**SMART DUSTBIN**

**Introduction**

Dustbin have been important part of our life. But, the issue we have to deal is its open cap. Due to this open cap, insect and flies visit the garbage and also the same flies roam around out kitchen or lunch buffet. This leads to serious health issue. In order to solve this issue, we had design here a Smart Dustbin using Arduino Uno. This smart dustbin automatic open its cap when we pass our hand above it.

**Materials and Methods**

Components Used:

* Hardware:

|  |  |  |  |
| --- | --- | --- | --- |
| S. No. | Component | Picture | Description |
|  | **Arduino Uno Board** | https://lh3.googleusercontent.com/g8NQnb2cVwsiBM2AlOEJIci8Y3gDUs_1tsxaNMI-hL1ZgjjoYHfy5VYvkvBbXecVCQl0FZ5C_xeHB185XfxYjDfRaPcsC2cc5KW_Dgu3X659OL_o3TeFsRcrp033nu48wQ | .  It is a microcontroller board based on the Atmega328P.It has 14 digital input/output pins, 6 analog inputs, a 16 Mhz quartz crystal, a USB connection, a power jack and a reset button. |
|  | **Servo Motor** | Related image | A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. |
|  | **HC-SR04 Ultrasonic Sensor** | Image result for HC-SR04 Ultrasonic Sensor | The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. |
|  | **ON/OFF Switch** | Image result for on off switch | A switch is an [electrical component](https://en.wikipedia.org/wiki/Electrical_component) that can "make" or "break" an [electrical circuit](https://en.wikipedia.org/wiki/Electrical_circuit), interrupting the [current](https://en.wikipedia.org/wiki/Electric_current) or diverting it from one conductor to another. The mechanism of a switch removes or restores the conducting path in a circuit when it is operated. |

* Software:

1. Arduino IDE:

It contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino to upload programs and communicate with them.

1. Fritzing:

Fritzing is an open source hardware initiative that makes electronics accessible as a creative material for anyone. It is a software tool and community website for processing and Arduino, fostering a creative ecosystem which allows users to document their prototypes, share them with others, and manufacture professional PCB’s.

Method:

Step 1:

The ultrasonic sensor echo pin and trigger pin is connected to pin digital pin D7 and D8. The control (PWM) pin of servo motor is connected to digital pin D9 of arduino. Hence, servo motor is used to open the cap of dustbin.

Step2:

Ultrasonic sensor HC-SR04 module is used to locate the distance between the dustbin and hands of user. When this sensor verifies the presence of hand (obstacle) it starts to send eight cycles of ultrasonic burst at 40 KHz and then it waits for reflected ultrasonic signal. For this project and components used, the preset level of distance between dustbin and hand is fixed to 30 to 70 cm.

Step3:

Initially, the cap of dustbin is switched back to zero-degree position (Close) by the servo motor. The controller keeps on monitoring the signal receive from ultrasonic module. When ultrasonic module detects an obstacle, the controller check if it crosses a threshold distance value set for open the cap of dustbin. As soon as that happens, the controller triggers the servo motor when then open the cap for limited line (as set in software).

Step4:

We also use ON/OFF switch, in order to activate and de-activated the smart dustbin whenever we want to use it. A pull-up resistor of 10K is connected in series of switch as shown in circuit diagram in order to solve the de-bouncing problem.

**Schematics**

**Cad Model**

**Future Scope**