

SMART GARBAGE MONITORING SYSTEM FOR HOSPITAL USING IOT

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Abstract - 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. In this paper, smart bin is built on a microcontroller based platform Arduino 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 status of the dustbin. Arduino will be programmed in such a way that when the dustbin is being filled, the remaining height from the threshold height will be displayed. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will continuously alert the required authority until the garbage in the dustbin is squashed. At regular intervals dustbin will be squashed. Once these smart bins are implemented on a large scale, by replacing our traditional bins, waste can be managed efficiently with the help of the smart dustbin. The unnecessary linkages may lead to the spread of the disease in the place where disease are meant to be cured.

Index Terms : Arduino Uno, GSM Modem, Ultrasonic Sensors, GPS .

I. INTRODUCTION

The population is increasing day by day, so is the demands of the people. Due to increased population, the health care centre are also increasing and so is the demands associated with the maintenance of those health centre. The garbage from each health centre are also increasing. The garbage are thrown in the bins, which in turn are cleaned by the concerned authorities. But the time is fast changing, the people are becoming more and more busy. There is always a race against time.

So, the garbage needs to be monitored and cleaned from time to time. Otherwise it may lead to the

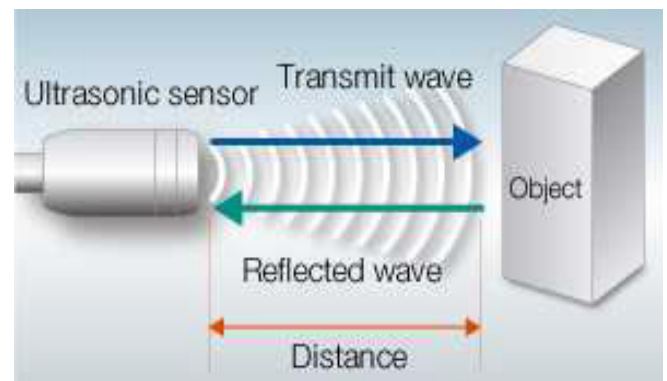
spread of the diseases. So, we have decided to design the smart garbage bin, that tends to monitor the garbage levels and reports it to the municipality via a message, which then sends the team to clear off the area. The microcontroller used in this system is Arduino UNO. The prototype of smart garbage bin were developed to reduce the overflowing of garbage in the metropolitan cities. Global Positioning System (GPS) is a satellite-based navigation system that stands from satellites that orbit in the space. The GPS system is able to provide three dimensional positioning, time and location for navigation purpose. GPS is mainly used in five purposes: navigation, tracking, location, mapping and timing.

Arduino Uno

Arduino UNO is the microcontroller that is used in this project. It is built based on ATmega328 in AVR 8 bit RISC architecture. It has a number of facilities for communicating with computers.

Ultrasonic sensor

Ultrasonic sensors are an electronic kit that are used to detect any objects or obstacles in 180 degree horizontal and 60 degree vertical. When the ultrasonic sensors detect any objects, it will activate the music shield automatically.



We use HC-SR04 ultrasonic sensor as it provides 2cm to 400cm non-contact measurement function.

Microcontroller:

It is used to process information that is been given by the sensors. It compares the received data with the threshold level set and accordingly output is generated. The LPC2131/32/34/36/38 microcontrollers are based on a 16/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high-speed flash memory. A128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate.

Garbage monitoring system:- Garbage Monitoring system is designed by using ultrasonic sensor. Implementation of this system in smart garbage bins is important as it is used to detect the level of the garbage bins before it overflows.

Way-Points Technique

Waypoints are sets of coordinates that identify a point in physical space. Waypoints are used to store and remember locations that are of interest to the user. They are often used to store intermediate turns and intersections that help define a route to a particular destination. These waypoints are used to define invisible routing paths for navigation.

OBJECTIVE

- To clean the garbage bins that are overflowing in the cities
- To help the surroundings from exposing the foul odors and the spread of the infectious diseases from the indisposed bins
- To inform the municipal regarding the inconvenience thereby reducing the man time.

PROBLEM DESCRIPTION

Instead of using plenty of bins in an unordered fashion around the city, minimal number of smart bins can be used.

Using only one sensor at the surface level instead of three not only makes it affordable but also achieves the same result. A big Challenge in the urban cities

is Solid waste management .Not only in India but for most of the countries in the world. The project gives us one of the most efficient ways to keep our environment clean and green. Zigbee and Global System for Mobile Communication (GSM) are the latest trends and are one of the best combinations to be used in the project. Hence, a combination of both of these technologies is used in the project. To give a brief description of the project, 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. As we have seen number of times the dustbins are getting overflows and concern person don't get the information within a time and due to which unsanitary condition formed in the surroundings, at the same time bad smell spread out due to waste, bad look of the city which paves the way for air pollution and to some harmful diseases around the locality which is easily spreadable.

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.

SOCIAL IMPACT:-

- This project gives a viable, alternative method for monitoring the overflowing garbage bins that can cause foul odors and tends to spread the diseases.
- It reduces the man work by intimating the level of garbage bins, so that they need not waste their time by viewing the bins regularly.
- This system may be much useful in the area where the population is in dense.

LITERATURE SURVEY

The garbage management in cities has to be effectively and efficiently implemented. The Various proposals were put forward and some of them were already implemented. So the survey was done among the different proposals and survey among different methods for smart garbage monitoring system using iot.

[1]Smart Dustbin-An Efficient Garbage Monitoring System

Though the world is in a stage of up gradation, there is yet another problem [1] 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.

Implementation and methodology:

In this paper, GSM 900A modem is used to send the messages. It consists of a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB, so that it can be easily connected to the other devices. The ultrasonic sensor is used to find the height of garbage filled at different intervals of time.

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

Future work

In this paper, implementation is done only for a single bin. Integration of many bins each with a unique ID can be done by implementing the principles of IOT and creating database for each bin which can be maintained by using SQL technology and a login webpage is created to ensure authorized entries.

Apart from this, differentiation can be made between dry trash bin and wet trash bin collecting plastic dry

waste and biodegradable waste respectively. To implement this methane and smell sensors can be used. This helps in distinguishing the waste at the source and hence reducing the requirement of manpower.

To enhance it further, an automated system can be developed which is able to pick up waste in and around the bin, segregate them and put them in respective bins.

[2]Waste Bin Monitoring System Using Integrated Technologies

Now a days, there are a number of techniques which are purposefully used and are being build up for well management of garbage or solid waste . Zigbee and Global System for Mobile Communication (GSM) are the latest trends and are one of the best combination to be used in the project. Hence,a combination of both of these technologies is used in the project . To give a brief description of the project , 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.

Technologies Integrated

1 ZigBee Technology:

Zigbee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world.

It transmit data or information over a long distance.This data or information is passed through intermediate instruments to reach the destination . The applications that require long battery life and low data rate use Zig Bee Technology because ZigBee has a defined rate of 250 Kbits/s which is the best rate for single signal transmission from a sensor or input device, creating a mesh network; i.e., a network with no head control or high-power transceiver able to reach all of the networked devices.

GSM Technology:

Global System for Mobile Communications, originally *Groupe Spécial Mobile* commonly known as GSM, is a standard set developed by the (ETSI) to describe protocols for second generation digital cellular networks used by mobile phones. It became

the fact of global standard for mobile communications with over 80% market share [2]. The GSM modem is interfaced with the ARM microcontroller. If the garbage Box is full and if SMS alert has to be sent to the central office through the GSM [2]. The compatibility between Microcontroller and GSM Module will

be taken care by MAX-232 chip and at the receiver side. Mobile is in the hand of user which receives SMS. The GSM Module is interfaced with the ARM microcontroller through MAX 232. GSM Module has a SIM card, it sends an SMS to user, when an error introduced. They are used for sending and receiving SMS and MMS alerts.

Future work

Municipal solid waste management (MSWM) [7] is one of the major environmental problems of Indian cities. The not so proper management system of municipal solid waste (MSW) causes hazards to inhabitants. Various studies reveal that about 90% of MSW is disposed of unscientifically in open dumps and landfills, which are effectively creating problems to public health and the environment. In the study recently, a sincere attempt has been made to provide a comprehensive and sincere review of the generation, characteristics, collection and transportation. This project solid waste monitoring and management system has been successfully implemented.

[3]IoT Based Waste Management for Smart City

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 "IoT Based Waste Management for Smart Cities". 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 an unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. 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.

METHODOLOGY

i. Keil μ Vision IDE

During the implementation of our project we have utilized certain software. The source code for the ARM microcontroller was written in programming language C. The IDE used was Keil μ Vision. The μ Vision IDE from Keil combines project management, make facilities, source code editing, program debugging, and complete simulation in one powerful environment. The μ Vision development platform is easy-to-use and helps you quickly create embedded programs that work. The μ Vision editor and debugger are integrated in a single application that provides a seamless embedded project development environment.

ii. Arduino IDE

The Arduino Software (IDE) is an open source software and it makes easy to the code and upload it to the board. It runs on the different platform from Windows, MAC OS, Linux. The environment is written in Java and before running the IDE

Java software to be installed on the machine this software can be used with any Arduino board.

Results And Discussion

The following are the results which obtained from this work,

- └ Waste Level detection inside the dustbin
- └ Transmit the information wirelessly to concerned
- └ The data can be accessed anytime and from anywhere
- └ The real-time data transmission and access
- └ Avoids the overflows of Dustbins

[4]IOT Based Smart Garbage And Waste Collection Bin:

Wi-Fi Module helps us to send the detail of the dust bin at the receiver side. IR sensor gives indicates the level of the garbage filled in the dustbin.

Merits: Instead of GSM we used Wi-Fi module for the ease data transmission.

Drawback: Alert message will not send if there is insufficient

Cellular connection.

Future Work: Message can be sent directly to the cleaning authority instead of the contractor's officers.

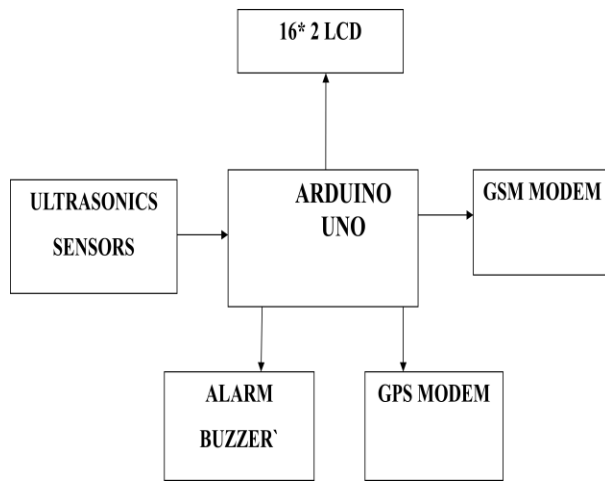
Hardware Requirement:

- GSM
- BUZZER
- ARDUINO UNO
- SENSOR

Software requirement:

- ARDUINO IDE

SYSTEM DESIGN:



MODULES

- Sensor Module
- GSM Module
- Alarm Module
- Location mapping.

MODULE 1: SENSOR MODULE

A **sensor** is an object whose purpose is to detect events or changes in its environment and sends the information to the computer which then tells the actuator (output devices) to provide the corresponding output. A sensor is a device that converts real world data (Analog) into data that a computer can understand using ADC (Analog to Digital converter).

Ultrasonic Sensor

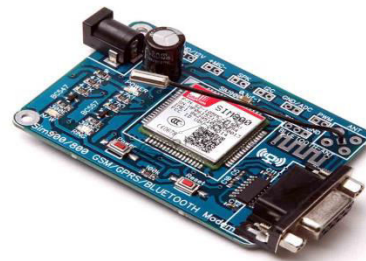
A transducer that works on the principle similar to the sonar or radar and estimate attributes of the target by interpreting is called as ultrasonic sensors or transceivers. There are different types of sensors that are classified as active and passive ultrasonic sensors that can be differentiated based on the working of sensors.



MODULE 2: GSM MODULE

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands.



MODULE 3:ALARM

The Alarm is used to send additional notification.. If the bin remain the same ie)remains the overflowing even after the notification of

message, the Alarm will triggered. It will indicates the bin is not yet clean. By using this alarm buffer we are able to monitor the status of the bins even better.

The alarm is the signal that alerts the respective person regarding the status of the dustbin after the message is triggered by the GSM module. This module is used to reduce the manual work.

MODULE 4:LOCATION MAPPING

The location mapping module is used to map the exact location of the bins.it tracks the bin by knowing it latitude and longitudinal position of bins.this module is useful for the cleaner in which place the garbage is overflowing.

EXPERIMENTAL RESULT:

Figure1)

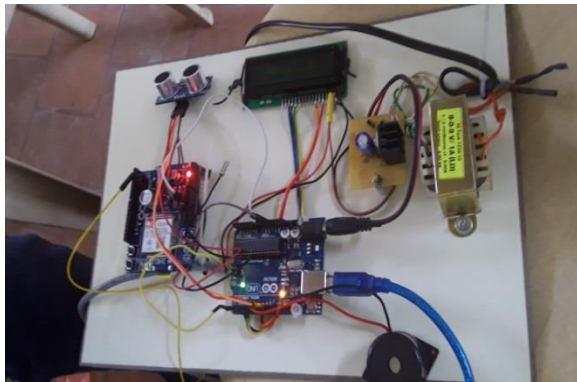
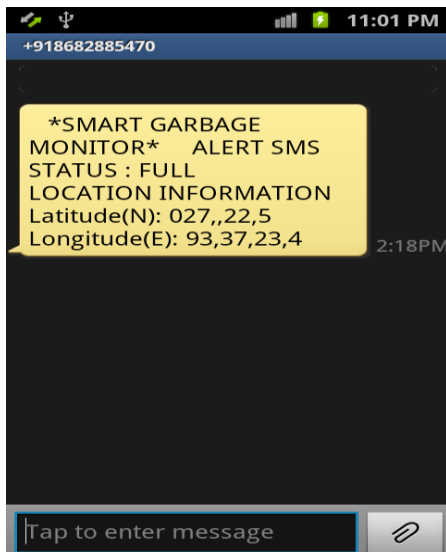


Figure2)



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