

Smart Bin

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Abstract - In the recent decades, Urbanization has inflated enormously. At part there's a rise in waste production. Waste management has been an important issue to be thought-about. This paper is an attempt to improve the modern day waste management system. In the proposed paper, The Smart bin is made on a microcontroller-based platform Arduino Uno board that is interfaced with GSM Modem and Ultrasonic Sensor. Ultrasonic sensor is placed at the summit of the bin which is able to measure the stature of the bin. Arduino is programmed in such the way that once the bin is at threshold level, it sends a message to the server about the status of the bin. Once the waste reaches the threshold level, Ultrasonic Sensor activates the GSM Modem which in turn alert's the specified authority till the waste within the bin is cleared. Once the bin is cleared, People can again use the bin. At regular intervals bin are cleared. Once the Smart Bins are implemented on large scale, the traditional way of collecting waste and garbage will be eliminated. Foul smell from these rotten wastes that stay untreated for a prolonged time, could cause health issues. Breeding of insects and mosquitoes will produce nuisance around promoting unclean atmosphere. This might even cause dreadful diseases. All this type of phenomenon can be avoided with the help of Smart Bin.

Key Words: Arduino Uno, GSM Modem, Time Series Analysis, Ultrasonic Sensor.

1. INTRODUCTION

Improper waste management easily paves route for air pollution and soil contamination which in turn poses adverse effect to health of mankind and in addition to environmental deteriorations. A Survey made by a top magazine in India have apparently proven that Garbage Accumulation is the prime reason behind the hazardous air pollution in Guwahati, an Assamese Township. This pollution in the above told township was the reason behind the serious health issues like Chronic Obstructive Pulmonary Disease (COPD) and Asthma that was being faced by the people who have their livelihood over there. The failure of removal of accumulated garbage is the sole reason for breeding of mosquitoes and houseflies which is the root cause behind various deadly diseases like malaria, dengue, chicken guniya etc. A city with poor sanitation and malodorous environment can never be a healthy place to live in. Nearly 235 million people currently suffer from breathing illness due to the inhalation of air with foul smell. Almost 90% of COPD sufferers are from low and middle income countries. A health magazine has issued a survey result that

approximately three million people died of COPD in 2005. Inopportune managing of garbage is recognized to be the sole reason for over 22 human diseases that causes premature death every year. Enactment of this smart dustbin could possibly avert the mounting of the garbage for an elongated period of time which would prevent the widespread of diseases to a great extent and it do affirm a clean environment in the city.

3. Literature Survey

Title	Purpose	Analysis
Smart Bin: An Intelligent Waste Alert and Prediction System Using Machine Learning Approach	The email alert and the text message have been sent automatically to the concerned authorities once the level of waste in the dustbin crosses the threshold. It guides the garbage-trucks to collect the garbage only from those areas where the bin is critically filled.	The proposed system successfully demonstrates its capability of real time monitoring of the waste generation patterns in a city. The alert messages are also sent to the responsible authorities to pick up the waste in case the bin is full.
Smart Bin- An "Internet of Things" Approach to Clean and safe Public Space	In this approach, sensors are placed in the bins located at public areas, to sense the level of the garbage in the bin. When garbage reaches the threshold limit, the status of the bin is updated in the cloud, and this status can be accessed by the concerned authorities and an immediate measure can be taken for the cost-effective disposal.	The following results are observed from this work- -Detection of garbage level in the bin -Wireless transmission of information using Arduino -Real-time data can be accessed through the Cloud -Overflow of the bins can be avoided

3. Materials Required

Arduino Uno, HCSR04 Ultrasonic Sensor and API

A. Arduino UNO

Arduino UNO is a microcontroller board based on the AT mega 328p. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an I2C header and reset button. Connect

the controller using USB cables or power it with AC-to-DC adapter or battery. The Arduino UNO can be programmed with Arduino software IDE.

B. Ultrasonic sensor

The object distance is determined by calculating the duration of ultrasound waves of a certain frequency and determine the objects distance from the duration of ultrasound that it reflects. Ultrasonic sensor ranges from 2cm-400cm measurement function. The connecting wires such as 5v power supply trigger pulse input, echo pulse output, 0v ground.

C. GSM modem

A GSM modem is device which can be either a mobile phone or a modem device which can be used to make a computer or any other a network. A GSM modem requires a SIM card which operates over network range. It is connected to a computer through serial, USB or Bluetooth connection.

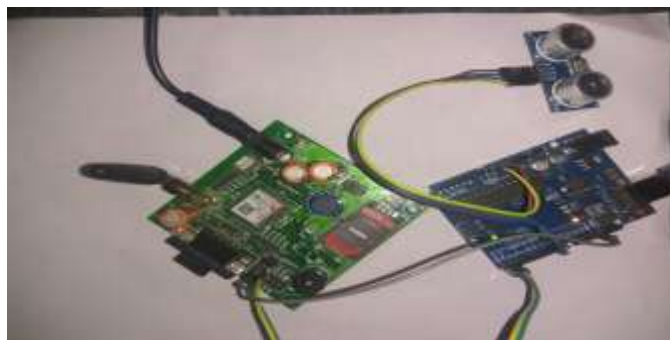


Fig-1: Hardware Connection

4. Proposed Architecture

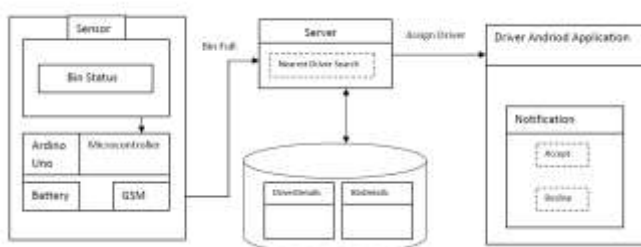


Fig-2: Proposed System Architecture

In system architecture there is android application which can be used by only authenticated Drivers. When the bin gets full Arduino will transfer this message to server. Server will calculate the distance between vehicles and the bin and find the nearest driver after that nearest driver will get assigned to collect dustbin. This notification will arrive on drivers application.

5. Implementation

The Implementation of “Smart Bin” system uses the sensors, Arduino UNO, ultrasonic sensor and GSM module. The system uses ultrasonic sensors placed over the bins to detect the garbage level and compares it with the garbage bin’s depth. If the level of the garbage reaches the threshold value specified by the authority, the status of the garbage bin is uploaded on the server, As soon as the level is updated on the server the nearest driver has been searched from the location of the bin. There is an android application is provided to every driver through which he can access the system. The location of the bin is being send to the driver as a notification. The driver has rights to accept or reject the request according to the protocols. When driver done his work then he update the status of bin. The ‘machine-learning’ concept has been used to gather information about the waste generation habits in that region and hence predict the how much workers and bins should be required in particular area in future . Apart from that, the analysis of the continuous data is also done that has been sent over the server in the form of graphs. The authorities take further action to empty the bin and avoid overloading of the garbage in the bins.



Fig-3: Bin Request on Application

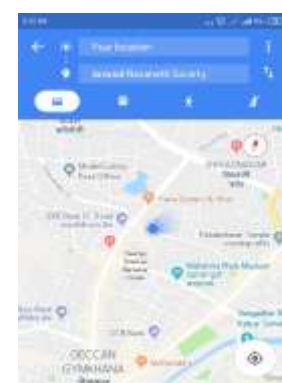


Fig-4:After accepting navigation towards Bin by driver

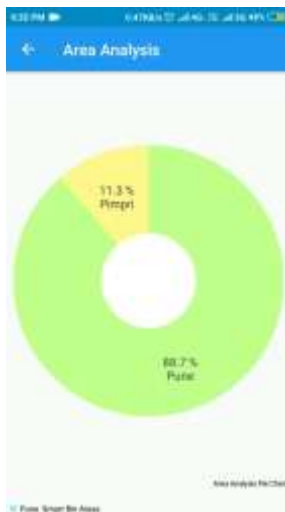


Fig-5: Analysis on input data



Fig-6: Decision given on the basis of analysis

3. CONCLUSION

The Goal is to keep “cleanness” in the society. Smart Bin works with the sensors and will demonstrate the various level of garbage in the bin. This make our environment clean and ensures hygienic surroundings. Improper disposal and improper maintenance of the domestic waste creates issues in public health and environmental pollution. This project provide practical solutions to help the local municipal administration in waste management system.

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