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Solid Waste Bin Monitoring Using Zig –Bee

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ABSTRACT
Through the history, the significant amount of solid waste generated by humans was due to low population density and low levels of the exploitation of natural resources. Common waste produced during pre-modern times was mainly ashes and human biodegradable waste, which were released into the ground locally, with minimal environment impact. Tools made out of metal or woods were generally reused or passed down the generations and generations .
However, in mid-19th century, due to cholera outbreaks and the emergence of a public health debate that the first legislation on this solid waste issue emerged. the report The Sanitary Condition of the Labouring Population in 1842 of the social reformer, Edwin Chadwick, in which he argued for the importance of adequate waste removal and management facilities to improve the health and wellbeing of the city's population was highly effective.
Keywords*:* ARM 7, GSM, Solid Waste, Waste Management, Zig Bee

I. INTRODUCTION

The classification of Solid waste can be done into three main types by making reference to the sources of waste. These three types of solid waste are municipal solid waste, overall construction waste and special waste. The detailed description of some commonly used terms are described below.

Municipal solid waste includes domestic waste, commercial waste and industrial waste.

I.1 DOMESTIC WASTE:

It is nothing but household waste, the waste which is generated from daily activities in institutional premises and refuse collected from public cleansing services. Public cleansing waste includes dirt and litter collected by the Food and Environmental
Hygiene Department (FEHD), marine refuse collected by the Marine Department and waste from country parks collected by the Agriculture, Fisheries and Conservation Department.

I.2 COMMERCIAL WASTE :

It is the waste arising from commercial activities taking place in shops, hotels, offices, markets in private housing estates, etc. It is collected mainly by private waste collectors.

I.3 INDUSTRIAL WASTE:

It is waste arising from industrial activities and do not include construction waste and chemical waste. It is usually collected by private waste collectors. However, some industries deliver the industrial waste directly to landfills for disposal.

I.4 MUNICIPAL SOLID WASTE:

It contains a small portion of bulky items like domestic appliances which would not be handled by conventional compactor type refuse collection vehicles. These items are bulky waste and are usually collected separately.

Hence , we need a effective and ofcourse a new technology which can continuously improve the productivity, profitability, sustainability of Solid Waste monitoring and Collection System .

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

Hence our problem statement would be Designing a System Based on Arm 7 for collecting the garbage from a particular area – the area whose public Garbage Bin 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 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. TECNOLOGIES INTEGRATED

II.1 ZIGBEE TECHNOLOGY :

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802.15.4` standard for personal area networks. ZigBee devices are often used in mesh network form to transmit data over longer distances, passing data through intermediate devices to reach more distant ones. This allows ZigBee networks to be formed ad-hoc, with no centralized control or high-power transmitter/receiver able to reach all of the devices. Any ZigBee device can be tasked with running the network.

ZigBee is targeted at applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is a low-cost, low-power, wireless mesh network standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications. Low power-usage allows longer life with smaller batteries. Mesh networking provides high reliability and more extensive range. ZigBee chip vendors typically sell integrated radios and microcontrollers with between 60 KB and 256 KB flash memory.

II.2 GSM

The compatibility between Microcontroller and GSM Module[2] 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.

It is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. They are used for sending and receiving SMS and MMS alerts.. The GSM modem is interfaced with the ARM microcontroller [3]. If the parameter values of temperature, humidity, light intensity and soil moisture exceed the set points a SMS alert is sent to the user through the GSM.

III. IMPLEMENTATION

Fig.4.1 Actual Implementation

In Solid Waste Bin Monitoring And Collection System[4] , the ultrasonic sensors placed on the lid sense the level of the garbge Bin.When the level is reached to our expectation , signal is sent through Zig –Bee technology to the ARM Board placed in the Central Office .The Central Office will find out the place and area of the signal sent . And this Place and Area Of the Garbage Bin which is full, will be conveyed to the driver of the dumper truck through SMS , so that he can head towards that particular area without wasting time and fuel . As well as will get displayed in the central Office.

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 level so selected as , 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.

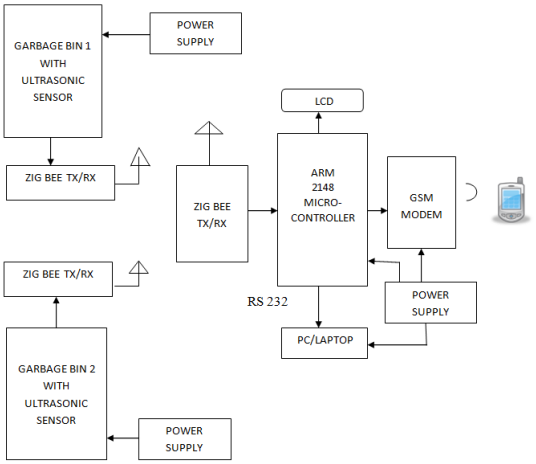

Fig 4.2 Block Diagram

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a *small* and cost-effective processor core.

Pipeline techniques[5] are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory.

The LPC21xx microcontrollers are based on a 16-bit/32-bit ARM7 CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory .

A power supply is a device that supplies electric power to an electrical load or circuit . The 5V supply is required for ARM board . Hence we will design the same .

IV. CONCLUSION

Solid Waste is a severe and important matter in which everyone needs to put responsive and immediate action without any delay. The proposed system would monitor the solid waste collection process and manage overall collection . It would provide in time solid waste collection resulting into clean environment, fuel saving and important time saving as well.

We have designed a solid waste moitoring and control system with advantages of low cost and accuracy. The benefits that this project can give is for global warming . for Applying Zigbee based WSN technologies is a revolution for protected Solid Waste Management which overcomes the limits of wired connection systems. In this we proposed a new approach using the so the user can view the required data anywhere from the world on his android mobile phone as these devices are connected via Internet. In our future work, it is proposed to implement the system using VLSI technology.

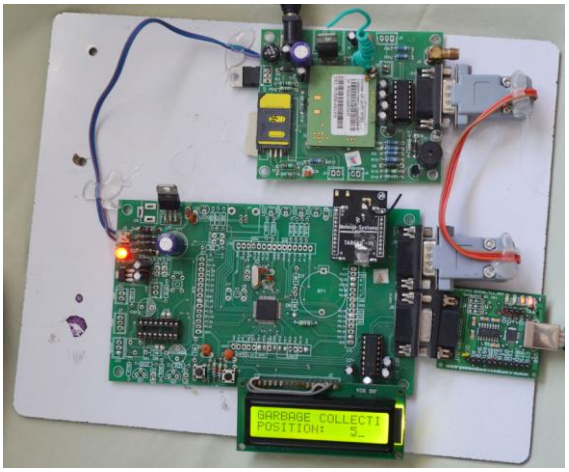

Fig 5.1 Cental Processing Unit

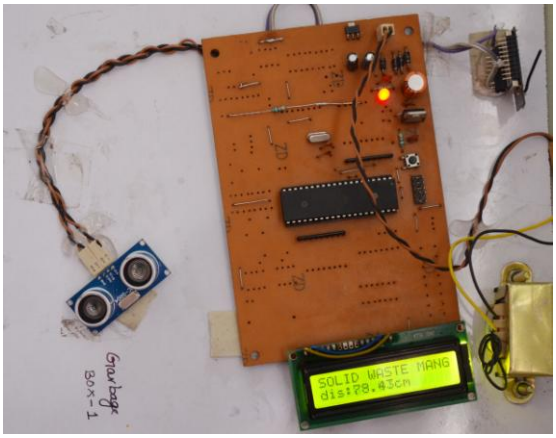

Fig 5.2 Garbage Box 1

Figure 5.2 and 5.3 shows the different garbage Boxws located at different places.They communicate with central node as shown in figure 5.1

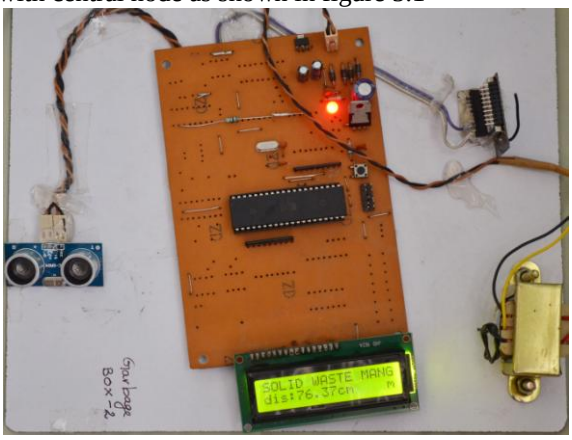

Fig 5.3 Garbage Box 2

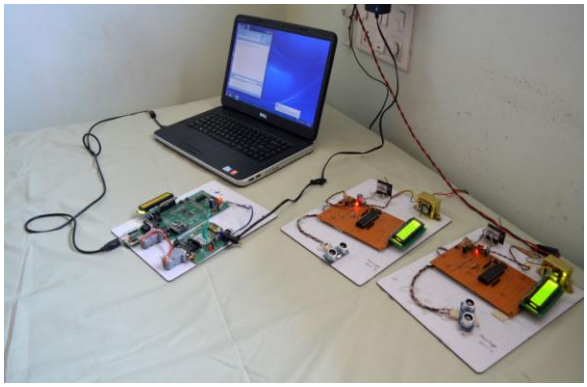

Fig 5.4 Complete System

REFERENCES

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

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

[3] *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] 4)Md. Shafiqul Islam, Maher Arebey, M.A. Hannan, Hasan Basri,*Zig Bee Based Waste Bin Monitoring System , 2012 International Conference on Innovation, Management and Technology Research (ICIMTR2012), Malacca, Malaysia*,21-22 May, 2012.

[5] *5)*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.*