Waste management system using IOT

[1]Dr.B.Karunaiah,[2]Mrs.D.Aruna Kumari

[1]Associate Professor,Mahaveer Institute of Science and Technology,Hyderabad

[2]Assistant Professor,Sri Indu Institute of Engineering and Technology,Hyderabad.

Abstract: Due to urbanization and the growth of the human population, waste production has been rising. Cities with overflowing trash cans have unsanitary conditions. This has an adverse effect on the environment, so an "Waste Management" was developed to lessen the workload for ragpickers because doing so by hand puts workers' health at risk. Wet, dry, and metallic waste are divided into three categories under the suggested system. This newly created technique makes garbage management profitable in addition to being costeffective. The appropriate sensors identify each type of garbage, which is then separated into the bins that are allotted to it. Information about the amount of waste disposed of is updated on the server on a regular basis.

Keywords:IOT,ARDUINO

I.Introduction

Poor waste disposal was a result of the population boom. Garbage management takes more time and labor than other tasks. In recent years waste disposal is becoming a huge cause. The most common method of waste disposal is unplanned and it is dumped at landfill sites this method causes ill effects to all living beings. This process can cause the environment to lose its aesthetic value by producing liquid leachate and other fungi that pollute surface and subsurface water. It can also hasten the spread of dangerous diseases. In India, ragpickers play a significant role in the process of recycling solid waste, but they also suffer from a variety of health issues, including skin disorders, infections, respiratory problems the dependent of ragpickers can be reduced if the automatic waste segregation takes place in the dustbin. The wastes are segregated into basic main streams such as metallic, dry and wet this waste has a large potential of recycled and reused. Even if there are numerous industrial waste segregators present, it is always preferable to segregate the garbage at the source since rag pickers are not required for this sort of segregation.

Additionally, rather than sending the garbage to a segregation facility first and then a recycling facility, the segregated waste can be transported straight to the recycling facility. The primary goal of this project is to develop a small, affordable, and user-friendly trash segregation system for urban communities to streamline the waste management process since there is currently no such system for automatically separating waste into dry, wet, and metallic waste. Many individuals are currently likely to live in cities for the convenience of making their work easy for the intended goals in all directions, and other people are moving from urban or rural locations for the purpose of pursuing education or other possibilities that are lacking in their home communities. As a result,

metro flesh-presser Cities will continue to see population growth.

Therefore, by default, if the population is higher, the wastage % is also higher than the average level, and sooner or later, that wastage overflows from the trash cans and results in a situation where the typical bin turns into a little sell-off backyard in every street. Consequently, it becomes the municipal authorities main issue to squash that waste in 2 time due to lack of on-the-spot communique. Therefore, depending on cutting-edge technology, transitioning to intelligent automation is the best way to minimize these kinds of situations. This strategy hasn't always been frequently used in our nation up to now. On our grounds, we are now using the most basic regular boxes and compressor containers.

II.Methodology

This device keeps an eye on the trash cans and reports on the amount of trash being gathered there. The trash cans are connected to a microcontroller based system and a specific number of soil moisture sensors. This system is connected so that you can see the outcomes. The information has been gathered, examined, and processed to show the state of the garbage being fed; if it is deemed to be correct, it will be accepted; if not, it won't. The device does this by detecting the rubbish level and comparing it to the depth of the garbage containers using ultrasonic sensors positioned over the bins. The Arduino is fed the working programme. The Arduino receives signals from the ultrasonic sensor in response to the garbage level. The GSM Module received the signal after being processed by the Arduino. In our setup, the GSM Module also serves as a transmitter. The hardware of the system can be made smaller thanks in large part to the GSM Module. In this manner, when the level of rubbish exceeds the threshold, a sensor is utilized to determine if the garbage is dry or wet. The motor's (30 RPM) purpose is to separate waste. The direction of rotation of the motor depends on whether the rubbish is moist or dry, or whether it contains metal.
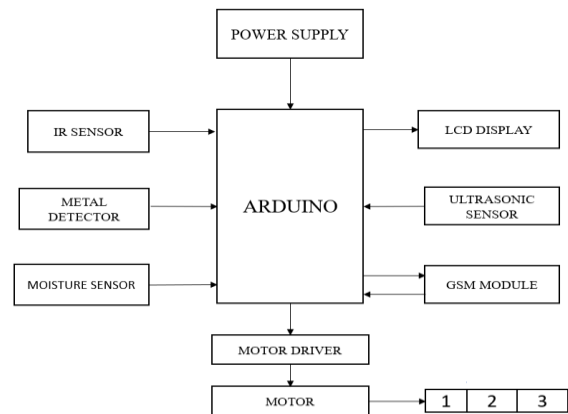
III. Block Diagram

Fig1: Block Diagram of Waste management

Power supply: The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. Transformer:Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC.

Rectifier:There are several ways of connecting diodes to make a rectifier to convert AC to DC. The bridge rectifier is the most important and it produces full-wave varying DC. A full-wave rectifier can also be made from just two diodes if a centre-tap transformer is used, but this method is rarely used now that diodes are cheaper. A single diode can be used as a rectifier but it only uses the positive (+) parts of the AC wave to produce half-wave varying DC.

Bridge Rectifier:When four diodes are connected in the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.

Smoothing:Smoothing is performed by a large value electrolytic capacitor connected across the

DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling. The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output.

Voltage Regulators:Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage.

Light Emitting Diode(LED):LED is abbreviation of Light Emitting Diode. It's nothing, but just a combination of semiconductors which emits light when current pass through it . Over the years, semiconductor technology has advanced to bigger heights, Light Emitting Devices have also been a part of this revolution and as a result, Now we have LED's which give better illumination with low power consumption.

Arduino Uno Board:Arduino/Genuino Uno is a microcontroller board based on the Atmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

GSM Module: GSM (Global System for Mobile communications) is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity.

The Switching System:

The switching system (SS) is responsible for performing call processing and subscriber-related functions. The switching system includes the following functional units.

- Home location register (HLR)**:** The HLR is a database used for storage and management of subscriptions. The HLR is considered the most important database, as it stores permanent data about subscribers, including a subscriber's service profile, location information, and activity status. When an individual buys a subscription from one of the PCS operators, he or she is registered in the HLR of that operator.

- Mobile services switching center (MSC):The MSC performs the telephony switching functions of the system. It controls calls to and from other telephone and data systems. It also performs such functions as toll ticketing, network interfacing, common channel signaling, and others.

- Visitor location register (VLR)**:** The VLR is a database that contains temporary information about subscribers that is needed by the MSC in order to service visiting subscribers. The VLR is always integrated with the MSC. When a mobile station roams into a new MSC area, the VLR connected to that MSC will request data about the mobile station from the HLR. Later, if the mobile station makes a call, the VLR will have the information needed for call setup without having to interrogate the HLR each time.

- Authentication center (AUC)**:** A unit called the AUC provides authentication and encryption parameters that verify the user's identity and ensure the confidentiality of each call. The AUC protects network operators from different types of fraud found in today's cellular world.

- Equipment identity register (EIR)**:** The EIR is a database that contains information about the identity of mobile equipment that prevents calls from stolen, unauthorized, or defective mobile stations. The AUC and EIR are implemented as stand-alone nodes or as a combined AUC/EIR node.

The Base Station System (BSS):

All radio-related functions are performed in the BSS, which consists of base station controllers (BSCs) and the base transceiver stations (BTSs).

- BSC: The BSC provides all the control functions and physical links between the MSC and BTS. It is a high-capacity switch that provides functions such as handover, cell configuration data, and control of radio frequency (RF) power levels in base transceiver stations. A number of BSCs are served by an MSC.

- BTS: The BTS handles the radio interface to the mobile station. The BTS is the radio equipment (transceivers and antennas) needed to service each cell in the network. A group of BTSs are controlled by a BSC.

The Operation And Support System

The operations and maintenance center (OMC) is connected to all equipment in the switching system and to the BSC. The implementation of OMC is called the operation and support system (OSS). The OSS is the functional entity from which the network operator monitors and controls the system. The purpose of OSS is to offer the customer cost-effective support for centralized, regional and local operational and maintenance activities that are required for a GSM network. An important function of OSS is to provide a network overview and support the maintenance activities of different operation and maintenance organizations.

IV.Advantages and Disadvantages

Advantages

- Decreasing the workload for ragpickers

- Easily divide the wet and dry waste

- Time Saving

- Decreasing the natural spread diseases

Disadvantages

- The main disadvantage is we cannot be notified until waste reaches certain level of bin.

Applications

- Wet and Dry Waste is separated, Dry waste like paper, glass, plastic and cardboard can easily recycled and wet waste like peels, fruits and leftovers etc the biodegradable waste to compost.
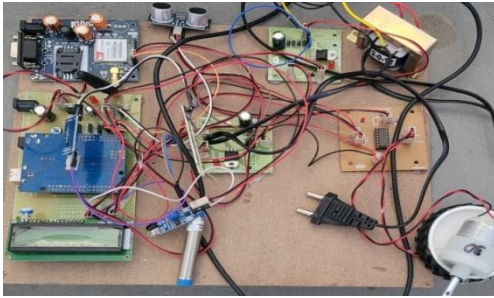
V.Results

Fig 6: SMS Sended as a notification when bin reaches certain level to Clear Bin

Fig2: Schematic Diagram of Waste Management System Using IoT
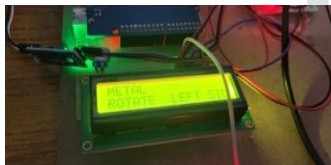

Fig 3: When Wet Waste is detected

Fig4: When Metal Waste is detected

Fig 5: When Dry Waste is detected

VI.Conclusion

The IoT-Garbage monitoring system contributes significantly to creating a clean, hygienic environment free of pollution. Given that this technology is new to India, there should be appropriate public awareness and attentiveness prior to its use. Otherwise, users' rough behavior could damage delicate equipment like sensors. It is an autonomous system that keeps track of dust bins in order to gauge their overall health. This eliminates the need for sporadic manual checks and overflowing waste bins by giving authorized users the proper updates on the position of the trash cans. Finally, this technique contributes to environmental preservation. as a result, trash collection is improved in terms of efficiency, effectiveness, and operation. The suggested smart bin is a successful waste segregation solution that prepares the way for prompt collection and disposal and requires no human involvement to separate dry and wet garbage. The suggested system can be installed in homes of small size or in public areas on a large scale.

VII.References

[1]. Abeesh A I, Amal Prakash P, Parvathy Mohan, Poornima, Dhanya M " IOT Based Waste Management, Monitoring& Tracking – SMART BIN", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, March 2018

[2]. Miss. Priya A. Jadhao, Miss. Sonal D. Sakhare, Miss. Kajal G. Bhaldane, Prof. Abhishek P. Narkhede, Prof. Vaibhav S. Girnale. Smart Garbage Monitoring and Collection System using IOT ,International Journal of Advance Engineering and Research Development, April 2018

[3]. Prof. R. M. Sahu, Akshay Godase, Pramod Shinde, Reshma Shinde, "Garbage and Street Light Monitoring System Using Internet of Things" International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering, ISSN (Online) 2321 – 2004, Vol. 4, Issue 4, April 2016.

[4]. Kanchan Mahajan, Prof. J. S. Chitode, "Waste Bin Monitoring System Using Integrated Technologies", International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 7, July 2014.

[5]. Twinkle Sinha, K. Mugesh Kumar, P. Saisharan, "SMART DUSTBIN", International Journal of Industrial Electronics and Electrical Engineering, ISSN: 2347-6982 Volume-3, Issue-5, May 2015.

[6] M.K.Pushpa , Aayushi Gupta , Shariq Mohammed Shaikh , Stuti Jha , Suchitra V.

"Microcontroller Based Automatic Waste Segregator"

[7] Mrs.D Anuradha , A Vanitha ,S Padma Priya ,S Maheshwar "Waste Management System Using IOT".

[8] IoT Based Smart Garbage and Waste Collection Bin – Technofist.