IOT Based Tool Garbage Management System

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Abstract. These days, safe and hygiene disposal of waste via dustbins in smart cities needs a centralized and monitored system. This system monitors various bins used for rubbish and garbage collection extent is also informed inside these garbage bins via centralized online Application. For this the system the bins are fitted specially placed ultrasonic sensors to determine the level and depth of rubbish. It incorporates an AVR based microcontroller, GSM Module, Wi-Fi modem, a buzzer for alert and LCD screen for viewing data. The voltage support is given by a 12V transformer. To determine the display status and the extent to which the rubbish bin is loaded an LCD screen is used. These LCD screens are used inside the rubbish bins. To point out the condition however the web application is designed which is used to monitor the garbage or rubbish bins. The geographical view of rubbish bins can be obtained by the web page and also these web pages indicate the colored rubbish that they can highlight Keywords: centralized online Application, AVR Based Microcontroller, GSM, WI-FI Modem, Ultrasonic sensors, LCD screen, Buzzer, Blynk web development platform

1. Introduction
The network of connected physical objects is referred as Internet of Things and these are supposed to deal in communication and data exchange process among each other in such a way that desideratum of human intervention is not needed. Infrastructure of the knowledge society is the typical term which is used for its formal definition since Internet of Things offers a lot of data and necessary information to us regarding various mediums such as animals, conveyances, humans, kitchen appliances etc. Inside the physical world any object present, allow data transmission can be supplied with IP address inside a given network to make it a part of Internet of things system and this is done normally by the combination of software, sensors and networking gears which are generally referred as electronic hardware. For the cleanliness purpose of entire city, the dustbins or garbage bins are considered and they are needed to be maintained. It is therefore always important to clean them well as soon as they are completely filled. With the help of indicators the dust bins can be easily emptied to be used later. This present system however has some disadvantages as well and workers are supposed to visit the bins and check these bins on the daily basis to find out their state either they are filled or not and higher cost is needed for this purpose. The environment becomes unhygienic if these garbage bins are not emptied at the time and this can end up in the spread of various diseases. The system suggested here can be used efficiently and hence these disadvantages can be overcome. Regarding the extent of dust bins filled in a system the real
time information is collected. It will help in the price reduction since workers can also visit a particular place at the time when bin is full. If the bins are emptied the environment will remain clean and hygienic and there would be lesser risk of diseases spread. Hence with the help of this technology the cities can be kept cleaner and also there would be less or no smell of rubbish in the streets.

2. Related work

As suggested [1] the smart bin in working with Internet of things is an Arduino Uno based garbage bin along with a specially placed multi controller which is generally connected to the GSM modem and a special kind of ultrasonic sensor is also connected to it. On the container the sensor is set at a highest point. At 10 cm the level of edge was adjusted. When at the degree of edges the trash gets filled the GSM modem is triggered by the sensor and in this way the authorities are sent information in the form of alarm to empty the content of the container. While planning these smart bins some special features are considered such as reasonableness, support and toughness etc. All this planning helps to keep the environment of the city clean and sterile and in such smart cities there is less spread of diseases. The investigative team [2] suggests various ways of management of trash which is mentioned below in this work. With the framework which is dependent on the microcontroller the container was configured as well. This container also had IR remote structure with a special structure or a framework which is mentioned at the garbage bin top. On the versatile based internet browser the status is seen in the form of a special html page making use of WiFi. The heaviness of waste present inside the garbage bin can be identified by the sensors however the level of waste is not clearly mentioned. The developer also suggested another special technique to sort out the trash assortment in the business and location of inside the communities of cities [3,4,5] for the utilization of control room inside the module of GSM. In the same way the GUI was developed in such a way that information or data is checked which has been developed for the various areas to collect the waste. On the MATLAB the GUI was dependent and it was designed especially. [6] Inside the framework two units were available, inside the container there was a slave unit and control room was also there in the expert unit. The quantity of waste and level of the waste will be checked [7] by the sensor and it is later sent to slave unit where data is sent to the control tower in the form of unit and in this way the specialists are informed to clean the bins Figure 1.

Architecture Diagram

Figure 1. Architecture Diagram

3. Hardware specification
   • Microcontroller
• Wi-Fi Modem
• LED’s
• LCD Display
• 12V transformer
• Ultrasonic sensors
• GPS
• LOAD CELL
• METAL SENSOR
• RELAY

4. Software specification
• Arduino Compiler
• BLYNK IOT
• MC Programming Language: C

5. Proposed system

Our goal is to achieve a computerized interaction to the current arduous technique where the cycle is quicker, cleaner and doesn’t influence the environment. The biodegradable items should be put to decay and the rest, reused. Assets should be saved and they should not be smothered.

5.1 Data Collection:

Ultrasonic sensors transmit a sound pulse that reflects off of items entering the wave field. The reflected sound, or “echo” is then gotten by the sensor. Detection of the sound creates a yield signal for use by an actuator, controller, or PC. The yield sign can be Analog or digital. In this project the ultrasonic sensor assumes a significant part in assortment of wastage things in urban communities. Here the natural and inorganic wastages are gathered in dustbin and gathered by metropolitan partnership.

5.2 Data Transmission and Processing

In this task it is productive to gather the wastage things without any problem. The level of natural and inorganic wastages are estimated by ultrasonic sensor on the off chance that it surpasses consequently the notice is given to metropolitan corporation. Wastage variety by IR sensor and metal sensor after distinguishing sort of wastage and dividing the wastage by running themotor(forward or fire up) worldwide frameworks for mobile communication and global positioning systems. IOT is utilized to gather an information from central unit and information sent through web. GPS gets data about an area from satellites.

5.3 Integrating with Blynk Application

Blynk Android Mobile Application provides an open source network. The Blynk application can be easily integrated with Arduino or Microcontroller via wi-fi, GSM or Ethernet cables. Blynk Application once integrated it displays whether the dustbin is fully fill, partially fill or empty. There by providing all necessary information regarding disposal of waste Figure 2.
5.4 Materials and Methodology

Arduino Uno. An open source is known as Arduino, Personal Computer gear and programming association, Endeavour, and customer bunch that plan and produce microcontroller packs for building customized gadgets and canny article that can distinguish and many important queries regarding the actual world. The beginning of the Arduino broadening started in the city Ivrea of Italy in the Interaction Design Institute. Arduino Uno appearing in figure 3.

Ultrasonic Sensor. To quantify the distance with more accuracy and stable readings the ultrasonic sensor is used. When this ultrasonic sensor is used, the time taken to strike the object is checked and how much time is needed in return and hence the distance is calculated by it. By the condition 1 the distance can be estimated for having the four pins. VCC and GND both are there inside it for the board
of Arduino. Trig and Echo pins are the other two pins connected and they will be interfaced with anu part of UNO as demonstrated in figure 5

![Load cell](image1)

**Figure 5. Load cell**

**GPS [Global Positioning System].** Global Positioning System (GPS) is star grouping of 24 satellites that are circling around earth. These satellites utilize radio signs to communicate area data. A GPS beacon (GPS beneficiary) on the ground gets the signs from the satellites to decide the area of a substance anyplace on the planet and gives boundary like time, latitude, longitude, altitude and so forth GPS is likewise called as NAVSTAR (Navigation System for Timing and Ranging) Figure 6.

![GPS module](image2)

**Figure 6. GPS module**

**LCD [Liquid Crystal Display].** LCD is one of the famous presentation gadgets utilized in significant zones, it has 16 lines and two sections for showing ready messages of residue canister it upholds 5 voltspower supply. 16, 15, 3, 2, 1 Power pins are utilized as supply to the module LED’s are likewise connected with by the pins Figure 7.

![LCD](image3)

**Figure 7. Liquid Crystal Display (LCD)**

The voltage to the Contract Adjust (Pin three or VEE) is typically given from a Potentiometer and can the board the greatness of the significant show off once the POT is changed. There are eight data pins for sending8bits of information i.e., one PC memory unit of information while not a second's postponement. The LCD is used in either 8bitmode or 4bit mode.

**Proximity Sensor.** The presence of object is recognized with no actual contact by the assistance of proximity sensor. It recognizes protests by discharging electromagnetic field or electromagnetic radiation and notices the adjustments in the field or bring signal back. The Inductive proximity sensor will be utilized to distinguish the metallic waste. It additionally separates among them as paper and plastic has distinctive permittivity value. Changing over electrical signs into ultrasonic sound. It is then reflected by the snag and got by the beneficiary that changes over the ultrasonic sound into electrical signal. The reflected signs are utilized to interpret the position of the trash in the container.
6. Experimental results

The status of level of garbage is displayed using different colour values. When it is less than 50% green and orange up to 70%. When the garbage is more than 70% filled then the Blynk shows red colour Figure 8.

![Prototype Model](image)

**Figure 8.** Prototype Model

Hence marking the garbage has exceed the threshold limit and set the buzzer on. Also the LCD screen shows whether the dustbin is partially filled, fully filled or Empty. All information related to filling of dustbin is then transmitted or Alerted to the corporation office Figure 9 and 10.

![Blynk App Login](image)

**Figure 9.** Blynk App Login

![Result Displayed in Blynk App](image)

**Figure 10.** Result Displayed in Blynk App

7. Conclusion and future
The primary goal is to keep up the degree of tidiness in cities and structures as environment which is better for living. By utilizing this framework we can continually check the level of the trash in the dustbins which are put in different pieces of the city. This might end up being a helpful framework whenever utilized appropriately with adding some attributes. The framework could be utilized as an benchmark by individuals who will make one stride more so that tidiness can be expanded in the territories concerned. To check the level of trash in the dustbins the ultrasonic sensor is used in the dust bins. In the coming times the sensors of different kinds will be used and in this way more accurate outcomes can be obtained to take this structure to another new level. Currently, this framework or prototype can be utilized in specific regions yet when it demonstrated its believability is very well may be utilized taking all things together the huge territories As this framework or prototype likewise lessens the work by hands and there is a need to progress the structure in such a way that another level is obtained and for the people and representatives who are making use of it in the coming times and it is also discussed that a group can be made which can control for dealing with and keeping up this framework and furthermore to deal with its systems for he upkeeps or Future Enhancements in this domain of Internet of Things.

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