

Centralize Information on The Level of Garbage Dumps in Urban Areas Using IoT System

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KEYWORDS	ABSTRACT
Garbage problem Centralize information IoT System Urban areas	Garbage problems that can be health and pollution problems if not managed properly, accurately and promptly. The problem of waste that is not managed properly, especially in large urban areas, will have a worse impact than in rural areas. Therefore, a system such as Centralize information on the level of garbage dumps in urban areas using IoT system is very necessary to be created in urban areas to ensure cleanliness, sustainability and thus the health and safety of living things are guaranteed. Thus, the need to have a clear policy on waste management and legislation to realize that policy is imperative. Malaysia is developing rapidly and problems such as the waste generation associated with development and industrialization are evident. Environmental Waste Management says Rapid industrialization has resulted in the generation of huge quantities of hazardous waste, both solid and liquid. Despite regulatory guidelines and pollution control measures, industrial waste is being dumped on land and discharged into water bodies without adequate treatment. This gross misconduct creates serious environmental and public health hazards. Provide clear evidence that the problem of inefficient, urgent and unsystematic waste monitoring and management in urban areas can be a serious problem for the urban population itself.

1.0 INTRODUCTION

Imagine big cities like Kuala Lumpur, Johor Bahru, Ipoh, Kuantan and other big cities in Malaysia, which have a dense population face the problem of garbage because these cities have a dense population, of course, a large population will produce garbage in large amount. As per the opinion of the authors Waste generation and its implications for humans and the environment is a global issue. The complexity of waste composition and increasing per capita waste generation is a challenge for waste managers, especially in developing countries such as Malaysia [1]. The problem of this pile of rubbish not only worsens the eyesight, but can also lead to symptoms of

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dangerous diseases such as rabies, cholera, chikungunya, zika, malaria, dengue and other dangerous diseases. This is because these piles of garbage can invite various animals and insects carrying dangerous diseases such as dogs, mice, lizards, mosquitoes (aedes, anopheles, culex), flies (chysomya megacephala, hydrotaea) as well as there are cases of other dangerous wild animals such as wild pigs or snakes especially in newly developed urban areas or towns close to forests.

As we already know, the total population of a place is directly proportional to the amount of garbage produced by the population itself. after all, in urban areas, there are usually industrial areas near or within the city that will of course also produce garbage, which will worsen the situation. The complexity of the waste composition and the ever-increasing precipitate waste generation is a challenge for waste managers, particularly in developing countries. Thus, the need to have a clear policy on waste management and legislation to realize that policy is imperative. Malaysia is developing rapidly and problems such as the waste generation associated with development and industrialization are evident [1]. Similarly, a study by Ram Chandra (2015), Environmental Waste Management says Rapid industrialization has resulted in the generation of huge quantities of hazardous waste, both solid and liquid.

Despite regulatory guidelines and pollution control measures, industrial waste is being dumped on land and discharged into water bodies without adequate treatment. This gross misconduct creates serious environmental and public health hazards [2]. Figure 1 Provide clear evidence that the problem of inefficient, urgent and unsystematic waste monitoring and management in urban areas can be a serious problem for the urban population itself.



Figure 1: Evidence that the problem of inefficient, urgent and unsystematic waste monitoring and management in urban areas.



Figure 2: Shows a pile of rubbish can attract animals and insects, which animals and insects.

Figure 2 shows a pile of rubbish can attract animals and insects, which animals and insects can be a medium to transmit dangerous diseases to humans, such as disease rabies, cholera, chikungunya, zika, malaria, and other diseases as a result of animals or insects being attracted to these garbage dumps, this situation will worsen if we fail to monitor and manage this waste problem promptly, accurately and systematically. it can not only cause dangerous diseases but also eye pain and even embarrassment if there are foreigners coming to our country, of course they say we are a filthy society. This is as according to the author the problem of garbage is focused on the concerns raised by city dwellers about disease and odor before entering the 20th century [3].

Table 1: Solid waste generated in Urban areas of Malaysia

Urban centre	Solid waste generated (tonnes/day)				
	1970	1980	1990	2002	2006 ^a
Kuala Lumpur	98.9	310.5	586.8	2754	3100
Johor Bharu (Johor)	41.1	99.6	174.8	215	242
Ipoh (Perak)	22.5	82.7	162.2	208	234
Georgetown (P. Pinang)	53.4	83.0	137.2	221	249
Klang (Selangor)	18.0	65.0	122.8	478	538
Kuala Terengganu (Terengganu)	8.7	61.8	121.0	137	154
Kota Bharu (Kelantan)	9.1	56.5	102.9	129.5	146
Kuantan (Pahang)	7.1	45.2	85.3	174	196
Seremban (N. Sembilan)	13.4	45.1	85.2	165	186
Melaka	14.4	29.1	46.8	562	632
^a Estimated figures					

Table 1 shows the garbage rate for urban areas in Malaysia, which rate increases from year to year according to the rate of population increase. Table 1 shows a very significant increase in garbage disposal by residents in large cities such as Kuala Lumpur, Johor Bahru, Ipoh and Georgetown because these cities have a very dense population, while in modest and small cities the amount of garbage is reduced but still high, it can be concluded that the urban garbage problem is quite critical because the garbage rate is directly proportional to the population, and will certainly increase year by year in line with the increase in population

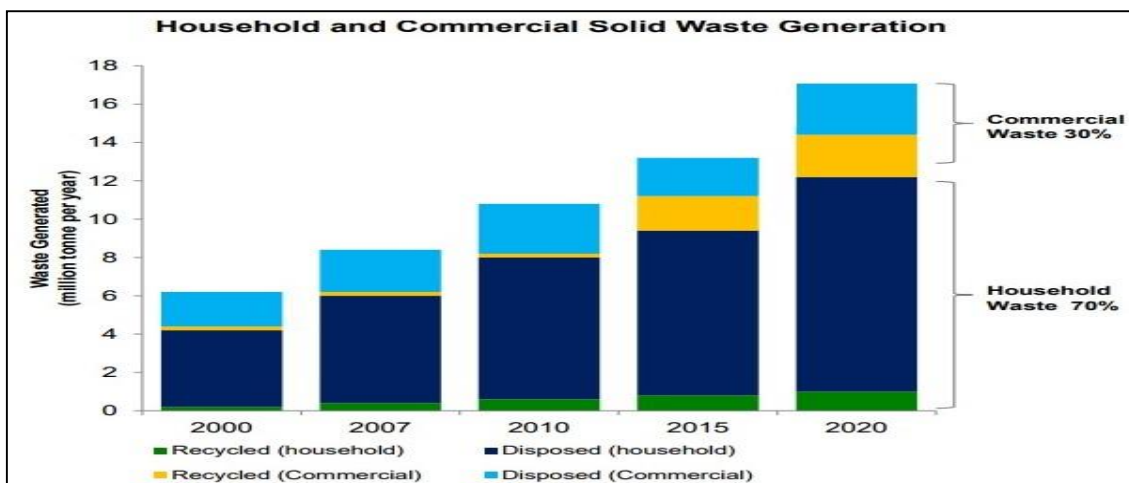


Figure 3: Bar chart for household and commercial solid waste generation

Figure 3 shows that for the generation of household and commercial solid waste, the amount of waste in urban areas is more critical due to the dense population and the presence of industrial areas near the city itself. This situation is very scary for us as Malaysians, especially those who live in cities, do we want to live in a sea of garbage? do we want to be known as a polluting society? do we want us and our descendants to get sick due to our failure to monitor and manage the garbage problem properly?

2.0 EXPERIMENTAL PROCEDURE

2.1 Recovery recommendations:

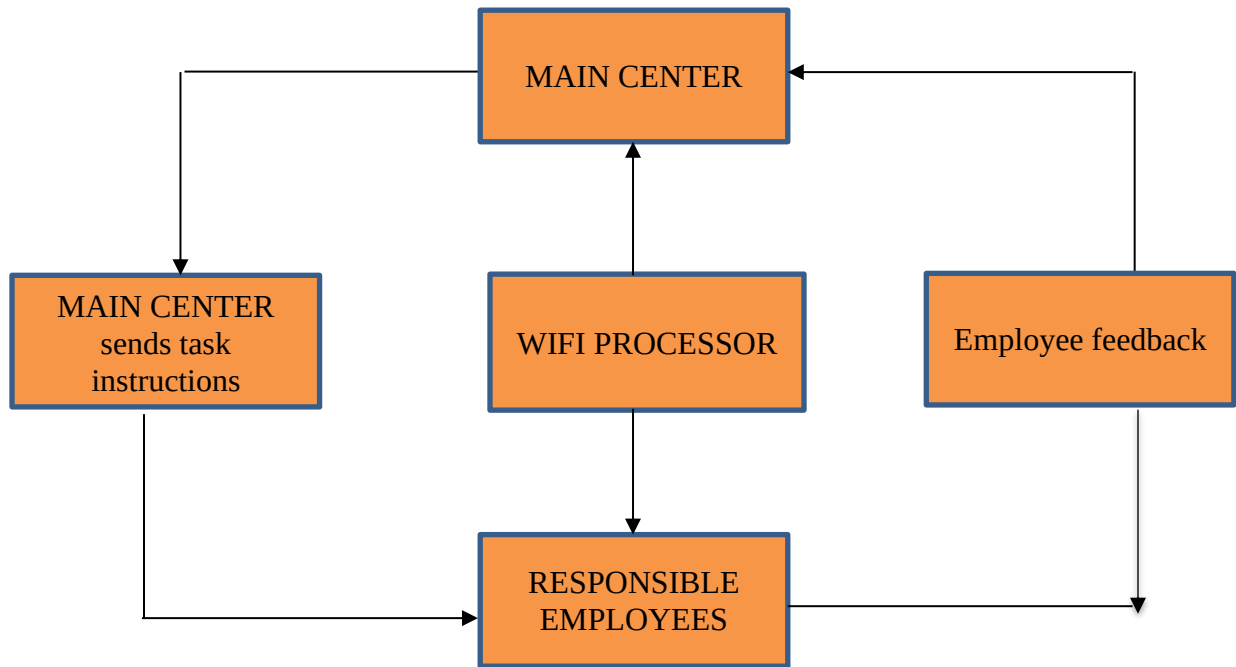
The problem of garbage piles at landfills is because the assigned party is slow to get accurate information on the condition of the garbage piles, therefore a system equipped with sensors and IoT, that can provide accurate, immediate and wireless information and borderless is very necessary especially in urban areas.

The system is known as Centralize information on the level of garbage dumps in urban areas using IoT system. The system is divided into 3 main parts, namely the main center, workers and the bin equipment equipped with sensors and wifi processor. This system is especially necessary in urban areas that have a dense population that actually produces a lot of garbage every hour or day. Changes in waste management need changes for the better and more up -to -date, this is in line with the author's opinion, Waste management and technology is a balanced and detailed account of all aspects of waste management, disposal and treatment in the municipality, covering both management and engineering aspects with a comprehensive emphasis on a life cycle approach [4].

2.2 Experiment works:

Methodology:

Centralize information on the level of garbage dumps in urban areas using IoT system, is a system that works systematically. The system is divided into 3 main parts, namely the main center, workers and the bin equipment equipped with sensors and wifi processor. Starting with the garbage bin equipment equipped with a sensor 1 (responsible for detecting the presence of garbage in the bin) then the garbage presence signal is immediately sent to the Wifi Processor, while sensor 2 (responsible for ensuring that the bins are not moved from their original place, this is important to prevent litter from scattering and can also result in paths or roads being obstructed by piles of rubbish that may endanger road users) all information or signal information is immediately sent to the processor Wifi (programmed to evaluate the percentage of garbage in the bin and ensure the bin is in normal condition or not removed from its original place) then all this information is immediately sent to the Main Center and also directly to employees in an area or zone, the Main Center also informs the situation of garbage bins immediately to employees in that area or zone to ensure these employees take appropriate and immediate action, the Main Center also store all information of bins and workers in an area or zone for the purpose of these workers carrying out their duties promptly, correctly and accurately.



Flowchart 1: System flow for Centralize information on the level of garbage dumps in urban areas using IoT system

Flowchart 1 shows how Centralize information on the level of garbage dumps in urban areas using IoT system works. WIFI PROCESSOR programmed to detect the presence and assess the percentage of garbage in the bin either exceeds 70% or the bin is turned or upside down. If the rubbish in the bin exceeds 70% or the bin is shifted or upside down this information is immediately sent to the MAIN CENTER and RESPONSIBLE EMPLOYEES with wireless and borderless connection, MAIN CENTER will immediately send instructions to RESPONSIBLE EMPLOYEES to carry out the task of either emptying the rubbish in the rubbish bin. If the percentage of rubbish exceeds 70% or re -correcting the bin if the bin is upside down or diverted from its original place. If the task has been completed or there is a problem related to the RESPONSIBLE EMPLOYEES will send feedback immediately to the MAIN CENTER for the MAIN CENTER to evaluate and store the task information of the RESPONSIBLE EMPLOYEES, all this happens immediately, accurately and through wireless and borderless connections. But although this new methodology can be used but research on it is also necessary as the author's opinion, conversion of new waste management technologies as well as new methodologies that can be used by public officials to assess in advance the feasibility of this type of project [5].

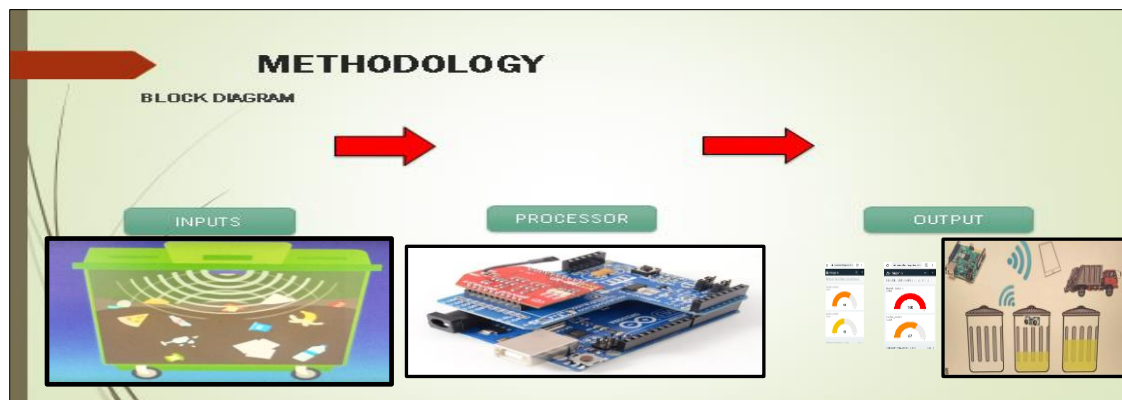


Figure 4: Block Diagram

Figure 4 shows a block diagram, where the input consists of an ultrasonic sensor that is responsible for detecting the presence of garbage in the bin, and sends the information to the processor to assess the percentage of garbage, in the input there is also a Reflective Optical Sensor that works to detect if the barrel is upside down or deviated from its original place, all this information is sent to a processor that has been programmed to assess the percentage of waste in the bin where if it exceeds 70% or if the bin is upside down or diverted from its original place, all this information is sent to the Output (MAIN CENTER and RESPONSIBLE EMPLOYEES) via wireless and borderless connection that is either via mobile phone or laptop or desktop then the MAIN CENTER will contact RESPONSIBLE EMPLOYEES to take appropriate action. Finally, the RESPONSIBLE EMPLOYEES will contact (Feedback) the MAIN CENTER to respond to the task has been completed or inform the relevant matters. All of this happens quickly, swiftly, accurately and systematically. All this is in line with the author's opinion on systematic problem solving, systematic problem solving describes the seven phases of management problem solving methods, a direction map on how to identify, conduct research in detail, and finally solve core problems [6].

Meanwhile, this project uses IoT system because it is a user -friendly system, fast, almost no boundaries, no wires and the latest, this is in line with the author's opinion, IoT stands for Internet of Things is a technological revolution, it has an unparalleled bright future, the installation of low-cost sensors with different devices and machines has made monitoring, analyzing, tracking, and responding quick and easy [7].

3.0 RESULTS AND DISCUSSION

Research has been done at the UCTATI hostel, the objectives or purpose of the research is to monitor the percentage of garbage vs time (hours) and also to ensure that this IoT system works as desired. UCTATI hostels were selected to see the effectiveness of these systems and equipment before they will be used in more populated areas, especially in urban areas. The results of the study can be concluded that this equipment has successfully achieved its purpose and objectives. The system and equipment has been able to send information about the percentage of garbage in the bin, with information that immediately reaches the user (MAIN CENTER and RESPONSIBLE EMPLOYEES) and this information is also accurate (level percentage of garbage in the bin) so that the relevant parties (MAIN CENTER and RESPONSIBLE EMPLOYEES) can take action quickly and accurately before the garbage problem becomes more difficult so that not only can cause hygiene problems that can lead to health problems but also

the pollution of the smell of garbage, as well as can hurt the eyes to see the piles of garbage scattered and the presence of animals or insects that love garbage all this is not only disgusting but can also invite dangerous infectious diseases, which eventually trigger an epidemic.

Through the results of this study that has been done on the bins equipped with sensors, wifi processor and all information on the bins either diverted from its original place or upside down will be sent to the MAIN CENTER, which starts from the percentage of empty garbage, then increased to the maximum (Full). The experiment involved two bins, named Dustbin 1 and Dustbin 2.

Table 2: Dustbin 1 (level 1 of KK3 hostel building of UCTATI)

Time (Hour)	Garbage (Percentage)
8am-9am	5%
9am-10am	6%
10am-11am	8%
11am-12pm	20%
12pm-1pm	55%
2pm-3pm	70%
3pm-4pm	80%
4pm-5pm	93%
5pm-6pm	95%
6pm-7pm	97%
7pm-8pm	100%

Referring to table 1 for dustbin 1 whose study location is at level 1 in the KK3 hostel building. It is found that the rubbish graph thrown into the dustbin 1 rises sharply. This condition is most noticeable during the hours of 1pm to 3 pm. This happened because many students ate and drank in the dormitory and dumped more garbage at that time.

Table 3. Dustbin 2 (level 2 KK3 hostel building)

Time(Hour)	Garbage Level (Percentage)
8am-9am	5%
9am-10am	6%
10am-11am	8%
11am-12pm	10%
12pm-1pm	50%
2pm-3pm	60 %
3pm-4pm	70%
5pm-6pm	90%

6pm-7pm	93%
7pm-8pm	97%

Meanwhile, table 3 studies for dustbin 2 located at level 2 in the same building also show an increase in the amount of waste that is almost the same amount, with the amount of waste disposal at level 1. This situation proves that we need accurate, efficient and fast garbage monitoring to ensure the cleanliness of our environment.

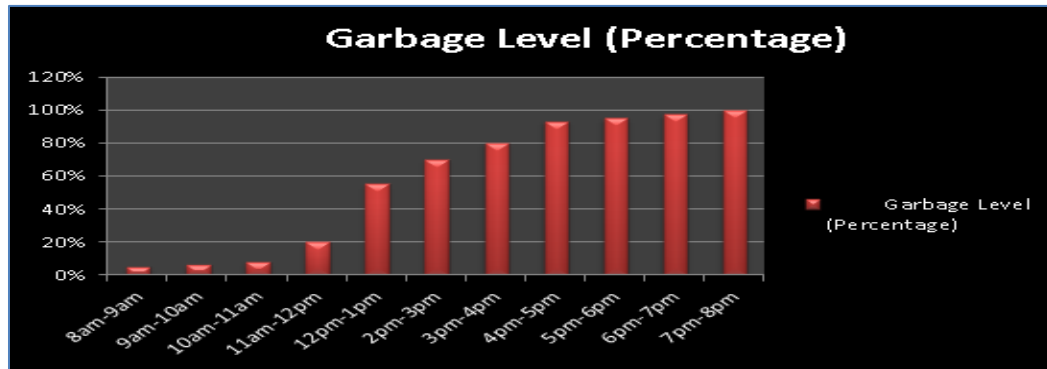


Figure 5: The percentage of waste disposal graphs

Figure 5 shows the percentage of waste disposal graphs for hostels related to this research, which clearly proves that the resulting waste increases rapidly. Therefore, we desperately need a fast, efficient monitoring system for the purpose of the responsible party being able to take quick and efficient action as well. This is very important to ensure our health is protected from disposal which can affect our health if we fail to manage disposal in a managed manner.

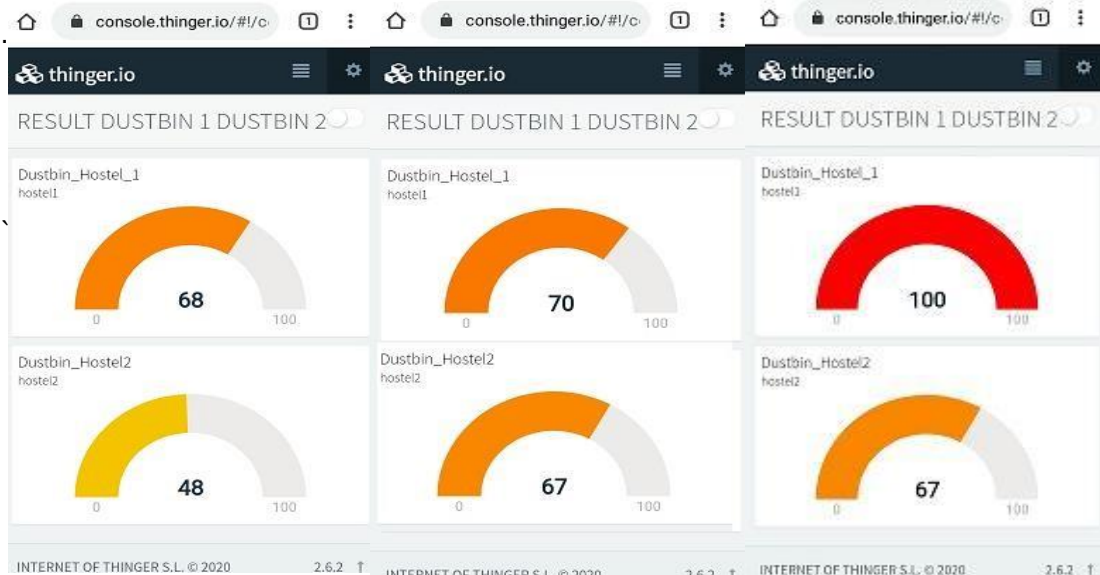


Figure 6: Percentage graph of garbage in dustbin 1 and dustbin 2

Figure 6 displays the percentage graph for dustbin 1 and dustbin 2 taken during the tool effectiveness experiment. The results of this study prove that this equipment works well, starting with Ultra sonic sensors detect garbage levels in dustbin 1 and dustbin 2, then this signal is sent to Wifi Arduino processor for the purpose of processing the available data, which this data will be translated as the result of the percentage of garbage level for each dustbin. The result of this percentage of garbage level is then sent to the user's mobile phone, through wireless and almost borderless connections (Internet of Thing / IoT), with the help of thinger .io platform, it is one of the source platform for the Internet of Thing. This situation is very necessary to ensure that the percentage information of the level of garbage in each dustbin reach users quickly, accurately and with almost no barriers, so that the user (responsible party) can take swift action before the garbage accumulates.

4.0 CONCLUSION

In conclusion, it is very important that the earth is protected from human-made garbage. Therefore, it is very important that a system such as Centralize information on the level of garbage dumps in urban areas using IoT system is necessary, to ensure cleanliness, health and safety, not only for human but also for all life and even the earth itself, so that the earth continues to be healthy and sustainable. Although this system requires less expense than regular bins, but the benefits and advantages outweigh it, for example, if a person or a group of people get a dangerous disease due to garbage that can spread and die, this will definitely result in more expense. and human beings will live in fear, anxiety and the earth will no longer be clean to be inhabited by humans and animals as well as plants.

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