

Safe Waste Disposal using Smart Dustbin

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Abstract – Cleanliness is a very important aspect in today's generation. In 2019, the world was struck by Coronavirus, an infectious disease which targets the lungs, thus causing severe acute respiratory syndrome. The importance of sanitation and proper disposal of waste is realized in these trying times. In this modern era, where technology is only advancing, there can be many techniques developed to ensure that the waste that is emitted on a large scale and a daily basis is dealt with properly. Quite often, there are various illnesses that can harm us while disposing of this waste. For example, there may be a lot of germs in the lid of the dustbin which would be very dangerous. In order to combat this, the ideology of a Smart Dustbin with an automatic lid opening technology has been coined.

Key Words: Smart-Bin, Arduino UNO, Servo Motor, Range Finder, Soldering Iron.

1. INTRODUCTION

The World in this modern era has become entirely dependent on technology. Though the technology today is highly advanced, pollution is still being emitted on a very large scale. With the rise in demand of electronic appliances and equipment, companies are forced to mass produce these goods and provide them to the consumer. Due to this, there is a lot of waste being generated. This waste causes various kinds of hazards, damaging the quality of the environment that people are living in. This also causes a lot of sicknesses and diseases among people. It is imperative to ensure that these things do not happen. The best way to do that is to ensure that sanitation is every person's top priority. It is very important to have a dustbin at home, where the waste can be disposed. Dustbins should also be kept in every society, road and colony. By combining the need for both, sanitation as well as technology, the 'Smart-Bin' concept was made.

1.1 Aims and Objectives

The major aim and objective of this 'Smart-Bin' concept is as follows:

- The Smart-Bin should be very reliable to a user who plans on making an everyday use of this bin (The lid should be strong and reliable and so should the motor)

- The Smart-Bin should be easy to design if a user wants to make such a device in his/her household or even society.
- The Smart-Bin or even the components to build the Smart-Bin should be easily affordable to a user.

1.2 Scope of the Smart-Bin

The major scope of this Smart-Bin is to design a dustbin that combines both, its basic objective of storing waste and also a technological aspect towards it. The technological aspect behind this will be the dustbin lid, which will open automatically when a person puts his/her hands on the Range Finder. This Range Finder has a distance of 25cm from the user. So a user can conveniently dispose of his/her trash without the need to touch the lid of the Smart-Bin.

2.1 Review of Literature

For this project, a detailed study was made on the various sanitation laws all over the world. A study was also made on Arduino UNO, which is the main component of this Smart-Bin. The code is fed into the Arduino UNO which is the central part of this Smart-Bin. It was also important to look at the various types of dustbins, their shapes and sizes online. The size of the motor depends on the weight of the lid. If it is a heavy lid, a bigger motor and a thicker wire will be needed. In order to demonstrate a homemade Smart-Bin, a cardboard lid has been chosen. This Smart-Bin has been created by using these products: A Bucket, an Arduino UNO, Servo Motor, Ultrasonic range finder, a thread and the cardboard used for the bin.

Table - 1: Main products Used to Create Smart-Bin

Product Used :	Quantity
Bucket for storing Waste	1
Arduino UNO Board	1
Servo Motor	1
Ultrasonic Range Finder	1

2.1 Description

As mentioned in the table, the major components that are required to design a Smart-Bin are: Arduino UNO, a bucket to store the waste, a servo motor and an ultrasonic range finder. Arduino is an open source software and hardware company that manufactures as well as designs single-board microcontrollers and kits for building various devices and interactive objects like this Smart-Bin. A servomotor is basically a linear or rotary actuator that allows a precise angular or linear position, velocity and acceleration control. It has a motor that is coupled to a sensor for the feedback of the position.

A Rangefinder is a distance measuring device. It measures the distance between the object and its target, which is a process known as ranging. These methods must include laser, radar, lidar, sonar and ultrasonic page finding.



Fig -1: Components used to design the Smart-Bin

The design of this Smart-Bin is as follows: The Ultrasonic Range Finder and the servo motor are connected to the Arduino UNO. This connection is done using electrical cables. A soldering iron is used in order to secure the connection. These connections can be observed in Fig-2: The connections made for this project. In the diagram, it can be seen how the Arduino UNO connects to the Ultrasonic Range Finder and the 9V battery. Once there is power, the Ultrasonic Range Finder works and gives the signal to the Arduino UNO which then sends the signal to the servo motor which will then ultimately open the lid. However, the diagram where the servo motor is connected can be seen in Fig -3: Servo motor Connection. The distance of the Ultrasonic Range Finder can be adjusted in the code. 25cm is a safe distance which will ensure that a user does not touch any part of the Smart-Bin.

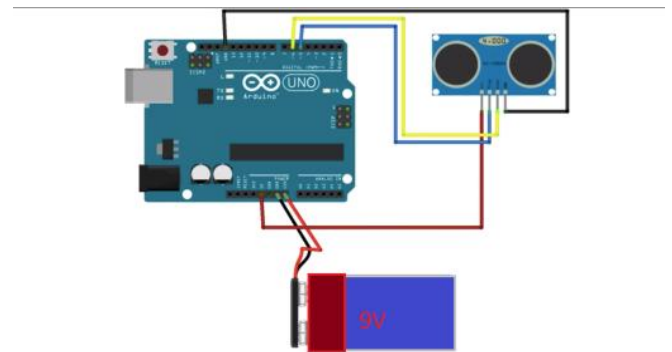


Fig -2: The connections made for this project.

Once the Servo Motor is connected, a nylon cord will have to be attached to the servo motor and the cardboard. The moment the Ultrasonic Range Finder picks up any kind of motion, it sends a signal to the Arduino Uno. The Arduino Uno then sends a signal to the Servo Motor which then simply rotates and lifts up the lid of the Smart-Bin. The nylon cord will have to be replaced with a stronger cord in case a heavier lid such as plastic or tin is needed.

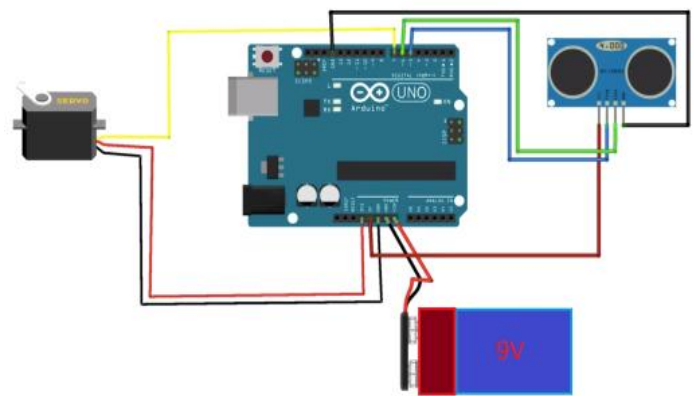


Fig -3: Servo Motor Connection.

Once this connection is made, the homemade Smart-Bin is ready to use. Fig -4: Actual picture of the Smart-Bin shows what the Smart-Bin looks like. The plastic portion of the bucket had to be cut to fit the Ultrasonic Range Finder.



Fig -4: Actual picture of the Smart-Bin.

3. CONCLUSION

Waste elimination is a very easy task as long as people are smart about it. It is very important to dispose of waste soon and in a sanitary way to avoid the spread of illnesses which will cause us a lot of harm. By combining technology and sanitation, this Smart-Bin can be created in every household and society in order to eliminate waste in a more efficient way. In this pandemic, people need to be aware of using such methods in order to avoid touching any dustbin lid, which could have been contaminated by someone suffering from Covid-19. This technology can even be incorporated by various companies and they can produce such Smart-Bins that can be helpful to all. The Smart-Bin showed here is useful for paper waste elimination. However, for dry waste elimination, the components will need shielding in order not to get spoiled. Also, various theft-proof measures will have to be added since these components can be stolen very easily. If these measures are taken, Smart-Bins will be seen all over the country and the world.

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