

Smart Dustbin for Waste Management System

D.Naveenreddy¹, I.V. Sudarsan Reddy¹, M.Pavan Kumar Reddy¹, E. Hemanth Kumar Reddy¹ and Shanky Saxena^{1*}

¹School of Electronics and Electrical Engineering, Lovely Professional University, Punjab, India 144411

Abstract: Now a days one of the big issue is garbage.to control these waste management system we have to provide smart dustbins in home, in our surroundings, in bus stands, in many people leaving areas, in railway stations, in colleges, in hospitals etc. Now we have to reduce waste in all places we have to put dustbins wherever it needs these is garbage management system. For Smart dustbin operation we are using ULTRASONIC sensor for detecting distance and object and another sensor SERVOMOTOR is used for opening and closing the dustbin top and we are also using PIR sensor which is used for calculating the level of dustbin is filled and also we are using GAS sensor which is used for finding which harmful gases present inside the dustbin like methane gas and also we are using buzzer and LED which is used for when the dustbin is filled completely the buzzer will start some sound like alarm and also it glows led and also we are using LCD which is used for showing the level of dustbin is filled and also it shows when dustbin filled it is showing dustbin is filled. Now days, garbage management system are used in many countries in different styles in garbage management system for cleanness for their city but in india garbage system was not proper. So, we have to provide dustbins where their dustbins needed.

Keywords: Smart Dustbin, gas sensor, servo motor

1. Introduction

Now a days most of them suffering from diseases because of overflow of garbage and mismanagement. We have to stay healthy we have to keep our surroundings neat and clean.so that we have to maintain our surroundings keep and clean we have to keep dustbins in our surroundings. So that we have to maintain our health as healthy well and good for our healthy environment. From these garbage management system most of people are suffering from dengue and malaria. These diseases was occur due to these garbage management system the insects are lying in waste and biting human beings. So they are suffering from these diseases.to prevent these problems we are keeping smart dustbins in where the most of the people are leaving like in homes, in hospitals, in bus stands, in railway stations and in our surroundings. These smart dustbins are placed in cities, in villages and towns to reduce garbage and for our healthy environment and also for keeping our home, our city keep and clean. We are introducing these smart dustbins that they are convenient to everyone. We are using Ultrasonic sensor which is used for detecting objects and also we are using Servomotor which are used for opening and closing of dustbin top. When the person go near to the dustbin the ultrasonic sensor detects the person and automatically the dustbin top is opened and the person through the dust inside dustbin and it also calculate and shows the how much level is complete through PIR sensor we are calculating the level of dustbin is filled and we are using GAS sensor which is used for finding harmful gases present inside the dustbin.the harmful gases like methane etc. and we are using Liquid crystal display (LCD) which is used for displaying how much level is completed and also displaying when dustbin is filled.it display dustbin is

filled completely and also we are using buzzer which is act like a alaram.when the dustbin is filled completely the buzzer is starting some sound like alarm and also we are using Light emitting diode which is used for blowing light when the dustbin is filled completely. While we are using smart dustbins, it is so convenient. We are keeping smart dustbins we keep our health in well and provides healthy environment.it is our responsibility to keep our surroundings neat and clean for our healthy environment.

2. Literature Review

Due to large population in india we are facing many problems related to waste management. So we have to arrange the dustbins in each and every area and to collect them properly without delay. So we thought that the consultant staff have to know that the garbage is full or not.so we are trying to insert an alarm sensor is buzzer and led ,level detector if the dustbin is full it doesn't open to fill and it indicates the red light , it also sends the message to consultant officer dustbin is full so they can remove within the time [1]. Due to waste management we are facing health issues like dengue, malaria. Because the areas of garbage was not taken by the authorities as they don't know the dustbin is full or not.so they neglect the area which is far for them if they have received information they are able to come and clear the garbage area.so after knowing about the problem we are trying to insert the gas sensors so the authorities came to know if there are harmful gases which are inorganic so they can immediately clear the garbage [2]. The dustbins wear removed from metro stations, railway stations. bus stands .Because dustbin is the safest place for explosions to hide so they decided not to keep in heavy crowded places so after knowing about the problem we have ideas to implement and to establish dustbins in heavy crowded places like railway stations, bus stations, metro stations.so we had to insert the level detector and display the level , if ti is more then authorities come and to remove so they can identify the explosion or we are inserting gas sensor it can send message or display what type of gas is present the explosion gas is maximum inorganic so it can be recognised and removable [3]. Nowadays we are building a smart world with the help of solar panels saving electricity, the smart world totally runs with the energy produced from the solar panel, so they are planning to implement the smart dustbin with the fitted solar panel to save energy and to utilise in the dark time. but there is an drawback in the dustbin so we have to place in a sun shaded region to absorb energy from.for suffuse we have to use the dustbin in home it cant absorb energy from it.as we understand from the reference [4]. There are staff working to collect the garbage from home, area, street, etc...the staff to collect the dustbin from the people and fill it in a container.in homes there is an alternate option after the dustbin is full they will through the dust in the garbage where all area people through in it.to resolve the problem we are implementing the alarm system to the authorities if the dustbin is full they will get the message from the area so they can come and collect the garbage [5]. India is a second largest population country.as population increases we have to keep environment clean and healthy if we neglect the cleanliness, there is large scope for diseases.in many areas the garbage is full the authorities don't care about the dust, the people living in area also neglect the things every one uses the same garbage it will be fill by within one day .to avoid all problems we are implement ting the Smart Dustbin to every home , every area, every town, we have to distribute the idea all over the world. If the dust is full it should not open then they have to call authorities, or it will send message [6]. As recently survey states that the most polluted area in the

world is Ludhiana in Punjab State. The most polluted city in our india.so they have to plan accordingly to improve and stay healthy. like implementing the volunteer work, we have to divide the city into different areas each area can split into different streets. each and every individual has to come and work for them by using gsm module they can receives a message the number 2 street is full the person who is allocated to it have to move and clean .it is totally depends upon the individual [7][8]. Due to waste management we are facing lot of problems. To handle it we are investing lot of money to overcome the problem but it is quite harder. The diseases are dangerous which can lead to death.so as we know the problem we are trying to implement the Gsm based smart dustbin with gas sensor. What type of gases present in the dustbin we can find with the help of gas sensors which are inserted inside the dustbin. And help people to overcome the problems

3. Literature Gaps

Gas Sensor:

Gas sensor is used for the presence of harmful gases inside the dustbin. These has not been investigated.

Optimization Of Placement: Position of the ultra-sonic sensor for improved operation has not been investigated.

4. Methodology

We have observed while reading research papers on smart dust bin, almost all have used simple one that means all are making smart dustbin by using ultrasonic sensor, servometer is only used for detecting object or any person come near to the dustbin. The dustbin top is automatically opened by the help of servometer and when the person or object has leave from there the dustbin is automatically closed as observed by reviewing research papers. All are using these process but we are making some new type of smart dustbin that means we are using Servometer which are used for opening and closing of dustbin top. When the person go near to the dustbin the ultrasonic sensor detects the person and automatically the dustbin top is opened and the person through the dust inside dustbin and it also calculate and shows the how much level is complete through PIR sensor we are calculating the level of dustbin is filled and we are using GAS sensor which is used for finding harmful gases present inside the dustbin.the harmful gases like methane etc. and we are using Liquid crystal display (LCD) which is used for displaying how much level is completed and also displaying when dustbin is filled it display dustbin is filled completely and also we are using buzzer which is act like a alaram.when the dustbin is filled completely the buzzer is starting some sound like alarm and also we are using Light emitting diode which is used for blowing light when the dustbin is filled. This is one new type of smart dust bin for finding any harmful gases present inside smart dustbin also checking how much level of smart dustbin is filled and it showing in LCD and also makes sound when dustbin is filled and also blowing LED when dustbin is filled and when dustbin is filled the dustbin top also is not opened it is deactivate or block the dustbin top when it is filled. These are the sensor we are using for the smartness of the smart dustbin. The block diagram is shown in Figure1.

Block Diagram:

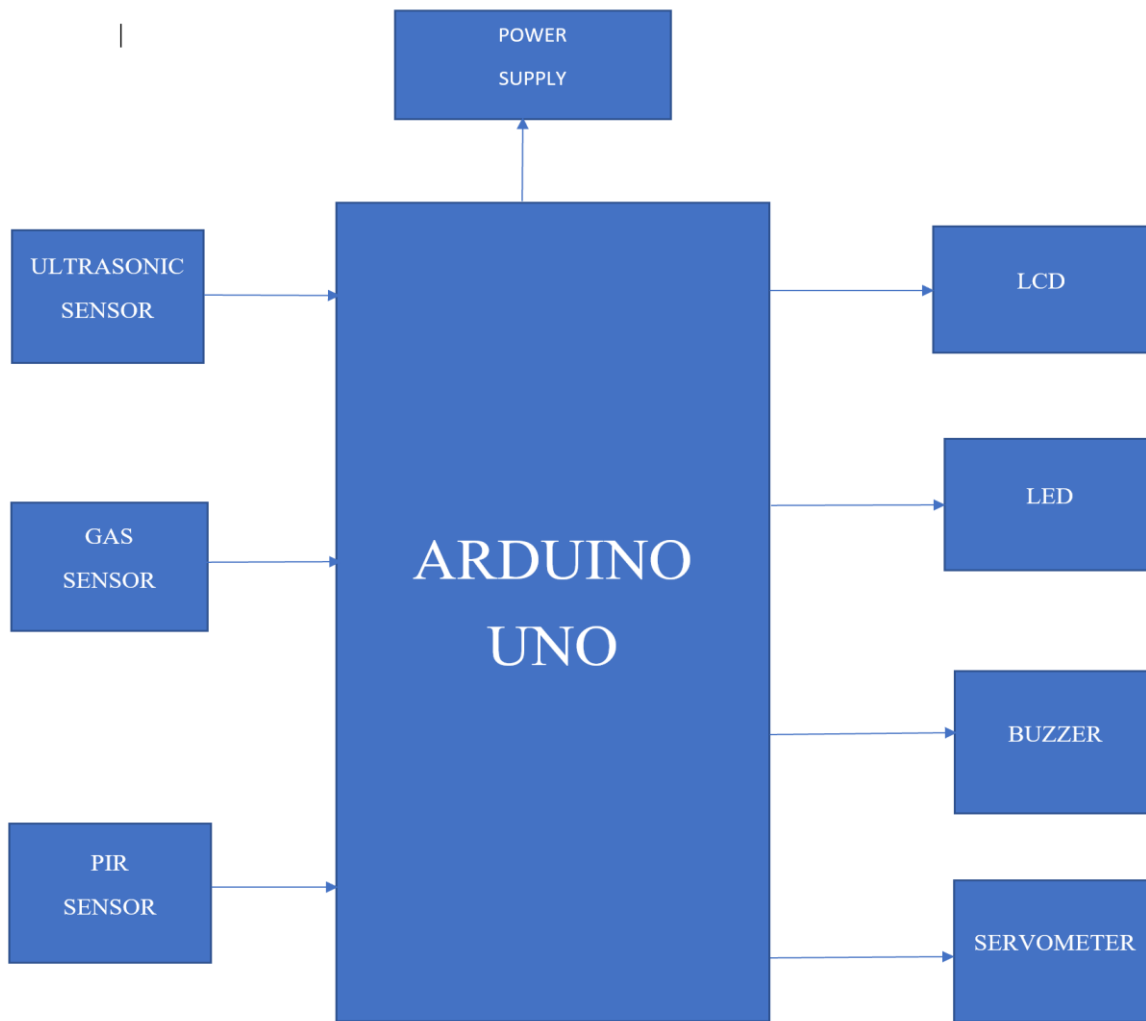


Figure.1 Block diagram of the Smart Dustbin

5. Hardware Description

Ultrasonic Sensor:

Ultrasonic sensor means it detects the object at certain distance and indicates the signal back. It indicates the object through waves which are emitted back through a medium. The power supply and ground will be connected through Arduino. VCC means power supply which consists of five volts DC. The two rounded boxes as shown in figure they are transmitter and receiver which receive and detect the signal.



Figure.2 Block diagram of the Ultrasonic Sensor

The ultrasonic sensor consists of 4 pins as shown in Figure 2 as we have discussed about the two pins above. the remaining 2 pins are echo and trigger. Echo is for output and trigger is for input signal.

5.1 Gas Sensor:

The sensor which is used for detecting what types of gases are present inside the area is known as GAS sensor shown in Figure 3 which is helpful for the environment to avoid harmful gases near them. The gas sensor are four different types. The gas sensor consist of four terminals like Vcc, ground, analog output, digital output. either gas sensor shows the output in digital form or in analog form. In digital form it shows either 1 or 0.

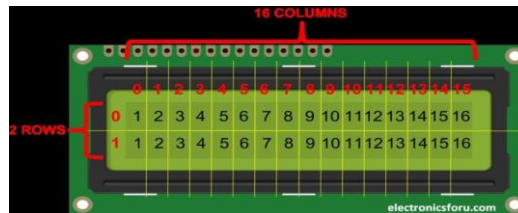


Figure.3 Gas sensor IC

Figure.4 Gas sensor IC

Figure.5 LCD Display

5.2 PIR Sensor:

PIR sensor stands for Passive Infra Red. The PIR sensor is used to detect the object at some distance and blink the light. There are 3 terminals consist of Vcc, Gnd, and Output. The first terminal is Vcc which is connected to 5v battery or Arduino. The third terminal is Gnd which is connected to 0V. The middle terminal is connected to output of the Arduino which is helpful to detect the object at certain distance.

5.3 Liquid Crystal Display(LCD):

LCD stands for liquid crystal display where the output of the Arduino will be displayed in the liquid crystal display. LCD consists of transmitter and receiver pins which will generated at the output of the code. LCD will be useful to us at the level detection and the level of the gases present at the inside the dustbin if the dustbin is full it will display the output of the code seen if Figure 5.

5.4 Light Emitting Diode(LED):

LED stands for light emitting diode which consists of two terminals positive and negative. Positive terminal is the voltage of current passing through it, the negative terminal is the grounded terminal as led means passing through the electrons and protons through a medium of channel. as we are using the led for the detection of dustbin if it is full then it will display the red colour and if it is in blue it display the blue colour it indicates the dustbin is empty as seen in Figure 5.



Figure.5 LED



Figure.6 Servo Motor



Figure.7 Buzzer

5.5 Servomotor:

Servomotor is a rotary device to operate by itself. Servomotor is an ac device which is controlled by the alternate current. as we are using the servomotor for the purpose to automatic lift of the dustbin where the object is detected by the ultrasonic sensor as seen in Figure 6.

5.6 Buzzer:

It is a pseudo buzzer consists of two terminals positive and negative. We are using the pseudo buzzer for the purpose of after detecting the dustbin is full, we get an alarm or sound from the buzzer at certain distance of the area as seen in Figure 7.

Results

We have designed and developed a smart dustbin hereby taking a society problem on garbage management system. For such problem we are implementing a smart dustbin by using latest technology. These smart dustbins are very convenient to everyone. In India one of the major problem is garbage management system. In other countries most of them implement these smart dustbins to keep their clean for their healthy environment. So, we want to implement these smart dustbins in our country to keep our country clean and for our healthy environment and also to stay healthy.

References

- [1] C. Kolhatkar, B. Joshi, P. Choudhari and D. Bhuvu, "Smart E-dustbin," *2018 International Conference on Smart City and Emerging Technology (ICSCET)*, Mumbai, 2018, pp.1-3. doi:10.1109/ICSCET.2018.8537245
- [2] G. S. Rohit, M. B. Chandra, S. Saha and D. Das, "Smart Dual Dustbin Model for Waste Management in Smart Cities," *2018 3rd International Conference for Convergence in Technology (I2CT)*, Pune, 2018, pp.1-5. doi: 10.1109/I2CT.2018.8529600.
- [3] A. Tripathi, C. Pandey, A. Narwal and D. Negi, "Cloud Based Smart Dustbin System for Metro Station," *2018 3rd International Conference On Internet of Things: Smart Innovation and Usages (IoT-SIU)*, Bhimtal, 2018, pp.1-4. doi: 10.1109/IoT-SIU.2018.8519845.
- [4] S. Mukherjee, B. Bhattacharyya and N. Banerjee, "Harnessing green energy for smart dustbin," *2017 IEEE International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials (ICSTM)*, Chennai, 2017, pp.484-490. doi: 10.1109/ICSTM.2017.8089208
- [5] S. Murugaanandam, V. Ganapathy and R. Balaji, "Efficient IOT Based Smart Bin for Clean Environment," *2018 International Conference on Communication and Signal Processing (ICCSP)*, Chennai, 2018, pp.0715-0720. doi: 10.1109/ICCSP.2018.8524230.
- [6] J. Ghorpade-Aher, A. Wadkar, J. Kamble, U. Bagade and V. Pagare, "Smart Dustbin: An Efficient Garbage Management Approach for a Healthy Society," *2018 International Conference on Information, Communication, Engineering and Technology (ICICET)*, Pune, 2018, pp.1-4. doi: 10.1109/ICICET.2018.8533851

[7] A. Imteaj, M. Chowdhury and M. A. Mahamud, "Dissipation of waste using dynamic perception and alarming system: A smart city application," *2015 International Conference on Electrical Engineering and Information Communication Technology (ICEEICT)*, Dhaka, 2015, pp.1-5. doi: 10.1109/ICEEICT.2015.7307410.

[8] S. Mirchandani, S. Wadhwa, P. Wadhwa and R. Joseph, "IoT enabled dustbins," *2017 International Conference on Big Data, IoT and Data Science (BIG)*, Pune, 2017, pp.73-76. doi: 10.1109/BID.2017.8336576

