

Monitoring and Security based Smart Wastebin for real time Application

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Abstract

The overwhelming and massive augmentations in population procreate despondent all over the map in present day. Waste management is hulking ultimatum subsequently. An appropriate waste management structure is imperative to abstain from the prolonging diseases. In this system the ingenious dustbin is ubiquitously installed in the road side of the smart city. All tracked ingenious dustbin are carefully monitored and appropriate arbitration are considered as per the status of the bin through the IoT technology. The projected system will forewarn the real time status of individual dustbin to the concern authority of a particular region. The collection agency will have to send a vehicle only when the bins are full. This service will curtail the fuel cost as the route of the vehicle is determined from the Google map where red marks are showing full of the dustbin, yellow marks are going to full and green marks are empty dustbin. The works include, Raspberry Pi, Arduino Uno, Servo Motor, Ultrasonic Sensor, IR Sensor and Solar Panel. An internet connection is enabled through a WSN based modem. All the received distinctive sensor data of the different dustbin are figured out and processed in the cloud database. A pertinent web application as well as GUI is responsible for displaying status of the garbage inside the dustbin.

Keywords. Raspberry Pi, Arduino Uno, Servo motor, Ultrasonic Sensor, IR Sensor and Solar panel, Python programming language, Mobile APP.

1. INTRODUCTION

The staggering and gigantic growths in populace reproduce discouraged everywhere in show day. Squander administration is bulky final offer accordingly. A fitting waste administration structure is basic to go without drawing out infections [1], [2], [3] and [4]. In this proposed framework the brilliant dustbins are watch out for and the choices are taken according to the status of containers. Through a WSN

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IoT based web association, information is gotten, dissected and prepared in the cloud that shows the garbage status in the waste canister on the GUI on the internet browser [5]. Data is collected from different sensor and stored in cloud [6]. A cloud-based analysis will take care. If the data are above the threshold level, then SMS will be sent to the concerned authority of Municipality Corporation and necessary action will be initiated. The analysis will be done in real time [7] [8]. A Mobile APP will be developed for the society people as well as to the concerned authority. They can control the respond from anywhere and anytime remotely [9].

The framework would manage two kinds of clients, i.e an official/administrator/overseer with special rights and community with constrained rights. The client's solitary method to collaborate with the framework is the web-based interface. An administrator client may have rights like checking status all bins then sending vehicles in the right time to right place and creating information for analysis report. While a native may just have the privilege to check the receptacle status of his region and enrol a protestation if any related with to the framework. Our proposed work can be actualized in our savvy city which is sufficiently enormous to tackle the issues with respect to waste management administration.

2. PROBLEM IN THE EXISTING TECHNOLOGY

Lack of data about the gathering time and region. and Lack of appropriate framework for checking, following the trucks and waste container that have been gathered continuously. There is no estimation to the measure of strong waste present inside the canister and the encompassing region because of the diffusing of waste. Lack of fast reaction to dire cases like truck mischance, breakdown and long time lingering. Odour issues and spoils the excellence of the city as well as Bad accumulation framework i.e., junk gathering vehicle is been sent to the territory every day twice or thrice relying on the separate populace here and there and there the dustbins may not be full.

3. SOLUTION TO THE PROBLEM

To plan a model which is a shrewd ready framework for savvy dustbin in the keen city and to incorporate diverse detecting and correspondence advancements utilizing IoT, constant strong waste container observing framework. When the dustbin is full then it naturally sends SMS to the concerning expert. It will likewise take care the filled level of dustbins. The primary objective in this proposed item is to decrease in cost, asset enhancement and compelling use of shrewd dustbins can be accomplished by actualizing this proposed framework. This will limit fuel cost as the path of the vehicle is as of now chosen. The concerned expert should send the trash gathering vehicle just when the dustbins are full.

4. PROPOSED SCHEME

A prototype model will be designed for Municipality Corporation and proficient enough and can be implemented in various street of the Bhubaneswar Smart City. A SMS signal will be given to the municipality authority so that they will be alerted and will send dustbin collection vehicle. The prototype model will be designed so that the authority as well as the society people can easily operate with the Mobile App with a minor training. All the sensors will be interfaced with high performance Raspberry Pi development board. All the sensors' data will be uploaded to IoT Platform where cloud analysis will be carried out. In this proposed prototype model low power Raspberry Pi based embedded system will be used, so the power consumption will be greatly reduced. The block diagram of proposed prototype model is shown in Fig .1

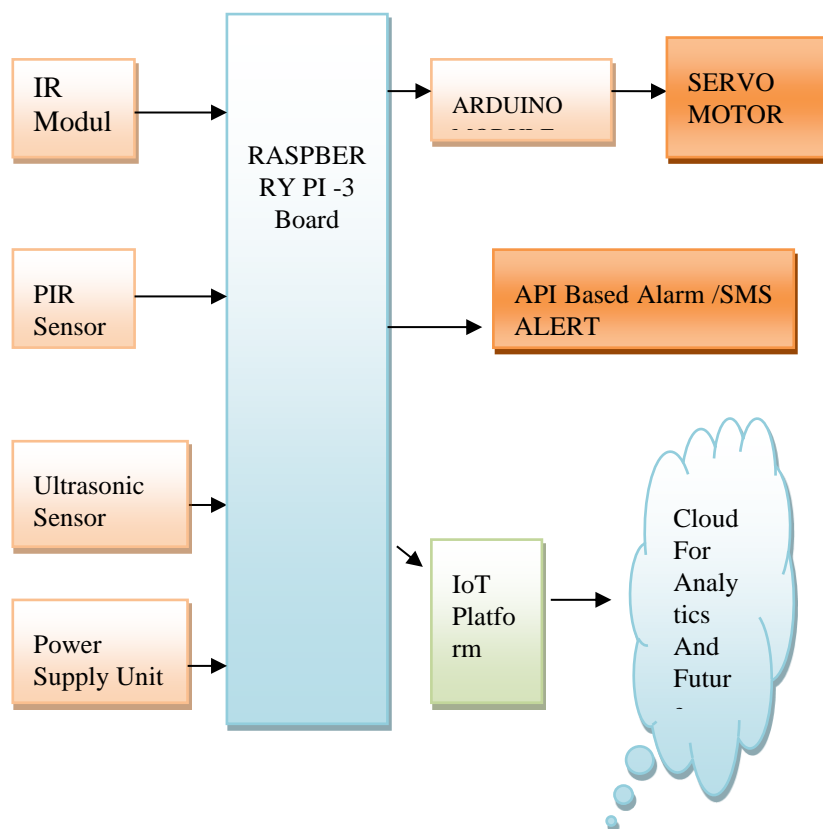


Fig.1 Block diagram of the proposed prototype model

5. METHODOLOGY

The ultrasonic sensors will be used to identify the person with garbage to be put in the dustbin. If the garbage level will be below the threshold level inside the dustbin,

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then the bin will be uncovered by a Servo Motor which will be connected through Raspberry Pi interface with the Arduino. The sensor output is fed to the input to Raspberry pi which will be programmed with NODE Red software in which algorithm will be designed for threshold levels for smart dustbin. The monitoring of bin will be shown in computer as well as a separate mobile application will be designed. The status of the dustbin will be hosted in cloud. If the dustbin level is more than the threshold level then a SMS will be sent to the BMC authority. Steps involved in designing the prototype model

Step-1 All the sensors i.e Ultrasonic and IR sensor will be interfaced with the analog to digital converter pins and then connected to Raspberry Pi.

Step-2 The prototype model will be designed in which the sensors will be exposed towards the inside of the bin. The signs created from the sensor will distinguish the level of the trash inside the dustbin. For the different concentrations of garbage, the corresponding values will be noted. The threshold level for bin to protect the overflow will be observed and will be written in the logical statements of the program.

Step-3 The WSN based embedded system will be interfaced with the IoT platform through which all the sensor data will be stored in cloud. The bin will be uncovered by a Servo Motor which will be connected through Raspberry Pi interface with the Arduino Uno, If the levels of garbage is above the threshold level, then an SMS signal will be generated and sent to the authority.

Step-4 An API will be designed for the mobile application. This portable application will be utilized by the administrator client who has rights to check the status of everything being equal and convey gathering vehicles and creates information examination report. In addition, a client may just have the privilege to check the canister status of his territory and enrol a protest. An SMS will be sent to the officer concerned, if the garbage levels are above the threshold level. Real Time field testing of the developed prototype model will be done which is shown in Fig.2.

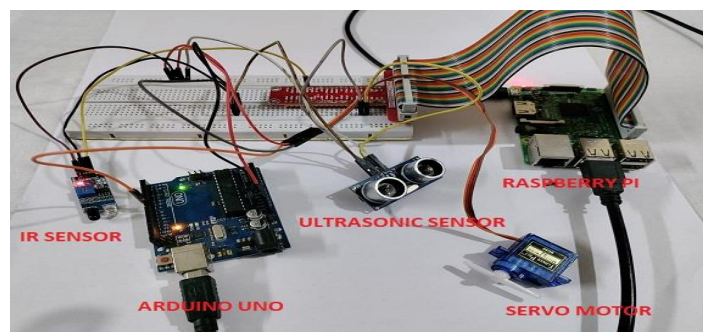


Fig 2. Interfacing the sensor module with Arduino and Raspberry Pi for Smart Dustbin

6. MODEL WITH CIRCUIT IMPLEMENTATION

The proposed work is done by utilizing Raspberry Pi for the WSN Technology for garbage monitoring using IoT. The garbage bin has sensors which check the level of garbage in the bin and informs the person about the status. All the sensors will be interfaced with the analog to digital converter pins and then connected to Raspberry Pi. The signals generated from the sensor will detect the level of the garbage inside the dustbin. The bin will be uncovered by a Servo Motor which will be connected through Raspberry Pi interface with the Arduino. If the levels of garbage are above the threshold level, then an SMS signal will be generated and sent to the person concerned. An API will be designed for the mobile application. This mobile application will be used by the operator user who has rights to check the status of all bins.



Fig. 3 Prototype Model Side View



Fig. 4. Prototype Model Top View

FLOW CHART: The total strategy for module is clarified by a Flow Chart as appeared in fig 5.

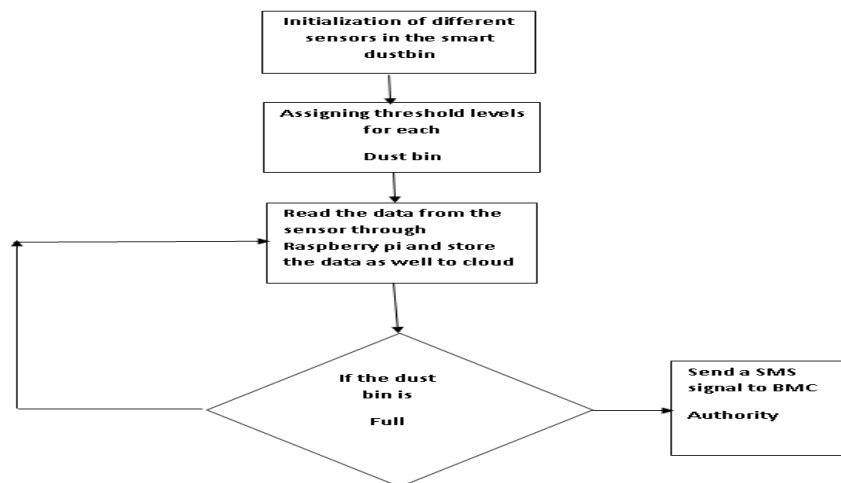


Fig. 5 Project implementation Flow Chart

7. RESULT

To evacuate the issues, numerous frameworks has been created. But IoT based smart dustbin has not introduce in the municipality corporation in the state of Odisha. Through this mobile app we can monitor and control of smart waste bin in smart city.

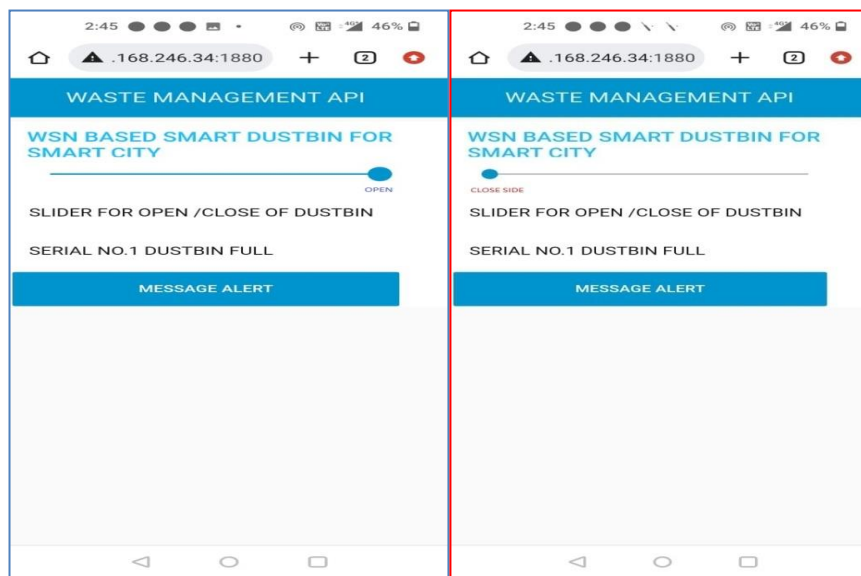


Fig.6 Mobile APP of the proposed prototype model for opening and closing the lid of the bin.

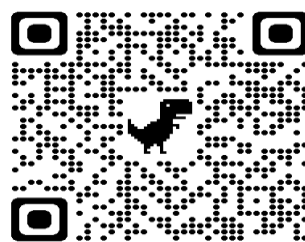


Fig. 7 This QR Barcode for the Application based URL (192.168.246.34:1880/UI) where the authority can send the alert message to the driver people.

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8. CONCLUSION

A neoteric approach for checking out the Smart Dustbin system in the smart city using IoT is presented in this paper. This broadly impacts on the broader scientific community in terms of benefits to society along with the smart city application.

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