



A Review on IoT Based Design of a Smart bin using Raspberry pi

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ABSTRACT

India is the second largest population country, so collecting and disposal of waste plays a vital role in day today life. This work proposes a clean city concept using Smart bin and its application through a proper interaction and networking with one to many devices. The paper presents a novel waste collection technique and interaction through a Smart bin which is developed using raspberry pi with ultra-sonic sensors and pressure sensing resistor .The proposed system also provides the web page interactions to the terminal side with effective data base management and alert system according to the function of the bin. HTML web page is being created to show various levels of every bin located in each ward with various levels of trashes. A GSM transmits an alert to the terminal of the particular bin. RFID were incorporated for the authentication.

Keywords : Raspberry pi, Force sensing resistor, GSM, HTML, Smart bin, RFID, Ultrasonic sensor.

I. INTRODUCTION

As the world is in a stage of up gradation, there is one stinking problem people have to deal with Garbage. In our daily life, we see the pictures of garbage bins being overfull and all the garbage spills out. This leads to the number of diseases as large number of insects and mosquitoes breed on it. A big challenge in the urban cities is solid waste management not only in India but for most of the countries in the world.

Hence, such a system has to be build which can eradicate this problem or at least reduce it to the minimum level. The project gives us one of the most efficient ways to keep our environment clean and green. The smart city concept is still new in India, although it has received a lot of attention in few years when our present prime minister gave the idea of building 100 smart cities throughout India. Now, with the upcoming large number of smart cities, large numbers of responsibilities are also required to be

fulfilled. The prime need of a smart lifestyle begins with cleanliness and cleanliness begins with dustbin. In this paper we have tried to upgrade the trivial but vital component of the urban waste management system, i.e. dustbin. Now with the rise of technology it is high time that we should use technology for waste management systems. As we have seen that technology with analytics has made the world a better place to live by its application in the field of genetics, insurance, marketing, engineering, banking etc. in past many years.

Waste management is a continually growing problem at global and local levels. Solid wastes arise from human and animal activities that are normally discarded as useless or unwanted. In other words, solid wastes may be defined as the organic and inorganic waste materials produced by various activities of the society and which have lost their value to the first user. The domestic waste products are collected through waste bin at a common place at a particular spot for an area/street. A major difficult task is that checking process of waste bins for the collection of wastes. The usual method by which, a person has to wander through the different spots and check the places for waste collection. This is somewhat complex and time consuming process. The present day waste management system is not as efficient as it should have been taking into consideration the advancements in the technologies that arose in the recent years. There is no surety about the management/ clearing of wastes at all the places.

To overcome this problem a new approach, Automatic waste management system is proposed. It is a step forward towards making the waste collection process automatic and efficient in nature. Whenever the waste bin gets filled this is acknowledged by placing a GSM transmitter at the waste bin, which transmits it to the receiver at the desired place in the area or spot. The received signal indicates the waste bin status at the monitoring and controlling system.

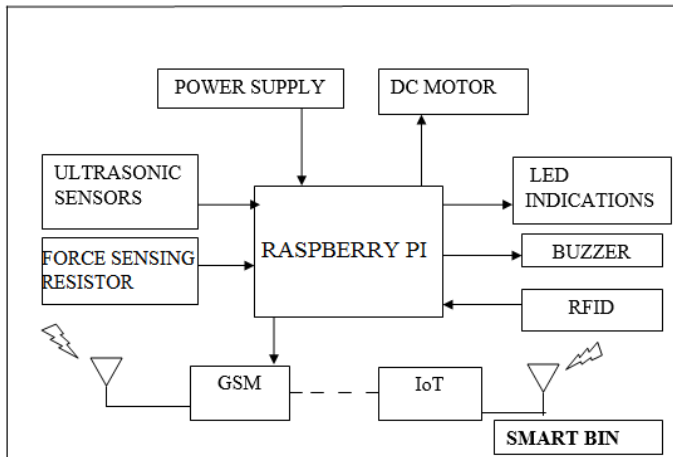
So, in this paper we have integrated analytics and electronics in order to create optimal changes in the conventional methodology of waste collection with the large amount of data that is being produced by the smart bin networks. The movement of waste across the whole city can be tracked and thus can be monitored by a single system efficiently and concretely. This system can prove to be a revolution for the whole urban waste management system of upcoming smart cities.

II. EXISTING SYSTEMS

One of the weaknesses of all waste collection systems is that the cost, and failed due to the sensors efficiency. In many system volunteer actions need to be taken. Fully automated system is not being implemented in India.

III. SYSTEM DESIGN

Proposed system is mainly monitoring the two sensor data namely level and volume. Ultra sonic sensor will detect the level of trash in the bin. FSR is used to obtain the weight. LED indicator in the bin will inform the level of trash and when the level crosses 90% automatic lock of bin will be done and Buzzer emits alarm sound. Also SMS is send via GSM interface to the collection Centre and also the cleaner. Once the cleaner cleans again SMS is sent to the collection center. All the bins status can be viewed at the Bin monitoring. Also statistics about collection and analytics is available at the Bin monitoring terminal. Microcontroller manages the smart bin. RFID is used for authentication purpose also helps to obtain the location.



IV. SYSTEM SPECIFICATIONS

1. Raspberry Pi 400: was released in November 2020. A modern example of a [keyboard computer](#), it features 4 GB of LPDDR4 RAM on a custom board derived from the existing Raspberry Pi 4 combined with a keyboard in a single case. The case was derived from that of the Raspberry Pi Keyboard. A robust cooling solution and an upgraded switched-mode power supply allow the Raspberry Pi 400's Broadcom BCM2711C0 processor to be clocked at 1.8 GHz, which is 20% faster than the Raspberry Pi 4 upon which it is based.
2. Ultrasonic sensor: HC-SR04 is the sensor used, which will sense the various levels of the trash in and sends the data to the server HC-SR04 provides ranging between 2cm- 300cm it has non-contact distance sensing capabilities, Ranging accuracy up to 3mm, module comprises an ultrasonic transmitter, a receiver and a control circuit.
3. Radio Frequency Identification (RFID): It is used to authenticate the user who is going to pick up the waste also the people who throw the waste to the bin. It Uniquely identifies an individual item beyond just its product type also it can identify items without direct line-of-sight, it has the potential to identify many

items (up to 1,000s) simultaneously, items within a vicinity of between a few centimeters to several meters it can identify.

4. Force sensing resistor (FSR): it helps to measure the weight, the weight being considered to measure its capacity. PSR are a Polymer Thick Film (PTF) device which exhibits a decrease in resistance with an increase in the force applied to the active surface. Its force sensitivity is optimized for use in human touch control of electronic devices. PSRs are not a load cell or strain gauge, though they have similar properties.
5. Global System for Mobile (GSM) sim900: GSM is used to send the message to the administrator, it is not necessary to have android based phone. It has RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz. It is well suited for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply.
6. Hyper Text Markup Language (HTML): Hypertext markup language helps to give website where all can log in identify the filed bins. HTML is very dynamic and interactive, and it plays an important role in improving the user experience of the web. It provides more robust structure and organization.HTML helps us to define our own thoughts, layout, and definitions attractive hence creating the user friendly environment.

V. CONCLUSION AND SCOPE FOR FUTURE WORK

Prototypes are successfully implemented. Ultrasonic sensor and force sensing resistor are interfaced for the level and weight of the bin monitoring. RFID is used for the authentication purpose. DC motor is

interfaced for the open and close of the lid. LCD and LED provided for the GUI purpose. GSM is being interfaced for the communication Webpage is created for the terminal side. It is updating the status graphically. Terminal side is getting the message through GSM.

Separation of the waste which is being put by user, if he doesn't separate properly, and giving him at least 3 chances for separating he doesn't follow, taking his picture and giving him penalty this work can be done as future enhancement

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