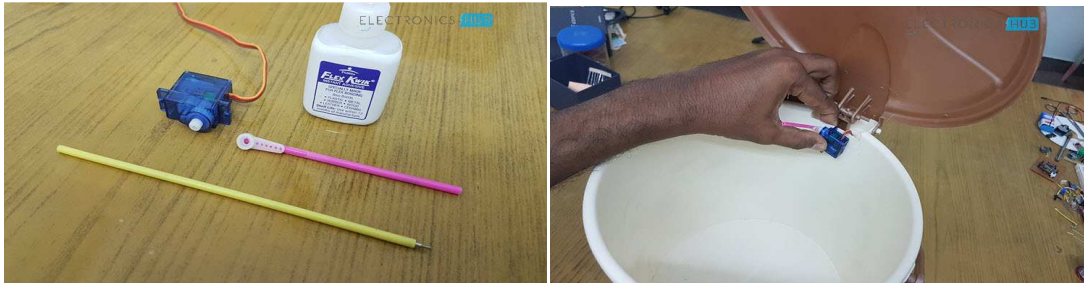
For this mechanism to be able to open the lid of the dustbin, it must be placed near the hinge where the lid is connected to the main can. From the following image, you can see that I have fixed the servo motor on the can. Also, make sure that the lifting arm is parallel to ground under closed lid condition. **NOTE:** According to the Laws of Physics, you will require more energy to push the lid from the hinge than at the extreme end. But in order to open the lid and not have any obstacle, this is the only place to fix the servo motor with its arm.

II. COMPONENTS AND METHODS

- Concept behind Smart Dustbin using Arduino
- How to Build a Smart Dustbin using Arduino?
- Connecting the Servo
- Connecting the Ultrasonic Sensor
- Wiring up the Components
- Circuit Diagram
- Components Required
- Code
- Working
- Output Video
- Conclusion

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Connecting the Ultrasonic Sensor:
Once the servo is in position, you can move onto the Ultrasonic Sensor. Make two holes corresponding to the Ultrasonic Sensor on the lid of the dustbin, as shown in the following image.
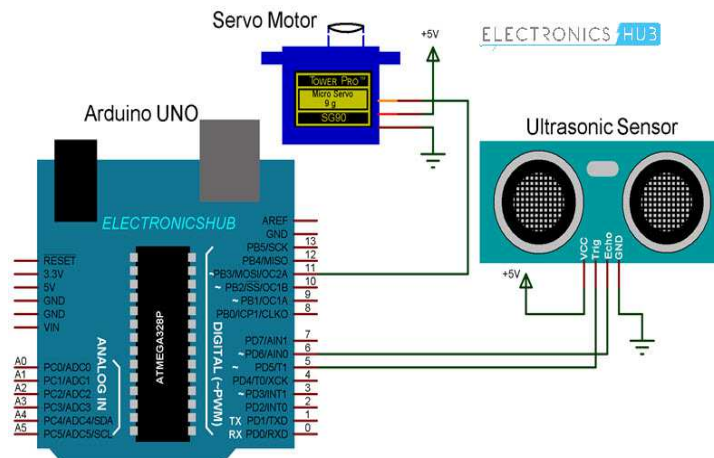
III. RESULTS AND DISCUSSION

In this Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste. In some places, littering is a serious offence and hence Public Waste Containers are the only way to dispose small waste.
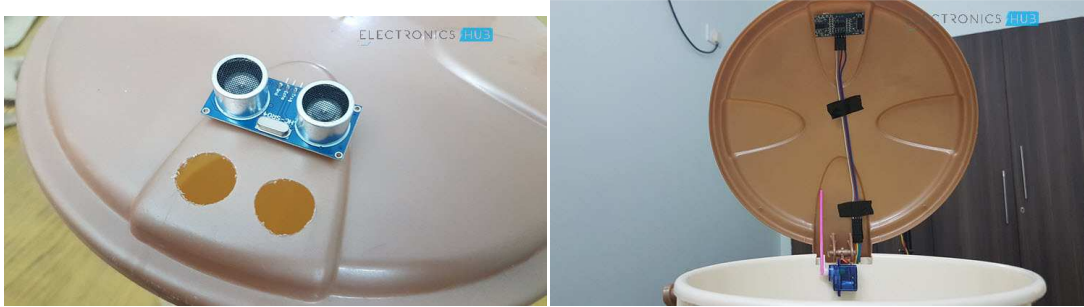
WARNING: You have to use a sharp object with a lot of force to make these holes. Be careful.

All the wires from both the components i.e. Ultrasonic Sensor and Servo Motor are connected to respective pins of Arduino. This finishes up the build process of the Smart Dustbin.

The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.

IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:

- Working
- After setting up the Smart Dustbin and making all the necessary connections, upload the code to Arduino and provide 5V power supply to the circuit. Once the system is powered ON, Arduino keeps monitoring for any object near the Ultrasonic Sensor.

- If the Ultrasonic Sensor detects any object like a hand for example, Arduino calculates its distance and if it less than a certain predefined value, Arduino will activate the Servo Motor and with the support of the extended arm, it will list the lid open. After certain time, the lid is automatically closed.
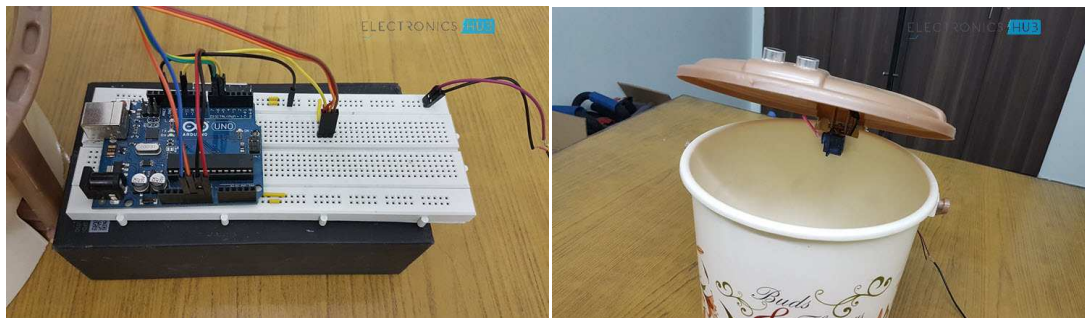

Fig. 1. Experimental Kit Diagram

V. CONCLUSION

A simple but useful project called Smart Dustbin using Arduino is designed and developed here. Using this project, the lid of the dustbin stays closed, so that waste is not exposed (to avoid flies and mosquitos) and when you want dispose any waste, it will automatically open the lid. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority in our case the admin who can take appropriate action against the concerned employee.

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