International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

CLOUD BASED APPROACH FOR FINDING, COLLECTING AND TRANSPORTING WASTE

V. Stella mary, Dr. M.Vasantha

ABSTRACT

The objective of the project is to identify, collect and transport the waste. It will update the daily processing 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 is a completely inefficient use of government resources. 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 network of smart bins which integrates cloud-based techniques to monitor and analyze data collected to provide predictive routes generated through algorithms for garbage trucks. An android or web app is developed for the workforce and the citizens, which primarily provides the generated routes for the workforce and finds the nearest available smart bin for citizens.

Keywords: Cloud, IoT, Garbage collection, Smart city

INTRODUCTION

Proper waste management is a basic requirement in any kind of an environment. Usually cleaning in these environments are done in the morning and the afternoon. If you take an urban city like Colombo usually there are about 1,200,000 to 1,500,000[1][2] 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 95% [3]of people are carrying food covers, polythene bags, and plastic bottles. If they dispose all 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. Thesis not a real solution. It takes way more cleaning staff and costs 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 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 spread them, but the animals also can be a source.

LITERATURE SURVEY

In the paper of S. Lokuliyana et al. on "IGOE IoT frame work for waste collection optimization" uses a sensor network based on disposal sites set up around the city. The sensor nodes not if y relevant authorities about the availability of waste to be collected. A mobile application is built for citizens to alert authorities about an overflow of an authorized disposal site or unauthorized dumping site of waste. The same application issued by the authorities to convey messages to the citizens. An optimization algorithm is used to create the route in which the trucks use to collect the garbage from the disposal sites. Finally, an analysis is done to calculate the delay of the waste collection process, effective waste collection rate and the waste collection process efficiency. The whole system is built as a framework and is named the IGOE waste collection framework [4].The paper by R. Fujdiak et al. on "Using genetic algorithm for advanced municipal waste collection in Smart City" main ly focusses on IoT vision that 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
. To optimize the logistic procedure of waste collection, the paper uses own genetic algorithm implementation. The presented solution provides a calculation of more efficient garbage-truck routes. As an output, the paper provides a set of simulations focused on the mentioned area. All the algorithms are implemented within the integrated simulation framework which is developed as an open source solution with respect to future modifications. The algorithms used are as follows: Floyd-Warshal, TSP formulation, crossover algorithm, Mutation algorithm and Dijkstra, TSP formulation Algorithm[5].Referring to a research paper by T. Anagno stopoulos et al.on “Top-k Query based Dynamic Scheduling for IoT-enabled Smart City Waste Collection” proposes a top-k query based dynamic scheduling model to address the challenges of near real-time scheduling driven by sensor data streams. An Android app along with a user-friendly GUI is developed and presented in order to prove feasibility and evaluate a waste collection scenario using experimental data. In implementation regarding spatial information, the Smart City is divided into multiple sectors which cover the entire city area. Each sector contains number of multiple intermediate waste depots, which are temporary waste storage areas. The proposed system architecture incorporates a heterogeneous fleet of trucks for serving the waste collection infrastructure. Cloud middleware irresponsible to collect data from sensors, aggregate and clean them in order to provide them to the engine which is implemented in Opinion. Dynamic scheduling algorithm locates the first available truck which can load waste from the filled bins. Then it is performed a top-K query which exploits real-time data from the relation. Also, data is stored in a spatial database in which mobile top-k queries specify the number of the full bins in order to initiate dynamic scheduling. An Android app is implemented in order the drivers to have a user-friendly GUI interface

Methodology

The Internet of Things (IoT), as expected infrastructure for 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 operating 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 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 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.

In the 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 sides of the garbage bins.

The existing system has the following drawbacks: On the streets of urban cities, hundreds of people are passing the same location around one minute. Around 95% of people are carrying food covers, polythene bags, and plastic bottles. If they dispose all 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 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

.

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 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

The proposed system has the following benefits: The application has a map that shows the current levels of all the bins. This receives the calculated route (mentioned in ther oute calculation) at the designated time slots and when there is special bin to be cleaned.

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.

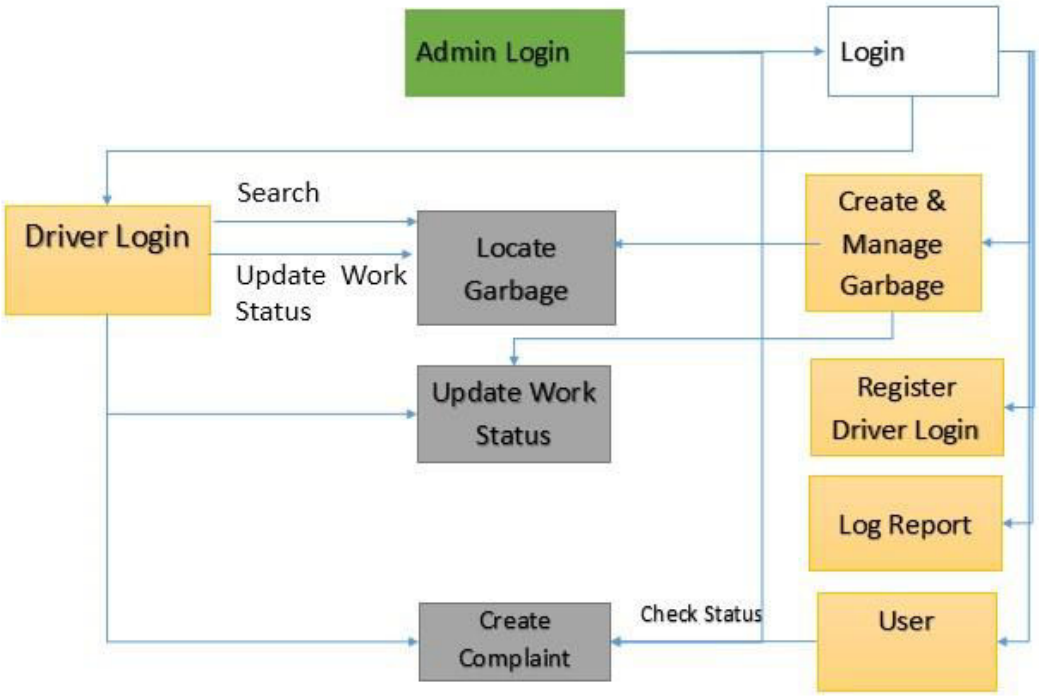
Modules

By using garbage update information of worker, general public can communicate with administrate. Communication is possible among the workers, general public and administrator.

System Features

In the life of the software development, problem analysis provides a base for design and development phase. The problem is analyzed so that sufficient matter is provided to design a new system. Large problems are sub-divided into smaller once to make them understandable and easy for finding solutions. Same in this project all the task are sub-divided and categorized.

Architecture Design:



CONCLUSION

Future work can include many areas. One area that can be improved on, but limited at this time due to trying to making this project low cost, is identifying types of garbage from the bin itself, thus removing human segregation. If this is mplemented,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.

Mrs. V. Stella mary pursued Master of Engineering from Anna University, India. Currently she is working as an Assistant Professor in Sri Muthukumaran Institute of Technology. She has worked as an Assistant Professor in reputed engineering colleges under VTU university and Anna University. She has 8 years of teaching experience and 2 years of research experience.

Mrs. M. Vasantha pursed Master of Computer Application from Alagappa University, Master of Engineering from Anna University, India and Doctorate in Computer Science from Mother Teresa University, India in the year 2015. She is currently working as Associate Professor in PG Department of Computer Sciences, Bhaktavatsalm Memorial College For Women, Chennai affiliated with the University of Madras, India since 2016. She has published more than 15 research papers in reputed international journals.. Her main research work focuses on Big Data Analytics, Data Mining, and Machine learning. She has 25 years of teaching experience and 10 years of Research Experience.

REFERENCES

[1] "Colombo Vehicle Statistics (2015)." Indi.ca. [Online]. Available: http://indi.ca/2015/10/colombo-vehicle-statistics-2015/. [Accessed: 09-
Jan-2017]
[2] "Population and Housing." Population and Housing. [Online].
Available: http://www.statistics.gov.lk/page.asp?page=Population%20and%20Hous ing/. [Accessed: 09-Jan-2017]
[3] Council, Colombo Municipal. "Colombo Municipal Council." Garbage
Collection. [Online]. Available: http://colombo.mc.gov.lk/garbagecollection. php/. [Accessed: 04-Jan-2017]
[4] S. Lokuliyana, J. A. D. C. A. Jayakody, L. Rupasinghe, and S.
Kandawala,"IGOE IoT framework for waste collection optimization," 2017 6th National Conference on Technology and Management (NCTM), Malabe, 2017, pp. 12-16.
[5] R. Fujdiak, P. Masek, P. Mlynek, J. Misurec and E. Olshannikova,

"Using genetic algorithm for advanced municipal waste collection in Smart City," 2016 10th International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP), Prague, 2016, pp. 16.

[6] T. Anagnostopoulos, A. Zaslavsky, A. Medvedev, S. Khoruzhnikov

"Top-k Query based Dynamic Scheduling for IoT-enabled Smart City Waste Collection," In Proc. of 41 the 16th IEEE International Conference on Mobile Data Management (MDM 2015), Pittsburgh, US.

[7] "National Solid Waste Management Support Center." National Solid

Waste Management Support Center « Ministry of Provincial Councils and Local Government. [Online]. Available:

http://www.lgpc.gov.lk/eng/?page_id=1118/. [Accessed: 03-Jan- 2017]

[8] See Ultrasonic Sensor. PDF. [Accessed: 23-Jan-2017]

[9] "Raspberry Pi Zero." Raspberry Pi. [Online]. Available: https://www.raspberrypi.org/products/pi-zero/. [Accessed: 25-Jan-2017]

[10] "Waypoints in directions | Google Maps JavaScript API | Google Developers." Google Developers.[Online].Available:https://developers.google.com/maps/documentation/javascript/exampl es/ directionswaypoints/. [Accessed: 15-Mar-2017]

[11] "2.2.3 determining current domestic waste generation per capita." 2.2.3

Determining current domestic waste generation per capita | Integrated Waste Management Plan(IWMP).[Online].Available:http://iwmp.environment.gov.za/guideline/2/2_2_3/.[Accessed: 23-Apr-2017]