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Review on Smart Garbage Management for Smart Cities Using IoT

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ABSTRACT: In the present day scenario; many times we see that the garbage bins or Dust bin are placed at public places in the cities are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness, to avoid such a situation we are planning to design “Smart Garbage Management for Smart Cities Using IoT”. In this proposed System there are multiple dustbins located throughout the city or the Campus, these dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins and a unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. We have used Infrared Sensors to detect the level of garbage in each bin. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. This ID is transmitted to the central system through RF transceiver. These details can be accessed by the concern authorities from their place with the help of Internet and an immediate action can be made to clean the dustbins.

KEYWORDS: Smart Cities, IoT, RF trans-receiver, Infrared Sensors.

I.INTRODUCTION

All Modernization and progress has had its share of disadvantage and one of the main aspects of concern is the pollution it is causing to the earth. Traditionally, litter bins are emptied at certain intervals by cleaners. This method has several drawbacks such as: some litter bins fill up much faster than the rate of emptying and they are full before the next scheduled time for collection. This leads to overflowing of rubbish bin and poses hygiene risks. There are special periods (e.g. festivals, weekends, and public holidays) when certain litter bins fill up very quickly and there is a need for increased collection intervals. It is a challenge to maintain a clean city. It involves several factors such as different stakeholders, financial/economical, collection & transport, etc. With increase in the global population and rising demand for food and other materials, there has been a rise in the amount of waste being generated daily by each house and locality. This waste is ultimately thrown into municipal bins and ultimately, waste collection centers from where it is collected by the area municipalities to be further thrown into the landfills and dumping areas. However, either due to resource crunch or inefficient infrastructure and facilities, not all of this waste gets collected and transported to the final dumping sites. If at this stage the management and disposal is not done properly, it can cause serious impacts on health and the problems to the surrounding environment. Cleaning of garbage bin at proper intervals will ensure proper cleanliness of the surrounding. But regularly manually monitoring the garbage level is a hectic job.

Things (Embedded devices) that are connected to Internet and sometimes these devices can be controlled from the internet is commonly called as Internet of Things. In our system, the Smart dust bins are connected to the internet to get the real time information of the smart dustbins. In the recent years, there was a rapid growth in population which leads to more waste disposal. So a proper waste management system is necessary to avoid spreading some deadly diseases. Managing the smart bins by monitoring the status of it and accordingly taking the decision. There are multiple dustbins are located throughout the city or the Campus (Educational Institutions, Companies, Hospitals etc.). These dustbins are interfaced with micro controller based system with IR Sensors and RF trans-receiver Modules. Where the IR sensor detects the level of the dust in dustbin and sends the signals to micro controller the same signal are encoded and send



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through RF trans-receiver module and it is received and decoded by other GSM module at the Central System (Arduino) and an Internet connection is enabled through a LAN cable from the modem. The data has been received, analyzed and processed in the cloud, which displays the status of the Garbage in the dustbin on the GUI on the web browser. Section I provides the introduction of the system that is to be implemented, sections II and III provide the literature survey and block diagram explanation of the system respectively, section IV gives the methodology and flow chart of the system, and section V and VI provide the results and conclusion of the system.

II.LITERATURE SURVEY

In [1], the ZigBee, GSM (Global System for Mobile Communication) and ARM7 is used to form the Integrated system to monitor the waste bins remotely. The sensors are placed in the common garbage bins placed at the public places. When the garbage reaches the level of the sensor, then that indication will be given to ARM 7 Controller. The controller will give indication to the driver of garbage collection truck as to which garbage bin is completely filled and needs urgent attention. ARM 7 will give indication by sending SMS using GSM technology. In [2], it is being proposed in this paper that introduction of an integrated system combined with an integrated system of Radio Frequency Identification, Global Position System, General Packet Radio Service, Geographic Information System and web camera will solve the problem of solid waste. They also analyzed the actual performance of the system. In [3], the proposed system describes that the level of garbage in the dustbins is detected with the help of Sensor systems, and communicated to the authorized control room through GSM system. Microcontroller is used to interface the sensor system with GSM system. A GUI is also developed to monitor the desired information related to the garbage for different selected locations. This will help to manage the garbage collection efficiently. In [4], it describes the application of our model of "Smart Bin" in managing the waste collection system of an entire city. The network of sensors enabled smart bins connected through the cellular network generates a large amount of data, which is further analyzed and visualized at real time to gain insights about the status of waste around the city. This paper also aims at encouraging further research in the topic of waste management [5]. In this paper, the authors present the Smart bin system that identifies fullness of litter bin. The system is designed to collect data and to deliver the data through wireless mesh network. The system also employs duty cycle technique to reduce power consumption and to maximize operational time. The Smartbin system was tested in an outdoor environment. Through the testbed, they collected data and applied sense-making methods to obtain litter bin utilization and litter bin daily seasonality information. With such information, litter bin providers and cleaning contractors are able to make better decision to increase productivity. [6] To avoid situations where mismanagement of garbage takes place and the bins are not emptied on time the authors intend to propose a solution for this problem "Smart Garbage Bin", which will alarm and inform the authorized person when the garbage bin is about to fill. Now, Instead of dumping the waste on land fill area, they propose a method to separate the 5 types of plastic resins (which are not biodegradable) by using NIR spectroscopy and use the rest of biodegradable waste to produce biogas.

III.METHODOLOGY

1. Block Diagram and Description

The Block diagram shows the different component used in the Smart Garbage Management System. IR Sensor, PIC 18F4520 microcontroller, Power Supply, RF Tx/Rx Module, Arduino and the web browser. The project module is divided into two parts Transmitter section and receiver section. Here in the transmitter section we are using microcontroller, RF Tx/Rx Module and sensors these are attached to the dustbin. Here IR sensors are used to detect the level in the dustbin whether the dustbin is full or empty. The IR sensors sense the content of the dustbin and sends the signals or the data to the microcontroller, Power Supply +9V Battery power supply is given to the microcontroller to drive the system and the microcontroller reads the data from the sensor and process the data received from sensor, and the same data wirelessly transmitted to the Central using RF Tx/Rx Module.

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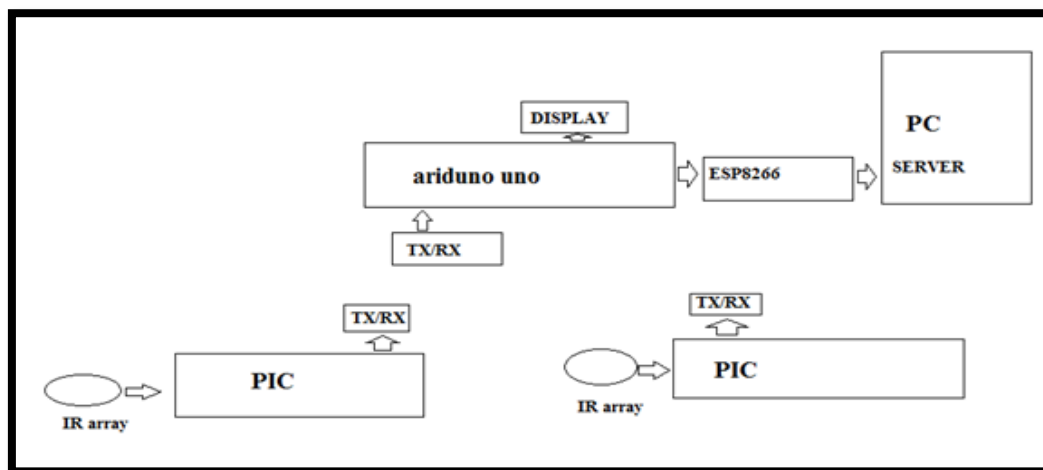


Figure 1: Block Diagram of Smart Garbage Management System

RF Tx/Rx Module is to transmit the signal form PIC microcontroller to the Arduino. The other section is receiver section in which RF Tx/Rx Module, Arduino, and Web Browser is used. Here RF Tx/Rx Module is used to receive the data sent by other GSM Module at dustbin to the Arduino. The Arduino board with GSM Module is used to receive the data sent by the multiple transmitters and process the data and the same data transmitted to the Client i.e., Web Browser. In order to do this the Arduino is connected to the ESP8266 Wi-Fi module. This ESP8266 communicates with the web page and transmits the data that has to be displayed on the webpage. The data displayed on the webpage is nothing but the status of the bins that are being monitored. Hence, this is how we can view the status of all the dustbins in real time through the internet.

2. Flow Chart

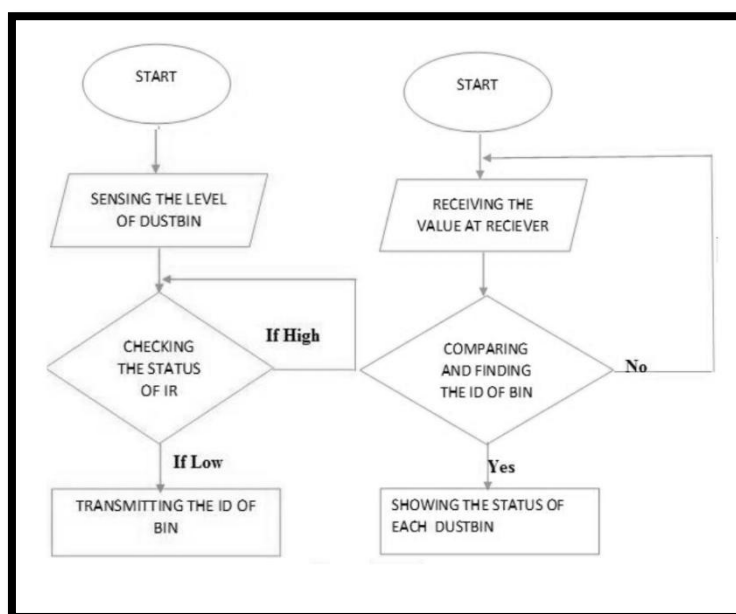


Figure 2: IR sensor

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Fig 2, shows the flow chart of the transmitter and the receiver section of the smart dustbin. Here in the transmitter section the sensors is deployed in the dustbin used to sense the level of the dust inside the dustbin and transmitting the signals to the microcontroller where the microcontroller check the status of dustbin and sends the signal to the central system through RF Tx/Rx. Whereas in the receiver sections receives the values sent by the sender through other RF Tx/Rx module to the central system and check the all dustbin status and display on the browser.

3.Steps

Part 1:-Transmitter Side:

1. Start i.e. turn ON the system
2. Check the status of IR sensors
 - If high go back to step 2
 - If low transmit the ID of the Dustbin using RF Tx/Rx module
3. End of part 1.

Part 2:- Receiver Side:

1. Start.
2. Monitor to see if any ID for dustbin is received.
3. Receive the Id sent by the transmitter side through RF Tx/Rx module.
4. Compare and find out the dustbin whose ID has been received.
5. Show the status of each dustbin.

IV.RESULTS

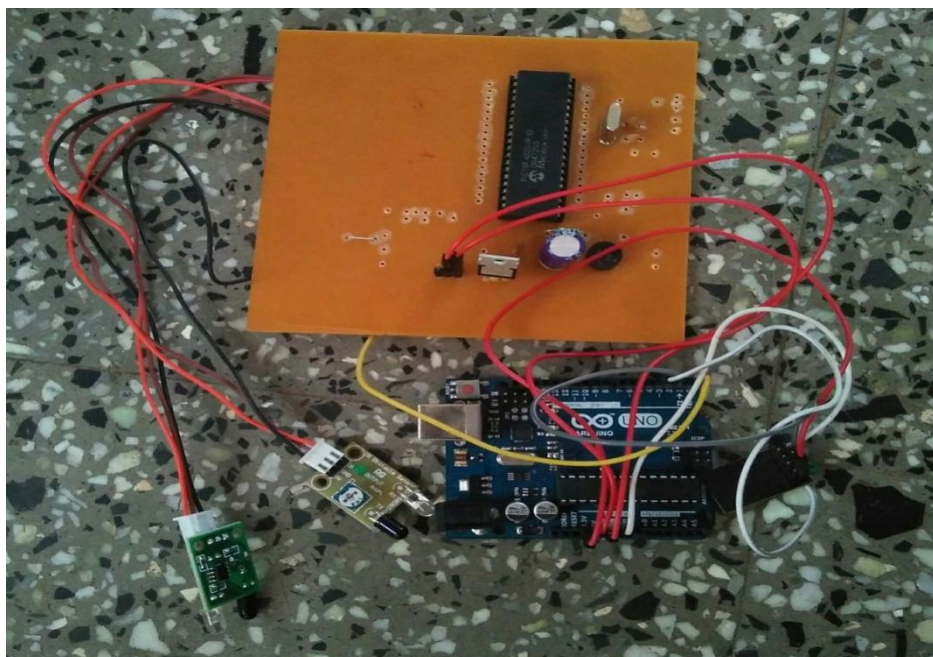


Figure 3: Hardware of System

The Fig.3 shows the Hardware diagram of proposed system. The 1st one is PIC 18f4520 microcontroller board with crystal. Arduino Uno is a card based on Atmel ATmega328 microcontroller (datasheet). It has 14 pin digital input / output (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz resonator ceramic, a USB connection, an ICSP connector, and a reset button. It contains everything you need to support the microcontroller; just



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connect it to a computer with a USB cable or connect to an AC adapter or a DC battery to get started. An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

V. CONCLUSION

Through this project we intend to propose a technological process for waste management system. The smart garbage bin will automatically send a message when the bin is about to fill. We have used IR sensors to monitor the filling up of garbage bins. RF Tx/Rx module is used to transmit the data of the status of dust bin. This helps in timely emptying of garbage bins. This helps in avoiding the overflow of the garbage bins in turn avoiding nuisance and maintaining the cleanliness of the area around the garbage bin. Hence we can conclude that we can help to improve the management of the garbage and avoid the surrounding from becoming unclean in turn preventing many harmful diseases.

REFERENCES

- [1] KanchanMahajan, "Waste Bin Monitoring System Using Integrated Technologies", International Journal of Innovative Research in Science, Engineering and Technology, Issue 3 , Issue 7 , July 2014.
- [2] Islam, M.S. Arebey, M. , Hannan, M.A. ,Basri, H,"Overview for solid waste bin monitoring and collection system" Innovation Management and Technology Research (ICIMTR), 2012 International Conference , Malacca, 258 – 262.
- [3] Vikrant Bhor, "Smart Garbage management System International Journal of Engineering Research & Technology (IJERT), Vol. 4 Issue 03, March-20152000.
- [4] Narayan Sharma,, "Smart Bin Implemented for Smart City", International Journal of Scientific & Engineering Research, Volume 6, Issue 9, September-2015.
- [5] FachminFolianto, Yong Sheng Low, Wai Leong Yeow,"Smartbin: Smart Waste Management System", 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Singapore, 7-9 April 2015.
- [6] ShubhamThakker, R.Narayanamoorthi, "Smart and Wireless Waste Management", IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems, ICIECS'15.