

Smart Dustbin: A Review

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Abstract: In today's world the technology was developing more as compare to past, but the cleanliness around us remained same. There is less improvement in the field of cleanliness, so there is a need to improve a lot. With this new concept we can bring some change and keep our surroundings clean. As it is new to everyone, this also shows some interest on the bin and come there to throw the waste. It intimates the supervising department regularly to maintain that bin i.e., to remove the waste from it. The main aim of this paper is to improve the system by throwing the waste into the smart bin which furthers helps helps to maintain the surroundings clean.

1. Introduction

In order to improve the livelihood of the whole world, various technologies are used to make the things smarter. If we compare India with the foreign countries, the only drawback of india is having dirty roads, unhealthy surroundings, poor wastage and drainage systems. That's why the concept of smart dustbin comes which uses mechanical systems to minimize the drawbacks of conventional bins [1-2]. When the bin is filled, the information is sent to the mobile that the bin is filled. In this way, the person easily gets the information about the status of bin whether it is empty or filled [3-4].

2. Materials and Methods

The various components which are used to make the smart bin are following:

2.1 Arduino: The main advantages of using Arduino are as follows:

- 1) The software of Arduino is easy to use for beginners.

- 2) The cost of the Arduino is inexpensive than other micro-controller based platforms. The minimum cost of the Arduino board is less than Rs1000/-.
- 3) We can run Arduino software on various operating systems such as Windows, Linux as compared to microcontrollers.
- 4) The software of Arduino is an open source tool.

There are many types of Arduino boards available in the market. The Uno or mini Arduino board can be used for small and simple Arduino projects that depend upon the size and cost of the project. Arduino board is used if we need more number of pins or serial communication devices to process with same the controller [5-6]. Uno board is best for the beginners. In this work, Arduino Nano is used due to the requirement of pins as shown in figure 1. It works with mini-B USB cable. It has 8 analog I/O pins and 22 digital I/O pins.

- 6 pins can be used as PWM outputs,
- 8 analog input output pins,
- Crystal oscillator is off 16MHz,
- a USB connection,
- Reset button

To get start an Arduino board, connect to a computer through mini-B USB cable or power it with AC to DC adapter or battery. The Nano board is programmable with ARDUINO IDE. The board consists of a boot loader which allows the programmer to upload new code to it without using any external hardware programmer. It can communicate using the original STK500 protocol which references the C header files.

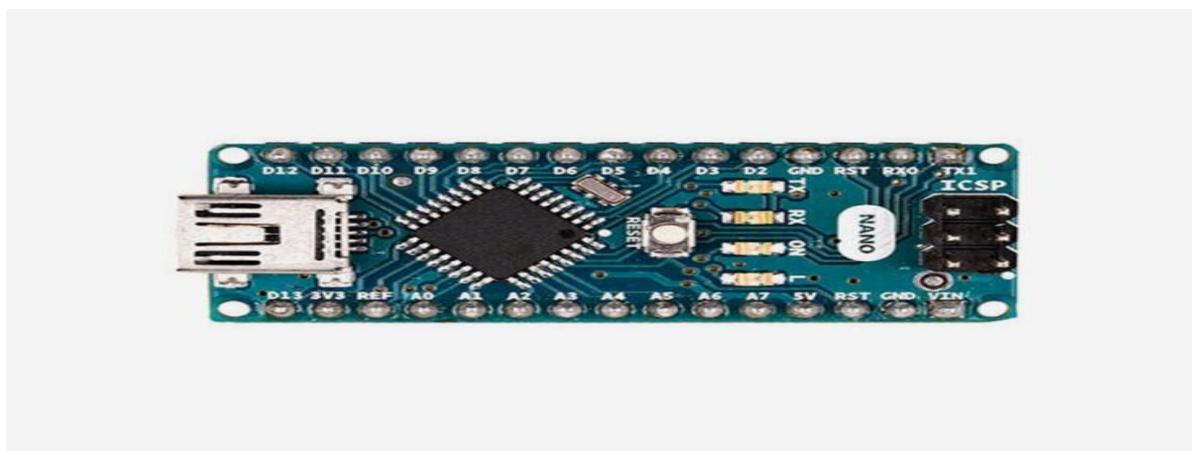


Figure 1: Arduino Nano

The Arduino Nano is powered via mini-B USB connection else with an external power supply. The power source is auto detected by the board. The NON-USB power is either AC TO DC adapter or from the battery. The adapter is connected by plugging 2.1 mm center positive power to the jack of the board. In case of a battery, leads are inserted in the GND and VIN pin headers.

2.2 Liquid Crystal Display (LCD)

The LCD (Liquid Crystal Display) has the rod shaped tiny molecules which are aligned as per to the electric charge applied in two different physical positions. The two positions are: as when electric charge is applied it is aligned to block the light from passing through it, and when no electric charge is applied it becomes transparent. The figure 6 shows the pin description of LCD. The LCD is an electronic display module which is more preferable in comparison to seven segments LEDs.

2.3 IR Sensors and PIR Sensors

Infrared Sensors (IR) works as a proximity sensor used for detecting the light in the Infra-Red (IR) spectrum. The sensor which is used for measuring the infrared light radiating from objects is known as Passive Infrared sensor (PIR).

2.5 Servo Motor

Servo motor is an electrical motor, that works on the principle of servomechanism. Servomotor are of two types (a) DC Servo Motor (b) AC Servo Motor

2.6 Sim 900a GSM module

Sim 900 means the module supports communication in 900MHZ band. The baud rate in this configuration is 9600 to 115200 through AT commands. The Sim 900A having internal TCP/IP stack to enable you to connect with internet via GPRS. The features of this module are sending SMS, and Making Voice call. This module needs to connect to Arduino.

2.7 Load Cell

In this work, strain gauge load cell is used. The four strain gauges are connected in a Wheatstone bridge configuration. The output electrical signal of this strain gauge load cell is

very low that is measured in terms of millivolts. This requires an amplifier to amplify the output signal.

These are the most common everywhere [7-8]. These have good resonance values, very stiff and have long life cycles. These are bounded on a fixed structure that deforms when weight is applied.

2.8 HX-711

It is a Load cell amplifier which is used to read load cells for measuring the weight.

The main features of HX-711 are as follows:

- Operation Voltage: 2.7V–5V
- Operation Current: < 1.5mA
- Simultaneous 50 and 60Hz supply rejection

3. Results and Discussion

Working of collection of garbage system

The idea of the Smart dustbin is that it should remind us when it gets filled without manual check-up, so that we can just take out the garbage from the bin and will empty it soon after it is filled.

On account of sensing the garbage of the bin and finalize that the bin is filled, we place Infra-Red sensors at the top of the bin, these will detect the level of the garbage or litter in it. When it is completely filled those IR sensors will detect the presence of litter and garbage in it using Arduino and at the backend the GSM module sends the message that **“the bin is filled, please collect the garbage”**. Not only the sensors detect the level but also when the weight of the garbage in it exceeds the threshold value then also it sends the same message, that to empty the bin.

Here we may come across the chance of misjudgement of the case whether the bin is filled or not? To avoid such cases we have used four IR sensors if all of them detects the presence of something then only we will get a message so that, the chances of misjudgement are nullified.

If the bin is filled and there is some delay occurred to empty it, then also some necessary measures were taken. The lid of the bin won't open and it also displays on the LCD that **“The bin is filled, Sorry for the inconvenience”**. Each block will be having some rules which are already fed in the base, so depending on the input it faces it just reflects the output. Example is if PIR sensor senses the radiation the servo motor will work as a result the lid will open.

Similarly after the fulfilment of the bin all the sensors (IR) will detect the presence of some litter or garbage in front of them so as a result of that action the system just gives an output of sending a message to the maintenance depart about the condition of the bin that it is filled and they need to empty it soon. The block diagram of each block used in the Smart bin as shown in figure 2.

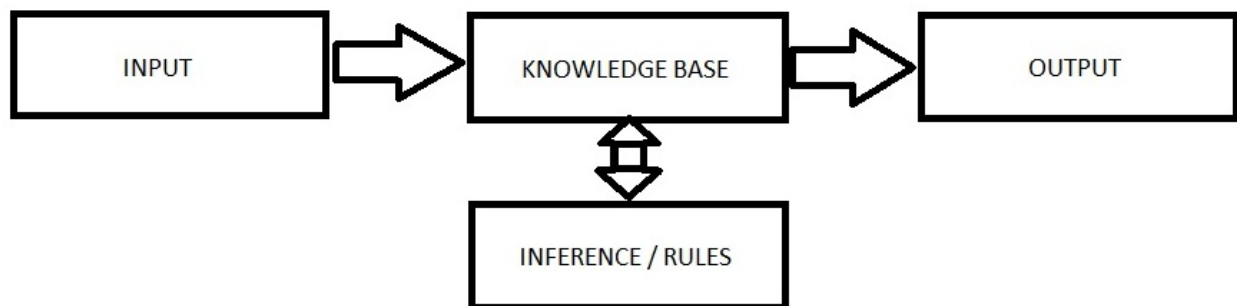


Figure 2: Block diagram of each block used in the Smart bin

So for the observation of the input and reflection of output, the rules and inference department will be responsible for smooth functioning which is simply termed as brain of the system which is Arduino Nano in our Smart Dustbin as shown in figure 3.

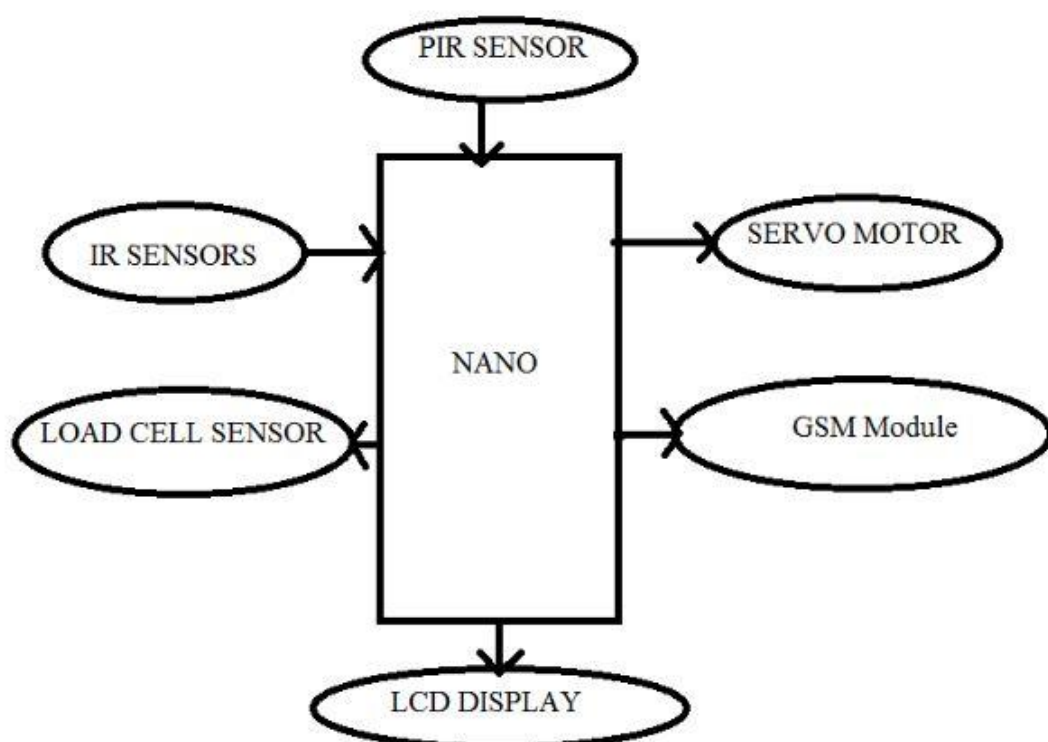


Figure 3: Block diagram of the System

4. Conclusions

As the world is growing smarter day by day, this work has a very good scope for further development and usage on a regular basis. Coming to our nation we can contribute our project as a small contribution regarding “SWACH BHARAT ABHIYAAN” simply which supports clean India. Along with that we can also useful

- For domestic usage purposes
- Industrial usage purposes
- Educational Institutional purposes
- In heavy crowded place

Even a lot more developments can be made in this kind of a project depending on their requirement, simply keeping a large scenario we developed it in a broad usage way, if we stick to some specific purposes like in some Laboratories there we can further introduce temperature sensor to sense and control heat delivered by the substance thrown into the bin like that. And a lot more changes and developments can be done in our project so we can conclude that we have a larger future scope in the project. By this we can also achieve SWACH BHARAT ABHIYAAN and make our nation neat and clean. **“Cleaning of the country cannot be the sole responsibility of sweepers; do citizens have no role in this? We have to change this mind set”** this is the initiation step taken to make every nation clean.

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