



IOT BASED ADVANCED WASTE MANAGEMENT SYSTEM FOR SMART CITY

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ABSTARCT:

In the recent decades, Urbanization has increased tremendously. At the same phase there is an increase in waste production. Waste management has been a crucial issue to be considered. In today's world, the trash cans placed in the cities are jam-packed due to the increase in the waste. A lot of stinking and sewage problems causes bad hygienic conditions and leads to deadly diseases & human illness. To avoid these, this project is designed with a innovative idea with fully automated mechanism. This idea can be implemented for Smart Buildings, Cities, Colleges, Hospitals, Public spots and Bus stands. Each trash can contain a smart device for level detection of the trash can which transmits the garbage/trash level with its token ID, accessed by the concerned municipal/regional authorities through the mobile app, so that they can take immediate actions to clean the trash can once it gets filled. Further, this project is enhanced by monitoring pollution parameters at dustbin place. Hazard chemicals compositions, temperature values may increase due to this accumulated dust. So, Continuous monitor of these parameters and intimation to authorities also main important thing.

INTRODUCTION: In Smart Cities Generation of waste is increasing due to rapid growth of people and industries in urban areas and the biggest problem to authorities is Collection of wastage from different locations i.e Houses, Public Places and Industries[1]. Due to the lack of proper information an amount of 85% of the total municipal solid waste(MSW)[10] budget is spent on waste collection and transportation to tackle this problem we need an intelligence to monitor waste and gives the complete information to authorities by this they can easily solve the waste management problem with well-organized manner[6]. Today main issue for pollution is Garbage Overflow. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness. To avoid all such situations we are going to implement a project called IoT Based waste management using smart dustbin. Implementation is done with the help of IoT concept. The Internet of Things (IoT) is a concept in which surrounding objects are connected through wired and wireless networks without user intervention. Objects communicate and exchange information. In this system multiple dustbins are located throughout the city or the Campus, these dustbins are provided with a sensor which helps in tracking the level and weight of the garbage bins and a

unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level and weight of the bin reaches the threshold limit, the device will transmit the reading along with the unique ID provided. In order to avoid the decaying smell around the bin harm-less chemical sprinkler is used which will sprinkle the chemical as soon as the smell sensors detect the decaying smell. Pollution is the spread of contaminants into an environment that causes instability, disorder, harm or discomfort to the environment. Solid waste management is one of the major environmental problems of India. Solid waste management is the collection, transport, disposal, managing and monitoring of waste material. Garbage may consist of the municipal solid waste construction waste, commercial Garbage may consist of the municipal solid waste construction waste, commercial waste ,industrial waste etc... left over the city. This project is useful for creating "Smart City" and it is based on "Internet of Things". For healthy lifestyle cleanliness is needed and it begins with the use of trash bins. This project will help to eradicate or minimise the solid waste disposal problem. In present scenario, many times we see the garbage bins gets overloaded due to increase in solid waste everyday. It creates unhygienic environment and bad smell in the society and because

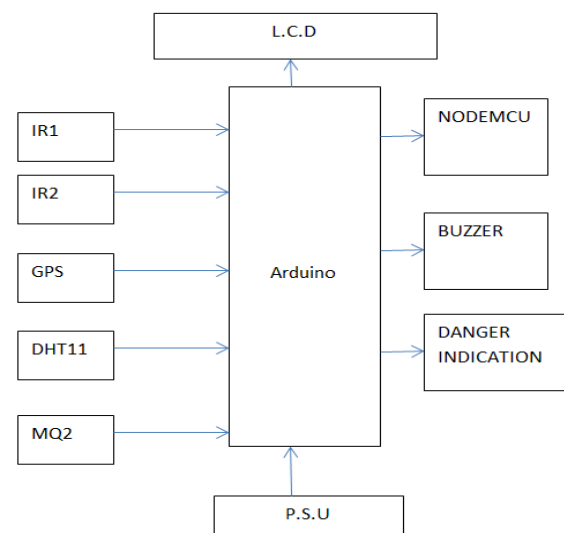
of this many disease get spread in the society to avoid this situation we are designing “Garbage monitoring system using Internet of Things” In this proposed system the multiple trash bins are located throughout the city, these trash bins are embedded with low cost embedded device. When the dustbin gets half filled that is when the threshold value become 50% then the corporation will get notification and when the garbage level will reach the threshold value 80% then the notification will get half filled. For the realisation of the topic of research, relevant information in the international scientific arena was collected through studies of the diverse literature from text books/literature, international scientific journals, environmental progress report from different agencies, internet website, reports by governmental agencies, substantial knowledge was gathered and a review of what other scientist have written on issues concurring with the research topic was made. Literature review was then undertaken to gather information on the research in the field of impact of urban waste on the quality of ground water and soil in different areas. The characteristics and composition of the urban waste i.e. sewage and municipal solid waste was studied by various workers in the world. Literature shows evidences of the work carried out on the health risk assessment due to urban waste. The impact of urbanization on the water quality as well as soil quality was also studied by various researchers in the different parts of the world. At International level, there are various organizations including private and government which are working in the field of environment and are engaged in research and development in the field of waste management. The international agencies like World Health Organization (WHO), Environmental Protection Agency (EPA) and United Nations Environment Program (UNEP) are engaged in developing new technologies for waste management and its disposal including its characterization. The clear idea about literature review at national and international level is given below Management of Municipal Solid Waste for various cities and towns has been widely studied throughout the world. As the huge quantities of solid waste generated in the urban areas is the major problem, majority of researchers concentrated on this issue.

LITERATURE SURVEY:

Mahar et.al., 2007[1] reported the review and analysis of solid waste management situation in urban areas of Pakistan. According to him poor solid waste management is one of the major causes for environmental degradation in Pakistan. According to Rajput et.al., 2009[2], municipal firm squander production displayed divergent fashion and a beneficial parallel with monetary development in

expression of kg/capita/day firm waste production at humanity weighing machine. Yadav and Devi, 2009[3] conducted studies on the solid waste management in Mysore city. Shivayoginath et.al., 2007[4] standard out a look into on neighborhood firm ravage supervision in Raichur city. They methodically deliberate all the mechanism of metropolitan rock-hard squander administration and also optional technical administration. Agarwal et.al., 2005[5] investigated recycling of the unrestricted firm waste (MSW) in the Indian capital city of Delhi. They establish that an unceremonious division comprising waste recyclists and a pecking order of eco-friendly dealers plays an significant position in the administration of firm waste. Sharholy et.al., 2008[6] reviewed the location of community firm waste association in Indian cities. They reported that civic firm waste supervision (CFWS) is one of the chief ecological harms of Indian cities. Upadhyay et.al., 2005[7] belongings to perceive the in progress state of affairs of waste institute and the options accessible to swap these wastes into obliging foodstuffs. Zhu Minghua et.al., 2009[8] studied the management practices carried out for the solid waste from Pudong New Area, China. They have illustrated important aspects of waste management, such as the current status of waste collection, transport and disposal in Pudong area. Moqsud and Hayashi, 2006[9], evaluated solid waste management practice in Japan and found that 20.3% of total solid waste generated in Japan is land filled, including ash from incineration. According to Moqsud and Hayashi, the “waste management hierarchy” (minimization, recovery, transformation and disposal) has been adopted by Japan in recent times as the menu for developing solid waste management strategies.

PROPOSED ARCHITECURE:



IR sensor1, sensor2 are used to measure the dust occupancy of dustbin. Based on dustbin occupancy message information will be passed to the authorized department through WIFI module using IOT technology. GPS device is used to location of the GPS. GPS location values also will be sent to department persons along with dust bin occupancy. As an enhancement pollution parameters due to garbage also is monitored using LM25, DHT11 and MQ2 sensors. Hazard gases are measured using MQ2 sensor, humidity levels are measured using DHT11 sensor and temperature values are measured using LM35 module. If any calibrated values exceeds predefined threshold value; dangerous warning message will be sent to department persons using WIFI module. Automatically buzzer will on, LED indication will on for indication purpose.

ARDUINO: The Arduino Software (IDE) allows you to write programs and upload them to your board. In the Arduino Software page you will find two options:

1. If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor). It will allow you to save your sketches in the cloud, having them available from any device and backed up. You will always have the most up-to-date version of the IDE without the need to install updates or community generated libraries.
2. If you would rather work offline, you should use the latest version of the desktop IDE. Code online on the Arduino Web Editor To use the online IDE simply follow these instructions. Remember that boards work out-of-the-box on the Web Editor, no need to install anything. Install the Arduino Desktop IDE

LIQUID CRYSTAL DISPLAY: The LCD is used for the purpose of displaying the words which we are given in the program code. This code will be executed on microcontroller chip. By following the instructions in code the LCD display the related words. Fig shows the LCD display.

Introduction



Fig. : LCD Display

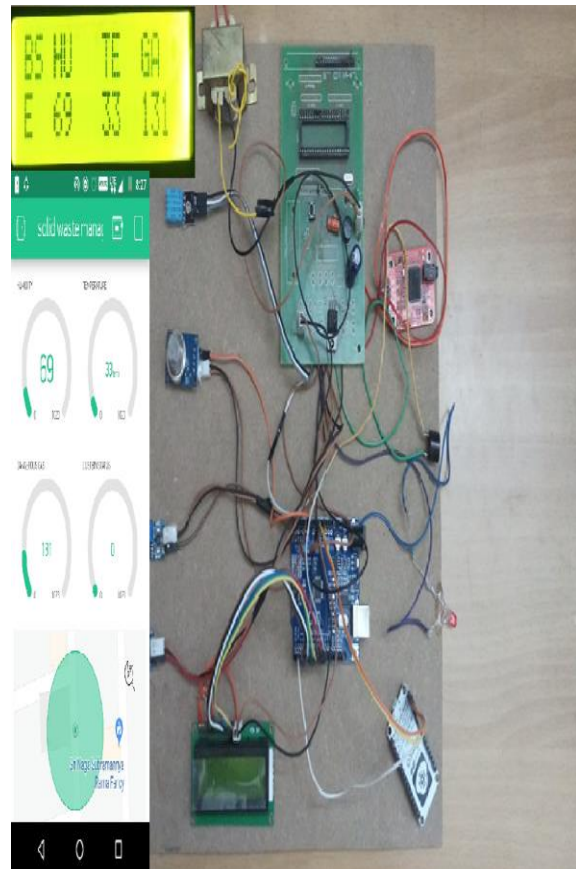
The LCD display consists of two lines, 20 characters per line that is interfaced with the PIC16F73. The protocol (handshaking) for the display is as shown in Fig. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen. Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

NODEMCU ESP8266:

The ESP8266 series, or family, of Wi-Fi chips is produced by Espressif Systems, a fabless semiconductor company operating out of Shanghai, China. The ESP8266 series presently includes the ESP8266EX and ESP8285 chips. **ESP8266EX** (simply referred to as ESP8266) is a system-on-chip (SoC) which integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overlocked to 160 MHz). It has a 64 KiB boot ROM, 32 KiB instruction RAM, and 80 KiB user data RAM. (Also, 32 KiB instruction cache RAM and 16 KiB ETS system data RAM.) External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the center. The ESP8266 is a System on a Chip (SoC), manufactured by the Chinese company Espressif. It consists of a Tensilica L106 32-bit **micro controller** unit (MCU) and a **Wi-Fi transceiver**. It has **11 GPIO pins*** (General Purpose Input/Output pins), and an **analog input** as well. This means that you can program it like any normal Arduino or other

microcontroller. And on top of that, you get Wi-Fi communication, so you can use it to connect to your Wi-Fi network, connect to the Internet, host a web server with real web pages, let your smartphone connect to it, etc ... The possibilities are endless! It's no wonder that this chip has become the most popular IOT device available. The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

RESULT:



CONCLUSION:

In this paper an Arduino sensor based automated garbage monitoring system is developed to monitor the garbage through the city. The system is more

effective in informing the municipalities about the status of the garbage at garbage bin location when the status of the garbage becomes full. Measuring the level of the garbage and informing the society and municipalities about at which level the garbage is and informing the driver to collect the garbage is the main feature that is developed in the project which makes the system more reliable and efficient

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