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Smart Bins Concept Implementation in India- Garbage Monitoring System using IOT

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Abstract: ***The system proposed in this paper is an advanced solution for the present garbage collection and disposal system and the improvements that can be provided by implementing IOT. At present one of the main causes for various types of pollution is an unsurmountable collection of waste resulting in dangerous landfills. If the waste stays unattended it can lead to deadly diseases. The open dustbin also invites the street dogs, cow, rats and birds. One way of moving forward is to implement IOT based smart dustbins. In this system, there will be sensors which will detect the level of waste inside it. As soon as it reaches the maximum level the notification will be sent to the person responsible for waste collection. By using this system we can avoid manually checking the dustbins;this leads to time, fuel and effort being saved.***
Keywords: IOT, Arduino UNO, Rasberry Pi.

I. LITERATURE REVIEW

Waste management is the primary problem that every country facing whether it is developed or developing country. How current system works is, the cleaning truck pickup the waste twice or once per day. The key issue in the waste management is that the garbage bin at public places get overflow in advance before the cleaning truck commencement of the next cleaning process. This leads to hazardous bad odor at that place which result into various disease. To avoid this situation and maintain cleanliness various Municipality started placing Smart Bins which is IOT enabled garbage alert system for proper garbage management system. A smart dustbin based on IOT in which the smart bin was built on a platform which was based on Aurdino UNO board interfaced with GSM modem and an ultrasonic sensor. The sensor will be placed on the top of the bin. There will be a threshold value which will be set of every bin, when the garbage reaches that particular limit the sensor triggers the GSM modem which will notify the responsible authority till the garbage in the bin emptied. Every dustbin will have unique ID assign to them which will help cleaning authority to identify which bin sent the alert message. The project is divided into two sections in which first section is transmitter and receiver. The transmitter section consist of a micro controller and sensors which check for the threshold value of garbage and it will sends the data to the department associated with it so that the bin will get emptied quickly. Once the bin get empty the status will change and it will be again ready to use.

II. CURRENT SYSTEM

In the current garbage monitoring and collecting system the corporation collect the garbage every day. Many a time we see the garbage overflows from the garbage bin and spreadsall over the roads and pollutes the environment.

The first problem with current garbage bin is that they not covered and hence causes air pollution and spreads disease too. We many a time see street dogs, crows and other animals eat the waste thus spreading it over the nearby areas which creates the dirty environment.

Second problem is the whole garbage monitoring system is manual, the corporation rounds the whole town and collects the garbage one after the another. Now the problem is not all dustbins are filled at the same rate and the dump vehiclewaste time checking each and every dustbin. Suppose if we take example of two dustbin, 'A' dustbin which is placed at busy street which have dense population and 'B' dustbin which is placed where only few families stays. So it is pretty obvious that dustbin 'A' will filled rapidly than 'B'. And the garbage of that will remain unattended till next cleaning process start.

To avoid such situation we are planning to design IOT based garbage management for smart cities.

Current Garbage System :

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Image reference: https://www.thehindu.com/news/cities/chennai/residents-complain-about-missing-bins-garbage-pileup/article6976347.ece

A. Reasons of Improper Management of Waste

1) Improper planning for waste management while planning the townships
2) Lack of technical and trained manpower
3) Incomplete community involvement
4) Less expertise and exposure to the city waste management using modern techniques and best practices
5) Outdated Management Information Systems
6) Less funds with ULBs (Urban Local Bodies)

B. Drawbacks of Current System

1) Time Consuming
2) Less Effective (Garbage collection trucks go and empty containers whether they are full or not)
3) As it is manual process which leads to more fuel usage, labor and cost.
4) Bins lid are not covered which results into creating unhygienic environment nearby. Also it spreads bad smell which causes illness.

III. PROPOSED SYSTEM

In this proposed system there are multiple dustbins can be placed through the city/town. The dustbin will not just normal bin it will be IOT based “Smart Bins”. So what this bins make them Smart?

Internet of Things is nothing but the applications performing with the help of internet access..IoT Communication over the internet has grown from user - user interaction to device – device interactions these days. Bin will automatically open the lid when it detects the people who want to throw out their garbage/trash. It also detects the level of garbage that inside the dustbin.

The dustbins are provided with sensors which helps in tracking the level of garbage and every bin have a unique ID

Will be provided for every dustbin in the city so it is easy to identify which garbage bin is full. These details can be accessed by the concern authorities from anywhere with the help of Internet and immediate action can be made to clean the dustbin.

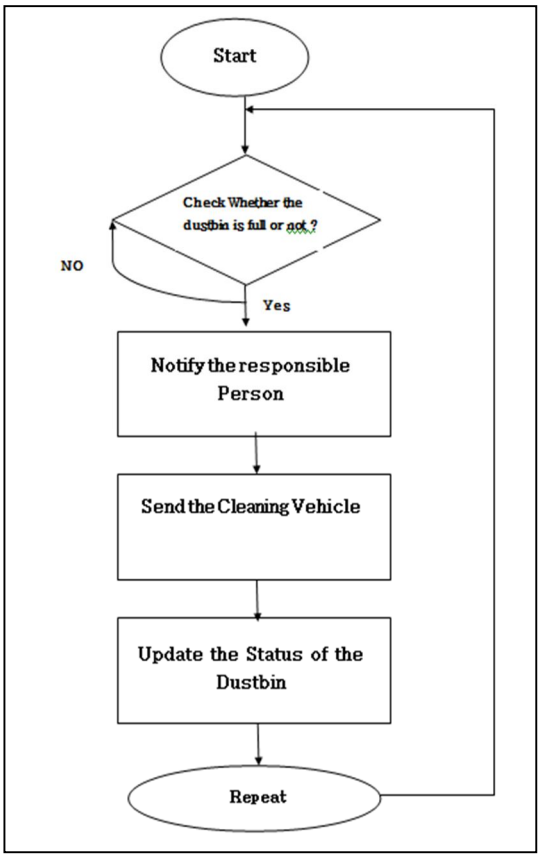


Image Reference: https://swachhindia.ndtv.com/waste-management-dharamshala-first-city-in-india-to-install-underground-bins-21971/

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Flow chart of Proposed System



A. Advantages of Proposed System

1) Real-time data transmission and access.
2) Avoids the overflow of the garbage.
3) Dustbin lid is closed which leads to fewer smells.
4) The Bin is placed underground because of that the surrounding area will be clean and neat.
5) The management will be automated, waste collection would become more efficient and also reduction in transportation cost.
6) Effective usage of dustbins.

IV. COMPONENTS

1) Arduino UNO: The Arduino UNO is an open source microcontroller board developed by Arduino.cc Arduino boards are capable to read inputs and display output according to command provided to it. As it is open source platform anyone can modify and optimize the board according to their needs. The numbers of instructions and tasks can be feed.

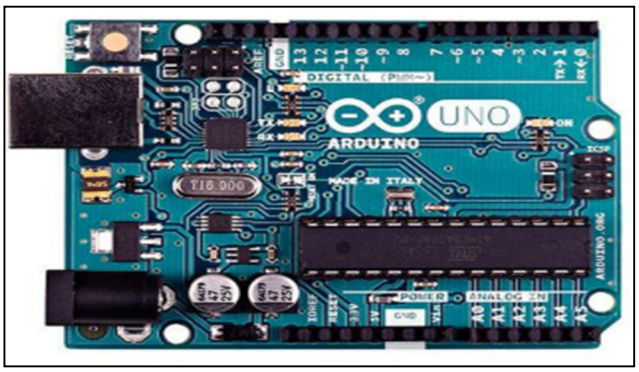


Image Reference : https://roguerobotics.com/products/arduino-uno-rev3?variant=19049613188

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2) *Wi-Fi Module:* The ESP8266 WiFi Module integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network.

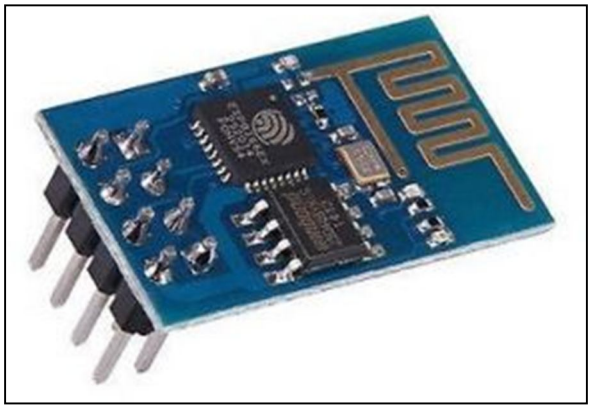


Image Reference:
https://grobotronics.com/esp8266-wifi-module.html?sl=en

3) *Ultrasonic Sensors:* Ultrasonic sensors used to measures the distance by ultrasonic waves. The ultrasonic sensors emits the waves and receives the waves back when its reflected back from the target.

The distance can be calculated with the following formula:

Distance d = ½ * T * C

Where d is Distance, T is time of emission and reception and C is sonic speed.



Image Reference: https://www.indiamart.com/proddetail/ultrasonic-sensor-18436665012.html

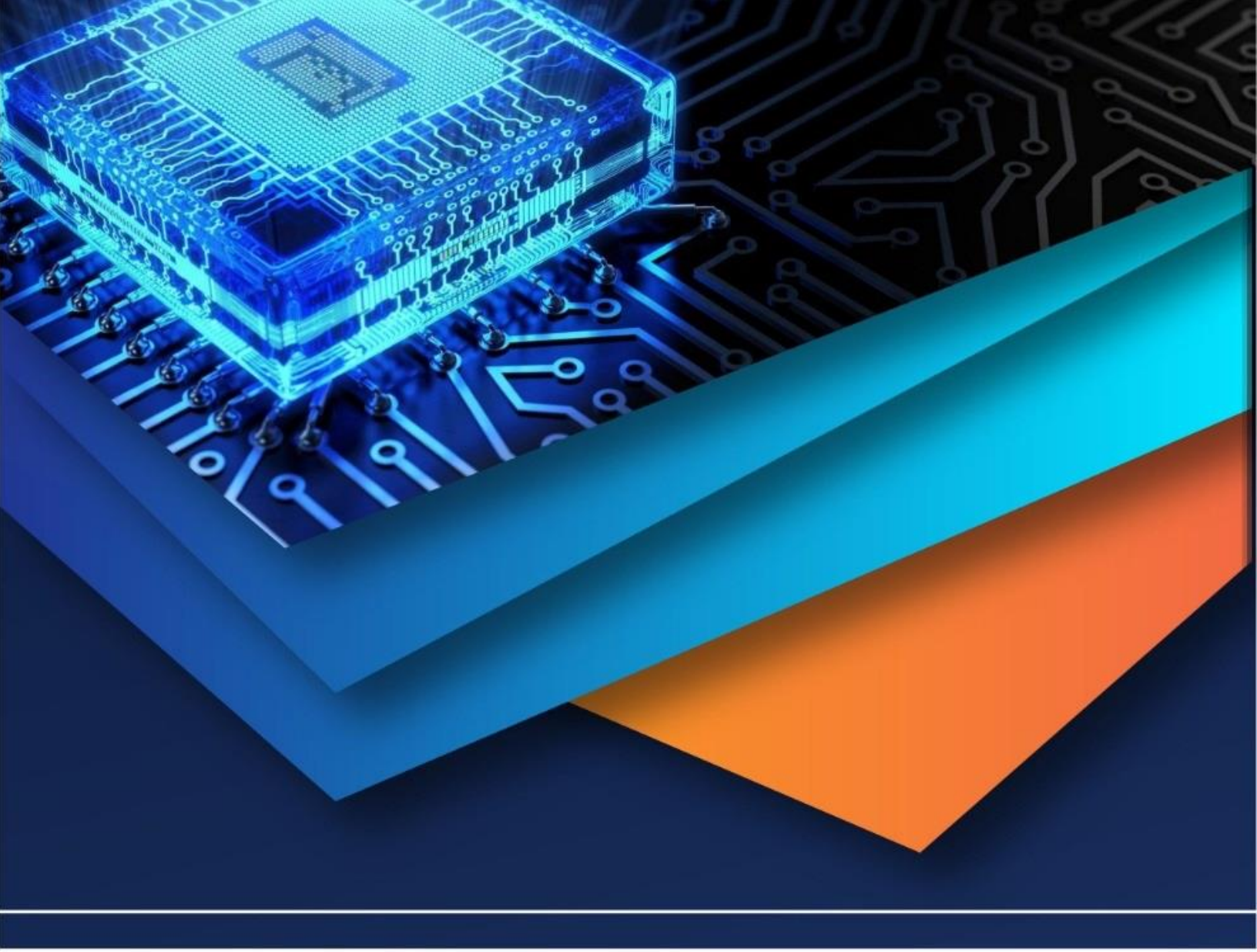
V. RESULT AND CONCLUSION

This implementation of Smart garbage Bin gives the solution for unsanitary environment condition in a city. This system assures to send notification when the bin reaches to its threshold value. If the dustbin not emptied in specific time, then the record is sent to higher authority who can take appropriate action against the concerned person. This can reduces the total number of trips of garbage collection vehicle which can leads to cost saving.

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