

A Review on Garbage Monitoring System and Waste Management

Akanksha Chaudhary², Ruchi Varshney¹, Mayur Rastogi², Isha Dua².

¹Assitant Professor, Electronics and Communication Engineering department, Moradabad Institute of Technology, Moradabad

²Student, Bachelor of Technology (ECE), Moradabad Institute of Technology, Moradabad

Abstract: As the population is increasing day by day, the environment should be clean and hygienic. In many of the cities the overflowing garbage bins are creating an unhygienic environment. This further leads to arise of different types of diseases. To cope up with the situation, Shree Narendra Modi, PM of India has presented a unique example of a way to achieve cleanliness by launching a campaign popularly known as SWACCHHA BHARAT ABHIYAN (Clean India Mission) in which every individual irrespective posts and authority, has to maintain clean surrounding. In this contemporary busy world, it is almost impossible to maintain the clean and hygienic environment. To overcome these situations, we need to implement a smart garbage level monitoring system, which will alert the municipal corporation or higher authorities about the current level of garbage in different zones of cities. As level reaches its threshold level the alert is send to corporation. As the notification is received by the municipal corporation, the rag picking truck will reach to that dustbin and will empty the bin. Hence the bins are emptied before the garbage starts overflowing.

Keywords: Ultrasonic sensor, wi-fi module, Internet of Things(IoT), Solid Waste, Electronic Waste, Hazardous Waste.

I. INTRODUCTION

A smart city is an urban development to integrate information and communication technology (ICT) and Internet of things (IoT) technology in a secure way to manage a city's requirements. Information and communication technology (ICT) helps to enhance quality, performance and interactivity of urban cities, to reduce costs and resource consumption and to enhance communication between people and government. It's a city with high-tech communication capabilities. It uses digital technology to improve performance and well-being, to reduce costs and resource consumption, and to engage more efficiently with its people. There are many huddles in formation of smart cities like, pollution, firefighting, housing, waste disposal, public transport, shortage of electric power, security etc. Some of them are explained below as:

Housing: The most important concern in all cities has been housing the sudden and large-scale inflation of migrants from rural areas to urban areas especially the metropolitans and state capitals. Due to lack of housing, in each city almost fifty percent population lives in slums. Slums are illegally created colonies of housing on open spaces in the cities. The structures are temporary they are very crowded and rows of such houses are separated by narrow lanes through which household drainage can flow. These colonies do not have any civic amenities like drinking water, sewage, electricity etc. Ideally, slums should be cleared and housing apartment buildings should be constructed by the government to accommodate all the slum dwellers.

Pollution: Pollution is the introduction of contaminants into the natural environment that cause adverse change and damage to the society. Pollution can take the form of chemical substances or energy, like noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classified as point source or non-point source pollution. There are many types of pollution like air pollution, water pollution, etc.

Waste Disposal: Another big problem that has come up due to the large increase in population has been the enormous amount of solid waste generated. In a city like Bengaluru the solid waste generated is estimated to be around 5000 tons per day. The collection, transportation and disposal of this huge quantity of solid waste is becoming serious problems for the municipality. Finding dumping grounds for this waste has become very difficult. Dumping this sort of waste has created serious problems of pollution, ill-health and stink to inhabitants nearby. Much research needs to be done on the disposal of various types of solid waste without causing any harm to the environment.

On an average India generates around 0.2 to 0.3 million tons of waste every day. According to a survey the maximum waste is generated by the metropolitan and big cities. Big cities like Bangalore generates around 3500-4000 tons of waste and Mumbai and Delhi generates almost double of it (i.e., 7000 tons per day). Out of the waste gathered only 70-80% of municipal waste is collected while the remaining is

dumped on to streets or open ditches. Fig.1. shows share of different states and union territories in the solid waste generated by the urban areas and fig.2. shows share according to the class of city. According to fig.1. maximum waste is generated by the Maharashtra and according to fig.2. maximum waste is generated by metropolitan cities.

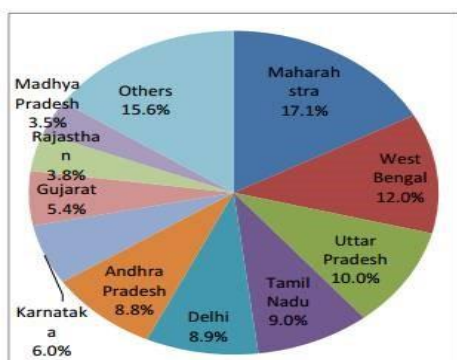


Fig.1.Share of states and union territories in urban MSW generated

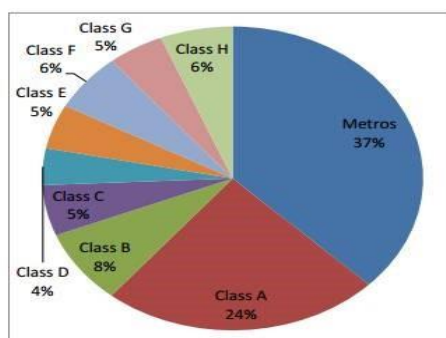


Fig.2.Share of different classes of cities in urban MSW generated

Now-a-days electronics technologies are growing due to which another type of waste is also added in the categories of waste i.e., Electronic Waste. Electronic waste is popularly known as E-Waste which can be defined as electronic equipment or product with power plug or batteries which become obsolete due to advancement in technology, life style and status. Electronic waste is one of the most hazardous problem to the environment. According to survey at present Bangalore alone generates about 8000 tons of computer waste generated annually.

The problem in the present scenario is that sometimes the bins are full and the garbage vans don't pick up the garbage due to which garbage bins overflow and litter on the road and sometimes when a garbage van reaches to pick up the garbage the garbage bins are empty this causes the wastage of fuel of the van.

1. Background

Solid waste management (SWM) is a major concern for many urban local bodies (ULBs) in India, where urbanization, industrialization and economic growth have resulted in drastic increased municipal solid waste (MSW) generation per person [5]. As pressure has mounted for more eco-friendly waste management, the industry has increasingly become involved in environmental policy. Generally solid waste is defined from the household refusal. The non-hazardous solid wastes are from industries, institutions such as hospitals, markets and streets. All these types of solid waste are a problem to environment. In developing countries, waste management is becoming a social issue due to unmonitored act. A significant amount of solid waste generated in country are not collected and managed properly leading to pollution. Wastes are either burned openly on the streets or end up with empty land, rivers and thereby creating a serious health issue to public and society. India faces major environmental challenges associated with these waste generation and inadequate waste collection, transport, treatment and disposal. Current systems in India cannot cope up with the amount of waste generated by an increasing urban population, and its impacts on the environment and public health. Population growth and particularly the development of megacities is making SWM in India a major concern. The status of SWM in India is poor because the best and most appropriate methods from waste collection to disposal are not being carried out. There is a lack of training in SWM and the availability of qualified waste management professionals is less. The current situation in India relies on inadequate waste infrastructure, the informal sector and waste dumping management. There are major concerns associated with public participation in waste management and there is generally a lack of responsibility towards waste management in the community.

2. Relevance

Improper disposing of waste has large environmental impacts and can cause serious problems to society. In the London much of the waste is buried in landfill sites like holes in the ground, sometimes old quarries, sometimes specially dug. Some waste will eventually rot, but not all, and in the process, it may smell or generate methane gas, which is explosive and dangerous contributing to the greenhouse effect. Leachate produced as waste decomposes cause pollution. Badly managed landfills may attract vermin and cause litter. A phase-out of the landfill of untreated waste, accompanied by an increase in recycling rates and energy-efficient treatment of residual waste, immediately results in successes in greenhouse gas reduction. In 1990, the German municipal waste management sector burdened the climate with nearly 38 million tons of climate-damaging gases. However today, it relieves the climate actively of 18 million tons per year. The resultant savings of 56 million tons of CO₂

equivalents achieved by the sector compared to 1990 correspond to about one quarter of the total reduction in greenhouse gas emissions achieved in Germany up to 2006. Methane emissions from landfills, formed by anaerobic breakdown of organic matter, are the main contributor to the sector's greenhouse gases. Germany reports in the National Inventory Report, about its greenhouse gas emissions to the United Nations Climate Secretariat, credits the German waste management sector with an emission reduction of about 28 million tons of carbon dioxide equivalents (for the period 1990 to 2008), thanks to the reduction of waste volumes sent to landfill and use of the landfill gas methane to produce energy.

II. IMPACT AND CHALLENGES

Modernization and progress has its bad impacts too at the same time in the form of pollution and other environmental problems too. As the global population is increasing there is an increase in the demand of the food and other essential things, but there has been a rise in the amount of the waste generated daily by each household activity. Somewhere there is a flaw in our system and the waste is not collected properly and even not disposed properly. The waste that is not treated properly, solid waste generated from households or communities leads to many infectious diseases. Unattended waste lying around attracts flies, rats which in turn cause diseases.

Although, many such plans, policies and schemes have been done but the desired outcome is still not the same as the actual one. Also, GPS system has been installed in each of the garbage picking vehicle but that can only monitor the route of the vehicle not that particular area which needs a major attention for picking the garbage at that particular time. Though there have been many barriers for achieving the desired outcome but the major ones are unavailability of database on waste streams generated-quantity and composition and lack of proper monitoring and inspection techniques. Instead of so many schemes what we see is that the bins are overflowing and the waste has been littering on the road resulting in number of problems to the nation.

There is no full proof system in India which can assure that waste is treated properly. Even there is no system which can make an efficient account or collect data about the waste management in any locality. Till now we are using survey method, directly contacting to people etc., all this method requires a lot of human efforts, efficiency is very less and time requirement is very large. So it is the urge of the society that there should be a system which can maintain the data record without any human effort and it should also be able to record the exact problem of the mankind.

III. POSSIBLE SOLUTIONS

The key challenges to solving this problem are:

1. The agencies responsible for implementation have not been geared up and empowered.
2. Community engagement has not taken off.
3. Suitable infrastructure has not been developed, and the incentive system has not been altered successfully.

The possible solutions to these challenges can be:

1. Community engagement to drive deep behavioral changes.

A first step towards that can be the Bruhat Bangalore Mahanagara Palike's pitching model that involves citizens composting their waste and the civic agency buying it from them. These composts will be used in the city's parks, before the waste is taken to waste plants. This will encourage people to start segregating and making composts at home. Other such initiatives can also be implemented.

2. The other solution to the challenge is inculcating the prowess to make right technological decisions.

For instance, the problem of plastic waste is a menace for the world, since the waste takes millions of years to degrade and causes a big threat to environment. However, an Indian professor in Madurai, [Rajagopalan Vasudevan](#), has given us a possible solution to this problem.

3. Political capital to make the requisite by-laws and enforcing them is the next solution to this problem. To ensure this, increasing taxes on fresh material may be increased, thereby encouraging people to start reusing materials.
4. Last but not the least, it needs to be ensured that human capital on a large scale follows all the aspects of this process – from planning, research to implementation. This is a solution which is being commendably followed by Kerala's Alappuzha city, which was even placed second in the United Nations Environment Assembly's list for smart waste management.

As individuals, we should always follow the 4Rs (Refuse, Reduce, Reuse, Recycle) for efficiently handling our waste. Start segregating your waste at home into dry and wet waste. A major portion of the waste generated in India is wet waste, which can be converted to a compost. So, start composting at home to turn wastes into resources.

It is very easy to blame the authorities instead of doing something constructive ourselves. It's high time to realize the damage our own waste can do to our future. So, start working on it now, before it gets too late.

IV. CONCLUSION

With the increasing population, the amount of waste is increasing day by day which is not properly manageable. The status of the bins is not properly monitored and the waste is over flown and littered on the roads leading to unsanitary living conditions. Instead of so many plans and policies already being made and many technologies already being implemented there has not been a better outcome coming out.

Hence improving the conditions of managing the waste is imperative. There is a high need to look after this major problem in India and to make it a much better place.

So, to initiate with a small prototype of properly collecting and monitoring the amount of garbage collected in the bins can be implemented, which through the sensing technology will determine the real time status of the bins to the concerned person in the municipal authority. So, that a vehicle can be sent at that particular time to collect the garbage which will further result in saving the fuel of the vehicle. The implementation of smart garbage collection system for smart cities, assures the cleaning of dustbins. Up till now we have simulated our expected circuit diagram and we have getting the expected result. The channel id is created on thing speak channel which is used to store the data and it gives the graphical representation of status of garbage level inside the bins.

V. FUTURE WORK

Collection of waste is generally divided into two categories: primary collection and secondary collection. The collection of waste from the source like houses, commercial establishments, markets and so on is primary collection. When waste is collected from storage places like bins and finally transported to processing units or disposal sites it is termed as secondary collection.

We should implement this system in several areas of the cities, some area may not have a continuous power supply for this system to be worked efficiently. This issue can be solved by using solar panels in future. Solar panels can be used with the solar batteries which do not require a continuous power supply. Secondly, we can add the suction pipes with compressors at the bottom of the bins, which will directly suck the wet garbage from the bin and will dump it in dump yard.

REFERENCES

- [1] Sunil Pandey, Shri Prakash, Jai Kishan Malik "Industrial and Urban Waste Management in India".
- [2] Ranjith Kharvel Anepu, Nickolas J. Themelis, Stanley Thompson "Sustainable Solid Waste Management in India", Columbia University in the City of New York, January 10, 2012.
- [3] "E-Waste in India", Research Unit (Larrdis), Rajya Sabha, Secretariat, New Delhi, June 2011.
- [4] Sonam Sahu, Dr. Sindhu J. Nair, Pankaj Kumar Sharma, "Review On Solid Waste Management Practice in India: A State of Art", International Journal of Innovative Research and Development, Volume 3 Issue 3 March 2014.
- [5] Jaiswal, A., & Bharat, A. Accessing Institutional and Regulatory Framework for "Solid Waste Management in India", International Journal of Regulation and Governance, in 2013.
- [6] "Municipal Solid Waste Management: Treatment Process and Prospects of Public Private Partnership". Gol, in JNNURN in 2011.
- [7] "Status of Municipal Solid Waste Management" in CPCB in 2012.
- [8] Kumar Sunil "Municipal Solid Waste Management in India: Present Practices and Future Challenge Clean Development Mechanism in United Nations Framework Convention on Climate Change".
- [9] Kanchan Mahajan, Prof. J.S Chitode "Waste Bin Monitoring System Using Integrated Technologies" International Journal of Innovative Research in Science Engineering and Technology Volume 3, Issue 7, July 2014.
- [10] Municipal Solid Waste Management Manual, Central Public Health & Environmental Engineering Organisation (CPHEEO) in collaboration with German International Cooperation, May 2014.
- [11] Vijay Kumar, Dr R.K.Pandit "Problems of Solid Waste Management in Indian Cities" International Journal of Scientific and Research Publications, Volume 3, Issue 3, March 2013.