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IOT BASED SMART GARBAGE MONITORING AND INTELLIGENT ALERT SYSTEM USING ARDUINO UNO

M.Indhu[1],O.Obukeerthana[2], S.Sathya[3], Mrs. B.Ananthi[4]

[1]UG Scholar, Assistant professor[2]
[(1,2)]Department of CSE,
[(1,2)]Vivekananda College of Engineering for Women, Tiruchengode, India

Corresponding author E-Mail-ID: indhumarimuthu96@gmail.com.

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ABSTRACT

In this project proposed advanced smart garbage monitoring and alert system using arduino uno. In the Waste is an important issue, which needs to be tackled smartly. Waste management is one of the primary problem that the world faces irrespective of the case of developed or developing country. The key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. It in turn leads to various hazards such as bad stink & ugliness to that place which may be the root cause for spread of various diseases. To avoid all such hazardous scenario and maintain public cleanliness and health this work is mounted on a smart garbage system. The main theme of the work is to develop a smart intelligent garbage alert system for a proper garbage management.This paper proposes a smart alert system for garbage clearance by giving an alert signal to the municipal IOT server using for instant cleaning of dustbin with proper verification based on level of garbage filling. This process is aided by the ultrasonic sensor and gas sensor which is interfaced with Arduino UNO to check the level of garbage filled in the dustbin and sends the alert message to the municipal IOT server and users or drivers using GSM once if garbage is filled. After cleaning the dustbin, the driver confirms the task of emptying the garbage with the aid of Controller signal.

Keywords: GPS, GIS, Ultra Sonic Sensor.

1. INTRODUCTION

India is one of the developing nation with a population of over 1.21 billion which covers the 17.5% of the world population (Source: Census of India 2011) having the problems of managing the municipal solid waste management in an efficient and hygienic way. Waste can be classifies into three types solid waste, semisolid waste and liquid waste. Solid waste can be food waste, vegetable waste, household waste, and non hazardous waste from organizations, industries and hospitals. Semisolid waste is sludge waste and liquid waste is night soil waste. Where hazardous waste from industries and medical are difficult to separate from municipal solid waste.Solid Waste management has become an issue of growing global concern as urban populations continue to increase. However, the growth of the solid-wastes, in the developing countries like India will be increasing the resource scarcity and the availability of new technologies are offering opportunities for turning waste into a resource. Waste is a   continually growing problem at global and regional as well as at local levels.

Management of solid waste may be defined as that discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid   wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations. The government of India started the 'Swachh Bharat Abhiyan' is a massive mass movement that seeks to create a Clean India. Cleanliness was very close to Mahatma Gandhi's heart. Mahatma Gandhi devoted his life so that India attains 'Swarajya'. Now the time has come to devote ourselves towards 'Swachchhata' (cleanliness) of our motherland. The government of India over the years has taken many initiatives and implemented new technologies and methods. Due to increased public awareness of MSWM, a public litigation was filed and resulted in the Municipal Solid Waste (Management and Handling) Rules, 2000. Government for the first time now has included private organizations in providing this public service. New methods of storage, collection, transportation, processing and disposal are being implemented. Management of solid waste is associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations

2.   RELATED WORK

1.UHF RFID tag antenna design for On-Body applications] Daniel V., Puglia P.A., and M. Puglia (2007)

This paper addresses the antennas design for passive UHF rfid applications involving the human body as the object to be tagged. Novel antenna geometry is proposed for conjugate impedance matching to the complex impedance of the rfid transponder. The proposed tag is capable of achieving high read range directly attached to a human thorax or in free space.

2.RFID Based E-monitoring System for Municipal Solid Waste Management Abu Nayeem Redwanur Rahaman, (2012).

With the increase of population of a country, proper management of cumulative of Municipal Solid Waste (MSW) becomes more acute for maintaining green environment. In conventional approach a number of trucks collect the MSW and then transport and transfer these MSW in a pre-specified location, but all the above jobs are not properly monitored. It is very important to monitor the trucks and record the information related to the collecting time and area from a central location to ensure the job well done. This project exploits the tremendous power of RFID technology and presents the development of an electronic monitoring (e-monitoring) system to overcome the above problem in the conventional approach. The proposed emonitoring system is an embedded system that consists of RFID technology interfaced with PIC micro-controller and a web based computerized software. It has been tested in the laboratory environment as well as in the field environment. The test results show that the system functions properly and is working real time. Municipal authority can monitor the SW collecting status through the system and can generate different reports to improve the performance of their service. The prototype developed in this project can be further improved and used for commercial purpose.

3. Internet of Things: Challenges and State-of-the-art solutions in Internet-scale Sensor Information Management and Mobile Analytics 2015 16thIEEE International Conference on Mobile Data Management

This paper describes an advanced seminar presented at the 16th IEEE International Conference on Mobile Data Management. The advanced seminar presents the stateof-the-art in the Internet of Things, which is fast emerging as the disruptive technology for years to come. The seminar focuses on the Internet-scale sensor information management, related mobile analytics and open source IoT technologies and emerging standards.

4. Overview for Solid Waste Bin Monitoring and Collection System (ICIMTR), 2012.

Solid waste management is a big challenge in urban areas for most of the countries throughout the world. An efficient waste management is a pre requisition for maintain a safe and green environment as there are increasing all kinds of waste disposal. There are many technologies are used for waste collection as well as for well managed recycling. In this paper we have introduced an integrated system combined with an integrated system of Radio Frequency Identification (RFID), Global Position System (GPS), General Packet Radio Service (GPRS), Geographic Information System (GIS) and web camera. The built-in RFID reader in collection trucks would automatically retrieve all sorts of customer information and bin information from RFID tag, mounted with each bin. GPS would give the location information of the collection truck. All The information of the center server would updated automatically through GPRS communication system. The performance of the implemented system have been analyzed and focused that the proposed system is much better than existing system in terms of high speed data transmission, precision, real time and reliability.

5. Early detection and evaluation of waste through sensorized containers for a collection monitoring application, Alberto Rovetta 26 August 2009

The present study describes a novel application for use in the monitoring of municipal solid waste, based on distributed sensor technology and geographical information systems. Original field testing and evaluation of the application were carried out in Pudong, Shanghai (PR China). The local waste management system in Pudong features particular requirements related to the rapidly increasing rate of waste production. In view of the fact that collected waste is currently deployed to land- fills or to incineration plants within the context investigated, the key aspects to be taken into account in waste collection procedures include monitoring of the overall amount of waste produced, quantitative measurement of the waste present at each collection point and identification of classes of material present in the collected waste. The case study described herein focuses particularly on the above mentioned aspects, proposing the implementation of a network of sensorized waste containers linked to a data management system. Containers used were equipped with a set of sensors mounted onto standard waste bins. The design, implementation and validation procedures applied are subsequently described. The main aim to be achieved by data collection and evaluation was to provide for feasibility analysis

of the final device. Data pertaining to the content of waste containers, sampled and processed by means of devices validated on two purpose-designed prototypes, were therefore uploaded to a central monitoring server using GPRS connection. The data monitoring and management modules are integrated into an existing application used by local municipal authorities. A field test campaign was performed in the Pudong area. The system was evaluated in terms of real data flow from the network nodes (containers) as well as in terms of optimization functions, such as collection vehicle routing and scheduling. The most important outcomes obtained were related to calculations of waste weight and volume. The latter data were subsequently used as parameters for the routing optimization of collection trucks and material density evaluation.

3. PROBLEM DESCRIPTION

The main problems of the existing solid waste collection process and management system are as follows.

  i) Lack of the information about the collecting time and area.

  ii) Lack of the proper system for monitoring, tracking the trucks and trash bins that have been collected in real time.

  iii) Loss of productivity due to inefficient utilization and unauthorized use of vehicles.

  iv) There is no quick response to urgent cases like truck accident, breakdown, longtime.

  v) There is no quick way to response to client's complaints about uncollected waste. However, with the conventional system, it is impossible to get all the facilities in time. Because, it may some trucks need to be available for important special events, some are to be on a daily schedule and some trucks may be under maintenance. To stimulate all these facilities, an effective and robust system is needed. The proposed system would be able to solve the mentioned problems with robust solution

4. PROPOSED SYSTEM

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.
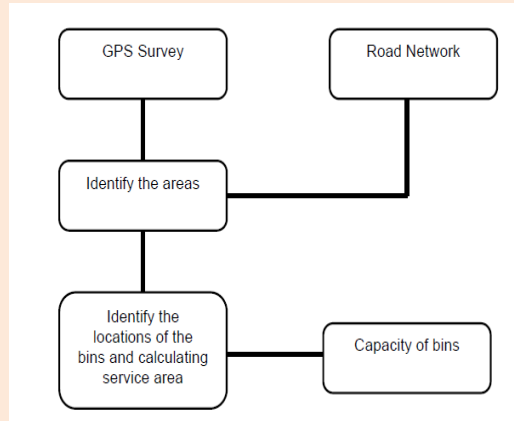
Figure 1: Procedure of the study for fixing Bins using GIS and GPS.

4.1 PROPOSED EXECUTION

- GPS and ultrasonic sensor is fixed in waste bins.
- When the waste bins is filled with garbage it automatically informs.
- GIS fixed in the waste bins collecting vehicle to track the location.
- Waste bins are designed based on level wise such as leve1, level 2, level 2.5, and level 3.
- The message automatically received after level 2.5 filled.
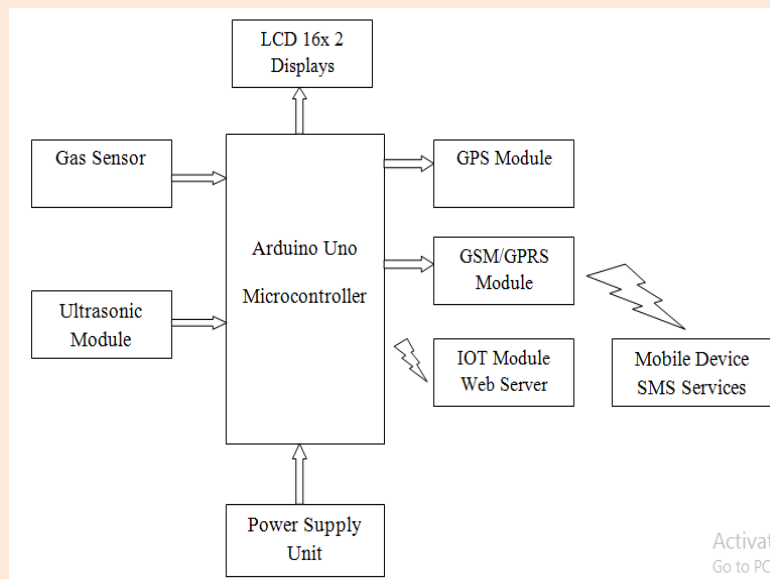- It overcomes the problem that overflows in the waste bins.

5. MODULES

Figure2: Block diagram

5.1 Bins:

Bins compose of sensors and communication technology. This unit is attached to the ultrasonic sensor under the lid. These sensors will sense fill level status of the bin as well as gas sensor present in the bottom of dustbin and report these values to the Microcontroller.

5.2Sensor:

The sensor unit will consist of two sensors. These will include ultrasonic fill level sensor and gas sensor. The ultrasonic fill level sensor will measure the level of waste in the bins. That sensor will use ultrasonic waves for distance measurement. The gas level sensor will measure the presence of gas in the trash bins.

5.3GSM Module:

The GSM module is used to send message about waste level and gas presence in the bins to the users and alert message to web server (IOT).

5.4GPS Module:

The location information collected through the GPS in real time and would be stored in a database in which all users would be able to access this information via web-base management system its easily know which location the garbage bin filled.

5.5Microcontroller:

This will be the processing unit for the embedded system at the bins. This will be used for controlling sensors and send information via network.

5.7Power supply:

The Power supply will provide electrical power for the microcontroller.

6. METHODOLOGY

In this paper we proposed an Android Application for e-Governing the system for municipal solid waste management. The waste bins and the waste dumping sites are monitored by using GIS and the vehicles which collecting the waste from the bins and waste dumping sites are monitored by using GPS. The collected waste will be separated as recycle and reuse. The recycle waste such as food waste, vegetable waste, cow dung are separated and it will be send to Bio Mass Gasified Plant (Multiple purpose) for generation of power and the power production will be monitored by the Android Apps. The reuse separated waste like plastic, medical, polythene will be collected and it will be sending for the process of recycle. The outcome of these apps is it will be generating MIS reports in Android mobiles and proper tracking of garbage collection vehicles. Monitoring the garbage for quick disposal.This App will be helpful for monitoring the solid waste management for developing countries like India and it will be a source additional income for the government of India. The system provides real time monitoring of waste collection through a mobile based application. The methodology is based on Global Positioning System (GPS) and Geographical Information System (GPS).

These were used for accurate measurements and formulation of geographic data bases for the analysis purpose. GPS is used to create instant local area map and to enclose the desired data base on the point, line and area. This methodology of this project is the GPS and the ultrasonic sensor is fixed in the waste bins. When the waste bins is filled with garbage it automatically informs the in-charge of the respective municipal solid waste administration office and they will be in a position to collect the waste from the bins and segregate to disposal in the bio mass gasification plant. The GIS fixed in the waste bins collecting vehicle to track the location where the vehicle exactly on road. Microcontroller kit fixed along with the waste bin to send SMS about the bins this methodology followed in this App is included survey to collect data and GIS based analysis to find proper location for bins along the roads.

6.1GSM Module:

Figure4:GSM module

6.2GPS Module:

Figure4: GPS module

6.3ADVANTAGES

i)improves Environment quality.
-Fewer smells.
-Cleaner cities.
ii)Real time information on the fill level of the dustbin.
iii)Intelligent management of the services in the city.
iv)Effective usage of dustbins

7: DATA COLLECTION AND DESCRIPTION

In order to efficiently manage the municipal solid waste system, detailed spatial information is required. This information is related to the geographical background of the area under investigation as well as to special data related to the waste collection procedure. In co-operation with the municipality and Town panchayat a large database of waste management data should be collected and statistically analyzed, regarding the static and dynamic data of each existing collection program: population density; waste generation rate for mixed waste and for specific waste streams; number, type and positions of waste bins; the road network and the related traffic; the current routing system of the collection vehicles; truck capacities and their characteristics; and, the geographic boarders and characteristics of the waste collection sectors. Thus, for the optimization of the collection process the following data were generated (data source in the bracket):

i)Study about the area boundary (Municipality Corporation).

ii)etailed urban plan of the municipality (official top sheet plan).

iii)Popiiulation density.

iv)Land use of the study area.

v)Satellite image of the municipality (Google Map).

vi)Road network of the study area (official top sheetplan).

vii)Location of waste bins (Municipality Corporation, field work).

viii)Capacities of bins (Municipality Corporation).

8: CONCLUSION

The Automatic waste management system is a step forward to make the manual collection and detection of wastes automated in nature. This project work is the implementation of smart garbage management system using IR sensor, microcontroller and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the smart garbage management system makes the garbage collection more efficient. Such systems are vulnerable to plundering of components in the system in different ways which needs to be worked on.

REFERENCES

[1].UHF RFID tag antenna design for On-Body applications] Daniel V., Puglia P.A., and M. Puglia (2007)

[2].RFID Based E-monitoring System for Municipal Solid Waste Management Abu Nayeem Redwanur Rahaman, (2012).

[3].Internet of Things: Challenges and State-of-the-art solutions in Internet-scale Sensor Information Management and Mobile Analytics 2015 16thIEEE International Conference on Mobile Data Management

[4].Overview for Solid Waste Bin Monitoring and Collection System (ICIMTR), 2012.

[5].Early detection and evaluation of waste through sensorized containers for a collection monitoring application, Alberto Rovetta 26 August 2009.

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

[7]. Marian Look, "Trash Plant: India", earth911B. February 2016 DOI:10.15680/IJIRCCE.2016. 0402029

[8]. Basic Feature, "Solid waste Management Project by MCGM

[9].P. Ilangovan et al. / International Journal of Computer Science Engineering (IJCSE)ISSN : 2319-7323 Vol. 5 No.04 Jul 2016.

[10].IoT Based Waste Management for Smart City Vol. 4, Issue 2, February 2016 DOI: 10.15680/IJIRCCE.2016. 0402029.