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IoT on smart waste management in cities

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ABSTRACT

With the increase in population, the scenario of hygiene with respect to garbage management is degrading extremely. The overflow of garbage in public areas creates the unhygienic condition in the nearby surrounding. It may provoke several serious diseases amongst the nearby people. It also degrades the valuation of the area. To avoid this and to improve the cleaning, 'smart garbage management system' is projected in this paper. In the proposed system, the level of garbage in the dustbins is detected with the help of IR Sensor systems, and communicated to the authorized control room through Arduino Sensor system contains Wi-Fi. With the help of Arduino we can transmit the data. A GUI will allow to interact with other device and also developed to monitor the preferred information related to the garbage for different selected locations. This will help to manage the garbage collection competently.

Keywords: *Dustbin, Waste management, Arduino, Android.*

1. INTRODUCTION

In our city many times we see that the garbage bins or dustbins placed at public places are spilling over. It creates unhealthy conditions for people. Also, it creates revoltingness to that place. At the same time, the bad smell is also spread. To avoid all such situations we are going to implement a project called Garbage collection bin overflow indicator using Arduino Sensor System technology. In this project, we are going to place an IR Sensor at the side of the dustbin. When the level of the garbage reaches the threshold value, a signal from Wi-Fi will be sent to the respective Municipal / Government authority person. Then that person can send the collection vehicle to collect the full garbage bins or dustbins.

In this project, we intend to develop a system which would help the environment from getting spoiled with an overflow of waste in many areas. Internet of things is nothing but the application performing with the help of internet access. We will observe that the municipal authority or driver will get the notification or generally we see that they have a regular schedule of picking up these garbage bins or dustbins. This schedule varies as per the population of that place. It can be once in a day or twice in a day or in some cases once in two days. However, we see that in case there is some festival or some function, lots of garbage material is generated by people in that particular area. In such cases the garbage dustbin gets immediately full and then it overflows which creates many problems. So in situations, with help of our project the government authority person can get signal immediately from Wi-Fi. So they will get signals before their periodic interval visit of picking up the dustbin. Then they can go and pick up the dustbin.

2. LITERATURE SURVEY

A) Alexey Medvedev, Sergei Khoruzhnicov

- This paper provided us with additional details and designs needed for flow and management of garbage while collection. They also proposed some improvements to the authentication of challenge-response authentication protocol in the garbage management system. In this paper, their system assures the cleaning of dustbins soon when the garbage level reaches its maximum.

B) Theodoros Anagnostopoulos, Arkady Zaslavsky, Alexey Medvedev, Sergei Khoruzhnicov

- The internet of things enables smart cities with novel services. Such services demand low power, high throughput, and low-cost sensor data collection technologies. The number of devices, their variety, breadth of their distribution, and the number of standards are constantly increasing. In this paper, we explore and seriously analyze rising IoT communication technologies. LoRaWAN has been selected for deployment in the smart waste management (SWM). The paper proposes an Architecture for SWM data collection and delivery as part of St. Petersburg pilot of Horizon 2020 Biotope project. Widespread experiments with actual sensors and smart garbage bins were conducted for stress testing the LoRaWAN technology, analyzing data rates and power consumption. The paper concludes with lessons learned and LoRaWAN wider consumption possibility and improvement discussion.

C) Insung Hong, Sunghoi Park, Beomseok Lee

This paper gave the general idea of the IoT based smart garbage bin and the food management. This project work is the execution of smart garbage management system using IR sensor and Wi-Fi module.

D) P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V. Parthasarathy

This published paper gave us the idea of IoT subject and addition details about IoT and the proper smart environment and various applications. The developed system provides improved database for garbage collection time and waste amount at each location.

3. PROPOSED WORK

The Proposed System is to execute a project called Garbage collection bin overflow indicator using Arduino Sensor System technology. In this project, we are going to place an IR sensor in the region of the dustbin. When the level of the garbage reaches the threshold value, a signal from Wi-Fi will be sent to the respective Municipal / Government authority person. Then that person can send the collection vehicle to collect the full garbage bins or dustbins.

Advantages of Proposed System:

- Easy tracking system.
 - Immediate disposal activities.
- Leads to a healthy environment.

4. PLANNING AND FORMULATION

4.1 Planning:

- Communication Plan:** In the initial phase, we as team planned to discuss initial steps, study material, inclusions, and exclusions, etc. with our project guide. In communication phase, we are tracing out *boundaries* i.e. *scope* and *analytical approach* to the project.
- Human Resource Plan:** Humans are key elements of every project, so we formed a team of four members and assigned them particular responsibilities.
- Implementation and Project Closure Plan:** To implement this whole conceived project, we planned to code all the inferences and our developed approach to **JAVA**. We planned to make a formal closure by 28th Feb. 2018 in the remark of **Normal** i.e. **Successful Closure**.

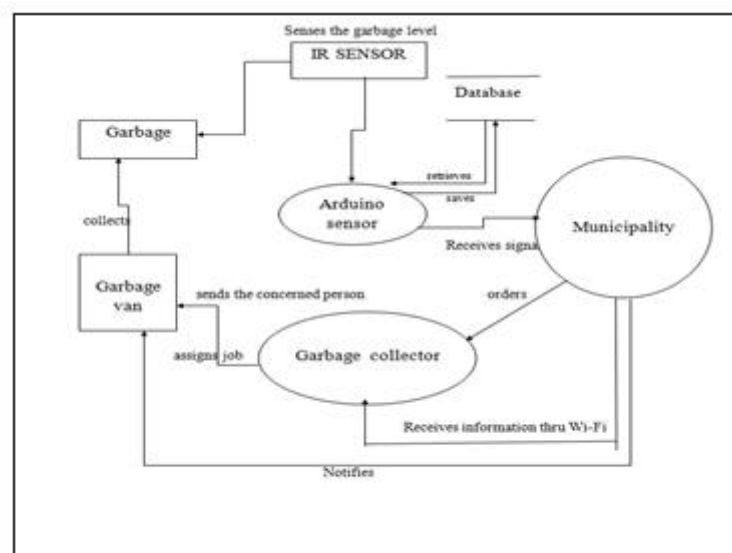


Fig 1: Data flow diagram of IoT waste management smart cities

4.2 Formulation:

- **Dustbin level detection:** We propose a smart garbage bin using IoT to identify when the garbage bin is being filled using a sensor so that we can get the volume occupied and left in the bin
- **SMS sending:** If the volume is full, the program triggers an alert message and sends the alert and location to the garbage collector. We can use way2SMS API for this
- **Web application:** After the dustbin is completely filled, a message will be sent to web application of the garbage collector.

5. CONCLUSION

Garbage management System is one of the major environmental problems of Indian cities. Various studies reveal that about 90% of MSW is disposed of irrationally in open dumps and landfills, which are effectively creating problems for public health and the environment. In the study recently, a sincere attempt has been made to provide a complete and sincere analysis of the generation, characteristics, collection, and transportation. This project solid waste monitoring and management system has been successfully implemented with the addition of communication technologies such as IR Sensor, Arduino Sensor, and Wi-Fi system. The planned system would be able to monitor the solid waste collection process and management the overall collection process. This technique would provide all the waste collection on time and also beat all the disadvantages which are as the use of minimum route, low fuel use, clean and green environment and available vehicle. The technologies which are used in the planned system are good enough to ensure the practical and perfect for solid waste collection procedure monitoring and management for green environment.

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