Food Waste Management System Using Smart Trashbin

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ABSTRACT

Over the years food wasted by people is not measured to reduce the wastage of food. Smart Bin System using GSM module to develop an intelligence bin which can monitor food waste through sensors and gives the information in detail, which are connected to microcontroller. Sensors will measure and calculate the amount of food waste disposed by every person and stores it in the database. Connecting embedded electronic device through a GSM module. It can be implemented with four steps Computing, Programming, Interfacing and Networking. RFID Card is the object used by every user for individual identification. RFID Card Reader is used to sense the RFID Card. After Successful detection of RFID Card bin will be opened for the user to dispose the food waste. Load cell is used to measure the food waste disposed by the particular user. It is connected with power Supply. The food wastage information is send via the SMS of the higher authorities. LCD Display is used to display the user id and food wastage details. DC Power Supply is used. Once the bin is full, information about that will be passed to the Authorities.

Keywords: Internet of things, RFID, Load cell.

I. INTRODUCTION

In India, thanks to the adoption of economy, the private sectors rose up in no time and thus caused urbanization rapidly. In 1901 census the share of urbanization was 11.4% where as in 2001 census it had been 28.53% and in 2011 census it rose to 31.16%. Consistent with a report by the World Bank, by 2030, quite 40% of the country's population is predicted to be in urban areas [3]. Consistent with a report of Times of India in 2017, India's urban population produces a whopping 62 million plenty of waste every annum. From this waste only about 22 - 28% of waste is treated and therefore the rest remains like that with none proper care. This causes pollution and harms the environment and causes many fatal diseases and results in slower economic process. Taken together, the main issue that India's dealing in today is that the 'waste management'. Wastes are often classified because the solid waste and the liquid waste, which in both form are harmful. It are often further classified as organic waste, e-waste, medical waste, reusable waste, recyclable waste, hazardous waste [7]. The liquid waste comes mainly from the three sources: residential areas, industrial areas, and commercial areas. While solid waste comprises of things like metal and tins scarps, garbage, old furniture etc. The workers come to gather waste in two to 3 days in

India from bins, but the dustbins are filled with dust then there are not any options to clear the dustbins [10]. It causes the spillage of the waste and thus creates unhygienic environment and causes many diseases. It's caused because the government doesn't have any means to see the status of the dustbin if it's full or not before the scheduled waste collection day, because the population is increasing at a really fast rate, this current model or scheme of waste collection doesn't properly works. The main aim of this paper is to develop a prototype for the longer term bins where the status of bins supported their depth is shipped of the officials once it's full and also to form the lid of the bins open and shut automatically as the person arrives so on improve the hygiene of the encompassing areas[13].

II. RELATED WORK

The new era of Web and Internet of Things (IoT) paradigm is being enabled by the proliferation of varied devices like RFIDs, sensors, and actuators. [3] Mart devices (devices having significant computational capabilities, transforming them to 'smart things') are embedded within the environment to watch and collect ambient information. In a city, this results in Smart City frameworks. Intelligent services might be offered on top of such information associated with any aspect of humans' activities. A typical example of services offered within the framework of Smart Cities is IoT-enabled waste management. Waste management involves not only the gathering of the waste within the field but also the transport and disposal to the appropriate locations.

In this paper, we present a comprehensive and thorough survey of ICT-enabled waste management models. Specifically, we specialise in the adoption of smart devices as a key enabling technology in contemporary waste management. We report on the strengths and weaknesses of varied models to reveal their characteristics. This survey sets up the idea for delivering new models within the domain because it reveals the requirements for outlining novel frameworks for waste management.

The paper [11] is predicated on the concept of Automation utilized in waste management system under the domain of Cleanliness and Hygiene. Dumping garbage onto the streets and in publicly areas may be a common synopsis found altogether developing countries and this mainly find yourself affecting the environment and creating several unhygienic conditions. So as to affect these problems Smart netbin is an ideology suggests which is a combination of hardware and software technologies i.e. connecting Wi-Fi system to the traditional dustbin so as to supply free internet facilities to the user for a specific period of your time. The technology awards the user for keeping the encompassing clean and thus work hand in hand for the right waste management during a locality. Smart netbin uses multiple technologies firstly the technology for measuring the quantity of trash dumped secondly the movement of the waste and lastly sending necessary signals and connecting the user to the Wi-Fi system. The proposed system will function on client server model, a cause which will assure clean environment, healthiness, and pollution free society.

Rapid increase in population, has led to the improper waste management in cities leading to increased pests and spreading of diseases[5]. Nowadays, the Garbage Collecting Vehicle (GCV) collects the waste twice or thrice during a week. So, the matter is over flowing of wastages on the roads. Hence, to beat this limitation, in this paper a scheme on smart waste management using Wireless Sensor Networks (WSN) and IoT (Internet of Things) is proposed. The rubbish bins are deployed with sensors and are networked together using WSN. The sensors deployed in the garbage bins collect the info for every determined interval. Once the edge is reached, it raises an invitation to the GCA (Garbage Collector Agent). This agent collects the

requests of all the filled vehicles and communicate using IoT framework. The experimental simulation is completed in proteus tool. A hardware prototype is developed for the proposed framework. Analysis of the proposed scheme provides better leads to waste management.

III. METHODOLOGY

The Internet of Things (IoT) shall be ready to incorporate transparently and seamlessly a outsized number of various systems, while providing data for many of people to use and capitalize. Building a general architecture for the IoT is hence a very complex task, mainly due to the extremely large sort of devices, link layer technologies, and services which will be involved in such a system. One among the most concerns with our environment has been solid waste management which impacts the health and environment of our society. The detection, monitoring and management of wastes are one among the first problems of this era. The normal way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and price which may easily be avoided with our present technologies. The proposed system has many advantages than the prevailing system. In Proposed system, user is identified individually by RFID user card. RFID Card reader is employed to detect the RFID card and identify the user individually. After card detection the bin opens automatically, then the user can dispose the garbage. After disposing the garbage the bin closes automatically. Load Cell is employed to live the garbage then the measurement is stored invariables. pic board and program are used to connect the smart bin to the pc. The graph is additionally designed on the idea of amount of garbage.
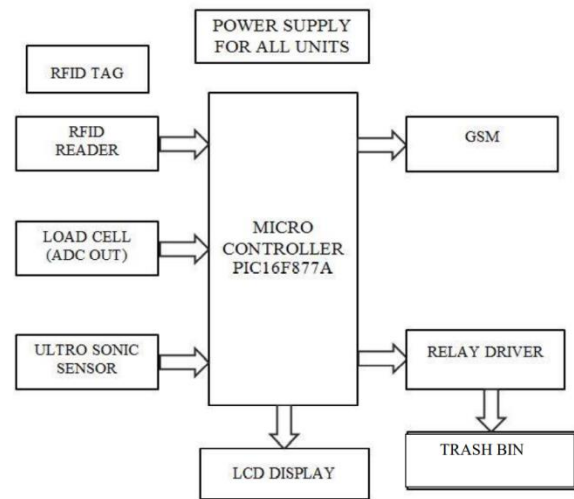

Fig 1: Diagram of Proposed System

The above block diagram explains connect the RFID reader, load cell, Ultrasonic sensor and LCD display connected in Microcontroller PIC16F877A. Identify the person using RFID TAG and RFID Reader after this process name are going to be display in LCD and eventually the ashcan will open and measure the load of the wastage. After the dustbin is full send the SMS using GSM module.   An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data. Variety of things can affect the distance at which a tag are often read (the read range). The frequency used for identification, the antenna gain, the orientation and polarization of the reader antenna and the transponder antenna, as well as the placement of the tag on the object to be identified will all have an impact on the RFID system's read range. The reader generates a magnetic flux through its integrated antenna at 125 kHz. Passive RFID transponders also have an integrated antenna that's tuned to an equivalent frequency. Once they are within range of the reader unit they're able to draw sufficient power from the electromagnetic field to power their own internal electronics. PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640.Originally developed by General Instrument's Microelectronics Division. The

name PIC initially referred to "Programmable Interface Controller".

Microcontrollers will combine other devices such as:

➢ A timer module to permit the microcontroller to perform tasks surely time periods.
➢ A serial I/O port to permit data to flow between the controller and other devices like a PIC or another microcontroller.
➢ An ADC to permit the microcontroller to simply accept analogue input data for processing.

This technique uses string gauge load cell for weighing the number of food. It's used to create an electrical signal whose magnitude is directly proportional to the force being measured. This signal are often a voltage change, current change or frequency change counting on the sort of load cell and circuitry used. The electrical signal output is usually within the order of a couple of milli-volts and requires amplification by an instrumentation amplifier before it are often used.

GSM is one among the most component during this project. Cell phones use a telephone service carrier's GSM network by checking out telephone towers within the nearby area. GSM networks operate during a number of various carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating within the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and therefore the United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems.

The structure of a GSM network

The network is structured into a variety of discrete sections:

➢ The Base Station Subsystem (the base stations and their controllers).
➢ The Network and Switching Subsystem (the a part of the network most almost like a hard and fast network). This is often sometimes also just called the core network.
➢ The GPRS Core Network (the optional part which allows packet based Internet connections).
➢ The Operations support system (OSS) for maintenance of the network.

Liquid cell displays (LCDs) are utilized in similar applications where LEDs are used. These applications are display of numeric and alphanumeric characters in matrix and segmental displays. When sufficient voltage is applied to the electrodes the liquid molecules would be aligned during a specific direction. The sunshine rays passing through the LCD would be rotated by the polarizer, which might end in activating/highlighting the specified characters.
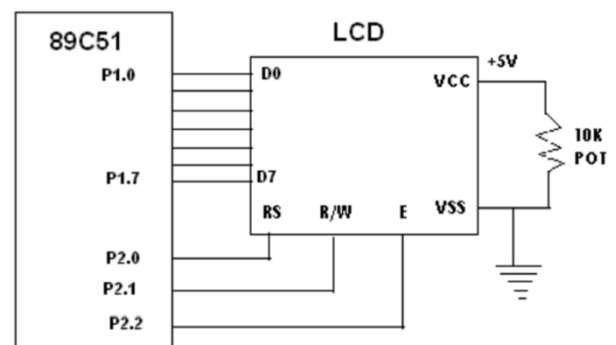

Fig 2: LCD interfacing with microcontroller

IV. EXPERIMENTAL RESULTS

A set of experiments carried out in this project. The performance evaluation of the system is performed using the database provided.

The screenshots of various phases of food waste management system are as follows:
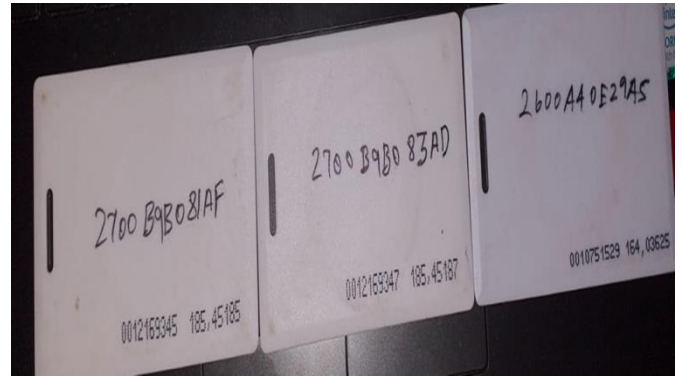
Fig 3: Model of food waste management system

Fig 4: LCD Display with connections.

Fig 5:RFID Tags which helps to identify the person.

Fig 6: Trash bin with ultrasonic sensor.

Fig 7: Display of the identified person in LCD

Fig 8: Notification of the filled trash bin in LCD
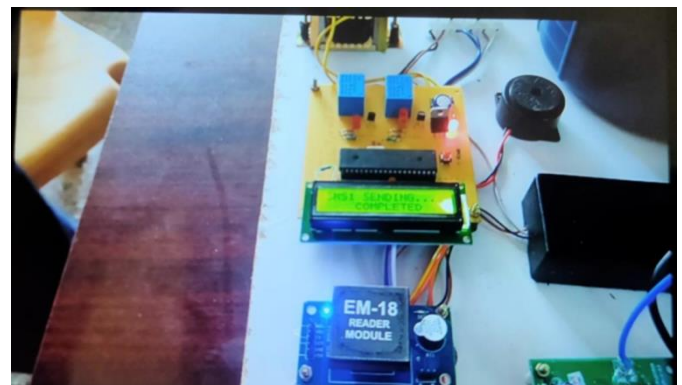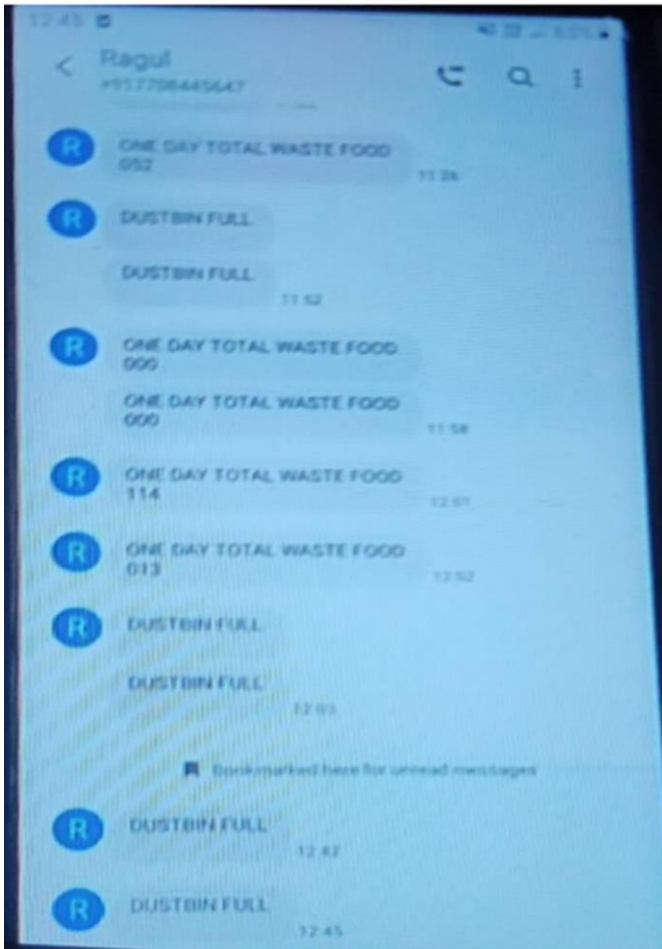
Fig 9:SMS notification.

V. CONCLUSION

The smart bin to see the amount of garbage in dustbin whether the dustbins are full or not. During this system the knowledge of dustbin are often accessed by the user/authorities from anywhere. When dustbin levels reached the condition details of bin are going to be stored to the authorities via database and this technique will reduce the monitoring system of cleaner to see the rubbish levels as result this may reduce the solid waste. During this system the wastage deposited by the individual also can be monitored. This maintains a transparent record of the user details. The user can access the bin by using the RFID cards. This greatly reduces the time and it also reduces the human effort. This also indicates the method that's happening within the bin.

VI. REFERENCES

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