

# Smart Waste Monitoring system using IOT and Arduino

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**Abstract-** Today, one of the challenges of most cities and towns are confronting is the decline in condition of cleanness of the environment regarding the garbage management. This occurs due to the mismanagement of the garbage collection. This mismanagement creates the spread of garbage in community which in turn creates unhealthy condition in the immediate area. It also stimulates several serious diseases amongst the people in close proximity and degrades the beauty of the area. To avoid mismanagement of the garbage and to improve the cleanness of the society, Garbage monitoring system is designed. In the proposed system, the level of the garbage is detected with the help of ultrasonic sensor and sent to the authorized agency for garbage collection through GSM system. A GUI is also developed to monitor the desired information related to the garbage bins for different selected locations. Depending on the received messages through the GSM at control room it is displayed on LCD and the authorized person inform the drivers to collect the garbage on time. This will capably help to monitor the garbage collection to make the environment smart, clean and safe.

**Index terms-** Arduino, Garbage, Monitoring, Sensor, System

## I.INTRODUCTION

Keeping the environment clean is quite important and it is used to emphases more on giving attention to the cleanliness. Nonetheless, it is not as easy as to speak out the proverb to effectively and properly managing the garbage. We frequently observe garbage bins being filled over and additional waste materials being disposed and accumulated around the bin in different cities of Ethiopia. Those improperly disposed garbage will be the dwelling for various number of dangerous micro-organisms, insects and mosquitoes to breed on. Because of this, severe and contagious disease is stimulated and also bad smell comes out of it and may cause illness to human beings. The municipality of most cities in Ethiopia has strived its best to alleviate this problem by providing several garbage bins throughout the town. However, it is

manual approach and a number of trucks from the municipal authority are sent to the waste bins to collect the waste. The wastes are loaded to the truck and conveyed to the pre-specified locations

## II. MATERIALS &METHODS

To begin with you must first enter the height of the dustbin. This will help us to generate garbage in the trash. We have two criteria that must be satisfied to show that a particular bin needs to be emptied:

- The amount of garbage, in other words, assume that if your bin is half full, you do not need to empty it. Our thrush, or the maximum amount that we allow trash, is 75% of thebin.
  - If a particular trashcan is filled by 20% and then does not change for a week, it falls into our second criterion, time. Over time, small amounts will also rot, which will stink around. To avoid that our tolerance level is 2 days, so if any garbage is less than 75%, but it is two days old then it also has to beemptied.
1. To analyze the work done so far to monitor waste
  2. Propose and design a waste monitoring system that can be controlled with aGU

## III.ARCHITECTURE

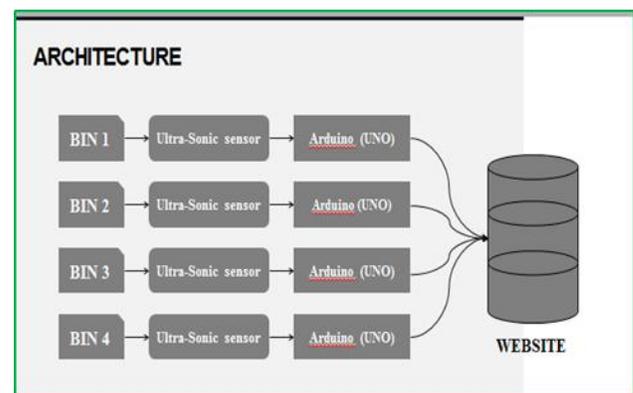


Fig 1. Screenshot

#### IV. ADVANTAGE

Cost reduction:

Our smart waste logistics solution reduces waste collection frequency dramatically, which enables you to save on fuel, labor, and fleet maintenance costs.

Improved cleanliness

CO2 reduction

Collecting garbage is a very pollutant heavy proposition. Our solution offers you the means to have less truck on the road for less time,

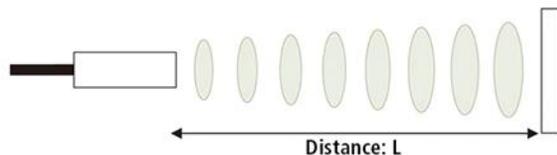
#### V. HARDWARE REQUIREMENT

##### 1. Ultrasonic Sernsor:

As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves.

The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head.



The distance can be calculated with the following formula:

$$\text{Distance } L = 1/2 \times T \times C$$

where L is the distance, T is the time between the emission and reception, and C is the sonic speed. (The value is multiplied by 1/2 because T is the time for go-and-return distance.)



Fig 2.Ultrasonic Sensor

##### 2.Arduino:

- Arduino Uno is a microcontroller board developed by Arduino.cc which is an open-source electronics platform mainly based on AVR microcontroller Atmega328.
- First Arduino project was started in Interaction Design Institute Ivrea in 2003 by David Cuartielles and Massimo Banzi with the intention of providing a cheap and flexible way to students and professional for controlling a number of devices in the real world.
- The current version of Arduino Uno comes with USB interface, 6 analog input pins, 14 I/O digital ports that are used to connect with external electronic circuits. Out of 14 I/O ports, 6 pins can be used for PWM output.
- It allows the designers to control and sense the external electronic devices in the real world.

It is an open-source platform, means the boards and software are readily available and anyone can modify and optimize the boards for better functionality.

The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language.

Some people get confused between Microcontroller and Arduino. While former is just an on system 40 pin chip that comes with a built-in microprocessor and later is a board that comes with the microcontroller in the base of the board, boot loader and allows easy access to input-output pins and makes uploading or burning of the program very easy.

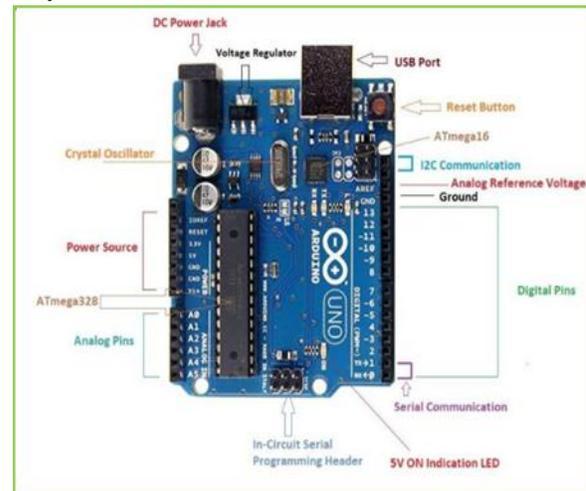


Fig 3.Arduino

## VI. EXPERIMENTAL SETUP

The following depicts the experimental setup of the proposed concept.



Fig 4. UltraSonic sensor attached to dustbin



Fig 5. Experimental Setup



Fig. 6 Experimental setup in operating state

## VII CONCLUSION

When designing these smart dustbins, various features such as durability, affordability, damage prevention and maintenance issues are addressed. This smart dustbin can contribute a lot to the creation of a smart city for a clean and hygienic environment. But since technology is new in India, proper awareness should be created among people before it can be implemented on a large scale. Otherwise, sensitive devices such as sensors may be damaged due to the rough action of the users.

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