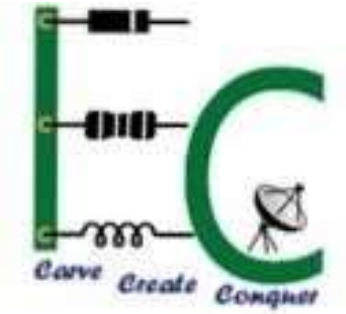
THE NATIONAL INSTITUTE OF ENGINEERING

MYSURU-570008

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



ANALOG DIGITAL COMMUNICATION LAB PROJECT

[EC5L01] – V Semester REPORT ON

SMART DUSTBIN

Under the guidance of:

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ACKNOWLEDGEMENT

The completion of the mini project gives me immense happiness and satisfaction by providing me with an opportunity to express my gratitude to everyone who has played an important role in supporting me in my venture, and i would also take a step ahead to thanks everybody else who inspired my actions and work.

On an outset I would take an opportunity to express my gratefulness to Dr. G.Ravi ,Principal, National Institute of Engineering, Mysore for always being the fountainhead of all encouragement and fostering me with the required amenities.

I would also like to express our sincere thanks to Dr. Narasimha Kaulgud, Head of the Department of Electronics and Communications Engineering, who has always been a constant source of inspiration and enlightenment.

My project could not have achieved its successful completion without the esteem supervision and guidance of Dr. Rajalekshmi Kishore Professor of ECE Department, who was always there to provide me with his immense knowledge and experience.

I would also like to express my indebtedness to my guide of Mini Project Dr. Rajalekshmi Kishore Professor of ECE Department who guided me throughout my project and helped me in all possible ways and provided me with his valuable suggestions.

Lastly, I would like to express my gratefulness to my parents and friends for having shown their trust and faith in me and boosting my morals

.

ABSTRACT

The main objective of the project is to design a smart dustbin which will help keep environment clean and also eco-friendly. This smart dustbin management system is built on the microcontroller-based system having ultrasonic sensors on the dustbin. In this proposed technology we have designed a smart dustbin using ARDUINO UNO, along with ultrasonic sensor, servo motor, and battery jumper wire. After all hardware and software connection, now Smart Dustbin program will be run. Dustbin lid will open when someone comes near at some range than wait for user to put garbage and close it. It's properly running or not. For social it will help toward health and hygiene, for business for we try to make it affordable to many as many possible.

Components required

- ULTRASONIC SENSOR - An ultrasonic sensor is an **instrument that measures the distance to an object using ultrasonic sound waves**. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.
- ARDUINO UNO - Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started
- SERVO MOTOR - A servomotor (or servo motor) 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.

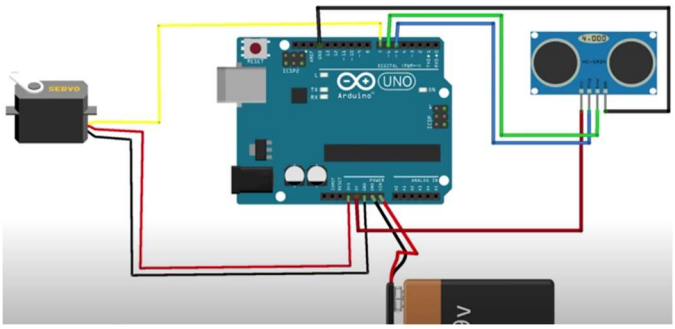
Introduction

This project was pretty simple and has been done countless times. It can be done countless times. The circuit is too simple and requires very less number of components.

Smart Dustbin as its name represents it works smartly or we can say that it is an automatic dustbin. it works like when you will come in front of this dustbin it will open automatically with the help of a servo motor. So there is some sensor work to detect the object in front of the dustbin.

smart Dustbin is a very good project from the Arduino board. it works likewise smart things. We can say that, It is a decent gadget to make your home clean and attractive. due to practically all offspring of home consistently make it grimy and spread trash to a great extent by paper, rappers and numerous different things.

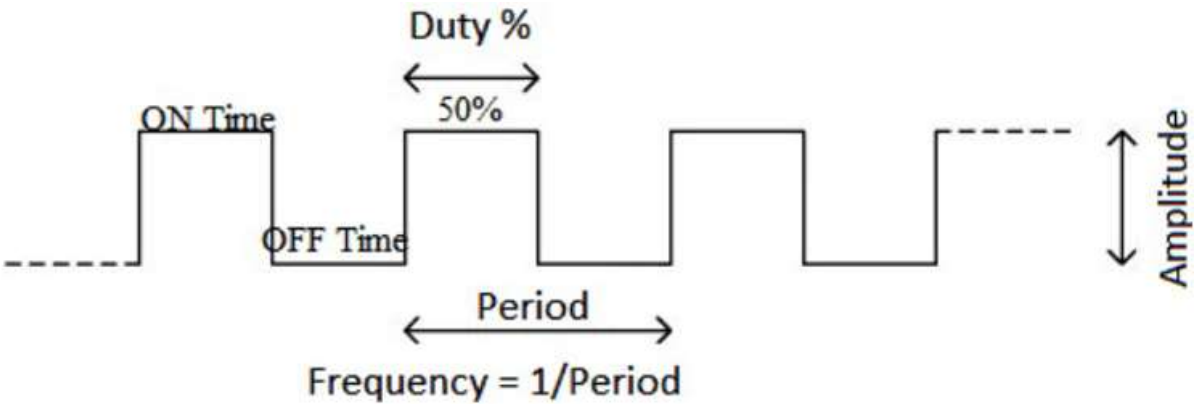
Circuit diagram



Design and implementation

Working of smart dustbin :-

Pulse-width modulation (PWM) is a technique for changing the amplitude of digital signals to control devices and applications that require power or electricity. It effectively regulates the amount of power delivered to a device from the standpoint of the voltage component by rapidly cycling the on-and-off phases of a digital signal and changing the breadth of the "on" phase or duty cycle. To the device, this would appear as a constant power input with an average voltage value determined by the proportion of on time. The duty cycle is represented as a percentage of being totally (100%) on.



The following image represents a PWM signal with 50% duty cycle. We can control the “on time” of PWM signal by varying the duty cycle from 0% to 100%. We are going to control a servo motor by varying the duty cycle of a particular PWM signal. One Period is the complete ON and OFF time of a PWM signal as shown in the above figure. The **frequency of a PWM signal determines** how fast a PWM completes one period. The formulae to calculate the Frequency is given below

```
Frequency = 1/Time Period

Time Period = On time + Off time
```

Normally, the PWM signals generated by microcontroller will be around 500 Hz, such high frequencies will be used in high-speed switching devices like inverters or converters. But not all applications require high frequency. For example, **to control a servo motor, we need to produce PWM signals with 50Hz** frequency, so the frequency of a PWM signal is also controllable by microcontroller

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```
#include <Servo.h>   //servo library
Servo servo;
int trigPin = 5;
int echoPin = 6;
int servoPin = 7;
int led= 10;
long duration, dist, average;
long aver[3];   //array for average


void setup() {
    Serial.begin(9600);
    servo.attach(servoPin);
    pinMode(trigPin, OUTPUT);
    pinMode(echoPin, INPUT);
    servo.write(0);         //close cap on power on
    delay(100);
    servo.detach();
}

void measure() {
 digitalWrite(10,HIGH);
digitalWrite(trigPin, LOW);
delayMicroseconds(5);
digitalWrite(trigPin, HIGH);
delayMicroseconds(15);
digitalWrite(trigPin, LOW);
```

Done compiling.

```
Sketch uses 4612 bytes (14%) of program storage space. Maximum is 32256 bytes.
Global variables use 241 bytes (11%) of dynamic memory, leaving 1807 bytes for local variables. Maximum is 2048 bytes.
```

7 Arduino Uno on COM5

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```
digitalWrite(trigPin, HIGH);
delayMicroseconds(15);
digitalWrite(trigPin, LOW);
pinMode(echoPin, INPUT);
duration = pulseIn(echoPin, HIGH);
dist = (duration/2) / 29.1;     //obtain distance
}
void loop() {
  for (int i=0;i<=2;i++) {   //average distance
    measure();
   aver[i]=dist;
    delay(10);              //delay between measurements
  }
 dist=(aver[0]+aver[1]+aver[2])/3;

if ( dist<50 ) {
//Change distance as per your need
 servo.attach(servoPin);
  delay(1);
 servo.write(0);
 delay(3000);
 servo.write(100);
 delay(1000);
 servo.detach();
}
Serial.print(dist);
}
```

Done compiling.

Sketch uses 4612 bytes (14%) of program storage space. Maximum is 32256 bytes.
Global variables use 241 bytes (11%) of dynamic memory, leaving 1807 bytes for local variables. Maximum is 2048 bytes.

8 Arduino Uno on COM5

CONCLUSION:

The main aim behind this project was to make real world application using communication techniques. The pulse width modulation is basic technique to implement in digital communication. Challenging part was servo motor working for optimizing angle of rotation. Course outcome was achieved through pulse width modulation.

Physically abled people, contactless dustbins in multinational companies and various other usage can be found using this project.

Referenc

www.electronicshub.com

www.electroniccircuitanalysis.com

Table ofcontents