SMART WASTE MANAGEMENT SYSTEM

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Abstract: This Waste management is one of the serious challenges of the cities, the system now used in cities, we continue to use an old and outmoded paradigm that no longer serves the entail of municipalities, Still find over spilled waste containers giving off irritating smells causing serious health issues and atmosphere impairment. The Smart Waste Management System will simplify, with the Web applications and mobile phone, the solid and hydric waste inspecting process, and the management system of this presentation's total collection process. The proposed system is a GPS based. The suggested device and implementation will track waste storage and monitor the vehicle's waste driver. This method helps to make the customer aware of accountability behind the job such as the system for solid waste inspection and management, integrating communications technology for truck control systems such as GPS.

Keywords: Smart waste management, Smart waste management application, GPS based, E-waste, waste management.

I. INTRODUCTION

Day by day the population is rapidly growing and the economic broadening of the country, there is a very vast growth of the waste of management also. There is no actual right way of its solution or proper chain system to track and monitor the waste and disposal system. And cities are getting smart nowadays, but waste is not. Regardless of all the cities, the dustbins and waste are not getting tracked, sometimes the garbage in the bins gets to above the point, where it blemishes outside the garbage pail and open out in whole areas and causes so many health issues to the citizens. In this work, the prototype schema which we are trying to address the waste management issues with several solutions like by using the smart bins which will indicate the level of the garbage inside the bins and will alert the admin to pick the garbage from the particular region. Next, as it is a smart waste management system, we are giving some approach to society. People can also trail the waste in its particular society or close by it. And regardless of the garbage collector not attending to the particular society or particular area, the society member can record the issue through the user app, and that can be reached directly to the admin. The motive of making this prototype is to put one step into the solution of waste management.

Fig. 1: Garbage (Courtesy google)

II. RELATED PROJECT

The problem of waste management is getting worse day by day. The attention to this problem needs to be addressed to avoid further problems and issues in society. The prototype consists of smart bins with RFID tags, garbage collector vehicle tracking using GPRS module, and the User App apart from this there is another side of the prototype is the Admin Panel where the admin can have track

of all the details in one go and able to generate the report on the daily basis. The prototype goes in this way, basically, the smart bins will be tracked using the sensors, the level of the bins will be generated and monitored to the garbage collector and will be alert to the admin also. Next, the garbage vehicle will be tracked using the GPRS module and RFID tags, when the garbage vehicle comes in contact with the particular dustbins, the RFID tag on the dustbins will be activated and it will store the results in the cloud database, that the garbage has been collected from the particular region or the society. Next, the results of this will be reflected back to the user app and to the admin also. Users also can track the vehicle details and other information related to the waste.

III. PROPOSED SYSTEM

The technology is built on the concept of IoT, Android, web and cloud. The system

  A. *System Architecture*

    1. *Smart Bins-* The bins will be connected with some sensors, so that it can give the status of the bins to the garbage collector, and the admin side the data of the bins will be collected in the cloud database, and from the cloud database it can be used.

    2. *GPRS Vehicle Tracking-* Garbage collecting vehicles can be tracked using the GPS module and the RFID tags, once the vehicle reaches the particular region where the bins are located, the RFID tags on the vehicle and dustbins read and transmit the signal of the status to the cloud. And from the cloud, the data will be shared to the user's app and the admin dashboard.

    3. *Android Application-* The Android app will act as a bridge between the users and the municipal cooperation people. The user can be provided with some features like tracking of the garbage vehicle, day to day activity of the society cleanliness and users can have an interaction with the municipal peoples also, and they can also raise their voice against the issues which they are facing in their region. People even can give some suggestions to the government regarding some better solution against the fight for Waste management. Along with that one more feature is added for the user, where he/she can book the garbage vehicle to take waste from his location on the user chargeable basis.
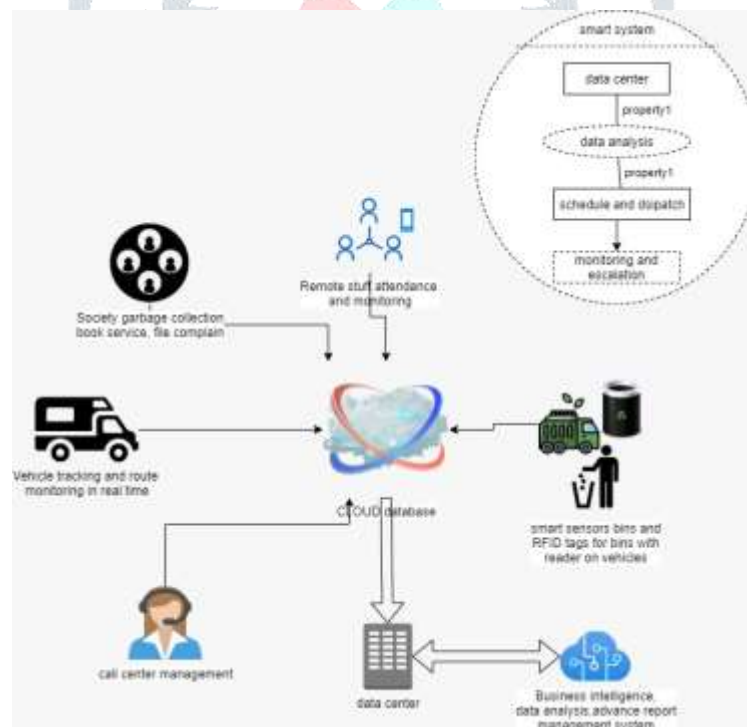

Fig 2: Architecture of the proposed system.

B. *Flow Chart*

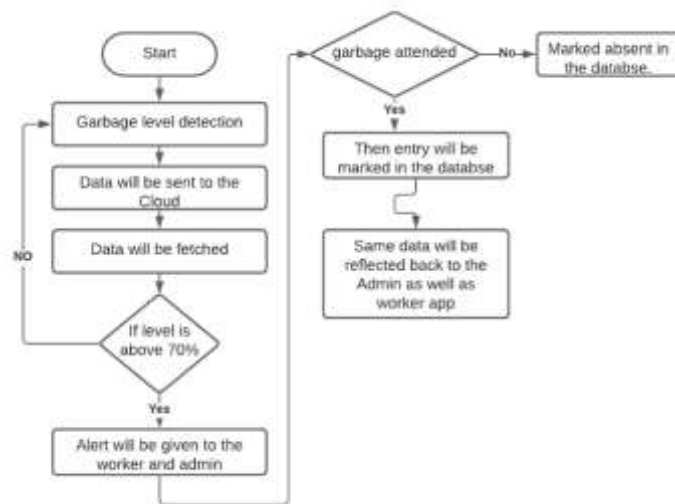The Flowchart begins from the smart bins, the level detection.
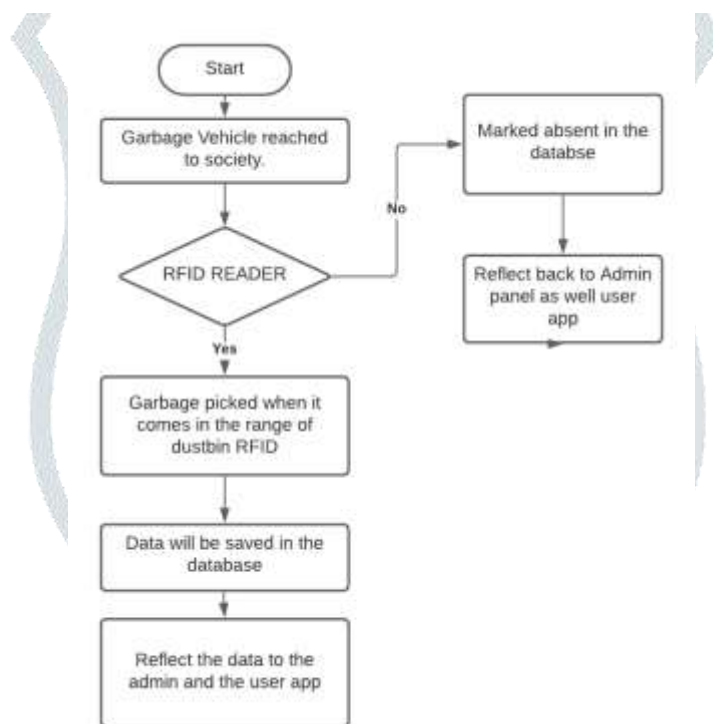

Fig. 3: Flow chart of smart bins activity

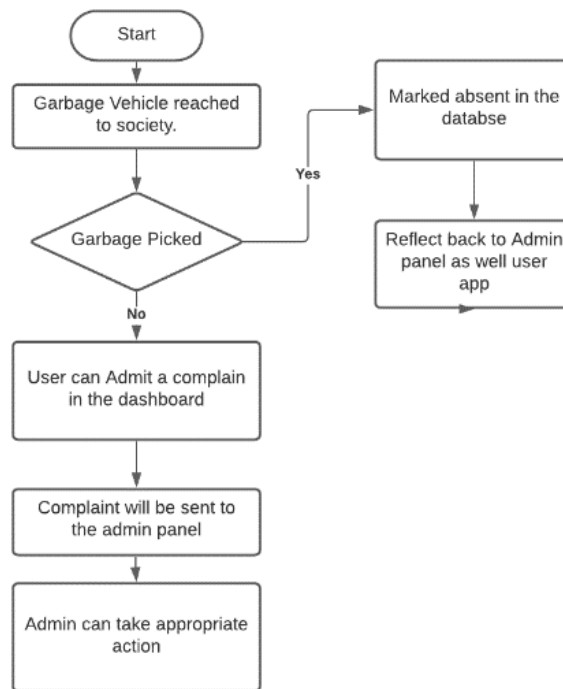Fig. 4: Flow chart of regular activity chart.

Fig. 5: User Activity.

C. Hardware Units

1. *GPS*- GPS refers to the satellite-based navigational system that informs and navigates where you are - GPS consists of three components: space, control and user section GPS consists of three components. GPS trackers are used to track the location and also show the way to a particular destination. We have implemented the GPS module and tracker to track the vehicle and its path. In this project the GPS will be fixed in the vehicle.

2. *IOT*- IOT (Internet of Things) refers to the system in which the object is connected to the internet and is able to transfer the data and collect the data with the help of the internet without the interference of humans. We have implemented IOT in our project so that it can collect the data from the source and deliver it to the destination. These devices will be attached in the dustbins for collecting the data of the dustbin and notifying the end users i.e. whether it is full or overloaded, the vehicles need to come or not.

3. *RFID TAGS and RFID READER*- RFID is a technology used for reading, collecting, and transferring data by using radio frequencies waves. It composes a tag and reader where the tag is attached to the particular object. And the reader can read the radio-frequency wave and collect the data through an antenna. Here tag is also known as a data transmitter and the reader is also known as data receiver. As it is a wireless technology and can read and collect the data from a distance of 12 meters to 100 meters depending on passive and active RFID tags. We have used this technology in our project for sensing the vehicle and marking whether the vehicle has arrived to collect the garbage or not. The RFID tag will be placed on the dustbins and the reader on the vehicles.

D. Software Unit-

There are basically three major requirements to implement this prototype - software, functional and Non-functional requirements.

1. Core System- The prototype is being developed in several parts, it goes like the web application which is for the admin panel is being developed using the latest technologies like ReactJS, NodeJS and AWS. And there will be two different apps - one is for the normal society users and other one is for the garbage collector. And development of the android app using the flutter framework and node js.

- **REACTJS** - ReactJS is the best platform for writing code for web applications.
- **NODEJS** - Using for writing the backend code.
- **FLUTTER** - Flutter for the app development User interface.
- **GOOGLE MAPS** - The service of google maps is to enable the subsequent experience to the user where they can track and see the vehicle status in the virtual manner.
- **AWS CLOUD SERVICE -** AWS for the cloud service for the database management.

2. Functional Requirements-

i. **Reports (login, dashboard) -** The Normal user app will consist of login and register page initial screen and the success of the login or registration the user will be redirected to the dashboard, where he/she can enjoy the features like tracking of the garbage vehicle, booking feature and complaining for the particular issues through the app.

ii. **Garbage collector app -** Another app is for the garbage collector where he can monitor the garbage level in the bins and he can also accept the booking for the garbage collection from any location.

iii. **Admin Panel -** The admin panel will be designed and developed in such a way; the admin can easily track the worker information in one go. The basic features like tracking of the garbage collector vehicle, bins garbage collection level and the complaints for any issues raised by the society people through App

IV. DISCUSSION AND RESULT

Waste management and dumping of solid waste in India have been researched and the findings show that municipal solid wastes are mostly composed of biodegradables and non-biodegradable materials. And also, the agency responsible for the evacuation of this waste does not do that on a regular basis. It was also observed that the present waste disposal situation is expected to worsen due to rapid municipal in the state, increase in unplanned settlements and housing, and lack of sustainable waste management technologies in India metropolis. The major proportion of the wastes emanates from the residential sectors and recycling is not currently practiced formally in the metropolis. The consequences of poor waste management are manifested in environmental degradation, road encroachment, air pollution, residential land encroachment, and loss of aesthetic view of the metropolis. The findings and solutions presented in this paper will serve as useful guides for improved waste management services within the metropolis and regions with similar waste challenges in India and other developing countries.

V. CONCLUSION

Analysis has been carried out and results indicate that urban solid waste comprises mostly biodegradable and non-biodegradable materials. Furthermore, this is not done often by the department responsible for the evacuation of this waste. Furthermore, it was observed that due to the rapid municipal situation in India, rise in unexpected slums and residential buildings, and absence of sustainable waste management technology in India, the current waste disposal situation is likely to worsen. The bulk of the waste comes from the private industries and recycling in the metropolis is technically not officially carried out. This paper will help to solve the waste management system in India and also other developing countries.

VI. REFERENCES

[1] Shyam, Gopal Kirshna, Sunilkumar S. Manvi, and Priyanka Bharti. "Smart waste management using Internet-of-Things (IoT)." IEEE Computing and Communications Technologies (ICCCT), (2017) pp. 199-203.

[2] Kurre, Vishesh Kumar. "Smart Garbage Collection Bin overflows Indicator using IOT." International Research Journal of Engineering and Technology (IRJET) (2016).

[3] Folianto, Fachmin, Yong Sheng Low, and Wai Leong Yeow. "Smartbin: Smart waste management system." Tenth IEEE International conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), (2015).

[4] Vu, Dung, and Georges Kaddoum. "A waste city management system for smart cities applications." (2017).2017 Advances in Wireless and Optical Communications

[5] Kumar, S. Vinoth, T. Senthil Kumaran, A. Krishna Kumar, and MahanteshMathapati. "Smart garbage monitoring and clearance system using internet of things." IEEE Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials, (2017).

[6] Swati Dewangan,IoT- Enabled Intelligent Solid Waste Management System for Smart City: A Survey, ISSN NO : 2249-7455

[7] Amoo OM, Fangbale RL (2013). Renewable municipal solid waste pathways for energy generation and sustainable development in the Nigerian context. International Journal of Energy and Environmental Engineering, 4(1): 42.J.H. Chuang. Potential-Based Approach for Shape Matching and Recognition. Pattern Recognition, 29:463-470, 1996.