



The Study of How Electronics can Contribute In Swachh Bharat Abhiyan - Government of India Initiatives

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Abstract:In the present scenario, with the increase in population, the garbage dumped by people is also increasing tremendously. It is difficult to manage such large amount of garbage daily. It may cause unhygienic environment around us and this would create the health issues. The Government of India has taken various initiative steps to create awareness among the masses for keeping the area surrounding them neat and clean. To achieve the target of cleanliness, the role of electronic technologies is very important. With the help of electronic technologies we can help in Swachh Bharat Abhiyaan. In this paper the realistic implementation of the smart garbage management system are proposed. In the proposed system, the garbage in the dustbin is sensed by the ultrasonic sensor. It will detect the level of garbage and arduino communicate with GSM which sends message to authorized phone number. We have used GSM module, Ultrasonic sensor and Aurdino for implementation. Aurdino software is used for coding purpose.

Keywords- Swachh Bharat Abhiyan, Smart Waste system using Ultrasonic Sensor, Aurdino, GSM etc.

I. INTRODUCTION

Swachh Bharat Abhiyaan: The Abhiyan was launched by Prime Minister Narendra Modi on 2nd of October, 2014 at Rajghat, New Delhi with an aim to make India clean. Aim is to provide sanitation facilities to every family, including toilets, solid and liquid waste disposal systems, village cleanliness, and safe and adequate drinking water supply by 2nd October, 2019. It will be a befitting tribute to the Father of the Nation on his 150th birth anniversary [1].



Fig.1: Prime Minister Narendra Modi launched Swachh Bharat Abhiyan

Source:https://en.wikipedia.org/wiki/Swachh_Bharat_Abhiyan

Swachh Bharat Abhiyan is a campaign by the Government of India to clean the streets, roads and infrastructure of the country's 4,041 statutory cities and towns. The government is aiming to achieve an Open-Defecation Free (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing 12 million toilets in rural India, at a projected cost of 1.96 lakh crore (US\$30 billion)[2] . Total quantity of solid waste Generated in urban areas per day (tpd) Of the country – 1.15 lakh tonne. Waste generated in 6 mega cities – 21,100 tpd, 18.35%. Waste generated in metro cities (1 million plus towns)- 19,643 tpd , 17.08%. Waste generated in other, Class-i towns (0.1 million plus towns) 42,635.28 tpd 37.07%. If waste produced in all the class-i cities is tackled, total percentage of waste scientifically managed would be 72.5% of total waste [3]. Therefore, there is a need for development of some new technology that can help in Swachh Bharat Abhiyan. The Government of India has taken various initiative steps to create awareness among the masses for keeping the area surrounding them neat and clean. To achieve the target of cleanliness, the role of electronic technologies is very important. With the help of electronic technologies we can help in Swachh Bharat Abhiyaan. Therefore in this paper first we will introduce the Swachh Bharat Abhiyan and various initiative taken by government. With the help of electronics we design the realistic



implementation of Smart Waste system. This type of system will help in Swachh Bharat Abhiyan.

I. Initiative taken by the government:

1.1.1 Door to door garbage collection:



Fig 2: Door to Door Collection

1.2 There are various apps:

1.2.1 Swachh Bharat Abhiyaan App

Swachh Bharat Mission is a mass movement for cleanliness launched on 2nd October 2014 by the Prime Minister of India.

Today, India has approximately 143 Million Smartphone Users who have access to Internet on 2G and 3G mobile platforms. Most of these Smartphone's are equipped with at least 5 Mega Pixel Camera and using various Apps (e.g. Whatsapp etc.), people are sharing text, images and videos on the Internet. Therefore, government has taken the initiative to create a Smartphone App to strengthen "Swachh Bharat Abhiyan" called "Swachh Bharat App (Clean India App)". Any Indian can download this "Clean India App" on their Smartphone [4].



Fig 3: Swachh Bharat Abhiyaan App

1.2.2 Ganga Shraavan Abhiyaan (GSA)

Mobile APP "Ganga Shraavan Abhiyaan" is a combination of Mobile APP with Web Portal which provides an interface to citizens to provide their valuable suggestions and inputs in the form of Water Quality Monitoring with the help of Standard Water Quality Testing (WQT) Kit or without WQT Kit.

It empowers citizens to participate in the "Mission Clean Ganga" by monitoring River Ganga water quality in their nearby locality and thereby driving policy decisions indirectly [8].



Fig 4: Ganga Shraavan Abhiyan

Except the semi underground dustbin is also the initiative taken by the government.

II. REVIEW OF LITEARTURE

- a. Automatic garbage collection and information gathering system which is based on Image processing as well as on GSM module is done previously. The main concept is that a Camera will be placed at every garbage collection point along with load cell sensor at bottom of the garbage can. The camera will take continuous snapshots of the garbage can. A threshold level is set which compares the output of camera and load sensor. The comparison is done with help of microcontroller. Controller checks if the threshold level is exceeded or not. The controller sends a message with the help of GSM module to Garbage collection local central office to notify that garbage can is exceeded its capacity and disposal of waste is required [5].
- b. A paper on IoT Based Smart Garbage Detection System is also done previously. The basic project idea is to design a smart waste detection system which would automatically notify the officials about the current status of various garbage bins in the city, would have real-time monitoring capabilities, which would be remotely controlled using IoT techniques[6]
- c. "Smart garbage management system" is also done previously. In the proposed system, 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 [7].

III. ROLE OF ELECTRONICS IN SWACHH BHARAT ABHIYAN

The role of electronics in our daily lives is very important. Electronics are used everywhere like at home, at work place, in the government etc. Many electronics gadget have been invented. These gadgets have become the part of our daily life like computer, tablet, mobile phone, printer, fax machine etc. that we use in our daily life. With the help of internet and mobile we can send or receive message within seconds. With the help of electronic technologies we can help in Swachh Bharat Abhiyaan. In this paper we designed the realistic implementation of Smart Waste system. This type of system will help in Swachh Bharat Abhiyan.

III.I. NEED OF SMART WASTE TECHNOLOGY

The cleaning is the most important thing in the environment. Although government has taken the various initiatives like door-door collection, underground dustbin. Inspite of this people throw the waste in the dustbin even if it is full.

while in many places the dustbin is empty ,the cleaning vehicle reaches that place and because of this the time and the fuel has been wasted, so there is need of smart technology to overcome this problem.

III.II. PROPOSED WORK

We will create a smart garbage system, in which we use ultrasonic sensor , Arduino, GSM module. The system sends the message to authority mobile number that dustbin is full.

By receiving the message, the cleaning vehicle will come to that specific area and cleans the dustbin.

By this system, we save the fuel, manpower and manage the time of government authority .

We will use ultrasonic sensor which will send the sound waves to the dustbin and after striking with the garbage inside the dustbin, it will calculate the level of the garbage in the dustbin. GSM module and Aurdino starts communicating with each other. If the garbage level condition is satisfied, aurdino commands GSM to send message to the authorized phone number.

III.III. WORKING OF SMART WASTE SYSTEM

In this system, we have used ultrasonic sensor it send the sound waves to the dustbin and the sound wave strikes with the garbage inside the dustbin, and the sensor receives the reflected sound waves as echo signals. After receiving the echo signal, the ultrasonic sensor calculates the time between the transmitted and received echo signal. After calculating the time, it will calculate the level of the garbage. GSM module and aurdino starts communicating with each other. If the garbage level condition is satisfied, aurdino commands GSM to send message to the authorized phone number.

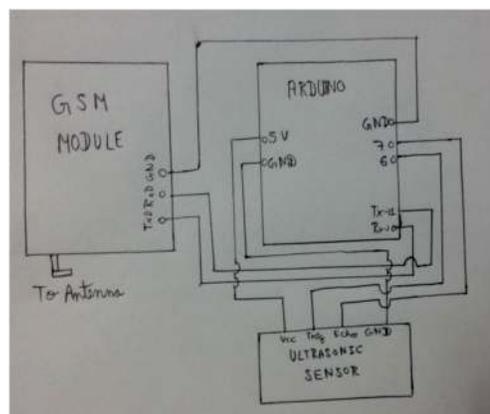


Fig 5: Circuit Diagram of Smart Waste System

III.IV. VARIOUS ELECTRONICS TOOLS USED IN SMART WASTE TECHNOLOGY

1. AURDINO

The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. Current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solderless breadboards.

Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably [8].

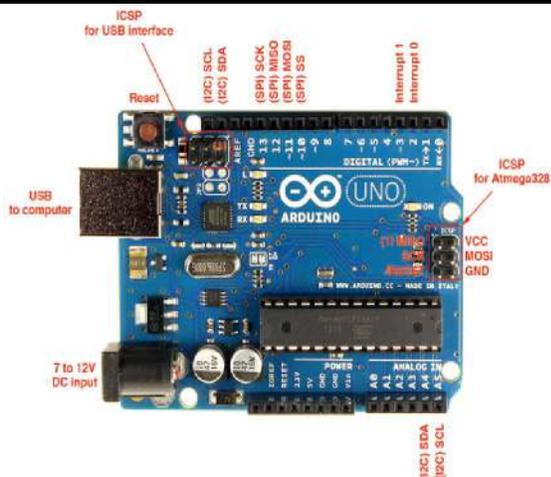


Fig.6: ARDUINO

2. Ultrasonic Sensor

Ultrasonic Sensors are self-contained solid-state devices designed for non-contact sensing of solid and liquid objects. For many applications, such as monitoring the level of water in a tank, ultrasonic technology lets a single device to do a job that would otherwise require multiple sensors. The range of ultrasonic sensor is within a 2 cm to 3 m. An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object [9].

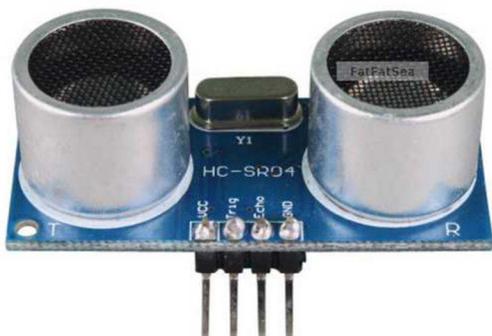


Fig. 7: Ultrasonic Sensor

3. GSM Module

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for

communication purpose. A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone send that data to the MC through serial communication [10].

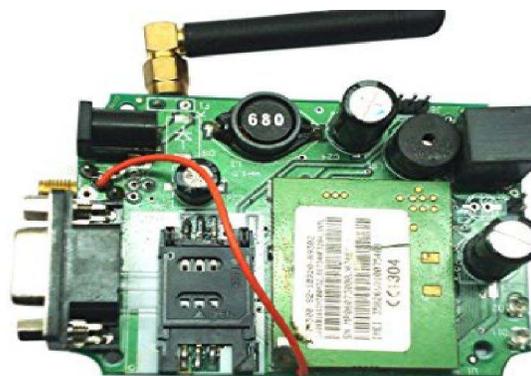


Fig. 8: GSM Module

4. INTERFACING BETWEEN HC-SR04 AND ARDUINO BOARD

The HC-SR04 Ultrasonic Module has 4 pins, Ground, VCC, Trig and Echo. The Ground and the VCC pins of the module needs to be connected to the Ground and the 5 volts pins on the Arduino Board respectively and the trig and echo pins to any Digital I/O pin on the Arduino Board [11].

5. INTERFACING BETWEEN GSM MODULE AND ARDUINO BOARD

The Tx pin of the GSM module connects to the Rx(0) pin of arduino board, the Rx pin of the GSM module connects to the Tx(1) pin of arduino, GND pin of the GSM module connects directly to the GND pin of the arduino.



6. CODING	delay(1000);
// defines pins numbers	Serial.write(0x1A);
constintrigPin = 6;	delay(1000);
constintechoPin = 7;	Serial.print("\r");
// defines variables	delay(1000);
long duration;	Serial.print("AT+CMGF=1\r");
int distance;	delay(1000);
void setup() {	Serial.print("AT+CMGS=\"+919571717565\"\r"); //Number
pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output	to which you want to send the sms
pinMode(echoPin, INPUT); // Sets the echoPin as an Input	delay(1000);
Serial.begin(9600); // Starts the serial communication	Serial.print("Dustbin Full in GWECA near Main Entry gate
}	Corner\r"); //The text of the message to be sent
void loop() {	delay(1000);
// Clears the trigPin	Serial.write(0x1A);
digitalWrite(trigPin, LOW);	delay(1000);
delayMicroseconds(2);	Serial.print("\r");
// Sets the trigPin on HIGH state for 10 micro seconds	delay(1000);
digitalWrite(trigPin, HIGH);	Serial.print("AT+CMGF=1\r");
delayMicroseconds(10);	delay(1000);
digitalWrite(trigPin, LOW);	Serial.print("AT+CMGS=\"+919950793210\"\r"); //Number
// Reads the echoPin, returns the sound wave travel time in	to which you want to send the sms
microseconds	delay(1000);
duration = pulseIn(echoPin, HIGH);	Serial.print("dustbin Full in GWECA near Main Entry gate
// Calculating the distance	Corner\r"); //The text of the message to be sent
distance= duration*0.034/2;	delay(1000);
// Prints the distance on the Serial Monitor	Serial.write(0x1A);
Serial.print("Distance: ");	delay(1000);
Serial.println(distance);	Serial.print("\r");
if (distance<=7)	delay(1000);
send_sms();	Serial.print("AT+CMGF=1\r");
voidsend_sms()	delay(1000);
{	Serial.print("AT+CMGS=\"+919642559684\"\r"); //Number
Serial.print("\r");	to which you want to send the sms
delay(1000);	delay(1000);
Serial.print("AT+CMGF=1\r");	Serial.print("Dustbin Full in GWECA near Main Entry gate
delay(1000);	Corner\r"); //The text of the message to be sent
Serial.print("AT+CMGS=\"+919462243994\"\r"); //Number	delay(1000);
to which you want to send the sms	Serial.write(0x1A);
delay(1000);	delay(1000);
Serial.print("Dustbin Full in GWECA near Main Entry gate	while(1);
Corner\r"); //The text of the message to be sent	}



IV. REALISTIC IMPLEMENTATION OF SMART WASTE TECHNOLOGY

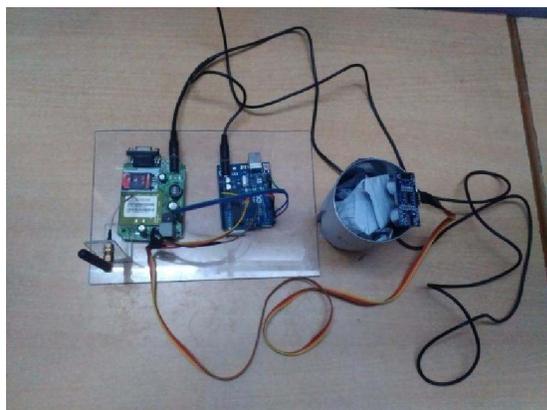


Fig. 9: Top View

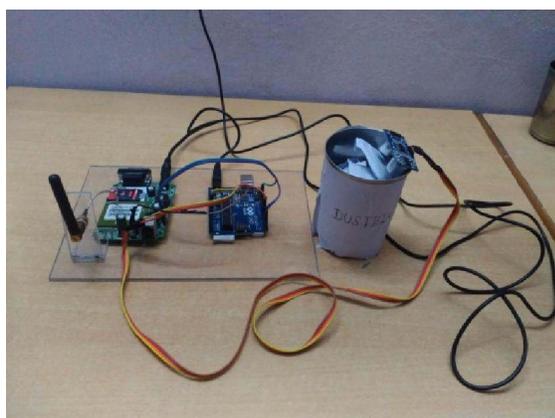


Fig. 10: Front View



Fig. 11: Circuit gets on as the power supply is given to it.

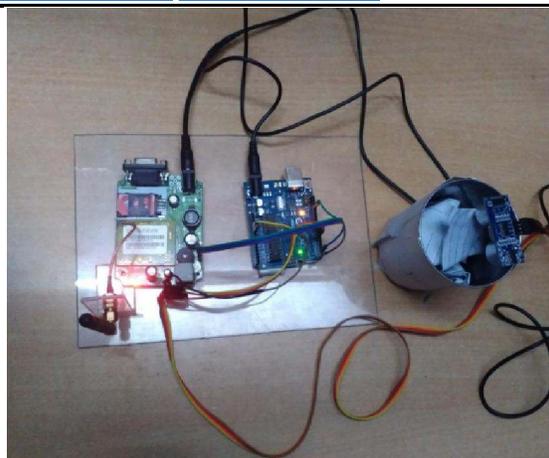


Fig. 12: SIM gets registered as the second red LED gets stop blinking.

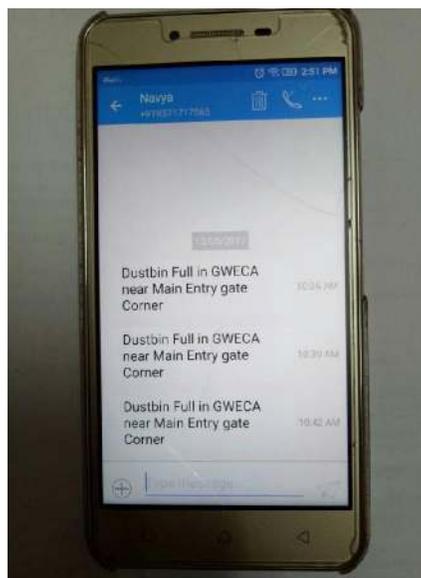


Fig. 13: SMS gets display on the higher authority phone number.

V. CONCLUSION

This paper shows the real life implementation of Smart Waste system using ultrasonic sensor, arduino and GSM module. The ultrasonic sensor senses the level of the garbage in the dustbin. After reflecting the sound waves from the garbage in the dustbin, it then communicates with arduino. After that GSM module and arduino communicate with each other and GSM sends message to the authorized phone number. The message sends by GSM goes to the higher as well as lower authority. By this the higher authority ensures the work given to the lower level person is done properly or not. This help the garbage collector person to know the area where the dustbins are full of garbage. If the person knows where the dustbins are



full he/she will go and collect the garbage in that particular area only which reduces the cost of petrol, time ,saves the environment from pollution. Therefore this type of technology will contribute in Swachh Bharat Abhiyan.

VI. FUTURE SCOPE

In future, to make it a full-proof system we will be used weight sensor,camera, smell sensor, LED light, Solar system etc. In future it can be prevented false alarm by animals or an antisocial element.

This idea will help to make city clean because of the practical problem of collection of waste in cities from various dustbins from various location, some are overflowing/unattended and some are unused.

This is a small contribution in Swachh Bharat Abhiyan and in Smart City, Ajmer for proper disposal of waste as and when garbage is full in dustbin.

This project is a contribution towards Swachh Bharat Abhiyan in Ajmer city, as every city in India has similar problem of garbage collection but has different or specific need of attending the same. As Ajmer city has its own pros n cons towards this problem we are thinking this project implementation to be a fool proof method of detecting and collecting the garbage from dustbins from various areas of Ajmer city. In future we are planning to support this project with the visual detection by palcing a camera over the garbage bin where the sensor is implemented so that the visual detection can be done before deploying the garbage collection unit to the station from where the messages has been received so that the unnecessary fuel consumption can be saved and other than this plus point of visual detection the security and monitoring will be easy for garbage bins from unwanted anti social elements and animals who can generate false alaram or message.

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MEDIA COVERAGE

The small contribution towards clean smart city has been covered by print, T.V. and Radio media [Radio City] on 2 June 2107 at 10:00 AM. and has been appreciated by them. It was a motivating message to the students who have done this project and to the other students also who wis to do project like this. We would like to thank you all the media for their kind support.



Fig. 14: News published in Dainik Bhaskar, Ajmer on dated 19/5/2017

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