

Waste Management System by Using IoT

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ABSTRACT

Solid waste management is one of the major aspect which has to be considered in terms of making urban area environment healthier. The common dustbins placed by the municipal corporation are leading number of health, environmental and social issues. Various causes are like improper dustbin placement in city, improper system of collecting waste by City Corporation, and more specifically people are not aware enough to use dustbins in proper way. These various major causes are leading serious problems like, an unhygienic condition, air pollution and unhealthy environment creating health disease. Up till now, research has been carried out by developing a Software Applications for indicating dustbin status, another by shortest part method for garbage collecting vehicles by integrating RFID, GSM, GIS system; but no active efforts has been taken paying attention towards managing such waste in atomized way.

Considering all these major factors, a smart solid waste management system is designed that will check status and give alert of dustbin fullness and more significantly system has a feature to literate people to use dustbin properly and to literate people to use dustbin properly and to automatically sense and clean garbage present outside the dustbin. Thus presented solution achieves smart solid waste management system.

KEYWORDS: IoT, RFID, GSM, Sensors.

I. INTRODUCTION

It is become necessary and challenge to manage the solid waste with rapid urbanization and increased population growth. While taking about waste collection and management, the attention can be highly by focused towards the common dustbins placed by respective Municipal Corporation at the various area of each city. As, it is the first stage which plays initial active roll to gather the waste generated in society and will ideally fulfill the major aims like, maintaining cleanliness of society, reducing environmental pollution, managing the healthy and hygienic surrounding etc. But such aims will fail to attain practically due to number of causes such as:

- People are not finding themselves responsible to use theses dustbins properly and not to throw the garbage outside the dustbins.
- Improper placement of dustbins.
- Improper management system which does not contain provision to track real time status of bin fullness.
- No any provision is present to clean the area surrounding to the dustbin automatically in case where people throws garbage outside the dustbin.

Up till now, in this filed, efforts has been taken in such a way that, the team who are in a role of collecting a garbage will get the prior information of status present in particular dustbin so that they can predefine the path of collection of garbage in the city in optimized manner. In similar way, software application is also developed in another invention

in which location of the dustbin nearby area can be shown so that people can find and use it properly and will not go and through it in anywhere else. Some inventions are going for the GIS for collecting the status of the garbage in the dustbin. Each and every invention that has invented up till date more and more focuses towards the monitoring the status of the dustbin by using number of ways and technologies and provide that status to the respective authority.

But one even more major and basic reason for the reason problem regarding with such common dustbins is still unsolved as it has not taken under consideration by the prior innovations, which is to literate people to use it properly and track and clean garbage present outside the dustbin in a fully atomized way. This paper is focused not only on monitoring the dustbin status and giving its alerts to City Corporation but also focuses on these on-field issues. Because it is the fact that not only the dustbins overflow condition but also improper use of International Conference on inventive Communication and computational Technologies of it makes the surrounding area dirty and unhygienic. The objective of giving alert to the Corporation gets achieved by the GSM System.

II. NONINVASIVE METHOD

The study developed a Smart and Green System (SGS) which embodies the in-depth integration of various informatics and the strategy of sustainable waste management. The

Proposed SGS is able to gather the massive volumes of waste and information from different application scenes of waste separation and differentiated collection, with the aid of sensor network technologies to timely detect state parameters throughout a waste collection system and the rate of waste separation and recycling. In network data processing and cloud computing contribute to managing the communications among all collection nodes, vehicles and crew in a secure, scalable and highly – available environment. The proposed SGS can deal with well – structured, semi-structured, and even poorly structured problems in a more efficient, collaborative, and resilient way with aid of a position – navigation – timing system. Integrated three-level SGS architecture with a scalable sensor network is proposed in this study as an instruction of developing SGS for sustainable waste management.

Safety plays a major role in today's world and it is necessary that good safety system are to be implemented in places of education and work. This work modifies the existing safety model installed in industries and this system can also be used in homes, villages, cities and offices. Most of drainage and unused wells are forming toxic gases. The main objective of the work is designing microcontroller based toxic gas detecting, alerting system and gas purification. The hazardous gases like H₂S, CO and Methane will be sensed and displayed each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (SMS) is sent to the authorized person through the GSM. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation using gas purification process convert toxic gases into pure air. The garbage alerting system is used to control the air pollution. All the gas sensor values are continuously monitoring through the mobile application using Wi-Fi module. This system is very much to make city smart as well as reduce the human death. The increase in population, has led to tremendous degradation in the state of affairs of hygienic with respect to waste management system. The spillover of waste in civic areas generates the polluted condition in the neighboring areas. It may aggravate numerous severe disease for the nearby people. This will humiliate the appraisal of the affected area. For eliminating or mitigated the garbage's and maintains the cleanliness, it requires 'smartness-based' waste management system. The paper is proposed IoT based smart waste clean management system which checks the waste level over the dustbins by using Sensor system. Once it detected immediately this system altered to concern authorized through GPRS/GSM system. To monitor and integrate an android application is developed for the desired information which is related to various level of waste in different locations. This is ensued the greenish in the environment and support for Swachh bharat for cleanliness.

With growth of cities, the waste produces also increase. Many of the world's developing cities are all lacking in the area of waste management, in particular, the collection garbage within cities. Because of this, garbage tends to pile up in certain areas. This not only poses a health risk to the surrounding communities, but also creates unpleasant environments for the residents. To provide a solution to this problem, a smart garbage monitoring system is therefore proposed to tackle the issued faced. This system will allow

the city authorities to better manage their resources in the collection of garbage and provide a platform that will allow for an efficient garbage collection system.

NAND Flash memory has been used for the data storage of mobile devices, laptops, and various embedded systems, but requires a garbage collection mechanism due to its erase-before-write characteristic. Garbage collection consist of a series of activities (such as read, write, and erase operations) that usually degrade the lifetime and the performance of NAND based storage systems. In this paper, we propose a demand-based caching method for garbage collection in flash-memory embedded system. The experimental results show that the proposed method can cache a small part of appropriate information about garbage collection in RAM – limited embedded system and the performance is till reasonable.

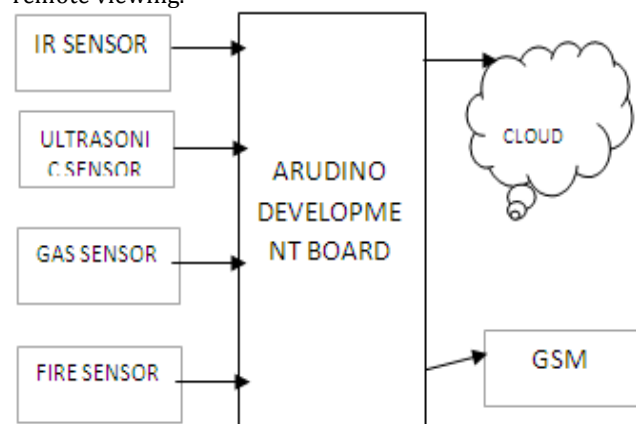
III. METHODOLOGY

A. EXISITING SYSTEM

In today's world many pollution monitoring systems are designed by considering different environmental parameters. Existing system model is presented in uses Zigbee based wireless sensor networks to monitor physical and environmental conditions with thousands of application in different fields. The sensor nodes directly communicated with the moving nodes deployed on the object of interest which avoided the use of complex routing algorithm but local computations are very minimal. A server is an instance of a computer program that accepts and responds to requests made by another program; known as a client. Less formally, any device that runs server software could be considered a server as well. Servers are used to manage network resources. The services or information in the server are provided through the Internet that are connected through LAN and made available for users via smart phones, web browsers or other web devices to make the system more intelligent, adaptable and efficient.

B. PROPOSED SYSTEM

The proposed embedded device is for monitoring the percentage of dustbin filled through wireless communication. The data obtained from multiple sensors will be read by a development board called Arduino UNO which is based on Atmega 328p. And the threshold value and actual value is compared here using some blocks of code. In case of up reached the threshold value the data of dustbin location will be sent to the incharge of particular dustbin using the GSM technology. It sends the data to cloud which stores, displays the data. We can host the data to internet for remote viewing.



C. ARUDINO UNO

The Atmega 328 microcontroller is the MCU used in Arduino UNO R3 as a main controller. Atmega 328 is an MCU from the AVR family. It is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8parallel data signals. Arduino is an open source electronics platform based easy to use hardware and software. Arduino boards are able to reads inputs light on a sensor, a finger on a button, or a Twitter message and turn it into an output activating a motor, turning on a LED.

D. THING SPEAK

According to developers, "THING SPEAK" is an open source Internet of Things (IoT) application and API to store and retrieve data from things using HTTP protocol over the Internet or via a Local Area Network. Thing speak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. Thing speak has integrated support from the numerical computing software MATLAB from Math Works allowing Thing Speak users to analyze and visualize uploaded data using Matlab without requiring the purchase of a Matlab license from Math works.

IV. SENSORS

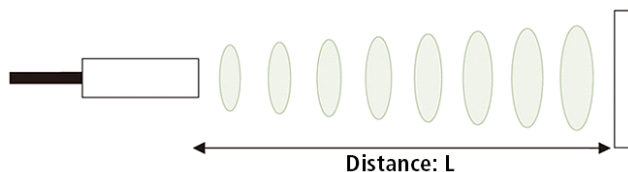
A. ULTRASONIC SENSOR

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air, and when it gets objected by any material it gets reflected back towards the sensor this reflected wave is observed by the Ultrasonic receiver module. Ultrasonic sensors measure distance by using ultrasonic wave. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensor measure the distance to the target by measuring the time between the emission and reception.

An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternatively. This enables miniaturization of the sensor head.

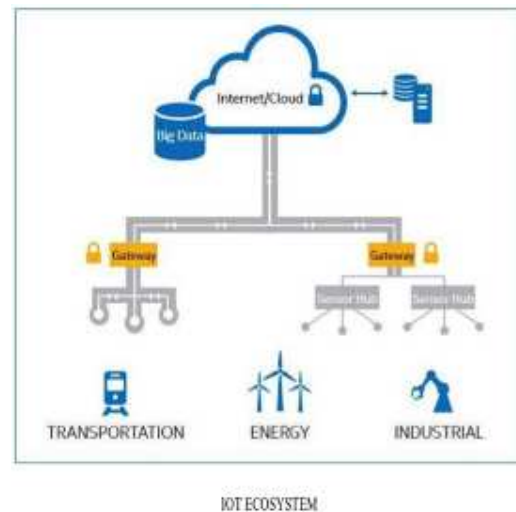
The distance can be calculated with the following formula:

$$\text{Distance } L = \frac{1}{2} \times T \times C$$



B. Internet of things (IoT)

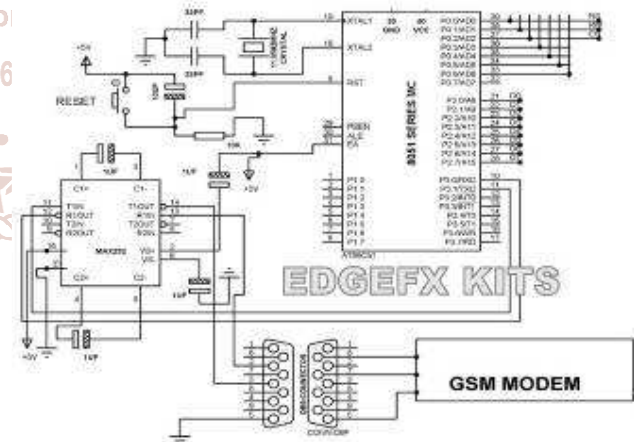
The internet of things is a network of physical objects embedded with electronics, software, sensors and network connectivity that enables these objects to collect and exchange data. A collective term for the physical that are connected to the internet and can exchange data without user involvement. A Thing in the Internet of things; a processing unit that is capable of connecting to the internet and exchange data with the cloud. Devices are often called smart devices or connected devices. They communicate two types of data: - telemetry and state.



C. GSM

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 require 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, a USB or Bluetooth connection.

A GSM modem can also to be standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port a USB port on our 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.

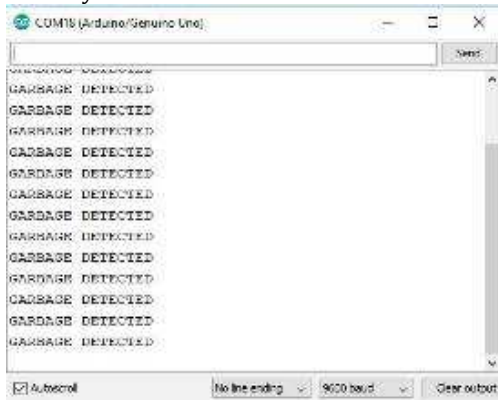


D. IR SENSOR

Infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensor measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistance and these output voltages, change in proportion to the magnitude of the IR light received.

V. CONCLUSION

The proposed method explains how embedded system can be either to our district municipal improve their cleaning process system. A reference model is described to implement the proposed solution. Our future work includes implementing the scheme in all high speed wireless communication devices, hardware. It is also planned to convey the information about the garbage level to the respective person through the GSM and Internet of Things. This system will benefit the government to reduce garbage level with based on time and improve their cleaning system of our country.



VI. REFERENCES

- [1] Daniel v, Puglia P. A, and M. Puglia (2007). "RFID – A Guide to Radio Frequency Identification", Technology Research Corporation.
- [2] Flora, A. (2009). "Towards a clean environment: A proposal on sustainable and integrated solid waste management system for university Kebansagaan Malaysia". Report from Alam Flora.
- [3] Gogoi.L (2012), "Solid Waste Disposal and its Health Implications in Guwahati City: A study in Medical Geography", Lambert Academic Publishing, Germany, ISBN 978-3-8454-0149-2.
- [4] Mircea Popa, member IEEE, and Catalin Iapa (2011), "Embedded Weather Station with Remote Wireless Control", 19th Telecommunication from TELFOR, IEEE.
- [5] Muthoni MASINDE, Antonie BAGULA, Muthuna NZIOKA (2013), "Sense Weather Monitoring System for Kenya", www.IST-Africa.org/Conference2013.
- [6] N. Kotamaki, S. Thessler, J. Koskiahio, A. O. Hannukkala, H. Huitu, T. Huttula, J. Havento, M. Jarvenpaa (2009), "Wireless in-situ Sensor Network for Agriculture and Water Monitoring on a River Basin Scale in Southern Finland: Evaluation from a Data User's Perspective", *Sensors*, 9, pp.2862-2883.

