Sensor Based Mediwaste Disposal Smart Trash Bin

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Abstract— The main idea of SENSOR BASED MEDIWASTE DISPOSAL SMART TRASH BIN is how efficiently the bio-medical wastes are collected in the hospital especially in the wards using the concept of IOT. Proper medical waste management strategy is needed to ensure health and environmental safety. Usage of common dustbin for collecting both the normal and medical wastage then there occurs a creation of infectious bacteria and viruses to avoid such cases we proposed a partitioned bin to collect both the wastages separately in the common bin. GSM module is used for communication between the authority and the bin. Image processing is proposed to segregate the medical waste and normal waste. The automatic open close of the lid, measure of distance between the object and bin, motion of the object are all achieved by using sensors like Servo Motor, Ultrasonic Sensor, and PIR Sensor. The entire process is carried out by the open source Arduino platform embedded with the micro-controller. To dispose the medical waste in a proper way and provide clean environment to the patient.

Key words: Bio-Medical Waste, IoT, Ultrasonic Sensor, PIR Sensor, Servo Motor, Image Processing, Arduino, GSM Module

I. INTRODUCTION

Inefficient collection of medical waste leads to the pollution in the hospitals. The wastages that are collected in the wards are to be segregated from the normal wastage since they form the toxic chemicals when treated together with each other to avoid such reactions the bin is partitioned into two parts with two separate lids one partition contains the medical waste and the other contains the normal waste. Image processing methodology has been implemented for the identification of objects as well. In this technology the image of the wastage thrown in the dustbin is being captured by the camera and it is compared along with the image set stored.

After processing the image the lid of particular wastage is opened. The technique of GSM module is used to send the alert message of the bin status to the concern authority along with the bin id. After receiving the message the concerned person is sent from the authority to collect that wastages from that particular bin.

The above mentioned concept is being realized through the use of real time systems and sensors. The filling level of the garbage in the dustbin and the distance between the object and the bin is identified using the ultrasonic sensor. Programming in the Arduino is done in such a way that once a particular level of filling is sensed and the information is sent. PIR Sensor is used to detect the heat and motion of the wastage.

II. LITERATURE SURVEY

The idea of shrewd receptacles isn't new, it has been in talks for a great part of the time. Actually it is as of now being executed is a few sections of the world. A few answers for waste administration framework with IOT office have been proposed by different creators in their writings. Some of them are as per the following

1) Narayan Sharma, Nirman Singha, Tanmoy Dutta, "Keen container usage for brilliant urban communities", International diary of Scientific And Engineering Research, Volume 6, Issue 9, September 2015.

 In this they outfitted the savvy receptacles with ultrasonic sensors which measure the dimension of dustbin being topped off. The compartment is isolated into three dimensions (h/3, 2h/3, h) of waste being gathered in it. Each time the rubbish crosses a dimension of the sensors gets the information of the filled dimension. This information is additionally sent to the refuse analyzer as text utilizing GSM module.

2) Akshan Wijaya, Zahir Zainudd, Muhammed Nizwar, "Plan squander canister for savvy squander the board", Institute Of Electrical and Electronics Engineers, August 2017.

A shrewd waste canister that comprise of a keen sensor and brilliant correspondence.

3) Vinoth Kumar, Senthil Kumaran, Krishna Kumar, Mahantesh Mathapati, "Shrewd trash checking and leeway framework utilizing IOT", Institute Of Electrical And Electronics Engineers, August 2017.

IOT based shrewd waste clean administration framework which looks at the waste dimension over the dustbins by utilizing sensor frameworks.

4) Prof.R.M.Sahu, Akshay Godase, Pramod Shinde, Reshma Shinde, "Junk and road light checking framework utilizing IOT", International Journa Of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering Volume 4, Issue 4, April 2016.

In this they have manufactured a system in which a camera will be setted every waste gathering point close by load cell sensor at base of the junk can. The Camera will take persistent depictions of the rubbish can. A limit level is set which thinks about the yield of camera and load sensor.

This correlation is finished with assistance of microcontroller. In the wake of investigating the picture and load cell sensor a thought regarding level and load of the trash can be known. As needs be data is prepared for example controller checks if the limit level surpass or not. This module is costly and for all intents and purposes not attainable.

III. METHODOLOGY

A. GSM Module

GSM modem can acknowledge any GSM organize administrator SIM card and act simply like a cell phone with its own exceptional telephone number. It very well may be utilized to send and get sms or make/get voice calls. It can

likewise be utilized in GPRS mode to associate with web and numerous application for information logging and control.
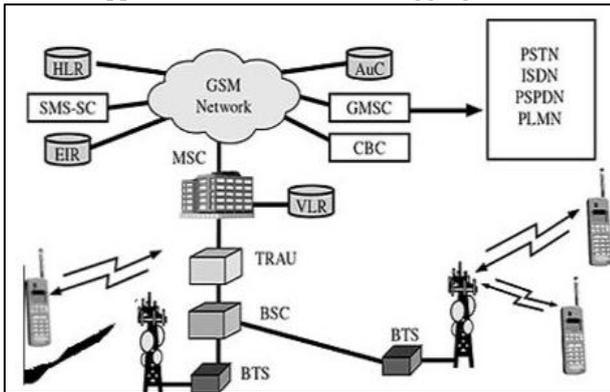

Fig. 1: GSM Module

B. PIR Sensor

PIR sensors enable you to detect movement. They are utilized to recognize whether a human has moved in or out of the sensor's range. the upsides of PIR Sensors is Small in size, Wide focal point go , Easy to interface, Inexpensive, Low-control, Easy to utilize, Do not wear out.
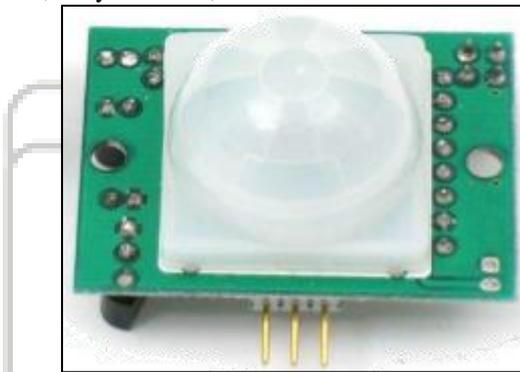

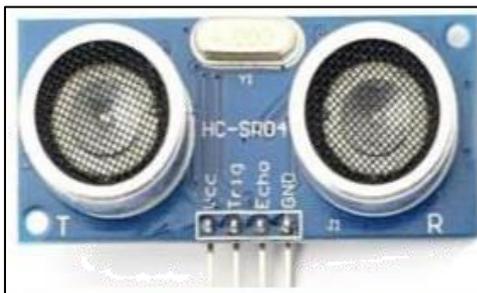Fig. 2: PIR Sensor

C. Ultrasonic Sensor

Fig. 3: Ultrasonic Sensor

This sensor is utilized to gauge the separation between the item and the client. The activity isn't influenced by daylight or dark material, albeit acoustically, delicate materials like fabric can be hard to recognize. It comes total with ultrasonic transmitter and collector module.

D. Servo Motor

Fig. 4: Servo Motor

A servo engine contains an open shaft that makes the cover to open and close. The engines are little, have worked in charge hardware, and are amazingly ground-breaking for their size.

E. Image Processing

Picture preparing innovation is being utilized so as to confirm the picture caught by the camera settled in the canister and contrast it along and the picture set. Subsequent to handling the picture the top gets opened in like manner.

F. Arduino

Arduino an open source pack is the key part of keen dustbin. This is finished by the procedure stream of detecting, information exchange and informing which bode well to be open naturally as we drawing close to this and we get the showcase message on LCD screen that the dustbin is full or not. In the meantime it is associated with the server and GSM framework which send the data about the status of dustbin. The entire procedure is finished equipment and programming stage controlled by C dialect.
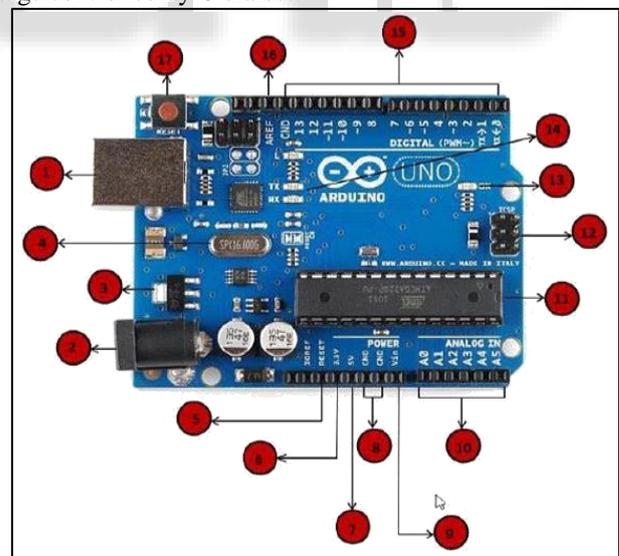

Fig. 5: Arduino Pin Configuration

1) Power USB

Arduino board can be fueled by utilizing the USB link from your PC. You should simply interface the USB link to the USB association

2) Power (Barrel Jack)

Arduino sheets can be controlled specifically from the AC mains control supply by interfacing it to the Barrel Jack.

3) Voltage Regulator

The capacity of the voltage controller is to control the voltage given to the Arduino board and balance out the DC voltages utilized by the processor and different components.

4) Precious stone Oscillator

The precious stone oscillator helps Arduino in managing time issues. How does Arduino figure time? The appropriate response is, by utilizing the precious stone oscillator. The number imprinted over the Arduino gem is 16.000H9H. It reveals to us that the recurrence is 16,000,000 Hertz or 16 MHz.

5) Arduino Reset

You can reset your Arduino board, i.e., begins your program from the earliest starting point. You can reset the UNO board in two different ways. To begin with, by utilizing the reset catch (17) on the board. Second, you can interface an outside reset catch to the Arduino stick named RESET (5).

(6, 7, 8, 9). Pins (3.3, 5, GND, VIN)

−   3.3V (6) − Supply 3.3 yield volt
−   5V (7) − Supply 5 yield volt
−   Most of the parts utilized with Arduino board works fine with 3.3 volt and 5 volt.
−   GND (8) (Ground) − There are a few GND sticks on the Arduino, any of which can be utilized to ground your circuit.
−   VIN (9) − this stick likewise can be utilized to control the Arduino board from an outside power source, similar to AC mains control supply.

6) Simple pins

The Arduino UNO board has five simple info pins A0 through A5. These pins can peruse the flag from a simple sensor like the stickiness sensor or temperature sensor and convert it into a computerized esteem that can be perused by the microchip.

7) Fundamental Microcontroller

Each Arduino board has its own microcontroller (11). You can expect it as the mind of your board. The principle IC (incorporated circuit) on the Arduino is marginally not the same as board to board. The microcontrollers are for the most part of the ATMEL Company. You should recognize what IC your barricade has before stacking another program from the Arduino IDE. This data is accessible on the highest point of the IC. For more insights regarding the IC development and capacities, you can allude to the information sheet.

8) ICSP Stick

For the most part, ICSP (12) is an AVR, a small programming header for the Arduino comprising of MOSI, MISO, SCK, RESET, VCC, and GND. It is regularly alluded to as a SPI (Serial Peripheral Interface), which could be considered as a "development" of the yield. As a matter of fact, you are slaving the yield gadget to the ace of the SPI transport.

9) Power LED Pointer

This LED should illuminate when you plug your Arduino into a power source to show that your barricade is fueled accurately. In the event that this light does not turn on, there is some kind of problem with the association.

10) TX and RX LEDs

On your board, you will discover two names: TX (transmit) and RX (get). They show up in two places on the Arduino UNO board. To start with, at the advanced pins 0 and 1, to demonstrate the pins in charge of sequential correspondence. Second, the TX and RX drove (13). The TX drove flashes with various speed while sending the sequential information. The speed of glimmering relies upon the baud rate utilized by the board. RX flashes amid the accepting procedure.

11) Computerized I/O

The Arduino UNO board has 14 computerized I/O pins (15) (of which 6 give PWM (Pulse Width Modulation) yield. These pins can be designed to fill in as info computerized pins to peruse rationale esteems (0 or 1) or as advanced yield pins to drive distinctive modules like LEDs, transfers, and so forth. The pins named can be utilized to create PWM.

12) AREF

AREF represents Analog Reference. It is once in a while, used to set an outer reference voltage (somewhere in the range of 0 and 5 Volts) as far as possible for the simple information pins.

−   Microcontroller-ATmega2560
−   Working Voltage - 5V
−   Info Voltage (prescribed) - 7-12V
−   Info Voltage (limit) - 6-20V
−   Computerized I/O Pins 54 (of which 15 give PWM yield) Simple Input 16

IV. CONCLUSION

Through this paper we proposed an innovative procedure for the transfer of restorative waste. We began from Smart junk can by utilizing the system condition and the constant information from the framework actualized could be utilized for the proficient gathering of the therapeutic wastages. It is trusted that through this framework the diseases get diminished in view of the productive gathering of wastages in the wards and in the end add to a contamination less condition to the patients.

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