

# Iot Based Smart Waste Management System

Dhanasekaran P<sup>[1]</sup>, Avinash G<sup>[2]</sup>, Prakash D<sup>[3]</sup>, Ranjith kumar R<sup>[4]</sup>

<sup>1</sup>Assistant Professor, Electronics & Communication Engineering Dept., Anna University, The Kavery Engineering College, Salem, Tamil Nadu.

<sup>2,3,4</sup>B.E. (ECE), The Kavery Engineering College, Salem, Tamil Nadu

**Abstract-** In the recent years, Urbanization has increased tremendous rate. At the same speed there is an increase in waste production. Waste management has been a crucial and major issue to be considered. This system is a way to achieve this good cause. In this system, smart bin is built on a pic16f877a microcontroller, which is interfaced with ESP8266 wifi module and sensor network (Ultrasonic/MQ6). Ultrasonic sensor is mounted at the top of the trash which will measure the stature of the dustbin. The threshold stature is set as equal distance according size of the dust bin. The microcontroller as been programmed when the dustbin is being full, the remaining level from the threshold level will be exposed. Once the garbage reaches the threshold level sensor will trigger the Microcontroller. The microcontroller sends the information to Wi-Fi module which will continuously alert the required authority until the garbage in the dustbin is squashed. The light automation process also present with this system for enabling the light is ON at night time and disabling the light at day time. This system also includes GAS sensor (MQ6) for measuring the various gas level from dust bin as well as environment. The camera unit also includes with this system for capturing the human face who throw the wastes out of dust bin. By replacing our modern bins present today, waste can be managed efficiently as it avoids unnecessary lumping of wastes on public sector.

**Keywords-**IoT,Ultrasonic,MQ6,NodeMCU,ESP8266, PIC16F877A Microcontroller, smart dustbin.

## INTRODUCTION

In the recent years, Urbanization has increased tremendous rate. At the same speed there is an increase in waste production. Waste management has been a crucial and important issue to be considered. In this system, smart bin is built on a microcontroller with Ultrasonic sensor, GAS sensor, camera unit and light automation. Ultrasonic sensor is placed at the top of the dustbin which will measure the deposition rate of the dustbin. The threshold stature is set as 10cm. Project as been programmed when the dustbin is being filled, the remaining altitude from the threshold level will be displayed.

Once the garbage reaches the threshold level then the ultrasonic sensor will trigger the IoT(wifi module) network which will continuously alert the pollution control authority until the garbage is squashed. Once the garbage is squashed, people can reuse the bin. At regular intervals dustbin will be squashed. Once these kind of smart bins are employed on a huge scale, by replacing our old-fashioned bins present today, waste can be managed capably as it avoids needless lumping of wastes on roadside. Foul smell from these nasty wastes that remain unprocessed for a long time, due to negligence of authorities and carelessness of public may lead to long term problems. Breeding of insects and mosquitoes can create irritation around helping unclean environment. This may even cause dreadful diseases.



Fig.1.1.current status of garbage level.

Garbage! Pictures of garbage bins being overloaded and the garbage being leaked out from the bins can be seen all around. This leads to various illnesses as large number of insects and mosquitoes breed on it. A big challenge in the metropolitan cities is solid waste management. Hence, smart dustbin is a system which can eliminate this problem.

## II.LITERATURE SURVEY

Name	Bin Measurement	Technology used	Object detection around the bin	Technology Used	Web UI	Alert Messages	Technology used	Scheduling
"Developing a Self-Powered Enlarging Smart Waste Bin"	Yes	Infra-red	No	No	No	Yes	GSM	No
"A Smart IoT System for Waste Management"	Yes	laser, Photo diode Ultrasonic	No	No	Yes	Yes	Wifi-module	Yes
"Efficient IOT Based Smart Bin for Clean Environment"	Yes	Infra-red , Ultrasonic	Yes	Infra-red	Yes	Yes	Wifi-module	Yes
"Smart Waste Collection Monitoring and Alert System via IoT"	Yes	Ultrasonic	No	No	Yes	Yes	Wimax	Yes
"An IoT based Smart Garbage Alert System"	Yes	Ultrasonic	No	No	Yes	Yes	Wifi-module	No

## III.EXSISTING SYSTEM

Day by day increase in population, the average waste produced by an individual is increasing every day which leads to severe waste management issues. Nowadays sanitation's and hygiene are one of the stressed issues by any state all over the world. This is mainly produced due to improper waste observing and management processes To overcome these problems a garbage monitoring system is planned which periodically measures the level of trash in the containers and alerts the concerned authorities. This is done by placing a sensor network to collect the trash levels in the containers and remotely activating the required controls using IoT.. Internet of Things (IoT) powerfully supports the nation of interfacing and observing the real world objects (things) through the Internet. The discovery of bin limits in the container is carried out using the NodeMCU ESP8266 microcontroller board. The main objective of this paper is to trigger an alert message to the people concerned when the container is filled thereby avoiding the over spilling of garbage

### Problem identifications

- Monitoring and communication process has been made
- There is no camera unit and light automation

## IV.PROPOSED SYSTEM:

In this system, smart bin is built on pic16f877a board which is interfaced with ESP8266 wifi module and sensor network (Ultrasonic/MQ6). Ultrasonic sensor is fixed at the top of the garbage can which will measure the height of the dustbin. The threshold stature is set as equal distance according size of the dust bin. The controller as been designed in such a way that when the dustbin is being fill, the remaining height from the threshold level will be displayed. Once the garbage reaches the threshold level sensor will trigger the Microcontroller. The microcontroller sends the information to Wi-Fi module which will continuously alert the required authority until the garbage in the dustbin is squashed. The light automation process also present with this system for enabling the light is ON at night time and disabling the light at day time. This system also includes GAS sensor (MQ6) for measuring the various gas level from dust bin as well as environment. The camera unit also includes with this system for capturing the human face who throw the wastes out of dust bin.

## V.IMPLEMENTATION SETUP

### Hardware components;

- ✓ PIC16F877A
- ✓ Ultrasonic sensor
- ✓ MQ-6(gas sensor)
- ✓ LM-35(temperature sensor)
- ✓ LDR
- ✓ Camera
- ✓ ESP8266 wifi-module

### Software components;

- ✓ MPLab IDE

### A. ESP8266



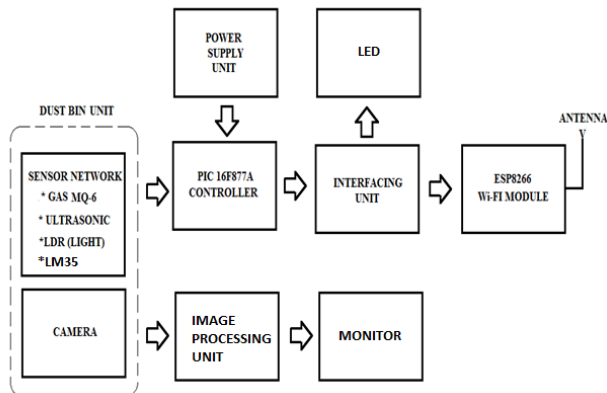
The ESP8266 is the best decision for Internet of Things due to its minimal effort and low power utilization capacities. It accompanies inbuilt WiFi Module, Full TCP/IP convention stack, onboard processing, and capacity features. The Real Time Operating System (RTOS) and WiFi stack allow about 80 percent of the dealing with the ability to be available for customer application programming and enhancement. It has 17 General Purpose Input Output (GPIO) pins for interfacing with outside segments and works with 3.3V

### B. CAMERA



The camera used is a live tech camera, which directly displays the image lively, the camera resolution up to 10Mp, possibly used to avoid the deposition of waste around the dustbin.

## VI.BLOCK DIAGRAM



## VII.METHODOLOGY

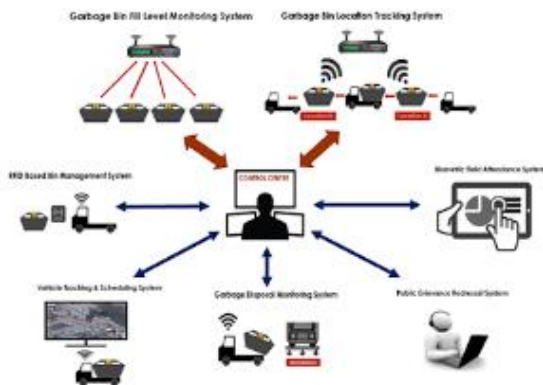


Fig.7.1.methodes of data transmission.

## VIII. RESULT

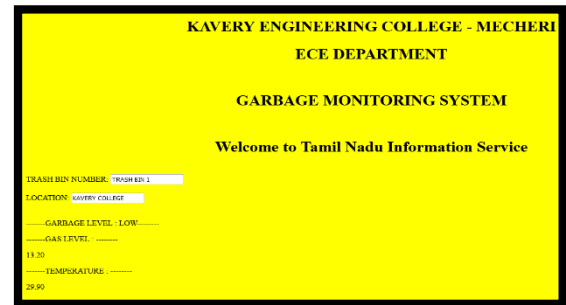


fig.8.1.Initial monitoring

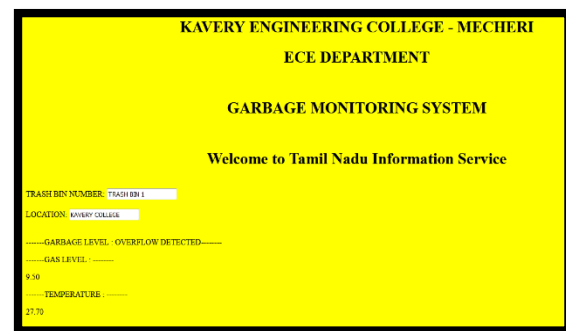


fig.8.2.Dustbin overflow detected

## IX.CONCULSION

The proposed system uses a more powerful and efficient microcontroller and the data is uploaded to the cloud only when leftover space and garbage weight in the garbage container cross thresholds. The collected data is stored in the cloud and can be used for predicting the waste generation. The automated execution of commands and triggering helps in providing exact values of the garbage levels resulting in efficient garbage collection.

## X. FUTURE WORK

The proposed design of the smart garbage alert system is very flexible and can be easily installed at more crowded regions like airports, railway stations, bus-stands, shopping malls, multiplexes, offices, etc. The system will develop the recycling (burning process for converting the waste into heat energy i.e., power generator or fertilizer) the wastage of the dust within the unit.

## **XI.REFERENCE**

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