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Smart garbage bin

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ABSTRACT

Garbage monitoring has become an essential issue for most of the cities in the world. The detection, monitoring, and management of wastes are one of the primary problems of the present era. Due to the negligence of authorities and carelessness of public, long-term problems such as bad odor and harmful diseases occur. The traditional system of waste collection and management is effective only in those areas where garbage bins become full on a daily basis. But in certain areas, garbage production is low whereas the garbage collection trucks check the garbage level each day. This checking and collection process leads to heavy fuel loss. In remote locations, garbage trucks do not arrive to pick the garbage on time leading to garbage overflow. To overcome these problems we have introduced "Smart Garbage Bin" as an effective system. The smart garbage bin employs a level detector that detects the amount of garbage in the bin. When the level of garbage in the bin reaches 75%, a notification is sent to the operator of the garbage collecting vehicle through a web interface.

Keywords— *Level detector, Garbage overflow, Web interface*

1. INTRODUCTION

In the present era, solid waste management has become one of the main concerns as it impacts the health and environment of our society. The traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies. Traditionally waste collections have been inefficient, targeting each and every trash bin without really knowing if the bins were full or empty. By 2030, almost two-thirds of the world's population will be living in cities. This fact requires the development of sustainable solutions

For urban life, managing waste is a key issue for health. Effectively managing waste is important in developed countries. Waste management may swallow up to 50% of a city's budget, but only serve a small part of the population.

In views of that, the efficient use and responsible handling of resources become more important. This is where smart garbage bin powered by it comes into an act which is an innovative way that will help to keep cities clean and healthy. Our smart operating system enables two- way communication between the dustbins deployed in the city and service operator. Therefore the focus is only on the collection of the route-based fill level of the containers. The sensors are installed inside the containers which provide real-time information on the fill level. This information helps determine when and where to prioritize collection.

In this way, both service providers and citizens benefit from an optimized system which results in major cost savings and less urban pollution. Applying this technology to the city optimizes management, resources, and costs, and makes it a "SMART CITY". As time changes everything around us, this implementation is available for further changes.

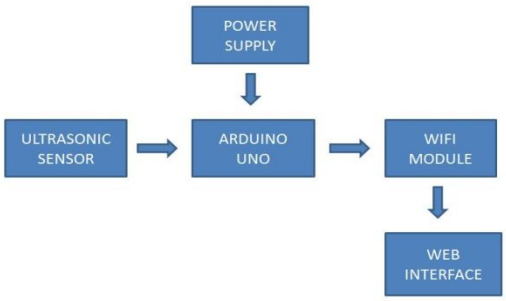

Fig. 1: Flow of process

2. PROBLEM STATEMENT

The main problem with smart garbage bin is it is not cost effective. The process needs a lot of money and time. As there is a huge increase in population all over the world, the production of smart garbage bins must be increased which further needs a lot of money, and further, the system must be effective as an even single error in the system will lead to global pollution. Our model tries to fill the gap present in the smart management of garbage and therefore, improves the quality of garbage management system.

3. EXISTING SYSTEM

In the existing system, garbage is dumped by local residents in a domestic garbage collection bin which is placed preferably in each street or which is assigned for one particular locality. It is a hard-earned process and it utilizes a lot of time and cost. The domestic garbage collection bin is then emptied into garbage

collection trucks on a regular basis. The garbage shrinks and overflows the garbage bin and is spread over the roads and pollutes the environment. This, in turn, produces air pollution and spreads disease at a faster rate. To avoid the poor waste management we are introducing "Smart garbage bin".

4. PROPOSED SYSTEM

The proposed "Smart garbage bin" employs the following methods to assist and enhance the existing model:

Our system gives a real-time indicator of the garbage level in a trash can at any given time. The garbage level is indicated based on the distance in cm, using the data we can optimize the waste collection and ultimately reduce fuel consumption. It also allows trash collectors to plan their daily or weekly pick up schedule. An ultrasonic sensor also is known as distance sensor will be placed on the interior side of the garbage bin. As the garbage increases, the distance between the garbage and the sensor present on the interior side of the bin decreases. The live data will be sent to a microcontroller Arduino which processes the data through the help of Wi-Fi which sends it to the mobile application. It visually represents the amount of garbage present in a graphical form with the help of thingspeak. It displays the distance of the garbage present in the bin. The data gets updated every 1 minute. Live status of the bin can be monitored in a web application regularly.

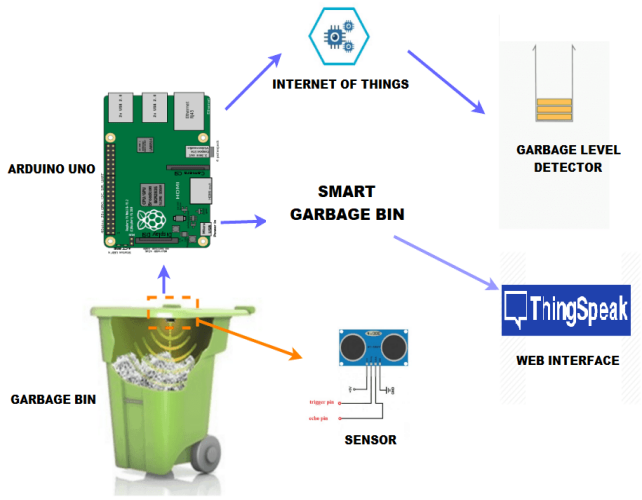

Fig. 2: The system

5. SYSTEM OVERVIEW

The proposed smart garbage bin consists of three main components an ultrasonic sensor, Wi-Fi module, an Arduino Uno. Ultrasonic sensor, 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.

Fig. 3: Ultrasonic sensor

At first, the level or the height of the garbage in each bin is measured by using the ultrasonic sensor. This information is then received and processed by the Arduino Uno. It will determine whether the garbage level has been surpassing the threshold level or not. For this research purpose, there are two threshold levels sets: the first threshold is at 70% of the bin height, and the second threshold is set at 90% of the bin height.

If the garbage level in the bin is crossing the first threshold level, then the first warning message is generated and sent to the municipality. Besides, the green LEDs will be turned ON in order to alert all the residents on every floor. Next, if the garbage level in the bin is

The ultrasonic senses the data and then sends it to the heart the Arduino UNO which executes the data and transfers to the Wi-Fi module. The final output is displayed in a web interface in a graphical form, which in this case is thingspeak.

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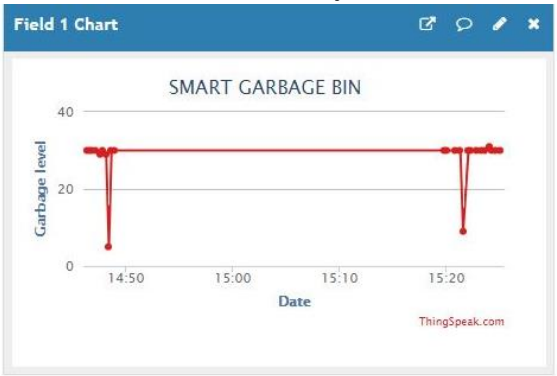

Fig. 4: Final data

6. FUTURE RESEARCH

As we all know with the large increase of population all over the world. The amount of garbage created will also increase which in turn leads to pollution. Hence an effective proposed system will lead to greater smart garbage management. Implementing this system on a large scale basis is totally possible, which will lead to easy maintenance of garbage bins and the negative effect of the population over the garbage can be completely destroyed all the over the world with a simple IOT powered smart garbage bin. The inclusion of GPS can also be done which is a time-consuming process and can be implemented in the nearing future.

7. CONCLUSION

This model leads to the improvement of the proper smart garbage management system which is powered by IoT.

It enhances the efficiency of the produced waste by segregating it in an organized manner. This proposed system can be introduced in almost all the areas and can even be implemented in large scale due to its practicality and reasonable cost. It helps the whole environment to move on with a developed mindset and hence it is a better way of managing waste than the traditional way.

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