Abstract:

This project introduces the design and development of a Smart dustbin. Waste disposal strategy is crucial to the environment. This project is implemented on Arduino and Particle Photon. It integrates two Ultrasonic Sensors. one sensor is used to monitor the bin level while the other sensor is used to open and close of the lid when an object is brought near to the bin. When the bin is full a buzzer rings to notify the user. Using a smartphone buzzer can be stopped this can be achieved by interfacing the Bluetooth module. A notification is sent to the user mobile using Photon Particle.

Introduction:

This project contains four modules. The first module is done using a servomotor and ultrasonic sensor when an object is detected at the lid of the bin it will open automatically. In the second module using the Ultrasonic sensor, the level of the bin is detected, Once the bin is full a buzzer will ring. In the third module, the user can stop the buzzer using the smartphone via a Bluetooth module. Finally, in the last module, a Photon Particle is used using this particle a notification is sent to the user's smartphone about the bin level and about the garbage pickup days. In detail design is explained in design description.

Motivation:

Garbage releases toxic gases which cause air pollution. Garbage disposal is very important to society, it not only causes air pollution but also contaminates water and leads to several health issues, so garbage management is vital for the general wellbeing of the public. Technology improved drastically that nowadays in every aspect technology is applied. The traditional method of garbage disposal is no more a part of society as it requires a lot of human power. Automated machinery has come to lift bins and dispose of the garbage. The concept of smart bin came into existence however smart the system is people forget to dispose of their dustbins properly in the home. They constantly need provocations or alarms when the bin is filled and get acknowledged with the garbage pick off days so that they can keep their bins outside. All the remainders are notified and can be controlled using smartphones as today's everything is smartphone mechanized.

Background:

DESIGN DESCRIPTION

Overview: The design and description of smart Bin are described in the following sessions. There is a total of four modules are explained in detailed. Each module is important to the next higher layer modules. Illustrate the different components involved in the project, their functionalities and why that component and also challenges faced while integrating all modules.

Components Required:

1. Arduino UNO
2. Ultrasonic ping sensor
3. Dustbin
4. Servo meter
5. Buzzer
6. LED
7. Smart phone
8. Bluetooth Module
9. Particle Photon
10. LCD Screen

Module 1: The components involved in the first module are the Ultrasonic sensor, Servomotor, Lid of the bin. When an object is brought near to the lid of the dustbin, the sensor detects the object and sends signals to Arduino, according to the code written in the microcontroller. It sends the signal to the servo motor and motor rotates its knob given an angular. The servomotor is attached to the lid of the bin when the servo motor receives the signal from Arduino it rotates its shaft as well as the lid of the bin and allows the user to place the waste into the bin and closes automatically. The user's hand will not contact with the dustbin for throwing the waste into the bin.

Component description:

Ultrasonic sensor: The model number used in this project is HC-SR04. It can measure the distance from 2cm to 400cm. It contains a transmitter, receiver and a control circuit. The transmitter transmits ultrasonic sound when these rays encounter object rays reflect and reaches the receiver. The distance is calculated by the time taken for the sound to travel forward and backward from the sensor to object times the speed of the sound. It contains four pins namely Trig pin, Echo pin, Vcc, Ground. The main reason behind choosing this component is it can calculate the distance of the object and perform certain actions. In this project the trig pin of the Ultrasonic sensor is connected to the digital pin 5 and echo pin is connected to the digital pin 6.

Servo motor: Servomotor works on the principle of pulse width modulation. It works in a closed loop mechanism and contains three parts Controlled device, Output sensor, the Feedback system. Encoder controls the position feedback. It can rotate up to 180 degrees. Precise control of the shaft can be achieved. Servomotor contains three wires one is positive second is the negative third to the digital pin. In this project, the servomotor is attached to the digital pin 11. When Arduino sends the signal to the servomotor the shaft of the motor moves according to the angular position given. So, with the above features, the only servomotor can rotate the lid of the bin.

Module 2: In this module Ultrasonic sensor, a buzzer and LCD are involved. The sensor continuously monitors the waste level of the bin and displays the amount of waste the bin is full and displays the same on the LCD screen. When the bin is full a message is displayed on the LCD screen and a buzzer rings to indicate the bin owner that it’s time to empty the bin. A buzzer is rung when the bin is full this is due to some lazy human beings require constant provocation to empty the bin.