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Waste Bin Monitoring System Using Integrated Technologies

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ABSTRACT : Now a days, there are a number of techniques which are purposefully used and are being build up for well management of garbage or solid waste . Zigbee and Global System for Mobile Communication (GSM) are the latest trends and are one of the best combination to be used in the project. Hence,a combination of both of these technologies is used in the project . To give a brief description of 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 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.

I. INTRODUCTION

In our daily 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.

A big Challenge in the urban cities is Solid waste management [1] .Not only in India but for most of the countries in the world. The project gives us one of the most efficient ways to keep our environment clean and green. Zigbee and Global System for Mobile Communication (GSM) are the latest trends and 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. To give a brief description of 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 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.

II.LITERATURE SURVEY

M. Al-Maaded, N. K. Madi, Ramazan Kahraman, A. Hodzic, N. G. Ozerkan [2]. They came to a point It is important to understand the societal concerns over the increased rate of resource consumption and waste production and therefore the policy makers have encouraged recycling and reuse strategies to reduce the demand for raw materials and to decrease the quantity of waste going to landfill.

Islam, M.S., Malaysia ,Arebey, M., Hannan, M.A. , Basri, H.[3].it is being proposed in this paper that introduction of an integrated system combined with an integrated system of Radio Frequency Identification, Global Position

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System, General Packet Radio Service , Geographic Information System and web camera will solve the problem of solid waste .They also analyzed the actual performance of the system .

Raghmani Singh, C. Dey, M.[4]. The objective of the study was to determine the characterization of the waste and the current system of management activities. The paper highlights an overview of the current municipal solid waste management (MSWM) system of Thoubal Municipality and it concludes with a few suggestions, which may be beneficial to the authorities to work towards further improvement of the current management systems.

III. TECHNOLOGIES INTEGRATED

III.1 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. In mesh Network , Zig Bee devices are generally used to transmit data or information over a long distance .This data or information is passed through intermediate instruments to reach the destination . The applications that require long battery life and low data rate use Zig Bee Technology because ZigBee has a defined rate of 250 Kbits/s which is the best rate for single signal transmission from a sensor or input device, creating a mesh network; i.e., a network with no head control or high-power transceiver able to reach all of the networked devices

ZigBee is a specification for a suite of high level communication protocols based on an IEEE 802.15.4 standard for personal area networks. ZigBee devices are mainly utilized in mesh network form to transmit data sequence over a longer distances and transmitting data through intermediate devices to reach more distant ones. Therefore, ZigBee networks are used to be form ad-hoc, with no centralized control or high-power transmitter/receiver able to reach all of the devices.

The Major applications of Zig Bee are the systems that require a lesser rate of data, longer battery life, and secure networking. ZigBee has a specific rate of 250 Kbit/s and is best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. The applications include electrical meters with in-home-displays, wireless light switches, traffic management systems and other consumer and industrial equipment that require short-range wireless transfer of data at relatively low rates. The device board is easily compatible with voltages like 3.3V and 5V.

III.2 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 fact of global standard for mobile communications with over 80% market share [5]. The GSM modem is interfaced with the ARM microcontroller. If the garbage Box is full and if SMS alert has to be sent to the central office through the GSM [5]. The compatibility between Microcontroller and GSM Module will be taken care by MAX-232 chip and at the receiver side. Mobile is in the hand of user which receives SMS. The GSM Module is interfaced with the ARM microcontroller through MAX 232. GSM Module has a SIM card, it sends an SMS to user, when an error introduced. They are used for sending and receiving SMS and MMS alerts.

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IV. IMPLEMENTATION

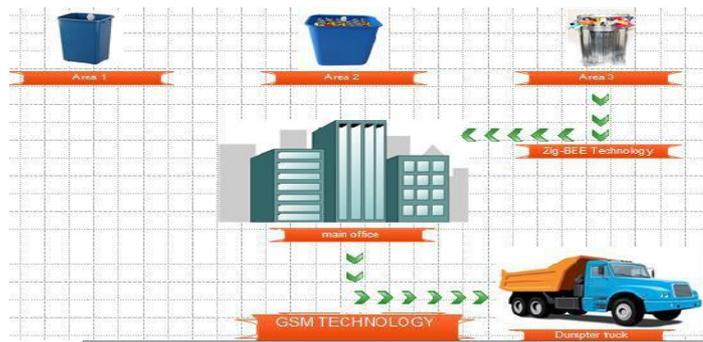


Fig. 1 Implementation of Solid waste management

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 always receive the 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 receiver attached to Zig bee will receive that command and will display that on Liquid Crystal Display (LCD) 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. [6]

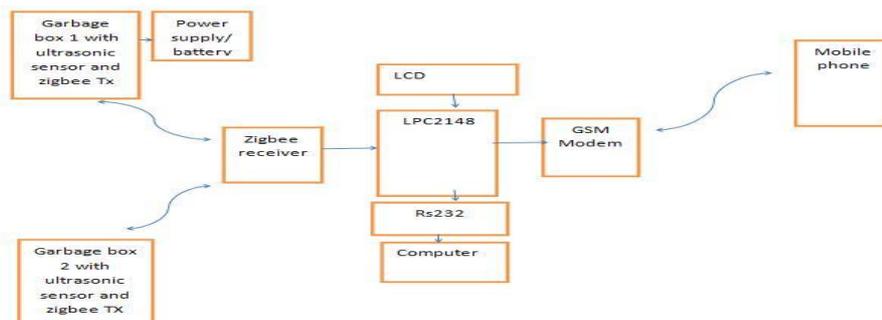


Fig. 2 Block diagram of solid waste management

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V. RESULTS

Municipal solid waste management (MSWM) [7] is one of the major environmental problems of Indian cities. The not so proper management system 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, which are effectively creating problems to public health and the environment. In the study recently , a sincere attempt has been made to provide a comprehensive and sincere review of the generation , characteristics, , collection and transportation. 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 The proposed system would be able to monitor the solid waste collection process and management the overall collection process. This technique would provide solid waste collection in time and also overcome all the disadvantages which are as use of minimum route, low fuel use, clean and green 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

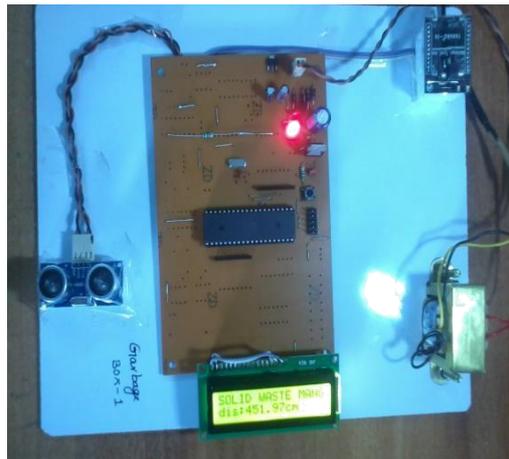


Fig. 3 Garbage box 1

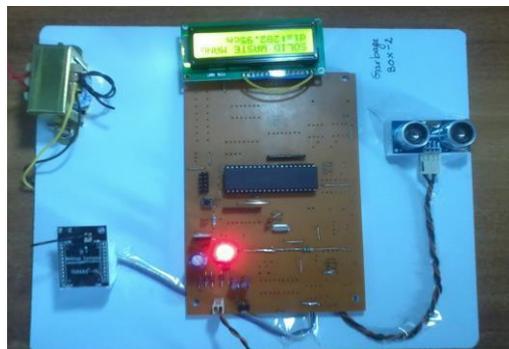


Fig.4 Garbage box 2

Fig 3 and Fig 4 shows the different garbage boxes located at different places. They all communicate with central node as shown in fig 5.

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Fig.5 Central Controlling Uni

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