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# Survey Paper on Garbage Collection System using IOT

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***Abstract:*** ***These days, there is a huge impetus on smart city initiatives across the world. One of the popular use cases of Smart City is the concept of Smart Bins. As we all know, efficient waste management is a growing challenge in urban areas. Hence, this Smart Bin concept has also drawn a lot of attention as part of automating the public infrastructure across cities. The residents need to put all the garbage into the container and once fill, the municipality people use to change it with another container. These filled container are then carried for garbage disposal. But mostly these containers are not replaced after proper interval of time. The result is bad odor, disease, inconvenience for the resident's and many more problems are faced by the peoples. Thus in this paper we are going to develop an android application which with the help of the sensors will recognize the container is full or not and will send the message to the concern person in the municipality to replace the container.***
***Keywords: smart city, garbage collection, Android system***

## I. INTRODUCTION

A Smart City is a city development to manage multiple information and communication technology(ICT) in order to make a solution for any problem in the city. Smart city includes many information such as, local department information system, schools, libraries, transportation system, hospital, power plants, law, traffic system, waste management, and others city services. The goal of a smart city is to improve an efficiency of services and connect all information into one system. Nowadays, development of ICT especially internet of things (IoT) allow the city to be developed into a smart city.

In this context, waste management involves numerous waste bins that exhibit significant filling variations (over days and seasons or location) and diverse requirements for emptying, from sporadic (a few times within a week) to very frequent (several times a day). On the other hand, other waste forms (i.e. agricultural, biomedical, chemical, electronic, mineral, organic/inorganic, and radioactive, etc.) are characterized by specific collection points, uniform and predictable production, and equal, usually long, filling periods. The detection of the fill-level for urban solid-waste-bins presents many difficulties due to the various irregularities of the waste-bin filling process, such as the irregular shape and the variety of the included materials.

More challenges exist for the economical and energy efficient data aggregation from a large number of bins, as the harsh environmental conditions (e.g., humidity, temperature, and dust) can significantly affect the sensor measurement accuracy and reliability, while on the other hand these conditions constitute parameters that one should also take into account for a holistic waste management process.

This work mainly focuses on investigating construction, examining the existing waste management approaches in the construction industry; investigating the existing implementation of waste management systems by power spectral and bispectral methods; and recommending methods to improve the existing implementation of waste management systems.

The time waste was just some kind of leftover that had to be disposed of is long gone. With the realization that our resources are not inexhaustible came the awareness that our waste offers economic opportunities that have to be taken advantage of. While the recycling goal for some products containing glass, metal, etc. is clear, it is important to point out that even the garbage we put outside can be used to make electricity or can be used in other useful products.

While emphasizing the durability of waste, we have to think about running the waste cycle efficiently too. Waste management is more than just collecting waste. It is the collection, transport, processing, recycling, disposal and monitoring of waste materials. Numerous factors, such as environmental, economic, technical, legislational, institutional and political issues, have to be taken into consideration. Several important decisions have to be made.

Amongst them is the opening of a new facility as available locations are becoming increasingly more scarce, or the expansion of a current facility.

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## II. LITERATURE SURVEY

Papers on waste management vehicle routing problems have on the whole been published after 1995, which indicates that interest in this topic has increased from 1995 on. The majority of the papers are available in online databases like Elsevier, Science Direct, Sage, Academic Search Premier, Business Source Premier and others. After that, a screening of the references of the earlier found literature helped complete the search. By analyzing the papers chronologically, trends in the type of solution method or software that was used, could be detected. The first publication regarding waste collection vehicle routing was by Beltrami and Bodin [5] in 1974. The most recent publication is by Benjamin [6] in 2010.

Every year 11.2 billion tones of solid waste are collected worldwide (UNEP 2011). In upcoming years the amount of accumulated waste will continue to increase together with growing population, an urbanization rate, overall economic and GDP/GNI per capita growth, an increase in production and consumption, and changes in a consumption pattern. However, there is a positive aspect to this waste—its huge economic potential. Today the world waste market, from collection to recycling, is estimated at USD 410 billion a year, not including the sizable informal segment in developing countries (UNEP 2011). Such a quantity of waste and its complexity not only have a significant adverse environmental impact, causing pollution, and posing threats to human health.

Integrated Sustainable Waste Management (ISWM) system was then introduced in 1995 to improve earlier system that neglect unique characteristics of a given society, economy and environment (van de Klundert, 1999).For example, European countries had applied various system assessment tools and engineering models to create sustainable communities, manage resources efficiently, tapping innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion in their SWM system (Pires et al., 2011). Asian countries had also given attention in building the national legal 12 frameworks, managing institutional, technology, operational and financial aspects, and creating public awareness and participation (Shekdar, 2009).

As mentioned before, most waste management models consider economic and environmental aspects, but very few consider social aspects. For a waste management system to be sustainable, it needs to be environmentally effective, economically affordable and socially acceptable. Nilsson-Djerf and McDougall (2000) [3], who go on to say, "for a waste management system to be effective, it must be accepted by the population". This point is further emphasized by Petts (2000), who states, "the most effective management of MSW has to relate to local environmental, economic and social priorities" and must go beyond the traditional consultative approaches that require the "expert" to draft the solution in advance of public involvement to a much more effective approach by involving the public before key choices have been made.

### *A. Problem Statement*

To develop an android application for garbage collection with the sensor on the container which will recognize the level of the container and the app will send message to the concern person.

### *B. Proposed System*



Fig. 1. A schematic of the proposed IoT-based waste management architecture, showing the interconnectivity between the smart bins, the collection vehicles and the cloud.

A smart bin is a regular trash can, equipped with a sensor. Thus, such sensored trash cans can measure the level of trash contained in them and report that to the users.

As per the above block diagram, the main components of this system are

*1)* Sensored trash can: Fitted with a hardware device that controls the garbage sensor.

*2)* Mobile app: This is a mobile app through which the user can monitor the trash level inside the trash can. This app may be used by the waste collection agency personnel or anyone who is responsible for clearing the trash.

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*a) Application*

*i)* For real time garbage collection in cities.

*ii)* For hospitals and schools etc

*b) Advantages*

*i)* The system will result in time to time replacement of garbage container.

*ii)* To lower the rate of contaminated disease.

*iii)* Former hands to keep our city clean.

*c) Limitation*

*i)* The admin will get the message but the immediate action should be taken.

*ii)* Security of the sensor on the garbage container.

## III. CONCLUSION

The garbage collector system with the sensor with the help of which the admin will get to know in which area of the city should need to be clean. This is the real world application and should be applicable to keep city clean and tidy.

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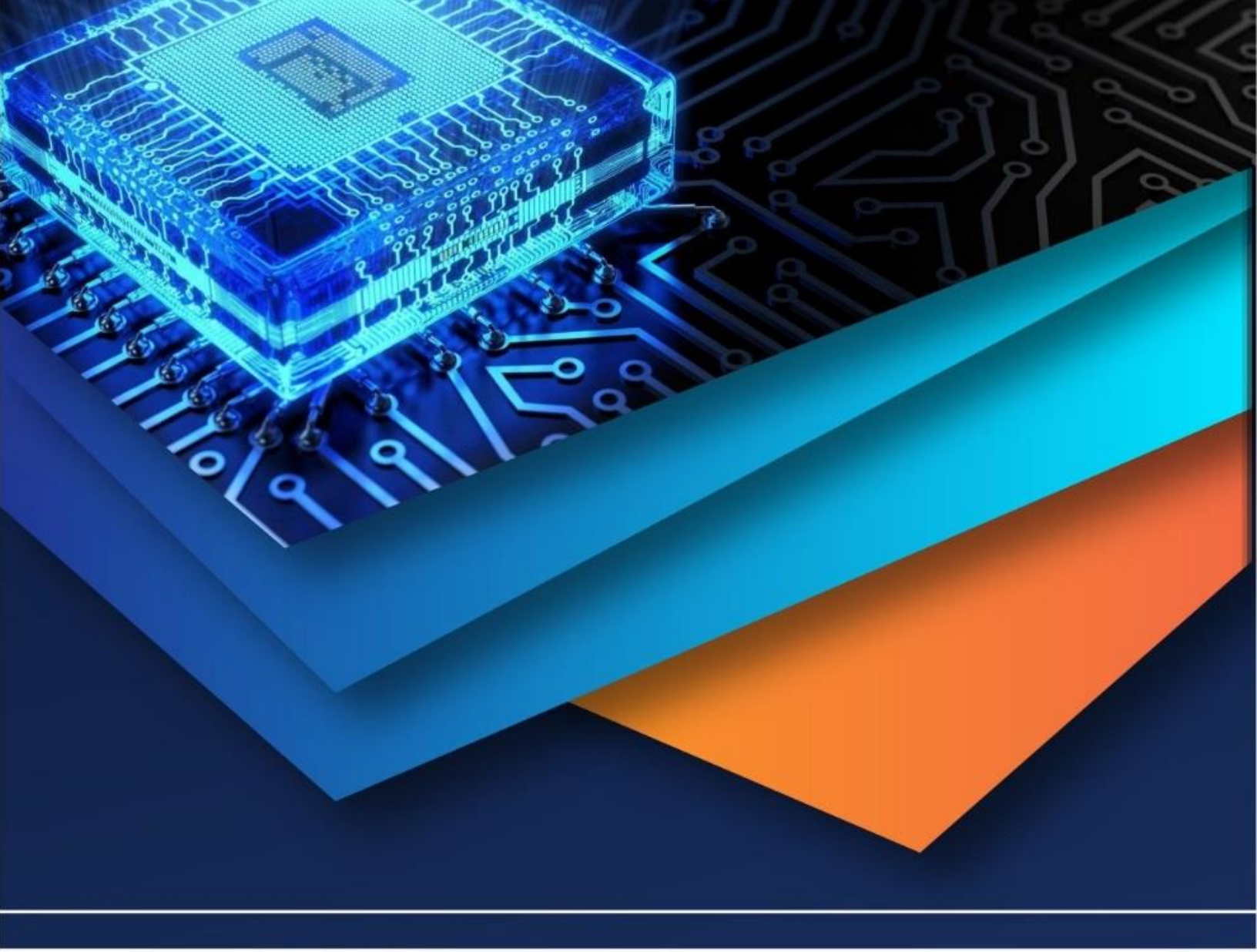
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