

An IOT for Door-2-Door Residential & Commercial (Waste Generating Units) Authentic Data Collection for Municipal Solid Waste

Shaik Akbar, K. Nageswara Rao, I. Murali Krishna

Abstract— Solid waste management play a major play role in the Municipal Administration. On days are going and increasing the population in the countries in the current ear SWM 2016 rules it becomes a difficult task to Municipal Administrative management. As per the SWM 2016 Rules in India garbage collected from sources individually. So many Urban Locale Bodies in India not have a proper mechanism, planning and authenticated sources. In this paper proposed a commercial collection for municipal solid waste for door-2-door as a solution using IOT Technology to solve waste management challenges in authentic manner. We proposed a single reliable and efficient structure to do the regular operations of Monitoring, Transportation and Collection in the municipalities.

Keywords: Door-2-Door, SWM, ULB, Authentic, waste, C&T, municipal.

1. INTRODUCTION

Solid Waste is something generated from many activities like medical disposals, wastes, industrial wastes etc. which can be either recycled or cannot be recycled. This solid waste which is generated in these days is more cautious than in olden days because of rapid industrialization and urbanization. Standard of living of people can also be affected if this waste is not managed properly. In olden days the industrialization is observed only in some areas and there is no effect of waste on the people and environment. And also the schemes that were used for the waste management in earlier days are manual only. This manual management is enough in those days because the garbage that is generated is biodegradable and is not much dangerous as of now. But now in this era, the waste is generated which is non-biodegradable also. This non-biodegradable waste causes imbalance in the environment which is very harmful. So this waste is to be handled and managed properly in order to overcome the consequences generated due to solid waste. The solid waste has to be categorized into required types and then the waste should be disposed. Due to rapid industrialization and technology the rural areas are also running to cities for their living. So due to this the chance of solid waste generation will be more in cities. In order to handle these waste management problems the government should adapt certain schemes to categorize these wastes and manage them properly.

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Dr. Shaik Akbar, Professor, Department of CSE, PSCMR CET, Vijayawada, Andhra Pradesh, India.

Dr.K. Nageswara Rao, Principal, PSCMR CET, Vijayawada, Andhra Pradesh, India.

I. Murali Krishna, Associate Professor, Department of CSE, PSCMR CET, Vijayawada, Andhra Pradesh, India.

2. EXISTING SYSTEM

In the present scenario in India, the collection of waste is being operated by using Carts/ Trucks / etc by facilitating them with Dry Collection/ Wet Collection / Glass Collection / etc., bins manually. The collected waste is being segregated to reproduce them in the form of fertilizers, reusable materials. With the help of reusable materials we can decrease the use of natural resources to manufacture many of the daily usable materials such as Plastic, Paper etc., with the help of reproduction of wet waste to be useful to use as Gas, Fertilizers etc., we can reduce the usage of natural resources, chemicals to meet the requirements of the society. The Srisailam Temple Town is having Bio-Toilets, complete green environment and also effective collecting mechanism of solid waste. This has led to establish the recycling plant which is now doing a fabulous job of segregating the waste to produce fertilizers, reusable plastic and also provided better opportunity to serve the society with employment. This mechanism has decreased more waste across the town and increased cleanliness and healthy environment. By using the technology and science we can create our environment healthy and also provide an employment to increase the life span.

Proposed System Architecture:

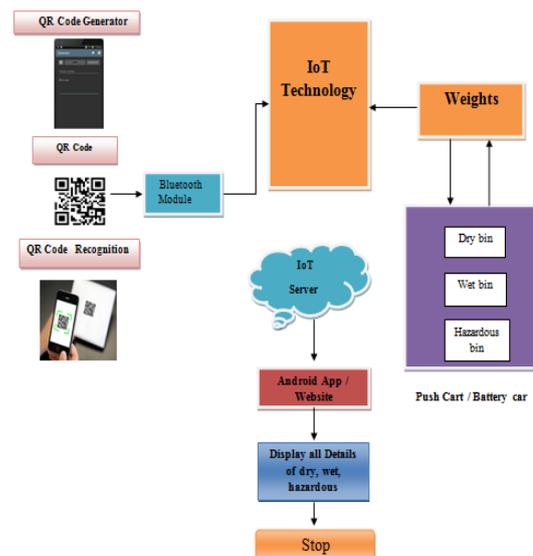


Fig1: Wet/Dry/HHH Door-2-Door Authentic Data Collection – QR Technology Working Process



In this model we collect the waste in three different categories such as Dry, Wet & Hazardous. This idea is not only for collecting the waste but also for knowing the quantity of waste generated by each household.

The Pushcart / Battery Cart contains the three plates (Iron Frame) each plate contains one iron ring for fix the bin because never clumsy or fall away from the carts or else mix up. Garbage Weight purpose load cell is fixed under the iron plates. Moreover our IoT Technology is embedded in the cart.

Working Process:

1. Garbage is dropped into bins That IoT is used to take the input from the app which we have made to scan the QR code. Coming to the app it is bluetooth / wifi based that scans the QR code which we provide to every house. The people who are living in that particular house will have that QRcode which is attached.
2. The amount of waste collected will be monitored regularly via Computer System, Android App with users of manager, administrator or any higher authorities.
3. Helps to improve the Working process and the mechanism accurately.
4. Time management and amount of waste collected and also their statistics will be available from time to time.
5. This authentic data will be useful for further to that house.

Therefore when workers scan the QRcode through our app it reads the code, dry, wet, hazardous weights and it has three options present in it. They are:

- 1) Garbage collected
- 2) No garbage
- 3) Not at Home

Whenever the QR code is scanned in through this app then the worker will click the options according to the wastage he/she collected.

Also if the QR code is not identified then the worker can manually enter it by typing the QRcode which is present in the below of the QRcode. Then the worker chooses the option as follows:

- 1) **No garbage:** If there is no garbage is collected by the worker from the particular house then they can choose the no garbage option on the app.
- 2) **Garbage Collected:** When the garbage is collected by the garbage collector then he/she places that garbage is collected in the Bluetooth app.
- 3) **Not at Home:** If no one is at home, then simply the worker places this option on to the app.

Therefore after the selection of options in the app immediately the info is sent to the IoT device. Through this IoT device the info about the daily wastage collected from every house and every day is given to the website.

In the website we have the QRcode number and the info about the owner of the house and the garbage they give every day to the garbage collector. Moreover this website will analyze the weights of everyday collection, every month collection of garbage and also every year garbage collection. Therefore this also consists of the data of the worker who

collected the garbage from different houses.

Advantages: There are several advantages present in this technology. They are as follows.

Firstly, QRcode which we are providing is highly secured so that no one can get the info about the owners of the house even to the worker who is scanning the QRcode in the app. The info about the owners will be in the website with high security.

We can monitor the working of the workers who are collecting the wastage and reporting them.

The database used to store this info is accessed by the authorities only.

TECHNOLOGY ENABLED PUSH CART/SMART CART FOR SWM - BENEFITS

- By having 3 type weighments at Door-2-Door level we get SWM Rules 2016 compliant collection and data generation.
- Nowhere in the country have we authentic data generation on Type of Waste and Quantity of Waste from Residential & Commercial (Waste Generating Units).
- Video on Smart Cart will record worker and waste generator behaviour without manual monitoring thereby giving clear picture to the Commissioner and Council what is happening in the field.
- No need for GPS as QR code based C&T (Collection and Transportation) work recording automatically generates Cart movements thereby giving Transportation route followed by Smart Cart in C&T activities.
- We can also generate statistics on daily basis how many did not dispose how many did not segregate and if any houses which complained the cart did not go in that route at all.
- Daily, Weekly, Fortnightly and Monthly report data will give opportunity to Data Analytics on Wet, Dry and HHH for future planning.

IoT Technology for Authentic Wet/Dry/HHH Data Collection System for the 1st time in the Country

1. Using the IoT technology the door-2-door waste collection becomes easy from each house hold.
2. Each house hold collected items of dry, wet, hazard items weights can be regulated discretely per house.
3. The Grand Total will be attained from the collected separate house hold dry, wet and hazard items.
4. The unavailable house hold information will also be available as they may not deposit the waste because of any reason. This information will be recorded for further reference.
5. This authentic data will be available online in the form of web and also mobile app.
6. The actual reports of individual, per day, weekly and monthly reports will be available.

The effective uses of IoT technology:

- a. As the updated chipset is available, it is easy to operate and also very informative.

- b. Easy to use, operate for even a layman.
- c. Peripherals available at low cost.
- d. Maintenance is also easy.

3. RESULTS – SCREEN SHOTS

ID	Date	Status	Name	Address	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8	Value 9	Value 10	Value 11	Value 12	Value 13	Value 14	Value 15	Value 16	Value 17	Value 18	Value 19	Value 20	Value 21	Value 22	Value 23	Value 24	Value 25	Value 26	Value 27	Value 28	Value 29	Value 30	Value 31	Value 32	Value 33	Value 34	Value 35	Value 36	Value 37	Value 38	Value 39	Value 40	Value 41	Value 42	Value 43	Value 44	Value 45	Value 46	Value 47	Value 48	Value 49	Value 50	Value 51	Value 52	Value 53	Value 54	Value 55	Value 56	Value 57	Value 58	Value 59	Value 60	Value 61	Value 62	Value 63	Value 64	Value 65	Value 66	Value 67	Value 68	Value 69	Value 70	Value 71	Value 72	Value 73	Value 74	Value 75	Value 76	Value 77	Value 78	Value 79	Value 80	Value 81	Value 82	Value 83	Value 84	Value 85	Value 86	Value 87	Value 88	Value 89	Value 90	Value 91	Value 92	Value 93	Value 94	Value 95	Value 96	Value 97	Value 98	Value 99	Value 100
89	4	11	M5021000205	G.Sarjamma, Dr.No.1-11-5, Medak, 53003095	46.60	0.3	39.6	0	60.09	2.03	2019-07-11	08:14:30	18.0468, 78.2682	Garbage Collected																																																																																										
90	4	11	M5021000206	K.Aruna, Dr.No.1-11-811, Medak, 46.60	0	39.6	0	60.15	0.06	2019-07-11	08:15:03	18.0468, 78.2698	Garbage Collected																																																																																											
91	4	11	M5021000207	P.Durgamma, Dr.No.1-11-4711, Medak, 34672566	46.14	0.49	39.6	0	60.65	0.5	2019-07-11	08:16:14	18.0465, 78.2599	Garbage Collected																																																																																										
92	4	11	M5021000208	T.Rudra, Dr.No.1-11-4732, Medak, 979162352	46.14	0	39.6	0	60.65	0	2019-07-11	08:17:58	18.0462, 78.2682	Not At Home																																																																																										
93	4	11	M5021000211	B.Bajamma, Dr.No.1-11-4732, Medak, 46.14	0	39.6	0	60.65	0	2019-07-11	08:18:27	18.0467, 78.2684	Not At Home																																																																																											
94	4	11	M5021000209	P.Laxmi, Dr.No.1-11-4711B, Medak, 46.14	0	39.6	0	60.65	0	2019-07-11	08:18:56	18.0467, 78.2684	No Garbage																																																																																											
95	4	11	M5021000210	M.Kamalya, Dr.No.1-11-4716, Medak, 9791674572	46.34	0.2	39.61	0.01	60.76	0.11	2019-07-11	08:22:03	18.0447, 78.265	Garbage Collected																																																																																										
96	4	11	M5021000211	B.Bajamma, Dr.No.1-11-4732, Medak, 9791674572	46.65	0.31	39.61	0	61.26	0.5	2019-07-11	08:23:36	18.0447, 78.2613	Garbage Collected																																																																																										
97	4	11	M5021000212	Venilamma, Dr.No.1-3-80315, Medak, 7702748704	46.65	0	44.97	5.16	61.26	0	2019-07-11	08:24:49	18.0461, 78.2682	Garbage Collected																																																																																										
98	4	11	M5021000213	T.Gangalaxi, Dr.No.1-11-4716, Medak, 46.74	0.09	44.97	0	61.26	0	2019-07-11	08:25:17	18.0469, 78.2615	Garbage Collected																																																																																											
99	4	11	M5021000214	A.Yashoda, Dr.No.1-11-942, Medak, 47.95	0.32	44.97	0	61.32	0.06	2019-07-11	08:26:20	18.0469, 78.2615	Garbage Collected																																																																																											
100	4	11	M5021000215	B.Sathesh, Dr.No.1-11-5011, Medak, 9177919942	47.1	0.04	44.97	0	61.96	0.04	2019-07-11	08:29:37	18.0466, 78.2626	Garbage Collected																																																																																										

Fig2: House Hold Data – Garbage Collected, Not at Home, No Garbage

ID	Name	Address	Remarks
1	M5021000137	K.Shankaramma, Dr.No.1-11-871E, Medak, 979148067	Not Disposed
2	M5021000138	K.Aruna, Dr.No.1-11-871A, Medak, 960015463	Not Disposed
3	M5021000144	K.Suguna, Dr.No.1-11-79A/B, Medak, 7731886991	Not Disposed
4	M5021000146	D.Shankaramma, Dr.No.1-9-79203, Medak, 819816169	Not Disposed
5	M5021000148	T.Gangamma, Dr.No.1-11-4717, Medak, 837493759	Not Disposed
6	M5021000149	T.Rudra, Dr.No.1-11-4716, Medak, 9648327	Not Disposed
7	M5021000150	K.Pohamma, Dr.No.1-11-572, Medak, 837493759	Not Disposed
8	M5021000152	T.Rajamoni, Dr.No.1-11-4718, Medak, 7915468702	Not Disposed
9	M5021000153	K.Laxmi, Dr.No.1-11-512, Medak, 837493759	Not Disposed
10	M5021000154	G.Naraina, Dr.No.1-11-58, Medak, 960309344	Not Disposed
11	M5021000155	G.Lalitha, Dr.No.1-11-59, Medak, 950271951	Not Disposed
12	M5021000156	Kamraj Begam, Dr.No.1-11-5411, Medak, 950271951	Not Disposed
13	M5021000161	K.Yashoda, Medak, 47.95	Not Disposed
14	M5021000162	K.Buchamma, Medak, 47.95	Not Disposed
15	M5021000163	K.Buchamma, Medak, 47.95	Not Disposed

Fig 3: Not Disposed Data



Fig 4: Longitude and latitude Screen

4. CONCLUSION

➤ We have given a solution for establishing smart cities with real case application. According to this work, there are many advantages for using smart waste management system. Moreover, this study shows that smart city applications are needed by municipalities.

➤ With IoT accomplishment, establishment and monitoring will become easy and reduce costs to the

government in turn provides better provide healthy environment.

➤ This model can be enhanced to multiple levels of hierarchy for any kind problems faced by metropolitan cities, villages or country level.

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