Garbage Monitoring System

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Abstract- ***With the development of urban communities, the waste delivered likewise increments. Squander the board is one of the essential issue that the world faces regardless of the instance of created or creating nation. The key issue in the waste administration is that the trash canister at open spots gets flooded well ahead of time before the initiation of the following cleaning process. Flooded trash containers are making an unpalatable smell and making an unhygienic situation. Furthermore, this is prompting the fast development of microscopic organisms and infections which are causing various kinds of sicknesses.***

To beat these circumstances productive trash assortment frameworks are getting created dependent on IoT. Different structures have just been proposed and have preferences just as burdens.

Indexed Terms- NodeMCU, GPS, LED, IoT, Garbage Collection

I. INTRODUCTION

Garbage consists of the unwanted materials left over from city, urban areas, Educational Institutions, Business organizations, home etc. This project will help to understand the ecosystem and in the developments of research on IOT to eradicate or minimize the garbage disposal problem. IOT is a recent communication Technology, in which the objects of everyday life will be equipped with Arduino family microcontrollers, transceivers for digital communication and suitable protocol stacks, that will make them ready to communicate with each other and with the users.

II. LITERATURE SURVEY

[1] In, once the truck comes close to the rubbish bin, RFID starts act of sending the information. Ultrasonic sensors measure level of waste, buzzer to alert the truck regarding proportion of garbage level and L.C.D displays the share level. GPS is employed for sleuthing the placement of the bin. During this project the rubbish bins square measure set within the urban areas of a town and an electrical circuit camera is mounted on the bin location.

[2] Device is made which might relay its information, that is, level of garbage bin to the concerned person due to which route for the truck collecting garbage is optimized. Garbage bins that square measure crammed quite seventieth square measure empty 1st. Optimized route is chosen by the algorithmic rule that saves time and price and raises a step towards clean town.

[3] In a wise system is made that alerts the net server of municipality once garbage within the bin is higher than threshold worth and wishes to be cleared inside given time. One who empties the bin confirms that he has completed the task. Real time status of the bin is often monitored with the assistance of this method that is integrated with RFID tag, Wi-Fi module, and ultrasonic sensing element.

[4] The main aim of the recycle system planned in is to change assortment of points for playacting a disposal activity into designate recycle bins. Such system encourages utilization activities by permitting the points to be re- deemable for merchandise or services. This feature is to help makers in managing the acquisition of useful merchandise. The system permits convenient recording of knowledge associated with the disposal activities, disposed material, identification of the user and points collected by the user. Recycle Bin that caters for utilization glass (brown), paper (blue) and metal will, plastic merchandise (orange) that mechanically judge the worth of the wastes thrown consequently and supply 3R(Reduce, Recycle, Reuse) card.

III. SYSTEM ARCHITECTURE

Microcontroller used for this module is NODEMCU Arduino which has in built Wi-Fi. Since it's less costly than Raspberry Pi we are using Arduino UNO. Also it's USB port which can be used for connecting device. Infrared LM393 sensor is connected to NODE MCU using jumper wires. During this module infrared is connected with servo motor TowerPro MG996R to NODE MCU for opening lid of bin when required. Ultrasonic Adraxx HC SR04 sensor is used for checking the extent of garbage present inside bin where it'll show level is full, half or empty on Blynk framework. For understanding of hazardous waste air quality sensor MQ 135 is implemented during this project. Overall communication interface of module is internet. Basic waterfall model is applied. All sensors are connected to NODE MCU using wires but with the assistance of USB cable hardware is connected to laptop.

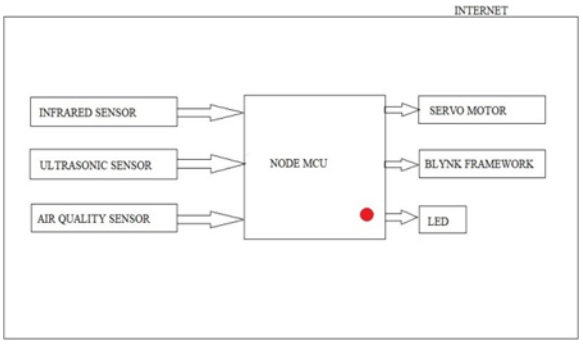


Figure 1 SYSTEM ARCHITECTURE

A Google map is used for fastest route calculation. This protects time and fuel as optimized path provided by google map is used for collection of garbage. Location co-ordinates for bin and phone location of driver are often used for implementing this feature. Dustbin is mounted at a specific place which won't be changed by anyone, so fixed co-ordinates are often added on google map. No live status of bin location is required, just the drivers position is changed.

IV. HARDWARE COMPNENTS

Our system consists of ultrasonic sensor, NodeMCU CP102 board, Infrared sensor,Servo motor, Air quality sensor, Jumper wires, USB-A to Micro-USB cable.

1. Ultrasonic sensor:

- HC-SR04 is an ultrasonic sensor. It uses sonar to measure the distance of an object.
- It has good range accuracy and also gives stable readings in an easy to use package. It is not affected by any dark material or sunlight.

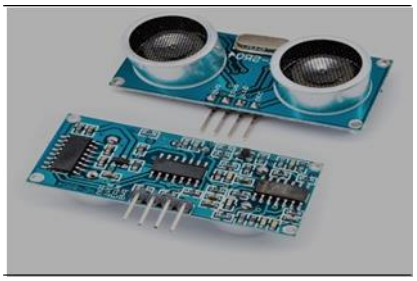


Figure 2 ultra-sonic

2. NodeMCU CP102 board:

- This the development kit based on the ESP8266. ESP8266 is low cost wi-fi microchip.
- It integrates everything on a single board. It is , helpful to power up the development.

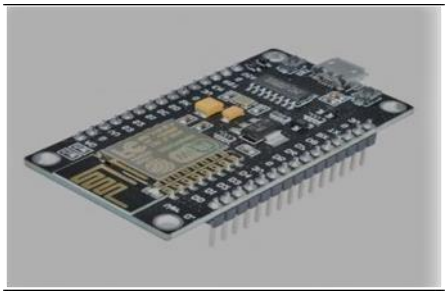


Figure 3 NodeMCU CP102 board:

3. Infrared sensor:

- Infrared sensor along with servo motor is used to open or close the lid automatically. Whenever someone comes close enough to dustbin then the lid gets opened otherwise its closed.

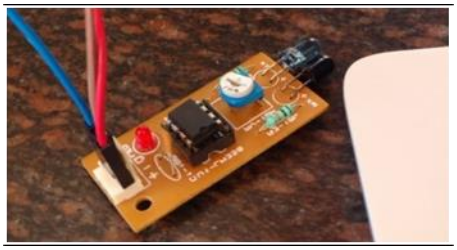


Figure 4 infrared

4. Jumper wires:

- These are simple wires that only that have connector pins at each end and allows them to be used to connect the points without soldering. Male to male, female to female, male to female are three different types of jumper wires.

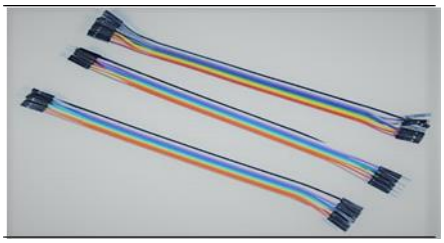


Figure 5 jumper wires

5. Servo motor:

- This is used for automatic opening of lid. 180 or 360 degree motor is rotated which leads to opening and closing of the bin. This helps to lessen the effort of people and more attractive system is implemented.

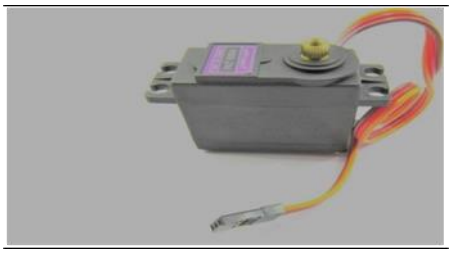


Figure 6 servo motor

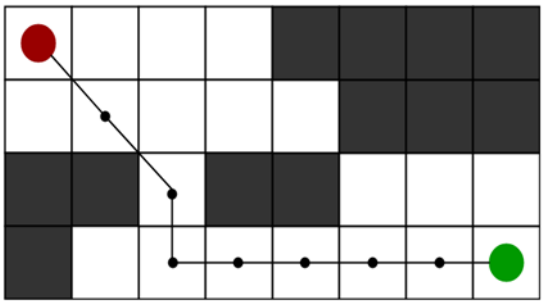
V. MATHEMATICAL EXPLAINATION

A* Search Algorithm

Motivation

To approximate the shortest path in real-life situations, like- in maps, games where there can be many hindrances.

We can consider a 2D Grid having several obstacles and we start from a source cell (coloured red below) to reach towards a goal cell (coloured green below)



What is A* Search Algorithm?

A* Search algorithm is one of the best and popular technique used in path-finding and graph traversals.

Why A* Search Algorithm?

Informally speaking, A* Search algorithms, unlike other traversal techniques, it has “brains”. What it means is that it is really a smart algorithm which separates it from the other conventional algorithms. This fact is cleared in detail in below sections. And it is also worth mentioning that many games and web-based maps use this algorithm to find the shortest path very efficiently (approximation).

VI. CONCLUSION

This module will focus on cleanliness of city. Investment is little high but it will be more useful for long time than traditional garbage system. It will reduce human efforts. Main advantage of this module is level detection feature will prevent overflowing of garbage.

It’s always a healthy choice for using such prototypes in our locality which will benefit tremendously. It can be used in both private, public sectors as well as in Government sectors. For improving the existing waste management system, reducing costs, increasing efficiency and increasing profits it will be beneficial.

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