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Efficient IOT Based on Smart Bin for Clean Environment

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ABSTRACT: Hospitals produce a vast amount of potentially dangerous wastes. Because there are so many people working in hospitals, serving all different types of functions, everyone from the doctor to the janitor needs to know the proper protocols for disposing of dangerous wastes. Otherwise, the wastes could pose problems for the hospital staff and/or public by making them vulnerable to infectious diseases such as AIDS, typhoid, boils, and Hepatitis A or B. The prime aim of this presentation is to project a novel new way for municipal waste segregation in India where most of the waste separation at present are done by rag pickers who mainly separate all the waste including harmful hospital parents. To overcome of this problem we are proposing implementation of an automated waste segregator at the hospital and medical clinic. The sensing unit consists of proximity sensor, a moisture sensor, a Water sensor, a gas sensor and an ultrasonic sensor used to detect and identify various types of waste respectively. After that with the help of wi-fi module hospital or medical authority can get the all the information.

KEY WORDS: Arduino UNO, Sensor, Smart bin IOT, Rain detector.

I. INTRODUCTION

A Smart City is a city development to manage multiple information and communication technology (ICT) in order to make a solution for any problem in the city. Smart city includes many information such as, local department information system, schools, libraries, transportation system, hospital, power plants, law, traffic system, waste management, and others city services. The goal of a smart city is to improve an efficiency of services and connect all information into one system. Nowadays, development of ICT especially internet of things (IoT) allow the city to be developed into smart city. The aforementioned concept is being realized through the use of real-time systems and sensors, where (a) data are collected from citizens and objects (things), then (b) processed in real-time and finally (c) the gathered information and related extracted knowledge are becoming the keys to tackling inefficiency. In this context, waste management involves numerous waste bins that exhibit significant filling variations (over days and seasons or location) and diverse requirements for emptying, from sporadic (a few times within a week) to very frequent (several times a day). On the other hand, other waste forms (i.e. agricultural, biomedical, chemical, electronic, mineral, organic/inorganic, and radioactive, etc.) are characterized by specific collection points, uniform and predictable production, and equal, usually long, filling periods. C.Nagarajan et al [5,7,9] proposed the detection of the fill-level for urban solid-waste-bins presents many difficulties due to the various irregularities of the waste-bin filling process, such as the irregular shape and the variety of the included materials.

II. PROBLEM DEFINITION

People dispose domestic wastes in the dustbins placed at the roadside. This public dustbin gets filled uprandomly. Continuous human monitoring is required to control the overflow level of the dustbin, because sometimes the dustbins fill up faster than usual. When dustbins overflow people can't dispose their wastes in the dustbin, so they dispose it outside the bin. In rainy season, the situation gets worse when rain water enters the dustbin, releasing bad odours. In order to prevent the overflow and to avoid people disposing their wastes outside the bin, we are proposing a smart bin system, which can detect overflow and alert the authorities and also detect the wastes being placed around the bin, and

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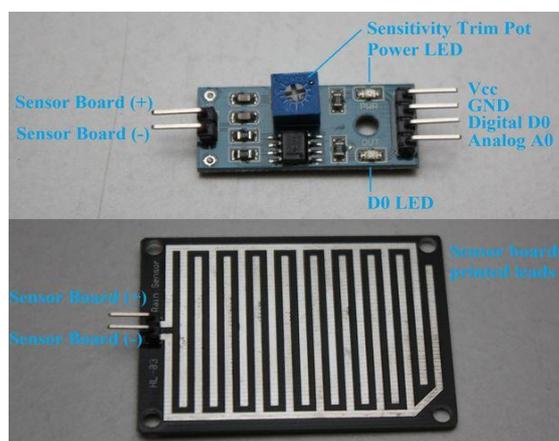
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send a buzzer to stop the people from disposing the wastes outside. Moreover a water Sensor is present which detects water and automatically closes the door in case of rain.

III. HARDWARE IMPLEMENTS

1. Rain sensor:

Rain sensors are connected to detect rainfall, Rain sensors are a group of water sensors clustered with an AND gate. So, a rain sensor detects rain by placing water sensors on the various sides, and by using the data on all the water sensors, a rain is detected.



Fig(a): RAIN SENSOR

2. Smoke Sensor:

MQ2 Gas Sensor module is used in this work for detecting flammable gases H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane. This sensor uses SnO₂, which has lower conductivity in clean air. When the targeted flammable gas is present, the sensor's conductivity gets higher as the gas concentration rises. This change of conductivity may be converted to corresponding voltage output signal of gas concentration through a simple circuit. The sensor has large measurement range (300-10,000 ppm), high sensitivity, fast response time. The sensitivity of the sensor can be adjusted by potentiometer. The output can be an analog signal (A0) that can be read with an analog input of the Arduino or a digital output (D0) that can be read with a digital input of the Arduino. Details of the interfacing circuit of MQ2 gas sensor.



Fig(2): GAS SENSOR

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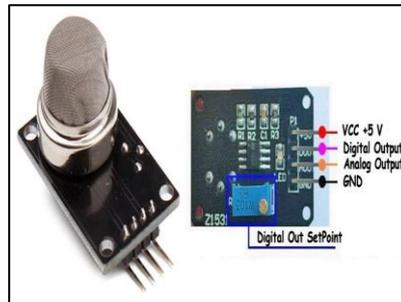
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3. UltrasonicSensor:

The ultrasonic ranging module, HC-SR04 is used in this work for garbage volume sensing in bins due to its low cost and good accuracy. It comprises ultrasonic transmitters, receiver and a control circuit, powered by a 5V supply. A high-level voltage signal is applied for 10 microseconds at the input pin of sensor which generates eight 40 kHz burst pulses which hit the target object and return. The module detects the returned pulses. The fill volume is inversely related to the time delay elapsed between transmitted ultrasonic burst and received echo signal. The HCSR04 connections and working principle. The measurement range of the sensor is 2400 cm with an accuracy of 3 mm and 15° angle of coverage.



Fig(3): ULTRASONIC SENSOR

4. Infra-red sensor:

Infra-red is connected to detect wastes placed around the dustbin. When an object is thrown near the bin, the infra-red sensor detects it and switches ON the buzzer.

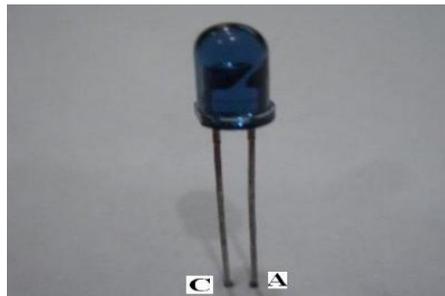


Fig (4): IR SENSOR

IV. IMPLEMENTATION AND METHODOLOGY

This smart bin system is very useful in preventing overflow of dustbins and accumulation of wastes around the dustbin. This prototype model monitors the bins and provides details about the level of garbage collected in the garbage bins via sensors & Internet. This system uses an Arduino device with a power supply. Ultrasonic Sensors placed over the bins lid to detect the garbage outside bin. IR Sensor is used to sense near garbage if any

Arduino:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, 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 The most important advantage with



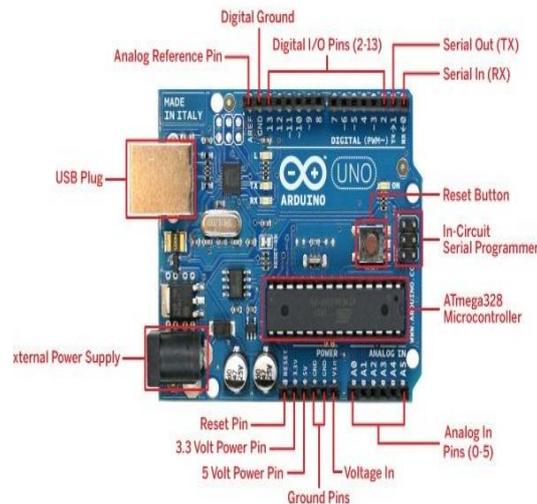
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Arduino is the programs can be directly loaded to the device without requiring any hardware programmer to burn the program. This is done because of the presence of the 0.5KB of Bootloader which allows the program to be burned into the circuit. All we have to do is to download the Arduino software and writing the code.



Fig(5): ARDUINO

V. CONCLUSION

Many works have been going on to reduce amount of waste accumulation and to maintain and dispose the waste present in the bin. Thus, by implementing these smart bins all around the world, the bins will be user friendly, and there will be hygienic environment around the bin. It will also be useful for the authorities who can inform the concerned to prevent the dustbin from getting overflow hence human monitoring is reduced. Using this, we can monitor the complete waste disposal in an efficient way. An Infra-red Sensor system is present in the bin to detect objects placed around the dustbin. This system will give alarm sound signals when we keep garbage's around the dust bin. This in turn will reduce the time the dustbin is overfilled, and hence will serve very useful for the society and the environment and surroundings where we live for the betterment of our future.

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