IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

Zig-Bee Based Waste Bin Monitoring System

Mrs. Kanchan Mahajan[*1], Prof.J.S.Chitode[2]
[*1,2] Department of Electronics Engineering, Bharati Vidyapeeth College of Engineering, Pune, India
kanchanmahajan18@gmail.com

Abstract

There are many technologies which are used for waste collection as well as for well managed recycling. In this project, we have introduced an integrated system combined with an integrated system of Zigbee and Global System for Mobile Communication (GSM).The sensors would be placed in the common garbage bins placed on the public places. When the garbage reaches the level of the sensor, then that indication will be given 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. ARM 7 will give indication by sending SMS using GSM technology.

Keywords: Solid Waste, Zigbee, ARM, GSM

Introduction

In Day to Day life, we see the pictures of garbage bins being overfull and all the garbage spills out resulting in pollution. This also increases number of diseases as large number of insects and mosquitoes breed on it.

Hence our problem statement is to design a System Based on Arm 7 for collecting the garbage from a particular area – the area whose public Garbage Bins are overflowing with prior concern.

Solid waste management [1] is a big challenge in urban areas for most of the countries throughout the world. An efficient waste management 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 project, we have introduced an integrated system combined with an integrated system of Zigbee and Global System for Mobile Communication (GSM).The sensors would be placed in the common garbage bins placed on the public places. When the garbage reaches the level of the sensor, then that indication will be given to ARM 7 Controller. The controller will gives indication to the driver of garbage collection truck as to which garbage bin is completely filled and needs urgent attention. ARM 7 will give indication by sending SMS using GSM technology.

Technologies Integrated

ZigBee Technology:

Zigbee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world. ZigBee suitable for high level communication protocols used to create personal area networks built from small, low-power digital radios. It is based on an IEEE 802.15 standard. Though low-powered, ZigBee devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones, creating a mesh network; i.e., a network with no centralized control or high-power transceiver able to reach all of the networked devices [2].
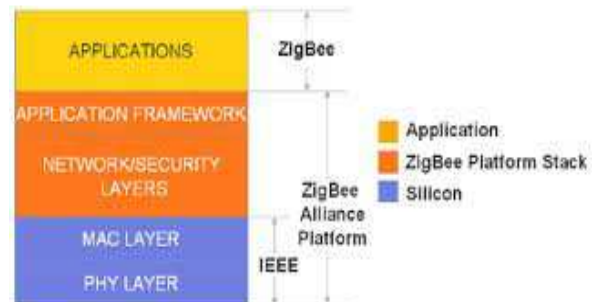

Fig. 2.1 Zigbee Protocol

The ZigBee boards use a V2 XBEE module to interface to the ZigBee network. These modules are compliant with the 2007 ZigBee Pro / ZNET standard. The V2 XBEE modules come in two varieties. One is configured to be the ZigBee network coordinator (EB051C) and the other is configured to be either a router node or an end device node (EB051R). The variety of the module is marked at the top right hand side of the ZigBee board. Coordinator nodes are responsible for creating the ZigBee network and allowing other ZigBee nodes to join. Only one coordinator node can exist on any single network. Router nodes are responsible for

routing signals to other routers or to end nodes. End device nodes are responsible for collecting or depositing real world data to and from the ZigBee network. The Coordinator node and Router nodes are capable of handling up to eight children devices. The children devices can consist of either other Router nodes or End device nodes. If an End device node is configured to sleep then the parent device associated for that node will be responsible for buffering any incoming data. Therefore if you are using sleeping End devices you must make sure to poll the parent for data every time the device comes out of sleep mode. The board is compatible with 3.3V and 5V systems.

GSM Technology:

Global System for Mobile Communications, originally *Groupe Spécial Mobile* commonly known as GSM, is a standard set developed by the (ETSI) to describe protocols for second generation digital cellular networks used by mobile phones. It became the de facto global standard for mobile communications with over 80% market share [4].

The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for fullduplex voice telephony [5]. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

Implementation

Fig. 3 Implementation of Solid waste management

The input to the sensor module would come from the waste bin which are placed at different localities in the public area

The sensor is placed in the garbage bin at a max level , if that level is crossed by the garbage in the bin, then sensor will sense that and will communicate to ARM 7 controller through Zig Bee technology.

When the garbage box 1 becomes full, the ultrasonic sensor attached to its lid will detect the level and send a command through zigbee. The zigbee receiver will receive that command and show the condition of garbage box on Liquid Crystal Display and on the computer .The Message would be that the garbage bin 1 in particular area is filled completely, please collect it". At the same time a same message will be sent to a driver's mobile that particular garbage bin is completely full through Short Message Service.

Same thing will happen when the garbage box 2 becomes full; the ultrasonic sensor will detect the level and send a command through zigbee. The zigbee receiver will receive that command and show on Liquid Crystal Display and computer that garbage bin 2 in another area is filled completely , please collect it. At the same time a same message will be sent to a driver's mobile to collect the garbage bins through Short Message Service.

By Instance even if both the garbage bin are full at the same time, then also both messages will be displayed on Liquid Crystal Display and computer of base station one by one. Also Short Message Service will be sent to driver's mobile one by one. [3]
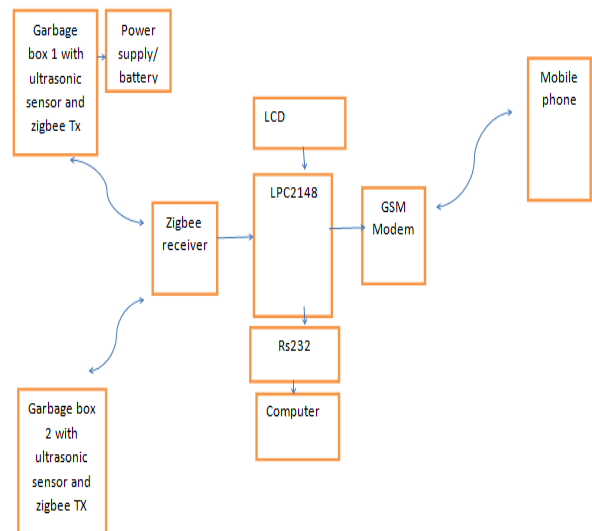

Fig. 3.1 Block diagram of solid waste management

Results and Discussion

Municipal solid waste management (MSWM) [6] is one of the major environmental problems of Indian cities. Improper management of municipal solid waste (MSW) causes hazards to inhabitants. Various studies reveal that about 90% of MSW is disposed of unscientifically in open dumps and landfills, creating problems to public health and the environment. In the present study, an attempt has been made to provide a comprehensive review of the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India.

This project solid waste monitoring and management system has been successfully implemented with the integration of communication technologies such as Zigbee, GSM and for truck monitoring system In this system, truck database has been developed in the way that information of truck ID, driver ID, date and time of waste collection, etc. are compiled and stored for monitoring and management activities. The proposed system would be able to monitor the solid waste collection process and management the overall collection process. It would provide in time solid waste collection and also overcome the disadvantages such as usage of minimum route, low fuel cost, clean environment and available vehicle. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for solid waste collection process monitoring and management for green environment
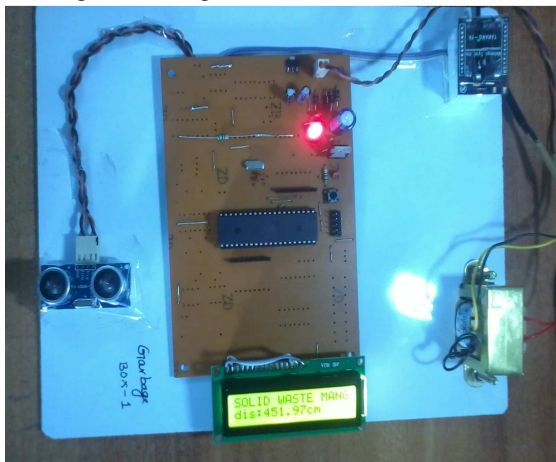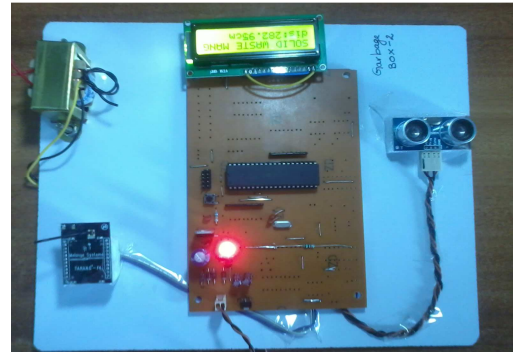

Fig. 4.1 Garbage box 1

Fig. 4.2 Garbage box 2

Fig 4.1 and 4.2 shows the different garbage boxes located at different places. They all communicate with central node as shown in fig 4.3
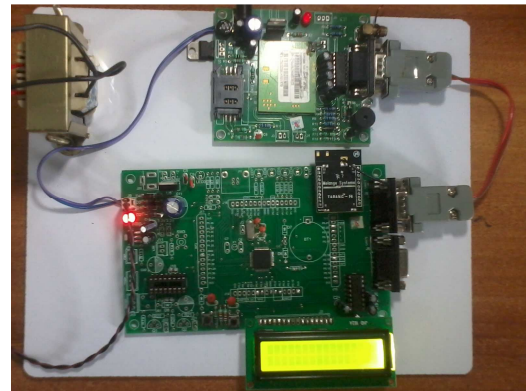

Fig. 4.3 central controlling unit

References

[1] Hassan, M. N. Chong, T. L., & Rahman. M. M. (2005). Solid Waste Management-What's The Malaysian Position. Seminar Waste to Energy, Universiti Putra Malaysia.

[2] Latifah, A., Mohd, A. A., & NurIlyana, M. (2009) . Municipal solid waste management in Malaysia: Practices and challenges. Waste Management, 29,2902-2906

[3] Vicentini, F. Giusti, A., Rovetta, A., Fan, X., He, Q., Zhu, M., & Liu, B. (2008). Sensorized waste collection container for content estimation and collection optimization. Waste Management.29, 1467-1472.

[4] " RFID and Integrated Technologies for Solid Waste Bin Monitoring System . Proceedings of the World Congress on Engineering 2010, June 30 - July 2, 2010, Vol I

[5] *Maher Arebey,M.A.Hannan ,Hassan Basri ,R A Begum and Huda Abdullah "Overview for Solid Waste Bin Monitoring and Collection System"*

[6] *Md. Shafiqul Islam, Maher Arebey, M.A. Hannan, Hasan Basri,2012 International Conference on Innovation, Management and Technology Research (ICIMTR2012), Malacca, Malaysia,21-22 May, 2012.*