

## WASTE MANAGEMENT OVERFLOW SYSTEM USING IOT AND CLASSIFICATION USING DATA MINING

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**Abstract** - Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid all such situations, we are going to implement a project called IoT Based Smart Garbage and Waste Collection bins. We have observed that the municipal officer or the government authorized person will monitor the status of dustbin. Or generally we see that they have a regular schedule of picking up these garbage bins or dustbins. These dustbins are interfaced with microcontroller based system having ultrasonic sensor along with Wi-Fi module showing current status of garbage, on server. So, in situations, with help of our project the government authority person can get alert. So, they will get alert before their periodic interval visit of picking up the dustbin. Then they can go and pick up the dustbins.

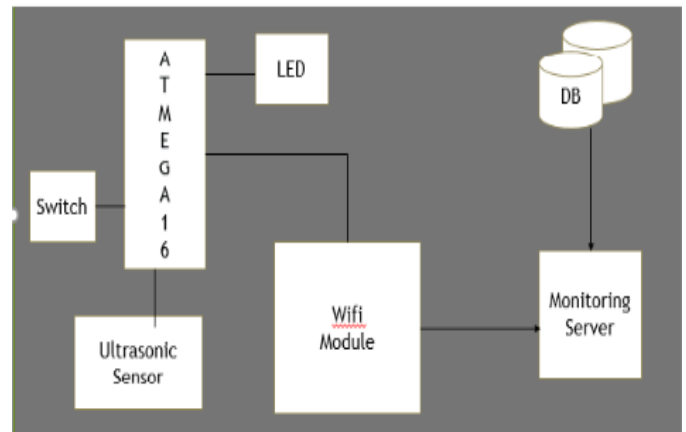


fig.1

**Key Words:** GSM, agriculture, soil moisture sensor, temperature sensor, monitoring, Arduino

### 1. INTRODUCTION

The garbage based detection system using IOT has achieved significant progress over the last decade resulting in a huge system with many advances on its own.

The previous advancements include the attachments of IR sensors in place of ultrasonic sensors due to the volume capacity problems of the dustbin. However, the garbage collection at a particular area and the number of trips to be taken to a more crowded area has always been a problem to the environments and the locals living in that area. So, to avoid this problem we have introduced the concept of data mining where we will be collecting the information of different areas from various people working in this field and thus instead of the garbage bin overflowing in a particular day many times or a total opposite condition where the less frequently used garbage bins will be left unseen for days resulting in pungent smell.

### 2. SYSTEM ARCHITECTURE

Fig shows the block diagram of waste monitoring system. WIFI module is used to keep information about the changes in the garbage levels

#### A. Hardware used

- a. Ultrasonic Sensor
- b. Micro controller (ATMEGA16)
- c. WIFI Module ESP8266
- d. Relay
- e. Switch

#### a) ULTRASONIC SENSOR:



Fig.2

HC-SR04 ultrasonic ranging sensor is economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit.

**b) ATMEGA 16**



fig.3

ATMEGA16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. [1]

**c) Wifi Module-ESP8266:**



fig.4

Wifi Module ESP8266 has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and Microcontroller.ATMEGA16 through its GPIOs with minimal development up-front and minimal loading during runtime. [2]

**d) RELAY:**

Relays are simple switches which can be operated both mechanically and electrically in which electromagnet is present. Relay works when there is a low-power signal and this information is used to control the circuit. It is used, where a number of circuits are controlled by a single signal. They are used for switching incoming signals from one source to different destinations. Relays are also used to perform Boolean and other logical operations in a computer.

**B. Software Requirements**

Basic Software Requirements are

- a) RAM-4GB
- b) MEMORY REQUIREMENR-1GB
- c)OS-WINDOWS XP

**3) Technology Used**

**3.1) .NET Framework**

The .NET Framework is an environment for building, deploying, and running XML Web services and other applications. It is the infrastructure for the overall .NET platform. The .NET Framework consists of three main parts: the common language runtime, the class libraries, and ASP.NET. The common language runtime and class libraries, including Windows Forms, ADO.NET, and ASP.NET, combine to provide services and solutions that can be easily integrated within and across a variety of systems. [3] The .NET Framework provides a fully managed, protected, and feature-rich application execution environment, simplified development and deployment, and seamless integration with a wide variety of languages.

**3.2) ASP.NET**

ASP.NET is more than the next version of Active Server Pages (ASP); it is a unified Web development platform that provides the services necessary for developers to build enterprise-class Web applications. While ASP.NET is largely syntax-compatible with ASP, it also provides a new programming model and infrastructure that enables a powerful new class of applications. You can migrate your existing ASP applications by incrementally adding ASP.NET functionality to them. ASP.NET is a compiled .NET Framework -based environment. You can author applications in any .NET Framework compatible language, including Visual Basic and Visual C#. Additionally, the entire .NET Framework platform is available to any ASP.NET application. Developers can easily access the benefits of the .NET Framework, which include a fully managed, protected, and feature-rich application execution environment, simplified development and deployment, and seamless integration with a wide variety of languages.

**3.3) Microsoft SQL Server**

Business today demands a different kind of data management solution. Performance scalability, and reliability are essential, but businesses now expect more from their key IT investment. SQL Server 2005 exceeds dependability requirements and provides innovative capabilities that increase employee effectiveness, integrate heterogeneous IT ecosystems, and maximize capital and operating budgets. SQL Server 2005 provides the enterprise data management platform your organization needs to adapt quickly in a fast-changing environment.

#### 4) WORKING

The GSM ultrasonic sensor measures the lengths of the waste bin and sends the data to the real-time server, which is processed by the ATMEGA16, and the server on the backhand uses the aql database, to add new users for the current data. The levels of garbage are processed using the naïve bayes algorithm and asked for an option of the disposal. [4]

#### 5) NAÏVE BAYES ALGORITHM

### Algorithm

- ▶ Step 1:-Start
- ▶ Step 2:-Classification in four levels:-low,medium,high,extreme.
- ▶ Step 3:-Prior probability of classes is set as  $P(c)$
- ▶ Step 4:-Calculate likelihood  $X$  given in  $c$

$$P(X/C) = \frac{\text{Number } c \text{ in vicinity of } x}{\text{Total number of } C \text{ cases}}, \text{ where } x=x_1, x_2, x_3, \dots$$

Step 5:-Set prediction prior probability of  $p(x)$

Step 6:-Calculate post probability of  $c(x)$

$$P(c/X) = \frac{\text{Likelihood of } x \text{ given in } c}{\text{Prediction prior probability}}$$

Step 7:-If (post probability >= dispose probab)

then

dispose garbage

else

don't dispose garbage


Step 8:-Stop

fig.5

#### 6) RESULTS

### Garbage Monitoring

Home
Manage Garbage
Manage User
Classification
Logout



CLASSIFICATION

SELECT TYPE	: MEDIUM
SELECT YES/NO	: YES
SET RANGE	: 0.3
<input type="button" value="SUBMIT"/>	

fig6

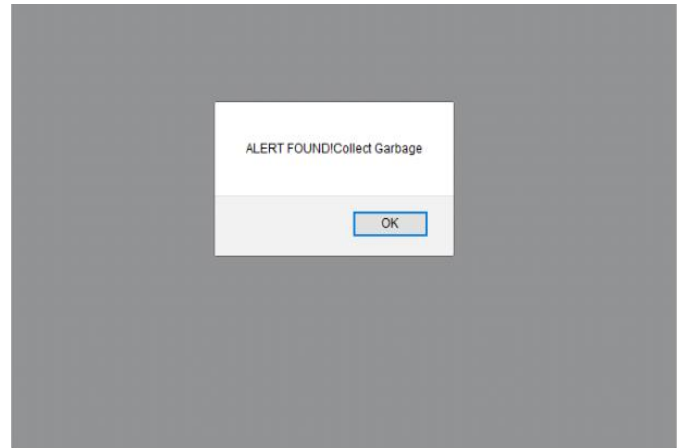


fig7

Alert has been found and the garbage can be collected and disposed now.

#### 7) FUTURE SCOPE

Multiple users can access this system through the server and every area's garbage collector officer can access the data of the respective area and hence collect the garbage accordingly. An android application of this system can also be made allowing the officers to just access the data in a pocket friendly way and thus getting notifications anywhere possible. This system if circulated and accepted by the government can be then used by the whole country. Additional, weight or fluid sensors can also be added instead of ultrasonic sensors thus allowing for more precise record and classifying the data according to the weight or volume respectively.

#### 8) CONCLUSIONS

Waste Management Overflow System Using IOT and Classification Using Data Mining is a successful and accurate system which helps the user to collect and manage data of various places and thus serving a major hand in the cleaning drive of the earth. The current system is too simple and not efficient making it really difficult for the garbage collectors to track the garbage and collect it on time. Also, void of the sensors in the system has not yet successfully helped the collectors to detect the level 20 of the garbage. The proposed system is more efficient, can easily be available at any place and at any time around the globe, this system is secure and can be accessed only by the authenticated users with authentic username and password. The proposed system can be used by any Municipal Corporation Officer sitting at a place and getting access to the data of the bins around an area. As this system is saved on the server many users can be added by saving their records and registering themselves as an authenticated user allowing the system to work on a larger scale and by multiple people at a single time.

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