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Smart Garbage Waste Management System

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Abstract
Smart cities integrate multiple mobile or web solutions to build a comfortable human habitation. One of these solutions is to provide an environmentally friendly, efficient and effective garbage management system. The current garbage collection system includes routine garbage trucks doing rounds daily or weekly, which not only doesn't cover every zone of the city but its completely inefficient use of government resources. The proposed system, where admin manages the garbage app for full online based monitoring and analyzes the system. Her admin handle bins, driver, complaints from user and work report from driver. This paper proposes a cost-effective mobile or web based system for the government to utilize available resources to efficiently manage the overwhelming amounts of garbage collected each day, while also providing a better solution for the inconvenience of garbage disposal for the citizens. This is done by a driver, app will provide predictive and guide routes generated through for garbage trucks. Then driver update the status of work done will be data collected. An android or web app is developed for the work force and the citizens, which primarily provides the user with an available smart bin.

Keyword: Garbage Management, MERN Application, Smart City

1. INTRODUCTION

Proper waste management is a basic requirement in any kind of an environment. Usually cleaning in these environments aredone in the morning and the afternoon. If you take an urban city like Colombo, usually there are about 1,000,000 to 1,400,000 employees heading for their workstations every morning. For all those people, there are just not enough garbage bins available. On the streets of urban cities, hundreds of people are passing the same location around one minute. Around 90% of people are carrying food covers, polythene bags, and plastic bottles. If they dispose of all of them at once, the bins will be filled in several minutes. When they fill up people just litter their trash around the garbage bins because there is nowhere else to put them. The obvious solution to this is for the cleaning staff to stay near garbage bins every day till they fill up to clean them. This Is not a real solution.

It takes way more cleaning staff and costs a lot of money. So, it is impractical. The same scenario is happening in workstations. For instance, a bank or a government office cafeteria usually has about five to six garbage bins to serve hundreds of employees. This is simply not enough.There are some notable negative effects when considering the garbage bins always being full.

One of the main effects is the surrounding area starting to smell and be very unpleasant. When The garbage bins are full people put their trash on the sides of the garbage bins. When this is done for some time, first it starts to smell bad. So, others who come later tend not to go close and throw their trash in the direction of the garbage bins. If there are any leftover food items, throwing it causes them to spill. This Attracts

animals like cats, dogs, and flies. And these animals spill them even more. Another negative effect is the diseases that spread. It's not just the garbage that spreads them, but the animals also can be a source.

2. LITERATURE REVIEW

The Internet of Things (IoT), as expected infrastructure for the envisioned concept of Smart City, brings new possibilities for the city management. IoT vision introduces promising and economical solutions for massive data collection and its analysis which can be applied in many domains and so make them operate more efficiently. In this paper, we are discussing one of the most challenging issues - municipal waste-collection within the Smart City.

To optimize the logistic procedure of waste collection, we use our own genetic algorithm implementation. The presented solution provides calculation of more efficient garbage-truck routes. As an output, we provide a set of simulations focused on the mentioned area. All our algorithms are implemented within the integrated simulation framework which is developed as an open source solution with respect to future modifications.

3. EXISTING SYSTEM

Employees heading for their workstations every morning.For all those people, there are just not enough garbage bins available. On the streets of urban cities, hundreds of people are passing the same location around one minute. The obvious solution to this is for the cleaning staff to stay near garbage bins every day till they fill up to clean them. This Is not a real solution. There are some notable negative effects when considering the garbage bins always being full. One of the main effects is the surrounding area starting to smell and be very unpleasant. When The garbage bins are full. People put their trash on the sides of the garbage bins.

4. PROPOSED SYSTEM

The proposed system overview for this system. Solid waste management can be broadly categorized as segregation, collection, and transportation. The server will collect the data and store them only in a database. This data will be analyzed and displayed on two different dashboards that can be accessed by the workforce and clients. Using data analytics, reports will be generated which can be monitored by the admins through the admin dashboard. Based on the data collected, garbage trucks can be given routes generated through various algorithms and google maps API to efficiently route through all necessary garbage bins and finally reach the dumping site.

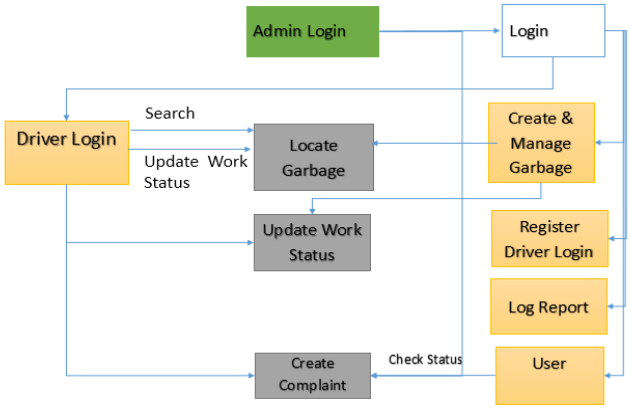

Fig.1. Block Diagram

5. SOFTWARE REQUIREMENTS

Front End : HTML5, CSS3, Bootstrap
Back End : PHP, MYSQL
Control End : Angular, JavaScript
Android Tools:
IDE : Android Studio, Android Emulator, Xampp, VS Code

PHP Tools:
Xampp-win32-5.5.19-0-VC11

Hardware Requirements:

Processor	:	Intel 3 or macOS
Installed memory (RAM)	:	4 GB minimum
Hard Disk	:	500 GB
Operating System	:	Windows 7,8,10 - 64 bit or macOS.

6. MODULES

ADMIN

1. Login
2. Create Garbage bin
3. Update/Delete garbage bin
4. Assign best route for drivers
5. Manage driver
6. View Garbage Report
7. View complaints from public

GENERAL PUBLIC

1. Register
2. Login
3. Register complaint
4. My complaint & status

DRIVER

1. Login
2. Check daily work updates
3. Choose best route
4. Update garbage load

7. MODULE DESCRIPTION

ADMIN

1. **Login :**The main activities in the application are the admin login page for admin. The other modules are followed by this login page. This module records only the admin and password of the admin.
2. **Create Garbage bin:** Admin can create a garbage bin for different areas. Which can be used for wasted collections from the areas then trucks can contain the garbage bin.

3. **Update/Delete garbage bin:** Admin will update the new garbage bin or else modified garbage bin and also delete the broken garbage bin, not used garbage bin.
4. **Assign best route for drivers:** Admin can be assigning the drivers for the garbage collections. The best route driver will be assigned for garbage collections.
5. **Manage driver:** Admin can manage all the drivers and maintain the best route drivers.
6. **View Garbage Report :** Admin can view the garbage reports from all areas and maintain the whole reports.
7. **View complaints from public :**Admin can view the complaints from the public. Then, the admin will rectify the complaints.

GENERAL PUBLIC

1. **Register :** Public has to register their basic details to get access with this application service.
2. **Login:** Once they have registered they need to login to avail the service at the needy time.
3. **Register complaint :**A public complaint can be arising if the garbage container of our locality is overflowing due to non-cleaning for many days. The rotten waste materials emanating bad smell thus making the people of the nearby area to wear a scarf around their nose.
4. **My complaint & status:** The public can view the complaint and check the status for complaints.

DRIVER

1. **Login:** The main activities in the application are the driver login page for drivers. The other modules are followed by this login page. This module records only the driver and password of the driver.
2. **Check daily work updates :** A driver will check the daily work updates and then, the driver will relocate for the garbage collections.
3. **Choose best route :** A driver will choose the best route of corresponding areas. Then the driver can choose the shortest route of areas.
4. **Update garbage load: s**A driver will update the garbage load of the container. How much will be contained per day. It will update the admin.

8. RESULT

Fig.2. Admin Page

Fig.3. Driver Login

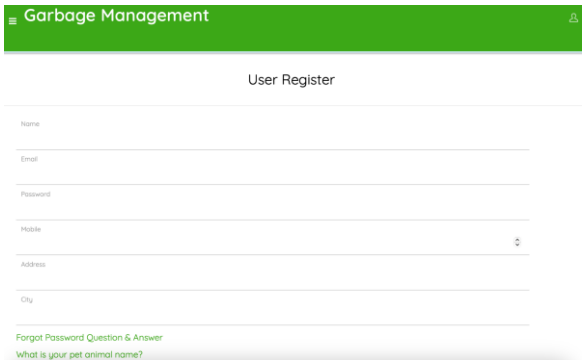

Fig.4. User Registration

9. CONCLUSION

Future work can include many areas. One area that can be improved on, but limited at this time due to trying to make this project low cost, is identifying types of garbage from the bin itself, thus removing human segregation. If this is implemented,in a single location instead of four bins for the four different types of garbage, one large bin can be placed which segments the garbage by itself. Another area which can be improved is instead of each bin connecting to an access point to communicate with the server, bins can communicate with each other and connect to an access point through the main hub. This method may reduce network costs and make the network process more efficient.

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