SMART DUSTBIN

A Mini Project Report Submitted

In Partial Fulfilment of the requirements

BACHELOR OF TECHNOLOGY

In

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CERTIFICATE

This is certifying that Project Report entitled "Smart Dustbin" which is submitted by Nikku Patel, Sakshi Upadhyay, Sanjana Srivastava and Sonal Singh in partial fulfilment of the requirement for the award of degree B. tech in the Department of Electronics & Communication Engineering of Dr. A. P. J. Abdul Kalam Technical University, Lucknow is a record of the candidate own work carried out by them in my/our supervision. The matter embodied in this project is original and has not been submitted for the award of any other degree.

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no materials previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institution of learning, except where due to acknowledgement has been made in the text.

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ABSTRACT

In the recent decades, urbanization has increased tremendously. At the same phase there is an increase in waste production. Waste management has been a crucial issue to be considered. This proposal is a way to achieve this good cause. In this project smart dustbin is built on a microcontroller based platform Arduino Uno board which is interfaced with the Servo motor and ultrasonic sensor. Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin.

The threshold stature is set at a particular level. Arduino will be programmed in such a way that when someone will come in front of dustbin the servo motor will come in action and open the lid for the person to put the waste material into the dustbin. Once these **smart bins** are implemented on a large scale, by replacing our traditional bins present today, waste can be managed efficiently as it avoids unnecessary lumping of wastes on roadside. Foul smell from these rotten wastes that remain untreated for a long time, due to negligence of authorities and carelessness of public may lead to long term problems. Breeding of insects and mosquitoes can create nuisance around promoting unclean environment. This may even cause dreadful diseases.

ACKNOWLEDGEMENT

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CHAPTER 1

INTRODUCTION

The rate increasing population in our country has increasing rapidly and also we have increase in garbage which have increased environmental issue. Dustbin is a container which collects garbage's or stores items which recyclable or non-recyclable, decompose and non-decompose. They are usually used in homes, office etc., but in case they are full no one is there to clean it and the garbage are spilled out. The surrounding of a dustbin is also conducive for increasing the pollution level. Air pollution due to a dustbin can produce bacteria and virus which can produce life harmful diseases for human. Therefore, we have designed a smart dustbin 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 will be applied for various type of waste. Dustbin will open its lid when someone/object is near at some range then it will wait for given time period than it will close automatically through the servo attached to it.

Fig. 1. Actual View of the Smart Dustbin

CHAPTER 2

DESIGN AND WORKING OF THE CIRCUIT

A.<u>THEORY</u>

SMART DUSTBIN using ARDUINO is an IOT based project. Here we are using Arduino for code execution, for sensing we used ultrasonic sensor which will open lid and wait for few moments. It will bring drastic changes in tern of cleanliness with the help of technology. Everything is getting with smart technology for the betterment of human being. So, this help in maintaining the environment clean with the help of technology. It is a sensor-based dustbin so it would be easy to access/use for any age group.

B. WORKING OF THE CIRCUIT

After wiring and attaching all the devices and setting up to the Smart Dustbin, now observe all the important setup whether they are well connected or something missed. After connection set up now next step is to submit/upload code in Arduino and supply power to the circuit. When system is powered ON, Arduino keeps monitoring for any things that come near the sensor at give range. When Ultrasonic sensor detect any object for example like hand or others, here Arduino calculates its distance and if it less than a certain predefines value than servo motor get activate first and with the support of the extended arm of the lid. Lid will open for a given time than it will automatically close.
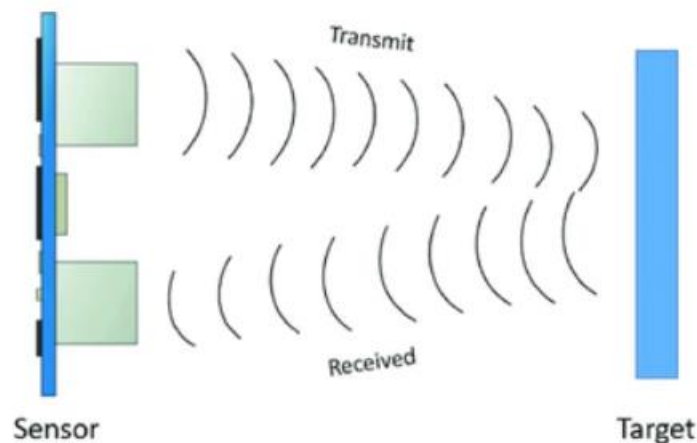

Fig. 2. Sensor Working Principle

COMPONENTS REQUIREMENTS

2.1 Arduino Uno

2.2 Ultrasonic Sensor HC-SR04

2.3 SG90 Micro Servo motor

2.4 Jumper Wires

2.5 9V Battery

2.6 LED

COMPENTS DESCRIPTION

➢ ARDUINO UNO

Arduino Uno is an open-source microcontroller board based on the processor ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a power jack, an ICSP header and a reset button.
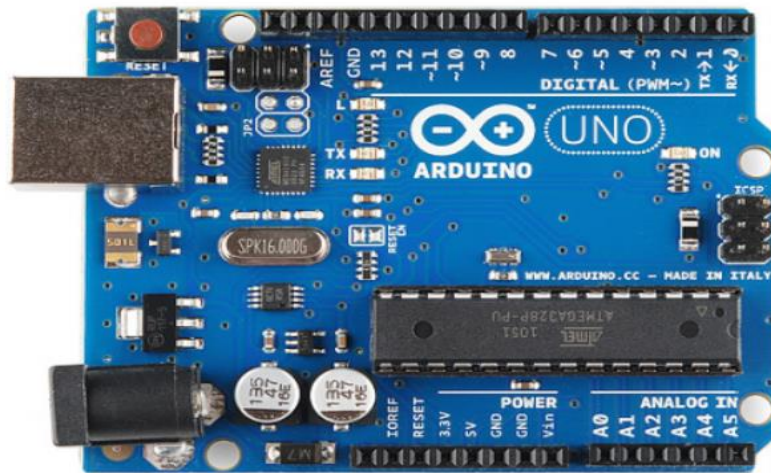

Fig. 3. Arduino Uno

➢ ULTRASONIC SENSOR HC-SR04

It is an ultrasonic distance sensor used for measuring the distance at which an object is located. The principle used by this sensor is called SONAR.

It has two parts, one emits the ultrasound sonar to measure the distance to an object. The other part is the receiver which listens for the echo. Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the

sensor acts as a microphone to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.

Fig. 4. Ultrasonic Sensor HC-SR04

➢ SG90 Micro Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight package. Due to these features, they are being used in many applications like toy cars, RC helicopters and planes, Robotics, Machine etc.

Fig. 5. SG90 Micro Servo Motor

➢ JUMPER WIRES

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jumper wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of the circuit board, or a piece of test equipment.

Fig. 6. Jumper Wires

➢ 9V BATTERY

The nine-volt battery, or 9-volt battery, is an electric battery that supplies a nominal voltage of 9 volts. Actual voltage measures 7.2 to 9.6 volts, depending on battery chemistry. Batteries of various sizes and capacities are manufactured; a very common size is known as PP3, introduced for early transistor radios. The PP3 has a rectangular prism shape with rounded edges and two polarized snap connectors on the top. This type is commonly used for many applications including household uses such as smoke and gas detectors, clocks, and toys.

Fig. 7. 9V Battery

➢ LED

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and blocks the current in the reverse direction.

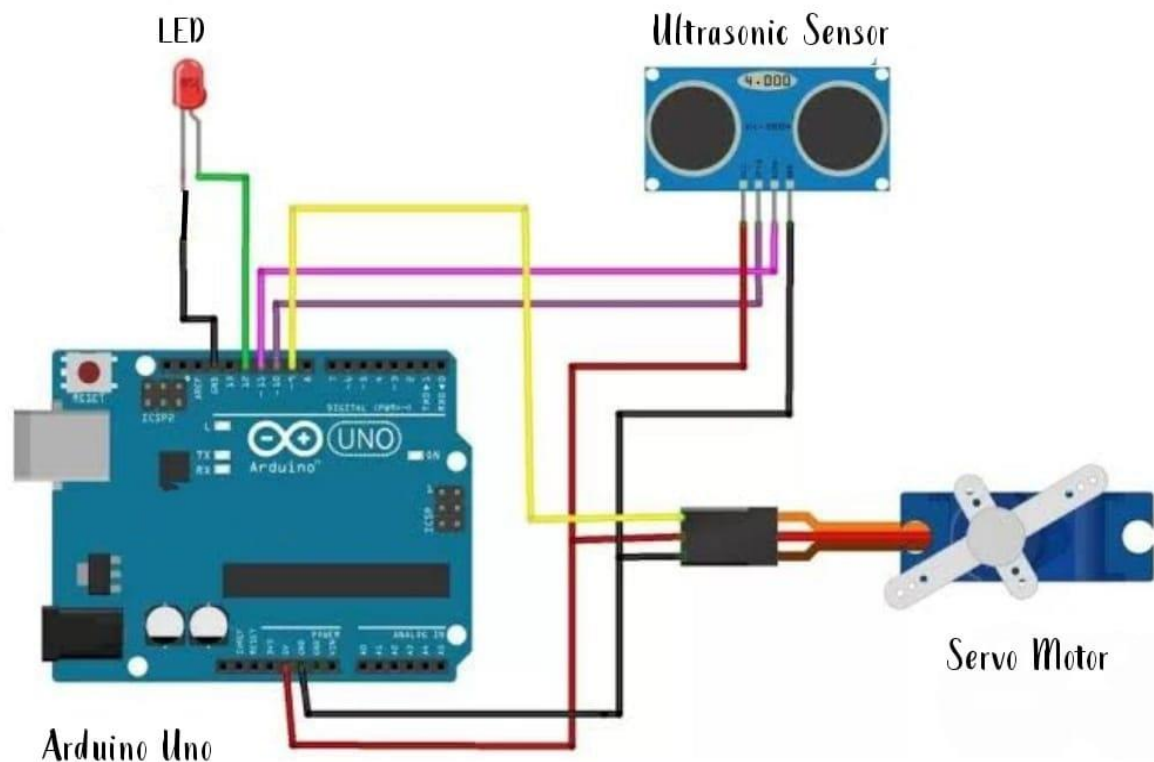Fig. 8 LED

CIRCUIT DECRIPTION

Fig. 9 Smart Dustbin circuit

The circuit diagram of smart dustbin is shown in given above. Arduino Uno board consist ATmega328P microcontroller, it is important component of UNO board. In this other components are present like a power supply, ultrasonic module and servo motor etc.

Ultrasonic sensor module has two drums. One of the drums is used for transmitting the pulse of ultrasonic and the second drums are for receiving the ultrasonic signal.

When ultrasonic detect/sense object, the echo pin of module is set high. Waiting period of reflected pulse is completely dependent upon the location of obstacle. When the echo signal is obtained, we can calculate the distance by using the formula: Distance (in cm) = (duration/2) / 29.1

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 code part). For this system prototype set time is given for 2 second.

The simplest part of the project smart dustbin using arduino is software part because it is clean, simple and easy to understand. The program check the distance had also used "Servo.h" inbuilt library function for servo operation. It can assume any value of motor rotation using "myServo.write(angle)" function but here we had only use two state of position (1) zero degree and (2) 1800 .

Arduino Coding Part

```arduino
//define pins
#include <Servo.h>

Servo servo;

int trigPin = 9;
int echoPin = 8;
int led = 13;

// defines variables
long duration;
int distance;

void setup()
{
  servo.attach(7);
  pinMode(led, OUTPUT);
  servo.write(0);
 delay(2000);

// Sets the trigPin as an Output
pinMode(trigPin, OUTPUT);
// Sets the echoPin as an Input
pinMode(echoPin, INPUT);
// Starts the serial communication
Serial.begin(9600);
}
void loop()
{
// Clears the trigPin
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);
// Calculating the distance
distance= duration*0.034/2;
// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);
if ( distance <= 25    ) // Change Distance according to Ultrasonic Sensor
 {

  digitalWrite (led, HIGH );
```

```
  servo.write(0);
  delay(3000);
   }
  else
  {
    digitalWrite (led, LOW );
  servo.write(180);

   }

  }
```

RESULT

1. Smart dustbin circuit is designed to open the lid of the dustbin when some object is placed in front of the sensor.

2. LED blinks simultaneously for each time the lid opens.

CONCLUSION

For social it will help towards health and hygiene, for business as we try to make it affordable to many as many possible. So that normal people to rich people can take benefit from it. Believe this will bring something changes in term of cleanliness as well technology.

APPLICATTIONS

1. In medical fields or hospitals.
2. At public places or crowded areas.
3. At homes, offices, industries, etc.

ADVANTAGES

1. Maintains environment hygiene (i.e. no overflowing of waste and less unpleasant odor).
2. It will help in bringing evolution by technology in term of cleanliness.

LIMITATIONS

1. Opening of the lid is less due to the small size shaft used in the dustbin.

2. Constant power supply is required for its proper functioning to send Ultra sonic waves.

3. Surrounding objects may affect the working of this dustbin.

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