

A Smart Bin Implementation for Smart City

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Abstract— Nowadays, in many areas we see that dustbins in Public places are not get cleaned time to time. By this unhygienic disease are increasing. To avoid this condition we are designing SMART WASTEBIN for SMART CITIES. In this proposed system there are multiple dustbins are placed in many areas. We are using sensor to detect the level of dustbins so that we can easily able to identify it weather it is full or not. If the dustbin is full then automatic message is generated and that message is then sends to the authority that is responsible for that area with the help of Internet or GSM. This system is also very useful in SWACCHA BHARAT ABHIYAAN which is started by our Prime Minister to keep our India clean and disease free.

Key words: Raspberry Pi3, Dustbin, IR Sensor, Wi-Fi Module, GSM Module

I. INTRODUCTION

Due to fleetly increase population growth, urbanization, developing countries because of this a lack of public awareness towards the waste management. The most important priorities are to ensure a clean and healthy globe and to protect the urban environment. Over a last few year, the operational cost for management of solid waste has increased gradually. The overall budget of solid management is 80-95% of expenditure is needed for the collection as well as transport of the solid waste [1].

Specially, in the developing countries, not only waste monitoring but also management is becoming an acute problem for their urbanization and economic development. Solid waste monitoring and management authorities are being tried to find the solution which is preferable and also cost effective.

A smart dust bin is a system which can destroy this problem or at least reduce it to minimum level. Our present prime Minister of India, Sir NarendraModiji has introduced the concept of implementing 100 smart cities in India'' Swachh Bharat Abhiyan'' was initiated to ensure a clean environment. As the requirement of controlling the garbage the demand of dust bin is increase, so it's time to control the waste material with the new techniques. As per 2013 report from the International Solid Waste Association (ISWA), the total garbage generation in 2013 was 1.84 billion tonnes per year around the world. As prosperity grows, 62 million tonnes of garbage is generated every day in India, now the India is third largest garbage generator in the world. Inspiring by these mission we proposed the smart Wi-Fi dustbin system for smart garbage waste collection. The work proposed in this seminar illustrates how the Smart bin solution empowers cleaning public area like Railway stations, Global store, Colleges, Hotels etc. to detect cleanliness issues in real time. Thus, the system is able to help in increasing overall productivity and cleanliness.

II. LITERATURE SURVEY

The authors described system, used two technologies. Zigbee and Global system for mobile communication (GSM) are the latest trends. This combination is one of the best combinations which is used in that system. There are number of techniques which are used as well as are being build up for well management of garbage. To give brief description of the system, the sensors are placed in the common garbage bins, which are placed at public places. In that, ARM7 controller is used when the garbage reaches the level of sensor, then the indication will be given to controller. This ARM7 controller will give information to the driver of garbage collection truck as to which garbage bin is completely filled. ARM7 will give indication with the help of GSM technology by sending SMS.

The author proposed web camera is mounted on the top of the dustbin with the load cell sensor and camera captures the continues images and threshold point is set at particular level. Threshold level compares output images of camera and load sensor this result compare by microcontroller. After observing the images of can it will give exact idea of level of dust in can and load cell sensor give exact weight of can. According to that the notification sends through GSM.

Limitation of this proposed system is that it required high processing power due to web camera and in the night sometimes it will give problem for capturing the images in the darkness. Cost is high due to web camera load sensor will not be able to differ the level of dustbin and actual load.

The author presents a novel approach garbage collection technique and interaction through a Smart bin which is developed using ARM LPC 2148 with ultra-sonic sensors and pressure sensing resistor. Ultrasonic sensor senses the level of bin and pressure sensing resistor (pSR) 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. This system provide web interaction to user it provide HTML pages where it shows the current level of dustbin .user is able to see the current status of bin on this web pages .this system provide RFID tag for authenticate control to specify user.

III. PROBLEM DEFINITION

We see many times the dustbins which are in bad conditions. Garbage in dustbin all overflowed as well as spilled out the garbage from dustbin. People thrown garbage on that dustbin which already overflowed. Sometimes due to this garbage bad smell created, toxic, unhygienic gases are produced due to unclean garbage bins. It is very bad look of the city which is way to support to the air pollution and to some harmful diseases which are easily spreadable.

IV. PROPOSED SYSTEM ARCHITECTURE

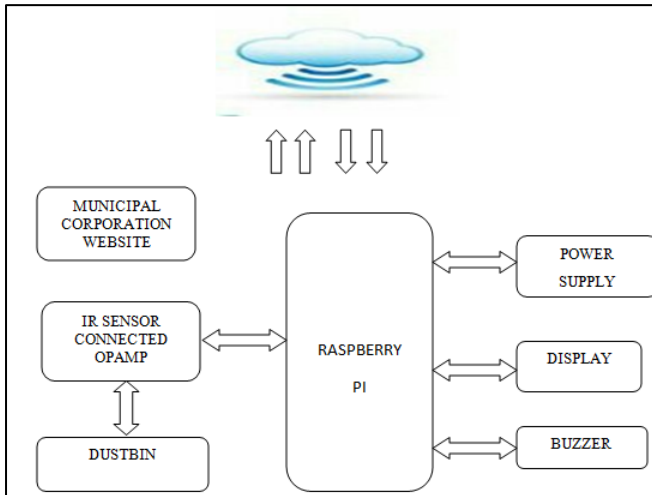


Fig. 1: Block Diagram of a Smart Bin implementation

A. Dustbin:

Every dustbin contains a sensor which senses the fill up status of dustbin and sends the data to the server. It also sends its current GPS location to the server at regular intervals. This sensor senses the moisture content in the waste, and if the moisture content is more than a particle threshold level, the information is sent to the number in the waste management center. Once this SMS is received, the dustbin is addressed even if it is not full. Thus the locality/city is saved from the irresistible smell of the garbage bin. By implementing this system resource optimization, cost reduction, effective usage of smart dustbins can be done. In our system a motor is used for opening and closing of the Garbage bin lid. This can be done by forward and reverse direction rotation of motor. For smooth running, good speed regulation and operating of motor Drive IC L293D is used. In all conditions we receive data on web portal using Wi-Fi module and the same thing will be displayed on LCD screen connected to the Garbage Bin. Wi-Fi Module helps us to send the details of the dustbin at the receiver side.

B. IR Sensor:

Infrared radiation is the portion of electromagnetic spectrum with wavelengths longer than the wavelengths of visible light, but smaller than microwaves. The region roughly from 0.75 micrometre to 1000 micrometre constitutes the infrared region. It works with an operating voltage of 5V. Transmitter flashes an IR light in a particular pattern, receiver component can pick up and translate into an instruction. The detection range of the IR module is 1.5 m. The basic working of an IR module is to transmit the IR signal (radiation) in a direction and a signal is received at the IR receiver in the absence of obstacles. Else the IR radiation bounces back from the surface of the obstacle. The applications of the IR module include air conditioning control, TV control, and remote control.



Fig. 2: IR Sensor

C. LCD Display:

Liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly. It is very compact and light. It has low power consumption a CRT monitor of the same size viewing area would use, and the modern LED backlit models typically use 10–25% of. Depending on the set display brightness and content being displayed, the older CCFL backlit models typically use 30–50% of the power the power a CRT monitor would use.

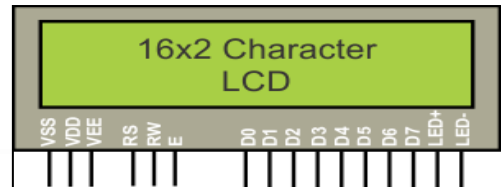


Fig. 3: LCD Display

D. Corporation Office:

The Zig-Bee placed at the corporation office is serial interfaced with PC. The visual display is coded with VB. If the trash can is not replaced in a particular duration, the microcontroller placed at the trash can produces the second intimation to the corporation office. The intimation will be displayed in corporation office and LCD continuously until the trash is removing.

E. WI-FI Module:

Major part of our project depends upon the working of the Wi-Fi module. Wi-Fi Module helps us to send the details of the dustbin at the receiver side. The controller gives the details to the transmitter module (Wi-Fi module). At the receiver section a mobile handset is needed to be connected to the Wi-Fi router so the details of the garbage bin is displayed on the web page and a mail notification (like email) will be sent to the respective Municipal / Government authority person.

F. RASPBERRYPI:

Upgraded ARMv7 multicore processor, and a full Gigabyte of RAM, this pocket computer has moved from being a 'toy computer' to a real desktop PC. The big upgrade is a move from the BCM2835 (single core ARMv6) to BCM2836 (quad core ARMv7). The upgrade in processor types means you will see ~2x performance increase just on processor-upgrade only. For software that can take advantage of multiple-core processors, you can expect 4 x performances on average and for really multi-thread-friendly code, up to

7.5x increase in speed! That's not even taking into account the 1 Gig of RAM, which will greatly improve games and web browser performance..

V. 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 [8]. 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 message. GSM Modem sends and receives data through radio waves.

VI. EXISTING METHODOLOGY

In this paper, GSM 900A modem is used to send the messages. However, three sensors can be employed at various heights like $h/3$, $2h/3$ and h , where h is the height of the bin but to make it affordable and to achieve the same results, only one sensor is placed at surface level. Interfacing is done between GSM modem and Raspberypi board by connecting RX pin of modem to TX pin of board and vice-versa. ECHO and TRIGGER pins of sensor is connected to digital pins 5 and 13 of raspberry board. raspberry board works at 5V power supply and GSM modem requires 2A to power on.

Threshold distance is the difference in height at which sensor is placed and the level of garbage fill. During the course of garbage accumulation, whenever the difference falls below threshold value, GSM modem is activated to send an alert signal to the concerned authority through an SMS.

As soon as an SMS alert is received, concerned authority can place orders to the workers for cleaning the filled bins on time without allowing them to overflow.

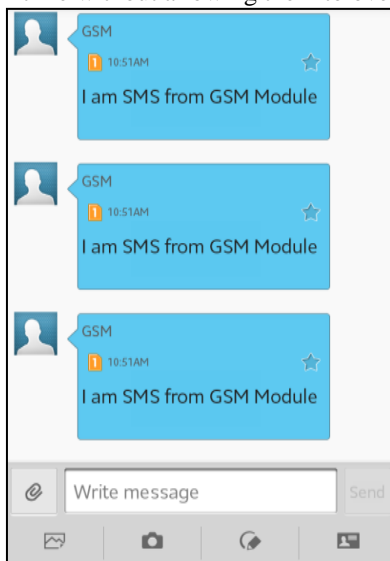


Fig. 4:

VII. ADVANTAGES

- Less time and fuel consumption as the truck go only to the filled containers
- Decreased noise, traffic flow and air pollution as a result of less truck on the roads.
- Reducing manpower required to handle the garbage collection.
- Speed of operation of garbage collection is faster as compare to home to home garbage collection.

VIII. DISADVANTAGE

Need for good sensor for regular sense dust

IX. CONCLUSION

Various features such as durability, affordability, prevention against damage and maintenance issues are addressed when these smart dustbins are designed. This Smart Dustbin can contribute a lot towards clean and hygienic environment in building a smart city.

But since the technology is new in India, proper awareness should be created among the public before it is implemented on a large scale. Otherwise, sensitive devices like sensors might be damaged due to rough action of the users.

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