International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869 (O) 2454-4698 (P) Volume-8, Issue-4, April 2018

Enhancement of smart garbage monitoring using IoT

Dr.C.Dhaya, J.Sujithra

***Abstract*— The IOT based Garbage monitoring system is a very advanced system which helps to keep the cities clean. This system monitors the garbage bins and conveys the level of garbage collected in the dustbins. Web pages are created to indicate the status of the garbage bin. The system uses ultrasonic sensors placed over the bins to identify the garbage level and compare it with the garbage bins depth. Once the sensor indicates the filling of the garbage bin, the alert message will be given to the nearby garbage collecting station. Hence, this is useful to keep the cities clean.**

***Index Terms*— IoT, Ultrasonic sensor, a Weight sensor, Arduino**

I. INTRODUCTION

Garbage Monitoring System: - Garbage may consist of the unwanted material left over from City, Public area, Society, College, home, etc. This project is related to the "Smart City" and based on "Internet of Things" (IOT). So for smart lifestyle, cleanliness is needed, and cleanliness begins with Garbage Bin.

One of the major concerns of the environment has been a solid waste management, which impacts the health and environment of our society. The detection, monitoring, and management of wastes are one of the primary problems of the present era. The usual way of manually monitoring the wastes in the dustbin is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies which give a real-time indicator of the garbage level in a dustbin at given time. Using that data, the waste collection routes can be reduced and ultimately reduce fuel consumption.

This system allows trash collectors to plan their daily/weekly pickup schedule. Instead of using plenty of bins in an unordered fashion around the city, minimal smart bins can be used. The height and width of garbage are measured by the ultrasonic sensor.

Then this concept can be applied to a big garbage bin that municipal corporation implements in an area. Thereafter, Municipal Corporation is aware to collect garbage. Hence the requirement of manpower will be lowered. At a small level, this concept is applied in housing dustbins which gives a detail about the amount of garbage collected in smart bins.

II. RELATED WORKS

A. Think Speak Read

Thing Speak is an application platform that can use the Internet of Things. Thing Speak can build an application around data that is collected by sensors. Thing Speak includes real-time data collection, data processing, visualizations, apps, and plug-in.

B. Arduino: Save data to the database

While broadcasting, this system allows to capture data from multiple input devices and display them when and how the user wants. Even though this could also be done with a dedicated web page by adding a little more code to the Arduino, it is easier to store it in a database and create a web page (or user interface) that reads data from the database.

III. SYSTEM ARCHITECTURE

The overall features of the software are concerned with defining the requirements and establishing the high level of the system. The major software components are identified and decomposed into processing modules and conceptual data structures and the interconnections between the modules are identified.

A. Architecture model

This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. The system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth and the weight sensor is used to monitor the weight of the garbage bin. Once the sensor indicates the filling of the garbage bin, the alert message will be given to the nearby garbage collecting station. This was made possible by connecting the garbage bin through IOT.

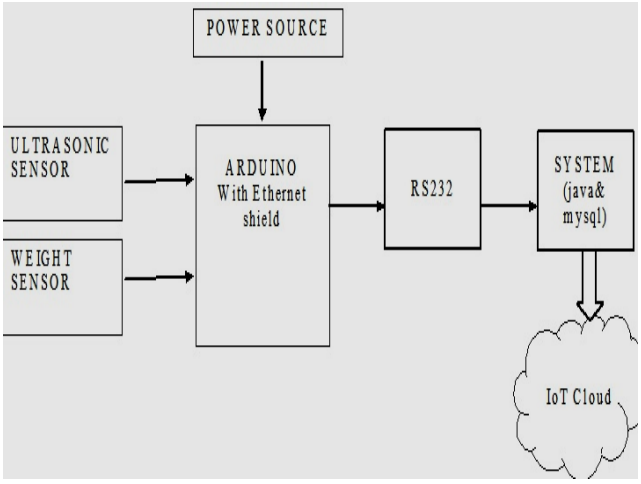

Figure1. Architecture diagram

IV. SYSTEM MODULES

A. Ultrasonic Sensor

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively.

Dr.C.Dhaya, Department of Computer science and Engineering, Adhiparasakthi Engineering College, Chennai, India
J.Sujithra, Department of Computer science and Engineering, Adhiparasakthi Engineering College, Chennai, India, Mobile No.8870352126

Ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor. The sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

B. Detectors

Since piezoelectric crystals generate a voltage when force is applied to them, the same crystal can be used as an ultrasonic detector. Some systems use separate transmitter and receiver components while others combine both in a single piezoelectric transceiver. Alternative methods for creating and detecting ultrasound include magnetostriction and capacitive actuation

.

C. Weight Sensor

A weight sensor is used to detect the weight of the garbage bin and conveys the level of garbage collected in the dustbins. Applicable to an electronic scale, price computing scale, electronic platform scale, a digital scale, parcel post scale, electronic balance and all varieties of commercial scales by single load cell.

D. Programming Arduino

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

V. METHODOLOGY

A. ADC Technique

Reads the value from the specified analog pin. The Arduino board contains a 6 channel (8 channels on the Mini and Nano, 16 on the Mega), 10-bit analog to digital converter. This means that it will map input voltages between 0 and 5 volts into integer values between 0 and 1023. This yields a resolution between readings of 5 volts / 1024 units or, .0049 volts (4.9 MV) per unit. The input range and resolution can be changed using analogReference (). It takes about 100 microseconds (0.0001 s) to read an analog input, so the maximum reading rate is about 10,000 times a second.

B. Serial Data Analysis

The Arduino Serial Plotter function has been added to the Arduino IDE, allowing us to natively graph serial data from Arduino to a computer in real time. A Serial plotter is an offline tool allowing visualizing data and troubleshooting your code offline without having to use third-party services like Processing.

.

C. UART Communication

The UART is used for communication between the Arduino board and a computer or other devices. All Arduino boards have at least one serial port (also known as a UART or USART): Serial. It communicates on digital pins 0 (RX) and 1 (TX) as well as with the computer via USB. Thus, if the user uses these functions, it cannot also use pins 0 and 1 for digital input or output.

VI. CONCLUSION

In this paper, the implementation is done only for a single dustbin. Various features such as durability, affordability, prevention of damage and maintenance issues are addressed when these smart dustbins are designed. This Smart Dustbin can contribute a lot towards the 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 the rough action of the users.

REFERENCES

[1] Narayan Sharma, Nirman Singha, Tanmoy Dutta, "Smart Bin Implementation for Smart Cities", International Journal of Scientific & Engineering Research, Vol 6, Issue 9, 2015, pp- 787-789.

[2] K. Vidyasagar, M. Sumalatha, K. Swathi and M. Rambabu, "Eco-friendly Environment with RFID Communication Imparted Waste Collecting Robot", Journal of Academia and Industrial Research (JAIR) Volume 4, Issue 2 July 2015, pp.43- 47.

[3] Twinkle Sinha, Mukesh Kumar, P.Saisharan, "Smart Dustbin", International Journal of Industrial Electronics and Electrical Engineering, SRM University, India, Vol-3, Issue-5, 2015,pp.101-104.

[4] M.T.H. Shubho, M.T Hassan, M.R. Hossain, and M. N. Neema, "Quantitative Analysis of Spatial Pattern of Dustbins and its Pollution in Dhaka City–A GIS-Based Approach", Asian Transactions on Engineering (ATE ISSN: 2221-4267) vol. 03 Issue 04, September 2013, pp.1-7.

[5] Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, and Sehyun Park, "IoT-Based Smart Garbage System for Efficient Food Waste Management", The Scientific World Journal, Volume 2014 (2014), Article ID 646953, 13 pages

[6] Prof. R.M.Sahu, Akshay Godase, Pramod Shinde, Reshma Shinde, "Garbage and Street Light Monitoring System Using Internet of Things", International journal of innovative research in electrical, electronics, instrumentation and control engineering Vol. 4, Issue 4, April 2016

[7] Vikrant Bhor1, Pankaj Morajkar2, Maheshwar Gurav3, Dishant Pandya,"Smart Garbage Management System", International Journal of Engineering Research & Technology, Mumbai, India, vol. 4 Issue 03, 2015,pp.1117-1119.

AUTHOR'S PROFILE

C. Dhaya received the B.E. Degree in Computer science and Engineering from Adhiparasakthi Engineering College, Anna University, Chennai, India in 2000. Received M.E. Degree in Computer Science and Engineering at Jerusalem College of Engineering, Anna University, Chennai, India in 2007. Received Ph.D. (Full Time) degree in Computer Science and Engineering at Pondicherry Engineering College, Anna University, Chennai, India in 2014. Her research interest includes Software architecture, Software Engineering, Network Security, Quality Metrics, Information Security.

J. Sujithra received the B.E. Degree in Computer science and Engineering from Adhiparasakthi Engineering College, Anna University, Chennai, India, in 2016. Currently doing M.E. In Computer Science and Engineering at Adhiparasakthi Engineering College, Anna University, Chennai, India.