INTELLIGENT WASTE SEGREGATION AND ALERTING SYSTEM USING IOT

Ms.R.VISHNUPRIYA[1], R.NIVETHITHA[2], S.SOWNDARYA[2], S.SUSHMITHA[2]

Assistant professor, Final year B.E. Students
Dept of Electronics and communication engineering,
Arasu engineering college, Kumbakonam-612501,India
ssowndarya1996@gmail.com

ABSTRACT

The Waste Management is the process which involves planning, financing, construction and operation of facilities for the disposition of waste after   collection, transportation, recycling . Rapid increase in population, it has led to improper waste management in metropolitan cities resulting is increased pests and spreading of diseases. The multi-fold increase in the quantity of solid waste generated becomes   a huge   challenge for environmental management , The need for intelligent waste management has led to the concept of the hierarchy of waste management that places the various means for dealing with Municipal Solid Waste (MSW) in order of environmental preferences. An efficient method to dispose this waste has been designed with Wireless Sensor Networks (WSN) using Bluetooth. Sensor have been made use of in the response system. The prototype based on efficient garbage disposal system is induced in a metropolitan city environment and has been implemented. In this paper posses two primary problem. The first primary problem is waste management. The garbage bins at public place get overflowed and they are not cleaned at proper time. The result of this land pollution, spread of diseases and also create ugliness to that place. So that the garbage level monitoring system is used to monitor the level of the garbage in dustbin if it is fully or not. If the garbage is filled it has send the signal to the municipal server through the internet of things (IOT). The primary problem is segregation of the waste. The improper segregation may cause mixing in landfills, it turns to toxic released in land and contamination of ground water and it also released the methane gas. The methane gas is very harmful to the environment. To properly segregate the waste it is to be handled, transporated and disposed. So it has used to reduce the work of the labours for sustainable environment, avoiding the spread of the diseases and maintaining the public cleanliness. The alerting signal is obtained by municipal web server through iot.
Keywords- ultrasonic sensor, moisture sensor, metal detector, Bluetooth, IOT

I.   INTRODUCTION

The Waste management is one of the primary problems in the world. The main issues in the waste management is that the garbage bin at the public place gets overflowed well in advance before the commencement of the next cleaning process. Improper segregation may cause mixing in landfills it turns leads to toxic release in the ground and eventual contamination of ground water. Methane gas is likely to be released in such circumstances, which is one of the harmful greenhouse gases. Even this poses some serious problem like it is not suitable for all type of environments and unable to segregate medical waste, sanitary waste and e-waste. The segregating waste with their bare hand might cause cuts and bruises due to glassy object. Infection may also lead to severe illness. In addition to high prevalence of bits of rodents, dog and other vermin. This system is still on large scale in India. Rags pickers play an important role in the recycling of urban solid waste. Rag picker have higher morbidity due to infection of   skin respiratory gastro intestinal track and multisystem allergic disorder. The most important reason for waste collection is the protection of the environment and the health of the problem. The segregation process is also important because if the waste not separated properly, if all gets mixed up in the landfills. The danger of this that they all leak after a period of time, resulting in leakage of toxic liquid at the bottom which can contaminate ground water and   release explosive methane gas. The generation of waste measured by 1.3% per annum. The urban population which is increasing Between 3 to 3.5 per annum   generates waste around 5% annually. Thus 42 million tonnes of municipal solid wastes are produced manually. Approximately 200gm to 600gm are generated per day. The collection of solid waste by the yardman varies from 50% to 90% .urban local bodies spend Rs 500 to 1500 per tons on solid waste management of which (60 to 70)% of the amount is on collection alone and 20% to 30% on transportation. The amount of fund that is spent on treatment and disposal of waste is minimal and hence crude dumping of this waste is practiced in most of the cities. If

_____

you do not segregate the waste approximately, such as dry waste, wet waste and even biomedical or sanitary waste, it will be dumped together at the landfill, when this happens the waste will leak toxic liquid that will start collecting at the bottom. Not only can in get mixed up in water bodies

and the soil over a period of time, it can also release the very exponential gas called methane.

II. **INTELLIGENT WASTE SEGREGATION AND ALERTING USING IOT-**In this section, we describe the block diagram of the system.

TRANSMITTER
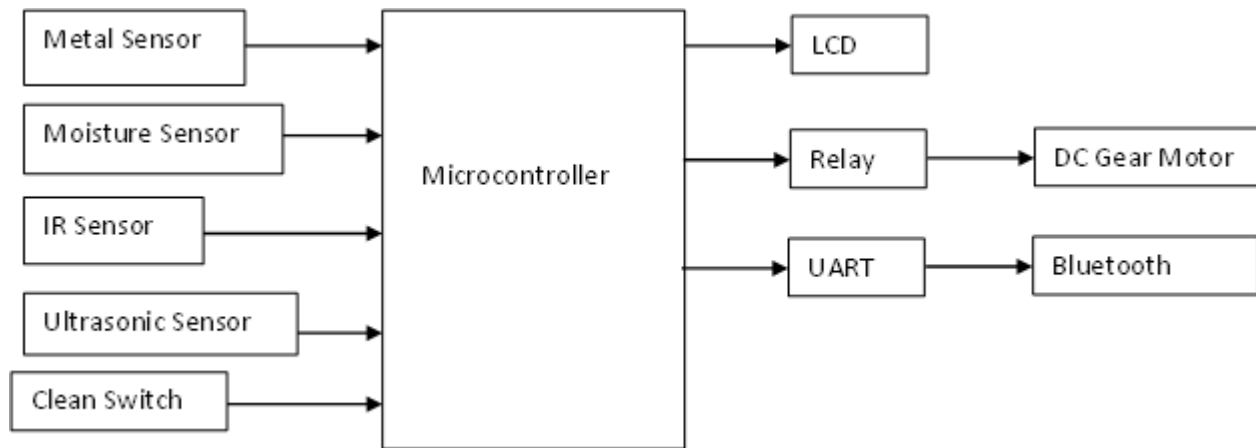
Figure 1: block diagram for waste segregation and alerting system

This section encompasses the design methodology of the waste management, which has a detailed description of the implementation of each block The system is designed in such a way that it avoids the overflow of the dustbin by Sending alerts to the web server with help of a pic microcontroller linked with a web server using Iot. It also Provides the verification process after cleaning the dustbin. In this, we try to differentiate between different types of waste such as dry waste and wet waste. We use moisture sensor along with IR sensor to differentiate between the type of waste present and a gear motor to segregate into respective dustbin.

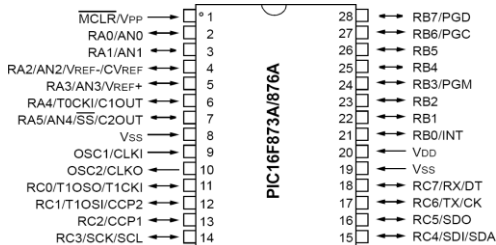III. **MAIN COMPONENT IN PROPOSED SYSTEM**

1. **PIC MICROCONTROLLER-**

Fig.2

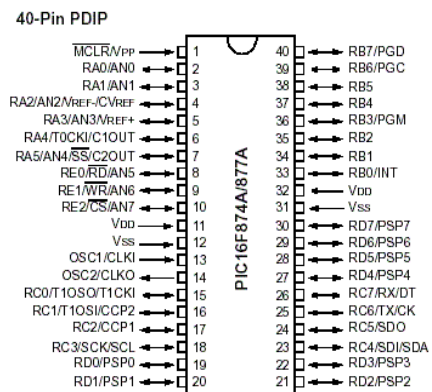Courtesy:http://mech.vub.ac.be/teaching/info/mechatronica/finished_projects_2007/Groep%202/Lift_Electronics.html

Fig.3

Courtesy: http://www.futurlec.com/Microchip/PIC16F874A.shtml

Block diagrams of the PIC16F873A/876A and PIC16F874A/877A devices are shown in Figs 2 & 3, respectively.. For more information refer PICmicro Mid-Range Reference Manual (DS33023),

Memory Organization- In each of the PIC16F87XA devices threr exists three memory blocks . The program memory and data memory have separate buses so that concurrent access can occur which is detailed in the following section.

_____

Program Memory Organization-PIC16F87XA have a 13-bit program counter capable of addressing an 8K word x 14 bit program memory space. And PIC16F876A/877A have 8K words x 14 bits of Flash program memory, while PIC16F873A/874A devices have 4K words x 14 bits. Accessing particular a location above the physically implemented address will cause a wraparound. For the present case Reset vector and interrupt vector are at 0000h and at 0004h. respectively.

Data Memory Organization- The data memory is partitioned into multiple banks which contain the GPR-General Purpose Registers and the SFR Special Function Registers. Each bank select bits namely Bits RP1 (Status<6>) and RP0 (Status<5>) extends up to 7Fh (128 bytes). The lower locations of each bank are reserved for the SPRs. Above the SPRs are GPRs, implemented as static RAM. All implemented banks contain Special Function Registers.

2. IR SENSOR:

Overview of the IR sensor:

IR sensors can be used for most indoor applications where no ambient light is present. A more complicated, ambient light ignoring sensor can also be used to measure the speed of moving object at a very high speed, like in industry or in tachometers. In such applications, that is ambient light ignoring sensor, which rely on sending 40 KHz pulsed signals cannot be used because there are time gaps between the pulses where the sensor is 'blind'.

The solution proposed doesn't contain any special components, like photo-diodes, photo-transistors, or IR receiver ICs, However it contains only a couple if IR leds, an Op amp, a transistor and a couple of resistors. Only , a standard IR led is used for the purpose of detection. Since the circuit is extremely simple, and any novice electronics hobbyist can easily understand and build it.

Object detection using IR

The basic principle of IR object detection is to send infrared light through IR-LEDs, which is then reflected by an object in front of the sensor.

For detecting the reflected IR light, another IR-detector is used It is an electrical property of LEDs –it Produces a voltage difference across its leads when it is exposed to light. It is a photo-cell, but with much lower output current. It is shown in the schematic diagram – in the present work we are using an Op-Amp (operational Amplifier) to accurately detect very small voltage changes.
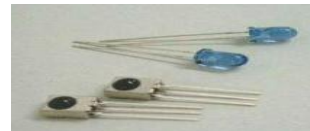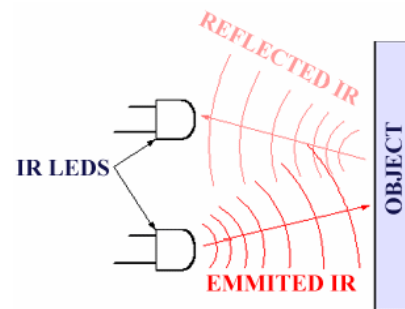

Figure 2: ir sensor

For sensing distances SDO sensors are used. When an inductive proximity sensor is used for sensing distance abd it refers to the sensor's ability to detect the "standard detectable object" at its specified sensing distance. The SDO-standard detectable object is a piece of ferrous iron of 1mm thick.

3. MOISTURE SENSOR-

This sensor can be used to test the moisture of waste in the bin based on that it detect the waste is a wet or a dry waste .the module output is at high level, else the output is at low level output mode, digital output is simple, analog output more accurate, serial output with exact readings. Here humidity sensor or soil moisture sensor is used both are used find the state of waste. Capacitance sensors are also used now for detecting the wet and dry waste.

Figure 3: moisture sensor

_____

4. ULTRASONIC SENSOR.

The working principle of Ultrasonic sensors is similar to radar or sonar .It detects a target by interpreting the echoes from radio or sound waves. Ultrasonic Sensors estimate the time interval between sending the signal and receiving the echo to determine the distance of an object

RELAY

A relay is an electrically operated switch. Relays mainly use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

5. UART

A universal asynchronous receiver/transmitter is a type of "asynchronous receiver/transmitter", It translates data between parallel and serial forms. UARTs are commonly used in combination with other communication standards such as EIA RS-232. UARTs are nowadays commonly included in microcontrollers. Modern ICs now come with UARTs which can also communicate synchronously; these devices are called USARTs.

In a computer UART controller is the key component of the serial communications subsystem. The UART takes bytes of data and it transmits the individual bits in a sequential fashion. At the destination, the individual bits are re assembled into complted bits by a second UART. At each end of the link a UART is used to convert the transmitted information between its sequential and parallel form.

6. BLUETOOTH

Bluetooth is a exclusive open wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating (PANs) with high levels of security. It can connect several devices without having the problem of synchronization.

A master Bluetooth device can communicate with a maximum of seven devices in a piconet (piconet:an ad-hoc computer network using Bluetooth technology), however not all devices will reach this maximum. The devices can switch roles, by agreement, i.e., the slave can become the master (for example, a headset initiating a connection to a phone will necessarily begin as master, but may subsequently prefer to be slave).

The Bluetooth Core Specification(BCE) provides for the connection of two or more piconets to form a scatternet. In scatternet certain devices simultaneously play the master role in one piconet and the slave role in another.

Many USB Bluetooth adapters /dongles are available, which includes an IrDA adapter. Older (pre-2003) Bluetooth dongles have limited capabilities, offering only the Bluetooth Enumerator and a less-powerful Bluetooth Radio incarnation. These devices can link computers with Bluetooth with a distance of 100 meters.

IV. EXISTING SYSTEM

In existing models, the following are done with RFID label with Electronic Product Code (EPC).
1.Real time monitoring of status of bins, 2.estimation of amount of waste in and around them, 3.surveillance for monitoring the movement of vehicles,a nd 4.optimization of routes and reallocation of bins according to the estimated waste. For this low frequency passive tags are proposed as they offer long term low cost solutions. Moreover these tags are operational in extreme conditions and resistant to environmental hazards. As soon as the container gets loaded onto the truck, the RFID reader reads the serial number of the tag on the container. The Global Positioning System (GPS) receiver on the truck calculates its location of the truck. The data like serial number of the tag, location, date and time are sent in real time via the Global System for Mobile (GSM) network to the communication gateway of the control server.

V. PROPOSED SYSTEM-

In proposed system, a new method is implemented with ultrasonic sensor which monitors and measures the garbage level continuously. IR Sensor sense the income and outgoing of the garbage. Metal and Moisture Sensor is use to classify the garbage for the recyclic process. Depends upon the garbage material type the DC gear motor will rotate. Once the garbage is full it notify the server by sending the message via Bluetooth to the android mobile, then the information are stored in the server through IOT. Finally, if the clean switch is press after the cleaning process. That information also sends through the message 'Garbage Cleaned' along with date and time via Bluetooth.

VI. METHODOLOGY-

The main theme of the proposed system is detection as well as segregation of waste. The waste is detected using the ultrasonic sensor it detect the level of the waste in the dustbin and the levels is programmed in the pic microcontroller based on the level the alert signal is given to the municipal web server through IOT. The same alert signal is also come to your mobile. Then the next process is segregation. They are different wastes like dry, wet, metal waste each waste are segregated in 3 different bins using the moisture sensor and metal detector. Based on the sensing of sensors the motor is rotated. For example if the waste is dry waste it is detected by moisture sensor

_____

then motor is rotated in 30 degree then the waste is fall into the related bin. Based on that method the segregation and alerting process will performed.

VII. CONCLUSION-

The implementation of smart garbage collection system using IOT, assures the cleaning of dustbin when the garbage level reaches its maximum. This system reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditures associated with the garbage collection. The proposed system is an efficient solution to the current waste management problem which is effectively segregates metal, dry and wet waste. This system can be effectively deployed in industrial material segregation. The sensor based smart dustbin effectively employs moisture sensor to segregate. Recycling the manufacture of the plastic using renewable resources and it also has an immense effect on the environment by managing the waste.

VIII. OUTPUT-

Figure 4: screenshot

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 Kebangsaan Malaysia". Report from Alam Flora.

[3]. Amrutha Chandramohan, Joyal Mendonca, Nikhil Ravi Shankar, Nikhil U Baheti, NitinKumar Krishnan Suma M S, "Automated Waste Segregator",Rashtreeya Vidyalaya College Of Engineering (R.V.C.E)

[4]. Prof. Mr. P. Balramdu, Prof. Mr. Manoj Kumar, Mr. Chape Laxman Murlidhar, Mr.Wankhade Sachin Sudamrao,Mr.Phalke Ulhas, Mr.Kotkar Narhari Ramkrushna, "Remote Monitoring and Sorting System for Waste Material Management Using RFID", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume **3** Issue 10, October 2014.

[5]. Subhasini Dwivedi, Michael Fernandes, Rohit D'souza, "A Review on PLC based Automatic Waste Segregator", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume **5** Issue 2, February 2016.

[6]. Priya B. K., T. Lavanya, V. Samyukta Reddy, Yarlagadda Pravallika, "Bin That Think's", The International Journal Of Science & Technoledge.

[7] Pedro Reis , Rui Pitarma, Celistino Goncalves, Intelligent System for Valorizing Solid Urban Waste, Filipe Caetano Faculty of Engineering UBI University of Beira Interior Covilha, Portugal, 2015.