



IOT Smart Garbage Monitoring System in Cities-An Effective Way to Promote Smart City

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Abstract: This is a very innovative system which will help to keep the cities clean. In the recent decades, Urbanization has increased tremendously. At the same phase there is an increase in waste production. Waste management has been a crucial issue to be considered. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses waterproof ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. smart bin is built on a microcontroller based platform Aurdino Uno board which is interfaced with GSM modem and Ultrasonic sensor. Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin. It is also easy to detect the liquified waste by using waterproof sensors. Foul smell from these rotten wastes that remain untreated for a long time, due to negligence of authorities and carelessness of public may lead to long term problems.

Keywords: Aurdino Uno, GSM Modem, Waterproof Ultrasonic Module JSN-SR04T, ESP8266 wifi-module, LCD display

I. INTRODUCTION

Though the world is in a stage of upgradation, there is yet another problem that has to be dealt with. Garbage! Pictures of garbage bins being overfull and the garbage being spilled out from the bins can be seen all around. This leads to various diseases as large number of insects and mosquitoes breed on it. A big challenge in the urban cities is solid waste management. Hence, smart dustbin is a system which can eradicate this problem or at least reduce it to the minimum level. Our present Prime Minister of India, Sri Narendra Modiji has introduced the concept of implementing 100 smart cities in India. “Swachh Bharat Abhiyan” was initiated to ensure a clean environment.



Majority of viruses and bacterial infections develop in polluted environment. Safeguarding the environment using technology sources is needed at present. Majority of the public environment seems to be polluted with the waste material. So, modernization of the restaurants is needed by imparting the smart technology.

Amounts of waste are largely determined by two factors: first, the population in any given area, and second, its consumption patterns. According to the UN, between now and 2025, the world population will increase by 20% to reach 8 billion inhabitants (from 6.8 today). With this increase in population, the responsibilities towards waste management also increase. Our waste administration frameworks and our economic situations, even taking care of business, are unequipped for taking care of the developing measures of waste universally. Unless a new paradigm of global cooperation and governance is adopted, a tidal wave of uncontrolled dump sites will be the principal waste management method, especially in Asia.

On the west coast of America, San Francisco leads the way with a landfill disposal diversion rate of 72% and the city has set itself a target of zero waste to landfill by 2020.

This paper gives us one of the most efficient ways to keep our environment clean and green. Dustbin is a common means and a basic need everywhere. It is observed that often the garbage gets collected due to irregular removal

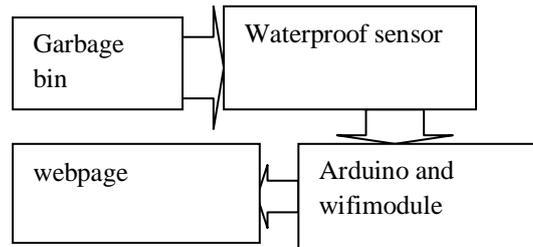
of garbage present in the dustbin. In the proposed paper, a new model for the municipal dustbins which intimates the center of municipality for immediate cleaning of dustbins has been proposed and it adds new features of waterproof sensors in this model.

II. RELATED WORK AND LITERATURE SURVEY

The authors in [4] have made a quantitative analysis between existing dustbins and their serving population. The study first analyses the spatial distribution of dustbins in some areas of Dhaka city using average nearest neighbour functions of GIS. Remarkably, the spatial circulation of the current dustbins has appeared to be dominantly in clustered pattern. Next, an optimal number of additional dustbins were calculated. It is shown that the number of existing dustbins is insufficient in the study area.

The authors in [6] have analysed the use of smartbin system with GSM based model which makes me feel it is better to use waterproof sensors in enhancing the problems in the present existing systems.

Block Diagram:



III. DESIGN

3.1 Components

Smart bin is built on Arduino board platform. It is interfaced with a GSM modem (SIM 900A) and the bin is equipped with waterproof sensor module JSN-SR04T.

3.2.1 Waterproof Ultrasonic Module JSN-SR04T

The waterproof ultrasonic sensor has two pins: Trigger and Echo, which are used for calculating the distance of the object by generating sound waves and thus calculating the time duration of the echo that is generated.



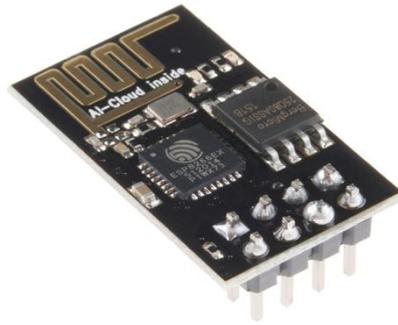
3.2.2 GSM Modem

A GSM modem is a specialized type wireless modem that works with a GSM wireless network. It accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. A GSM modem can be an external device or a PC Card / PCMCIA Card. An external GSM modem is connected to a computer through a serial cable or a USB cable. When a GSM modem is connected to a computer, this allows the computer to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. GSM Modem sends and receives data through radio waves.

3.2.3 ESP8266 wifi Module

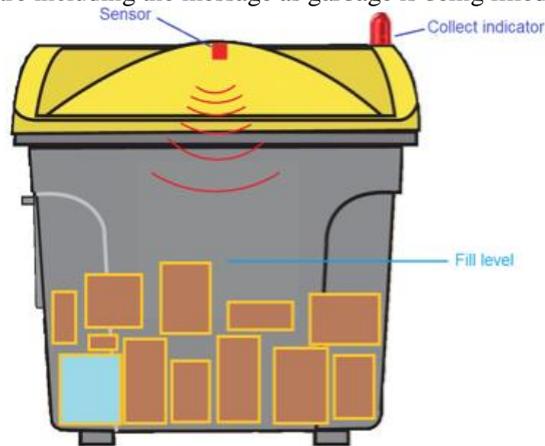
It is the leading IOT devices in the world in which it is very cheap and effective to use. The hardware connections required to connect to the ESP8266 module are fairly straight-forward but there are a couple of important items to note related to power:

- The ESP8266 requires 3.3V power—do not power it with 5 volts!
- The ESP8266 needs to communicate via serial at 3.3V and does not have 5V tolerant inputs. so you need level conversion to communicate with a 5V microcontroller like most Arduinos use.



IV. IMPLEMENTATION AND WORKING

The waterproof sensors are placed at particular level of the garbage bin which is connected to arduino and esp8266 wifi module. If once the garbage level reaches the particular height then it will immediately process the information to the web based software including the message as garbage is being filled by using wifi module.



If once the limit is reached then it will automatically send the message to the truck driver using gsm connectivity so that he clean the garbage bin.

SmartTrashData

	A	B	C	D	E
1	Date	Time	Depth(cm)	Percentage Filled	Comments
2	05/01/2016	21:27:37	13.11	4.31	
3	05/01/2016	21:28:38	13.09	4.43	
4	05/01/2016	21:29:16	11.34	17.22	
5	05/01/2016	21:29:53	8.09	40.93	
6	05/01/2016	21:30:31	1.87	86.33	Bin is almost filled
7	05/01/2016	21:31:16	1.91	86.08	Bin is almost filled
8	05/01/2016	21:31:59	1.92	85.95	Bin is almost filled
9	05/01/2016	21:32:41	1.91	86.08	Bin is almost filled

V. APPLICATIONS AND ADVANTAGES

- 1) To collect dustbins placed at public places in city.
- 2) This project can also be used in college / university campus
- 3) This project can also be used in companies
- 4) Many times Garbage dust bin is overflowed and many animals like dog or goat enters inside or near the dustbin. This creates a bad scene. Also some birds are also trying to take out garbage from dust bin. This project can avoid such situations.

VI. CONCLUSION AND FUTURE WORK

I have implemented real time waste management system by using smart dustbins to check the fill level of smart dustbins whether the dustbin are full or not. In this system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person and he/she can take a decision accordingly.

The waterproof sensors are very much advanced and useful in detecting the level at very accurate measure.

By implementing this proposed system the cost reduction, resource optimization, effective usage of smartdustbins can be done. This system indirectly reducing traffic in the city. In major cities the garbage collection vehicle visit the area's everyday twice or thrice depends on the population of the particular area and sometimes these dustbins may not be full. This also reduces the fuel consumption of vehicles by using the optimized route. Our System will inform the status of each and every dust bin in real time so that the concerned authority can send the garbage collection vehicle only when the dustbin is full.

The future work includes fixing the smell detectors to detect even the smell of the garbage this is highly complicated but once it came into existence, then it is completely a successful mission to enhance the smart city ideology.

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BIOGRAPHY

Yaswanth Sai Palaghat is a student studying computer science and engineering at naryanana engineering college gudur. I am the sole author of this paper. I am very much interested in internet of things since from its evolution. I have presented many papers in many symposiums. To obtain the level of my best, I am interested to publish it here.

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