

GARBAGE MONITORING SYSTEM USING IOT

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Abstract

Nowadays management of waste has become a major issue that the developing countries were facing in the last few years. Waste across the road side are getting overloaded day by day because municipal corporation had not collected the waste periodically. This leads to spread of several harmful diseases, pollutes water bodies and causes several issues. To avoid such situation we have proposed garbage monitoring system using IOT. This system allows the municipal corporation to monitor the status of the dust bins by sending a notification via an application and also by sending messages to respective garbage collectors.

This system consists of ultrasonic sensors placed on top of the bin which is used to measure the garbage level in the bin. It also consists of solar cell that supply power to the system.

Keywords-Arduino, Garbage monitoring system, GSM

1.INTRODUCTION

As a developing country, we in India face a unique problem that is waste management. Waste management has become a major issue not only in India but also to the most of the countries in the world. Waste management is a costly service that municipal corporation spends an average of 30% of their annual budget on waste management. There is no proper management system for laborers who work in the municipal corporation and not having adequate resources to collect the waste. There is a unique solution to solve this problem that is garbage monitoring system using IoT which helps us to keep our environment clean.

The proposed system overcomes the problem by updating the status of the garbage bins to the laborers and to the corresponding authorities by sending messages and notifications.

2.PROPOSED METHODOLOGY

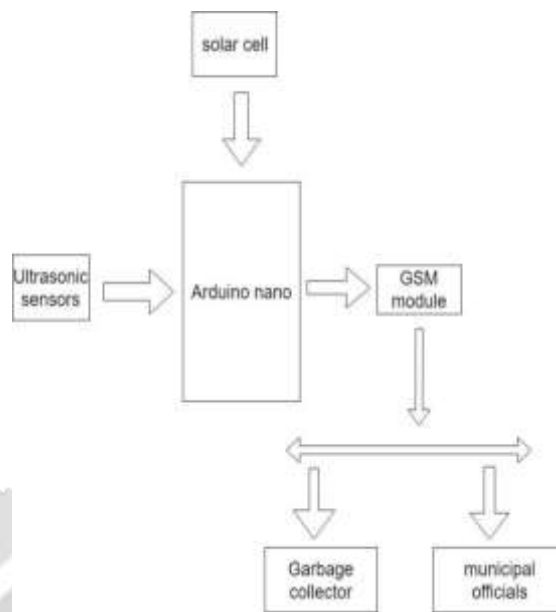


Fig1 : Block Diagram

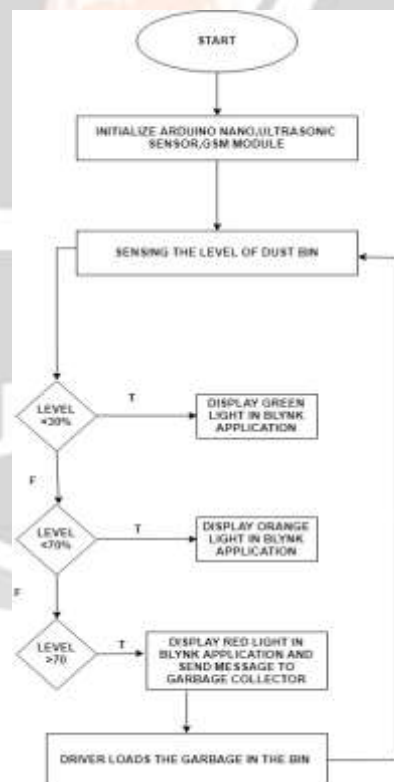


Fig2: Flow Chart

ALGORITHM:

- STEP 1: INITIALIZE ARDUINO NANO MICROCONTROLLER, ULTRASONIC SENSOR AND GSM MODULE.

- STEP 2: MEASURE THE LEVEL OF GARBAGE IN THE DUST BIN USING ULTRASONIC SENSOR.
- STEP 3: WHEN THE LEVEL OF GARBAGE IS LESSER THAN 30%,THEN GREEN LIGHT IS DISPLAYED IN BLYNK APPLICATION.
- STEP 4: WHEN THE LEVEL OF GARBAGE IS LESSER THAN 70%,THEN ORANGE LIGHT IS DISPLAYED IN BLYNK APPLICATION.
- STEP 5: WHEN THE LEVEL OF GARBAGE IS GREATER THAN 70%,THEN RED LIGHT IS DISPLAYED IN BLYNK APPLICATION.
- STEP 6: STEP 2-5 IS REPEATED AFTER COLLECTING GARBAGE FROM THE BIN

3.SYSTEM MODULES

ARDUINO NANO:

Arduino Nano is a small breadboard based on ATmega 328.It has almost same functionalities as compared to other arduino boards,but in a different packages.It lacks a DC power jack so it can be powered via a Mini-B USB cable instead of a standard one.It consists of 22 pins in which there are 14 digital I/O pins (6 PWM outputs) and 8 analog pins.

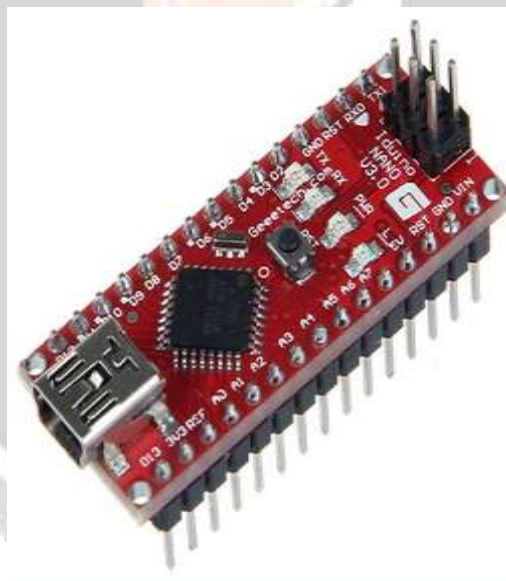


Fig3: Arduino NANO Board

Features of Arduino :

Arduino is a open source platform based on easy to use software and hardware which is easy for understanding.Arduino boards are in expansive as compared to other micro controllers.Arduino is cross platform where it runs on Macintosh,Windows and Linux operating system.

ULTRASONIC SENSORS:

The Ultrasonic Sensors are the one which are most commonly used to measure distance of the object or a target from the sensor.HC-SR04 Ultrasonic sensors can measure the level of the garbage in the bin.Ultrasonic sensor emits a high frequency sound waves in which humans are not capable to hear.It uses a

transducer to send a pulse which when strike an objects then they are reflected back as echo signals. These sensors typically doesn't require physical contact with their target object.

Ultrasonic sensors measure the distance to the object by measuring time between emission and reception of signals.



Fig4: Ultrasonic sensor

Calculating the distance of an object by finding the time taken by the sound signals to travel the distance between sensor and the object.

$$D = \frac{1}{2} * S * T$$

Where D is the distance ,S is the speed of the sound and T is time .

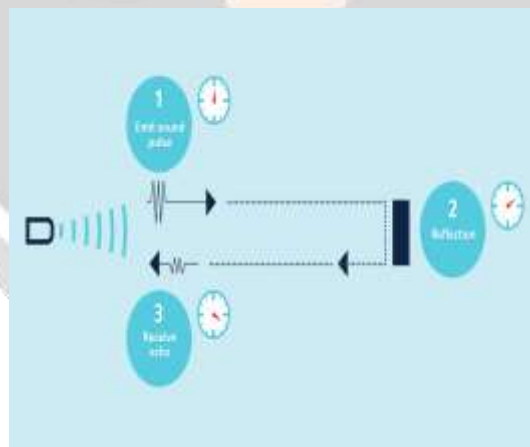


Fig5:Measuring Distance of the target

GSM MODULE:

GSM(Global System for Mobile).This system uses SIM800L GSM module which allows you to send and receive messages and connect to internet.It is most commonly used GSM module in arduino community .SIM800L is a very cheap portable GSM board having the capabilities like sending messages and connect to internet via GPRS .It is build with a stamp sized quad band GSM/GPRS module. This modem can be connected with micro controller via jumper wires. Additionally a micro sim card with cellular connectivity is needed that allows to send messages .



Fig6:GSM/GPRS-SIM800L

FEATURES:

Send and receive messages,able to connected to internet via GPRS,making calls,accept AT commands and can able to listen FM radio broadcast.

SOLAR CELL:

Solar cell which can convert light energy into electricity by photovoltaic effect.solar cells does not consists of electric generators or fuel to produce electric power.



Fig7:Solar cell

ARDUINO IDE:

Arduino IDE is a open source software used to write a code and upload it to the micro controller board.Arduino IDE is a cross platform which runs on Windows,Linux and Mac OS.

BLYNK APPLICATION:

Blynk application is an open source mobile application dashboard which can connect to any hardware over Wi-Fi, Ethernet, GSM...etc. It is used to provide real time analysis from edge devices.

4. IMPLEMENTATION

- Ultrasonic sensors are placed on the top of the bin which is used to detect the level of the garbage bin.
- The sensors emit sonic waves, when the waves strike an object then they are reflected back as echo signals. □
- Ultrasonic sensor measures the garbage level based on the range.
- GSM module is responsible for sending messages to the concerned authority.
- Status of the bin will be displayed in the BLYNK app.
- Push up notification is sent to Blynk app.
- Auth token is used in sending status to respective account.
- When the level of the bin is lesser than 30%, Green light is displayed.
- When the level of the bin is lesser than 70%, Orange light is displayed.
- When the level of the bin is greater than 70%, Red light is displayed and GSM module sends a message to municipal authority.

5. RESULT AND DISCUSSION

When the bin is empty, no status is displayed in the Blynk application. When the bin is filled with garbage up to 70%, green light and orange lights get displayed but GSM module does not send any message to municipal authorities to clean up. Red light will be displayed in Blynk app and the module will send a message only when the garbage in the bin exceeds 70%. This system avoids monitoring of bin by laborers.

Several researches have been done for monitoring of garbage. Some of the studies done and the views of numerous writers concerning about the improvement of garbage monitoring system are as follows.

a) Wireless Dust Bin Monitoring And Alert System Using Arduino

P. Siva Nagendra Reddy, S. Nanda Kishor, A. Amareshwar kumar, R. Naresh Naik proposed this system. This system uses Bluetooth, GSM, Arduino UNO to monitor garbage bin and informs the level of garbage in the bins. Whenever the garbage reaches to the maximum level in the bin, an alert message will be sent to server node which sends a message to collector to collect the waste.

b) Solid Waste Collection As a Service Using Solution For Smart Cities

Sangita S. Chaudhari, Varsha Y. Bhole proposed this system. This system uses Arduino uno, GSM Module to monitor garbage bin and sends information via web page. Garbage bins are equipped with a device that is used to locate the bin.

c) Smart Garbage Monitoring System Using Internet Of Things

Dr. Sandeep M. Chaware¹, Shriram Dighe, Akshay Joshi, Namrata Bajare, Rohini Korke proposed a system that uses both Wi-Fi modem and GSM module for implementation. This system sends status of the bin to web page via Wi-fi modem and send sms via GSM module.

d) Iot Based Smart Garbage And Waste Collection Bin

S.S.Navghanel, M.S.Killedar, Dr.V.M. Rohokale proposed the system that uses raspberry pi and IR sensors for detecting the garbage level in bin. When the sensor signal reaches to the threshold value it alerts and send the message notification to the municipal authority then that the person will be assigned to collect the waste from the respective bin.

6.CONCLUSION

The proposed system "GARBAGE MONITORING SYSTEM USING IOT" avoids the irregular cleaning of over filled bins by sending an alert messages to the respective departments when the bins are full. The real time status of the bin can be remotely monitored with the help of blynk app. This system completely avoids physical monitoring of garbage bin by labors.

7.REFERENCES

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