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SMART BIN BY USING ULTRASONIC SENSOR

PROJECT BY

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Abstract–
The Internet of Things (IOT) describes a kind of network which interconnects various devices with the help of internet. IOT assists to transmit data with among devices, tracing and monitoring devices and other things. IOT make objects 'smart' by allowing them to transmit data and automating of tasks, without lack of any physical interference. *In recent era of automation, human interaction with smart technologies have increased drastically. This is mainly due to the increase in use of smart applications which has reduced human effort in various fields. Due to discovery of Internet of Things (IOT) there has been a vast increase in applications which do not require human to human or human to computer interactions.* : The main objective of the project is to design a smart dustbin which will help in keeping our environment clean and also eco friendly. We are inspired from Swachh Bharat Mission. Nowadays technologies are getting smarter day-by-day so, as to clean the environment we are designing a smart dustbin by using Arduino. This smart dustbin management system is built on the microcontroller based system having ultrasonic sensors on the dustbin. If dustbin is not maintained than these can cause an unhealthy environment and can cause pollute that affect our health. 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 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. So that normal people to rich people can take benefit from it.

1. INTRODUCTION

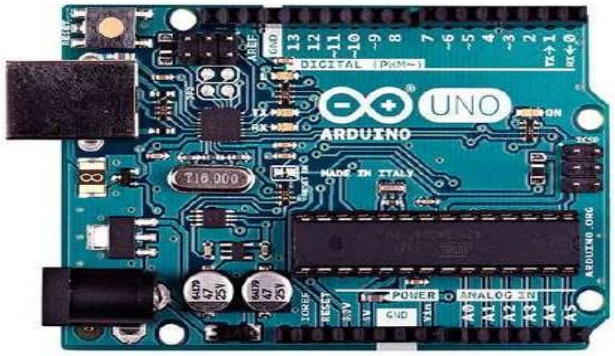
Dustbin is the storage container used for disposing waste by each and every person in the world. The main thing they look in their surroundings for disposing waste is the Dustbin. Smart Dustbin is just a normal bin where everyone can dispose waste but integration of some hardware components is done for more efficient use of it. Smart Dustbin is integrated with some hardware components such as Arduino, Servo Motor, Ultrasonic sensors. These components help in opening the lid, on detection of human hand. The code required to perform the above-mentioned operation is dumped in Arduino.

Since the smart dustbin is additionally intriguing and children make fun with it so it will help to maintain cleanliness in home.

HARDWAREDESCRIPTION

1. ARDUINO UNO

The Arduino UNO is an open-source micro-controller board based on the Microchip ATmega328P micro-controller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE(Integrated Development environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltage between 7 and 20 volts.



2. 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.There are four pins that you would use to interface with the sensor: VCC, Trig (signal output pin), Echo (signal input pin), and GND. Each of the four pins are connected to the Arduino: VCC to 5v, Trig to a digital pin, Echo to a digital pin, and GND to GND (ground).

3. 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.

4. 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.

5. DUSTBIN

Our main component for this project smart bin. A dustbin is a large container with a lid which people put their rubbish in and which is usually kept outside their house.

6.JUMPER WIRES

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit.

PROCEDURE

SERVO MOTOR CONNECTION SETUP: Now, let me take you through the actual setup and build process of the Smart Dustbin using Arduino. First, I will start with the mechanism to open the lid. As you might have already guessed, I have used a Servo Motor for this purpose. In order to open the lid, I have fixed a small plastic tube (like an empty refill of a ball-point pen) to the servo horn (a single ended horn) using instant glue. For this mechanism to be able to open the lid of the dustbin, it must be placed near the lid. In this the actual setup of dustbin design and build the system by using Arduino. Starting with the mechanism of opening the lid of dustbin, for this purpose Servo motor has been used.To open the lid, I have attached a small plastic tube (like an empty refill of a ball-point pen) to the servo horn (a single ended horn) using instant glue.

ULTRASONIC SENSOR CONNECTING:

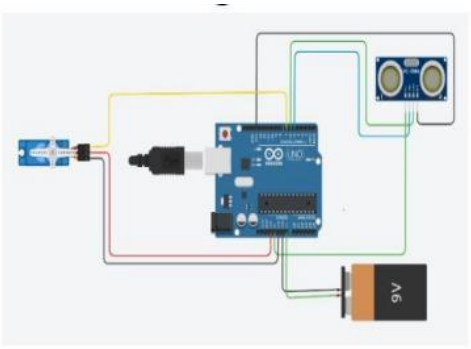
After successfully servo motor is placed now it's time for sensor, so HC-SR04 Ultrasonic sensor is placed at the front of the dustbin.

WIRING UP THE COMPONENTS:

The final step in the build process is to make the necessary connections using long connecting wires as per the circuit diagram and securing these wires so that they don't hang around. All the wires from both the components i.e. Ultrasonic Sensor and Servo Motor are connected to respective pins of Arduino. This finishes up the build process of the Smart Dustbin.InArduino Code has been submitted, and with all hardware and software connection in Dustbin. We will run our dustbin, wait its working or not.

The circuit diagram of smart dustbin is shown in given below.Arduino Uno board consist ATmega328 P microcontroller, it is important component of UNO board. In this other components are present like a power supply, ultrasonic module and servo motor etc. The ultrasonic sensor echo pin and trigger pin is connected to pin digital pin D7 and D8. The +Vcc pin is connected to +5V supply and GND pin is connected to ground pin of arduino Uno board. 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

CIRCUIT DIAGRAM



WORKING OF SMARTBIN

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.

BLOCK DIAGRAM

Fig 1.1 *Construction of front part of dustbin*

Fig 1.2*Construction of top part of dustbin*

Fig 1.3 *Construction of left part of dustbin*

Fig 1.4 *Construction of right part of dustbin*

USES OF SMARTBIN

♣ A reduction in the number of waste collections needed by up to 80%, resulting in less manpower, emissions, fuel use and traffic congestion.

♣ A reduction in the number of waste bins needed.

♣ Maintain environment hygiene (i.e. no overflowing of waste and less unpleasant odor).

♣ It will help in bringing evolution by technology in term of cleanliness.

♣Due To Urbanization, There Is A Tremendous Increase In Waste Production. For Proper Waste Management, The Government Has Installed Dustbins At Public Places. You Must Have Noticed that The Dustbins In Public Places Aren't So Clean And Hence People Avoid To Open It For Throwing Garbage. Also, Their Lid Cannot Be Left Open Or It Will Attract Flies And Cause Infections.

CONCLUSION

Here we are going to make an evolution changes toward cleanliness. The combination of intelligent waste monitoring and trash compaction technologies, smart dustbins are better and shoulders above traditional garbage dustbin. It is equipped with smart devices like sensor Arduinoetc. Lid of the dustbin will automatically open when an object comes near to the dustbin and after certain time period it will close the lid. For social it will help toward health and hygiene, for business for 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. So our next work will be adding one more sensor which will sense whether our dustbin is full or not. And there will be a display will be added so that user can notify that dustbin is full or not.

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