

IOT based Waste Monitoring System

Ashutosh Kamble¹, Mayur Kamble², Nikhil Khedekar³, Pranesh Sakpal⁴, Ankur Bhattacharjee⁵

Department of Electronics Engineering¹²³⁴⁵

Atharva College of Engineering¹²³⁴⁵

Malad (W), India¹²³⁴⁵

Abstract - Now a days we see that the garbage boxes are placed at the public places in the cities are overflowing due to increase in waste every day. It creates unhygienic condition for the people surrounding, this leads in spreading some deadly diseases and human illness, to avoid such a situation we are planning to design "IOT based waste management system". In this proposed system there are multiple dustbins located through the city or the campus, these dustbins are connected to the our circuit through bus topology. All dustbins connected to the main station and dustbins circuit acquire the level of waste and send to the main station and main station will plot that data on main website.

Key words - ATMEGA 328 controller, Ultrasonic sensors, WIFI module, IOT technology, Bus topology.

I. INTRODUCTION

Embedded devices 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 garbage boxes are connected to the internet to get the real time information of the garbage boxes. These dustbins are interfaced with micro controller based system with Ultrasonic Sensors and WIFI modules. Where the Ultrasonic sensor detects the level of the dust in dustbin [4] and sends the signals to micro controller the same signal are encoded and send through WIFI module. All WIFI modules are connected in bus topology, so all WIFI module data send to the main station and main station send that data on website.

I. LITERATURE SURVEY

In [1] The System is Based on Arm 7 for collecting the garbage from a particular. The Zigbee and Global System for Mobile Communication (GSM) 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. 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 send signal 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 to collect that garbage. ARM 7 will send SMS using GSM technology.

In [2] the dustbins are interfaced with micro controller based system with IR Sensors and RF 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 through RF Transmitter and it is received and decoded by RF receiver at the Central System(Intel Galileo) 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.

In [3] they use the level sensors which senses the level of garbage and that level of garbage is processed in the controller and controller will send that data through GSM module that data received at the main station using GSM module and controller will send message to the person.

II. THE HARDWARE SYSTEM

A. Microcontroller

It is used in the circuit to control the whole circuit. It requires the crystal and reset circuit to control the system. The ultrasonic sensors and WIFI modules are interfaced to the controller.

B. Ultrasonic Sensor

Ultrasonic sensors are used to sense the level of the garbage. It has transmitter and receiver also. The transmitter transmit the ultrasonic wave it strike on the waste and return back to the receiver. Then the microcontroller will measure the distance by using velocity divide by time.

C. WIFI Module

Microcontroller gather the data of three ultrasonic sensors. That data is send over the WIFI. All WIFI modules are connected through Bus Topology. The WIFI module has three modes (station, access and combination)[7].

D. Regulators

Regulators are used to regulate the voltage. We required the 5V, 12V & 3.3V regulators. So the 5V regulator will regulate the 5 volts and so on.

IV. WORKING PRINCIPLE

The Smart dust bins are connected to the internet to get the real time information of garbage. Three ultrasonic sensors are interfaced to controller which detects the level of garbage[6], then it sends signal to controller. This controller will measure that level by using formula velocity divide by time and send to the WIFI module. Like that we use two circuits which will detects the level of garbage. And that circuits are connected to the mainstation through Bus Topology. Then the first WIFI module will send the acquired data to second WIFI module and second WIFI module acquire its data and add to the previous data and send to main station. The main station will get that data and upload on the cloud. And we can access that web page from anywhere and from any computer. And if any dustbin is full then that will also show on the webpage.

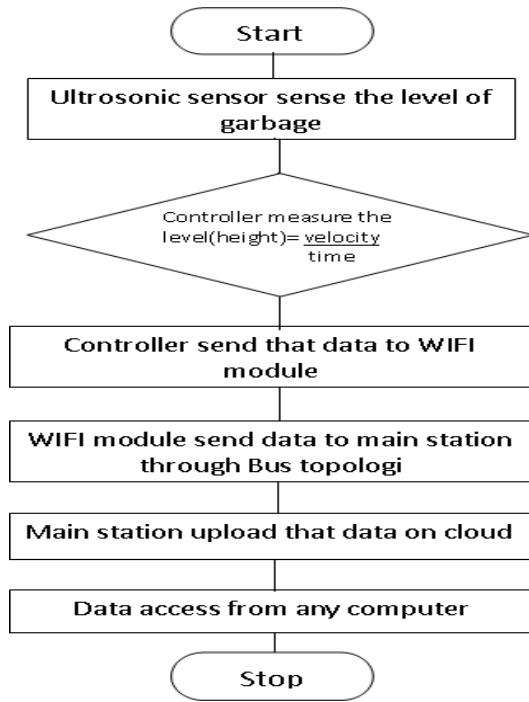


Fig. no. 1 Flowchart

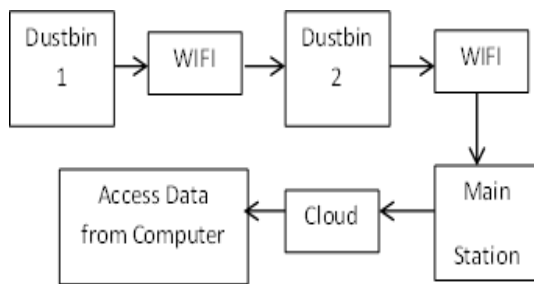


Fig. no. 2 Data Flow

V. DESIGN OF PROPOSED HARDWARE SYSTEM

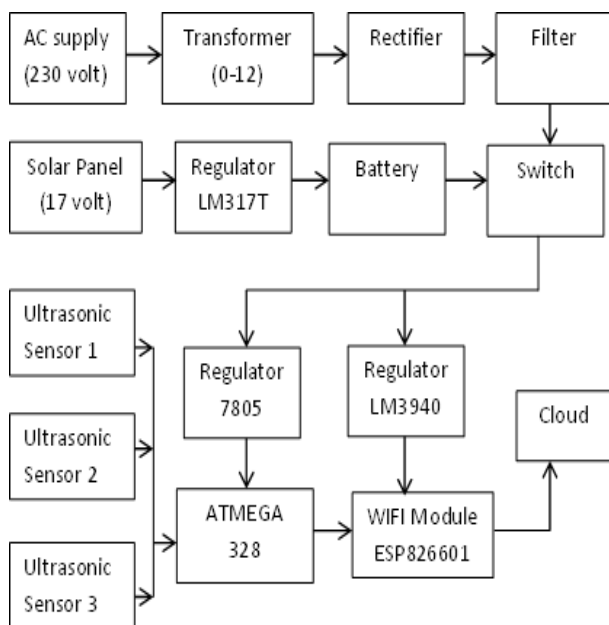


Fig. no. 3 Block Diagram

A. Power supply Stage

We get Supply from Mains and Solar panel. The mains supply is stepped down by using transformer 12 volt (0-12). The rectifier converts AC into DC. Filters are used to remove ripples. And the solar panel (17V) is giving fluctuating 17V. after that regulator (LM 317T) will regulate it to 12V[9]. We used the battery of 12V because solar panel gives fluctuating voltage so battery will store the charge and gives proper 12V. The Comparator is use as switch to differentiate between this two power supplies. Firstly it is connected to the solar panel and if the voltage of solar panel falls below 12V the it will switched to mains supply. There is also two more regulators (5V & 3.3V) are used. The 5V supply is given to main circuit through controller [8] and 3.3V supply is given to WIFI module.

B. Main circuit stage

The Smart dust bins are connected to the internet to get the real time information of garbage. In our circuit three ultrasonic sensors (HCSR04) are interfaced to controller (ATMEGA 328) wich detects the level of garbage, then it sends signal to controller. This controller is connected to the WIFI module (ESP826601) [5]. Like that we use two circuits wich will detects the level of garbage. And that circuits are connected to the main station through Bus Topology. Then the first WIFI module will send the acquired data to second WIFI module and second WIFI module acquire its data and add to the previous data and send to main station. The main station will get that data and upload on the cloud (web page). And we can access that web page from anywhere and from any computer. And if any dustbin is full then that will also show on the webpage.

VI. CONCLUSION

We are implementing waste monitoring system which will collect the real time information that is, present time fill level of the garbage bin. Garbage level will be sense by ultrasonic sensors controller will process that data and send to the WIFI module and WIFI module will upload that data on cloud. Respective Garbage cleaner can access that data from anywhere and anytime. This feature of the system makes it convenient for smart city project.

REFERENCES

- [1] Waste Bin Monitoring System Using Integrated Technologies, Kanchan Mahajan¹, Prof.J.S.Chitode², Department of Electronics Engineering, Bharati Vidyapeeth College of Engineering, Pune, India¹, Vol. 3, Issue 7, July 2014.
- [2] IoT Based Waste Management for Smart City, Parkash¹, PG Diploma Student, Dept. of Embedded System Design, NIELIT, Calicut, Kerala, India¹ & Prabu V2 PG Diploma Student, Dept. of Embedded System Design, NIELIT, Calicut, Kerala, India², Vol. 4, Issue 2, February 2016
- [3] Narayan Sharma,, “Smart Bin Implemented for Smart City”, International Journal of Scientific & Engineering Research, Volume 6, Issue 9, September-2015
- [4] Project Review on Ultrasonic Distance Measurement, Prakhar Shrivastava, Praveen Kumar, Ankit Tiwari National Conference on Synergetic Trends in engineering and Technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-086.

- [5] A wireless framework for environmental monitoring and instant response alert, Shreedeeep Gangopadhyay, Dept. of ECE, Techno India, Salt Lake, Kolkata, India, Molay Kumar Mondal, Dept. of ECE, Techno India, Salt Lake, Kolkata, India,16177674, 10.1109/MicroCom.2016.7522535, IEEE, 28 July 2016
- [6] <http://circuitdigest.com/microcontroller-projects/distance-measurement-using-hc-sr04-av>.
- [7] <http://maxembedded.com/2016/05/getting-started-esp8266-wifi-module/>
- [8] www.learningaboutelectronics.com/Articles/Atmega328-pinout.php
- [9] <http://www.circuitstoday.com/ic-voltage-regulators/>