International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 02, 2020
ISSN: 1475-7192

Smart Waste Management System

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Abstract-*The technological development has brought about a drastic rise in the volume of excess and discarded goods across both industrial and consumer industries. It adds to the need in and around the cities for stronger waste management schemes. The planned device contains a computer with an ESP8266 microcontroller, an ultrasonically operated sensor and a GPS camera attached to the trash bins.The ultrasonic sensor tracks the waste level in the cans continuously. When the trash in the can hit a certain point, the ultrasonic sensor and the position of the GPS node are sensed and changed through wireless Internet connectivity in the cloud. Raspberry Pi Microcontroller accesses the coordinates from the cloud using Wi-Fi. Top k-query preparation refers to the values for the threshold value consistency of the data sets and then stores those values in the MySQL database table. Planing thus avoids data baseline fragmentation by growing the amount of unknown entries. A website can view the MySQL table positions using php code that then displays the positions on a map. It may also be found that the website measures and reveals the shortest path between the points automatically from the experimental tests.*

Keywords--*ESP8266, GPS module, Top k test plan, MySQL database, Ultrasonic tracker*

I INTRODUCTION

While public utilities and waste treatment firms have been around for a long time, organizational productivity remains lacking in creativity.Smart garbage cans are a safer way to use for the handling of manual waste schemes. The trash cans are fitted with an inbuilt Wi-Fi module which connects with the base station to display the amount of trash cans being filled. The wireless data transmission device is activated by the WLAN module.This system proves to be effective because of the decrease in man power and the amount of resources needed to provide waste management facilities.

This method also helps to minimize the sum of time that is used to search the trash cans and to provide the dynamic path for collecting the garbage from the bins.The amount of loading of bins should also be remembered. Most tanks are loaded in a relatively little period, although others require a very long time. You may search the bins without getting next to the bins by means of this method. The sorting of garbage from the packed containers is easier; it allows to reduce the time required to manually test the amount of trash in the containers.Since the device is focused on the Internet of Things, it decreases human intervention considerably and hence proves very effective in contrast to traditional manual waste management or some other process.The route is measured and displayed on the map dynamically, so it is not appropriate to execute the code any time the route is found.

The daily usage of waste in both houses and factories relies on the amount of energy used. Improving the handling of waste goods with rising use is also necessary.This system is based on Internet of Things to automate waste collection by means of sensors and module microcontrollers. A low cost module with an ultrasonic sensor and a GPS is mounted for each trashcan. For this project, we are using an ESP8266 microcontroller with a 5V power and an embedded Wi-Fi-module, which renders the device quite complicated and immobile as data

Received: 23 Dec 2019 | Revised: 05 Jan 2020 | Accepted: 27 Feb 2020

transmission is achieved via wired connections.This also raises machine expense because it is important to attach all garbage cans to the base station.The ability to overload trashcans with this method was therefore greatly minimized because the trash cans was removed until they are loaded.It helps maintain the air healthy and also reduces the risk of infectious diseases. The trash level of the ultrasonic sensor is tracked continuously. The coordinates are sensed with the GPS module and transmitted to the cloud when the distance is below a set range.

The Raspberry Pi microcontroller uses the top kquery programming to collect sensor data from a server. The data is then used to produce data from a device. The schedule is based on the program's collection of threshold values. Until it is submitted to the website, these coordinates are placed in a database to display the path linking all of the points on the globe.

MYSQL database can be used for storing locations. Tables may be generated and accessed through the provided privileges in a database

II RELATED WORK

Proper recycling and disposal of waste have high emissions and environmental effects by storing raw materials. The waste collection work[1] appreciates, however, areas which suffer from inappropriate negative service. Suitable waste collection and management facilities have strengthened the recycling cycle and reduced waste generation.Therefore, we are committed to ensuring a safe, balanced and green atmosphere with an effective and economical waste management system. We are designing three subsystems within the project: an intelligent waste bin and a real time monitoring system interconnected[2] as an effective waste management system that delivers a green and safe living environment. We plan to design and develop the project as efficiently as possible to produce the best results.

This oids data congestion by reducing the number of inappropriate entries.

The MySQL table is accessed by a website, which uses the picture code to show[3] locations on a map. This can also be seen from the test results that the website measures and displays the shortest path between points dynamically.This paper explains how waste dust is being filled or whether it is being decomposed in waste disposal side waste on the webpage. Members of the town sign in to the website and have been sweeping up waste areas. If [4] individuals have not cleared the wastage prior to two days, higher officers are told. Used are IOT, controller & sensor. Here the IOT module is used for waste management and control and information to the individual company and to the common man is transmitted.In addition, this smart bin monitors bacteria in the bin to prevent bacterial floods from being polluted by the bin. [5] As a result, we introduced a prototype smart waste bin suitable for several forms of regular waste bin.The following paper proposes the use of an AT-mega 2560 Arduino board to collect a DHT -11 sensor, carbon dioxide concentration using MG-811 temperature and humidity parameter and to update it in the online MYSQL database. A[6] website has been developed and hosted for monitoring and control, which will offer a genuine IoT essence. An android framework is also developed to improve usability and versatility.

We propose an IoT-based solid waste management network which enables the tracking and dynamic planning of waste collection trucks and the routing of them in a smart city. In the program suggested, trash can be

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found in different locations in the whole of the city[7] loaded with low-cost embedded equipment. Effective period of basket status is submitted to the cloud along with the basket position.The present paper proposes a clean IOT-based method of waste management that uses Sensor systems to test waste level over dustbins. This[12] machine automatically moved to a GSM / GPRS certified company after it was detected[8]. Microcontroller was used to integrate the sensor device with the GSM / GPRS framework. with that method.The completeness of dustbin waste is monitored in the proposed system utilizing the sensors used in the device, and GSM / GPRS is used to transmit details to the appropriate control room. The sensor device can be communicated through Renesas[9] Microcontroller to GSM network. In order to track waste details at various selected sites, an android framework has been developed.In this article, we introduce recycle.io, a waste management system that uses Internet of Things (IoT) to classify certain causes of violations centered on a serverless architecture. Recycling.io can require monitoring of breaches locally, such as strengthening or applying tighter[10] waste disposal laws, which can help local administrations.

Microsoft Azure IoT Center is used for application control in our recycle.io program.In coevolving time series with the use of temporal dynamic matrix factorization techniques, we took up the task of missing data prediction. First, our methods are optimally structured to utilize both the interiors of increasing time series and the time series knowledge from a variety of outlets in order to construct an initial model. On the basis of this theory, we have placed hybrid regulatory criteria for restricting the objective[11] matrix factorization functions. It is then suggested to calculate the temporal dynamic matrix to upgrade the initial models already trained effectively.

III PROPOSED APPROACH

The network design for the current intelligent waste management program as seen in Figure 1. The ESP8266 is interfaced with the ultrasound sensor and the GPS module. The Ultrasonic sensor shows waste level in the bins and the GPS module shows where the binsare placed

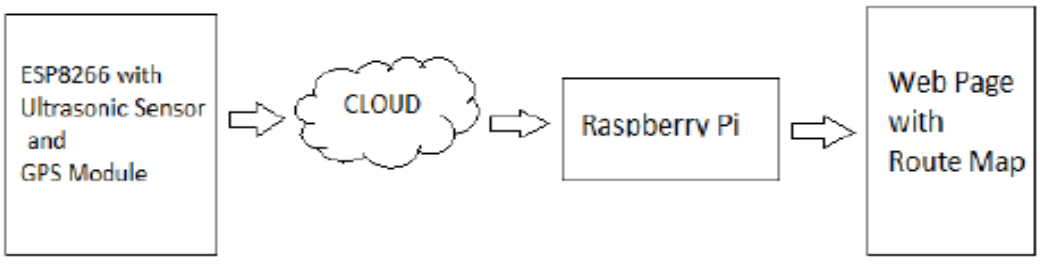

Figure 1. System Architecture

In the ThingSpeak cloud, sensor data from the ESP8266 MCU are updated via Wi-Fi.
Raspberry Pi serves as the Internet that reads the cloud bins and locates the algorithm for the Highest k-Query scheduling to configure the data stream range with threshold values. The modifications will be saved in the MySQL database. A php program is run on a web server showing a chart of a web page and finding the waste cans that are loaded. The shortest method of extracting waste from the plotted tanks is also determined.

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A. Top K- Query Scheduling

In certain areas, system processing and sensor networks, confusion occurs. Top-k queries with user-defined responses are an effective method to explore broad unspecified data sets (TheodorosAnagnostopoulos et al, 2015). The semantics of top-K queries on unknown data may be vague and indecisive, as many recent surveys have observed due to the high amount of data generated per second.In many applications it is important to handle unknown data. Examples involve data washing, system convergence, sensor networks, general processing and control of scientific data.For the measurement of distance between the sensor and the target, ultrasonic sensors are used. Owing to the complexity of distance sensing, sensor detections are sometimes unclear and an entity can be positioned in one of many positions. For each potential target one record is created as a standard approach to the storing of these sensor data

In this device, the values from the ultrasonic sensors are constantly fed to the cloud and the queries to store and read the data in tables are continuously executed. Therefore, the details must be consolidated and modified to give meaningful knowledge that can be further analyzed to draw a conclusion. The data source may be calculated by setting a threshold value for the spectrum of potential sensor values. The cloud values are measured and evaluated for the latitude and longitude values under the top k-request scheduling. It is processed in the database even if the position values are not null. If not, the bin is partly replenished and the prices are then neglected. The Top k-query scheduling will therefore prevent storing incertain data values in the database

IV RESULTS

A. Values on Thing Speak Cloud

Bin1 is positioned at G.N to check the proposed method. In Vadamadurai, Coimbatore and Coimbatore, Mines, Coimbatore and bin2 lie. The configuration of the ultrasonic sensor on the bin1 as seen in Figure2.The maximum volume of the trash cans as sensed by the ultrasonic sensor and is modified by the ESP8266 module on the ThingSpeak server. The ultrasonic sensor data occurs in a field, and the trash can position is seen in two areas.The amount of the Trash cans is shown in Field 1. The tanks are clean at first. The graph decreases until the tanks continue to fill. The cloud uploads the location of the trash cans if the gap between the trash and the sensor is less than or equivalent to 20 cm. This raises the latitude and duration of the GPS module in the maps in field 2 and Field 3. The place of bin1 on a map is seen in Field 4.

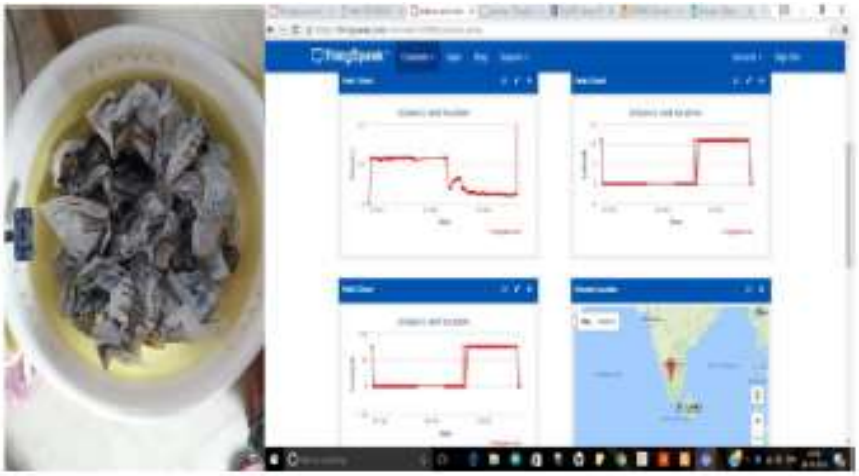

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Figure 2. Values of bin1 updated on the ThingSpeak cloud

Likewise, the state of bin2 is seen in Figure 3. The difference between the sensor and the trash can be seen from the Field 1 graph. As the value of bin2 was not less than 20 cm, the latitude and longitude values stay at zero and are not modified in the cloud

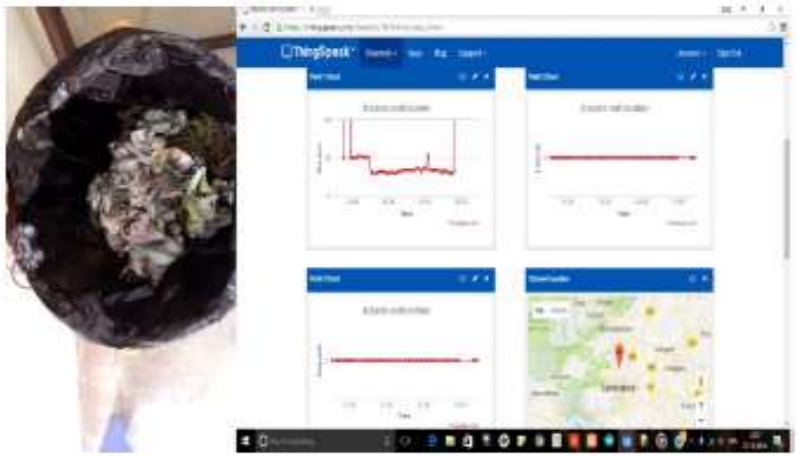

Figure3. Values for bin2 updated on ThingSpeak Cloud

A. *Accessing values from cloud*

The python script in Raspberry Pi implements the Top K query schedule such that values can be set within the proper range and data not contained in the database can be deleted. This decreases the amount of memory needed to store the unknown sensor data source.Figure 4 shows the performance of Raspberry Pi, which reads the ThingSpeak cloud values and uses the top k-query method. After programming, the bin2 value does not include the bin's position, because it is partially loaded.This shows and stores bin1 values in the index. The plan is performed to avoid all data from the sensor from being shown on the screen. The number of entries in the database table is therefore that.

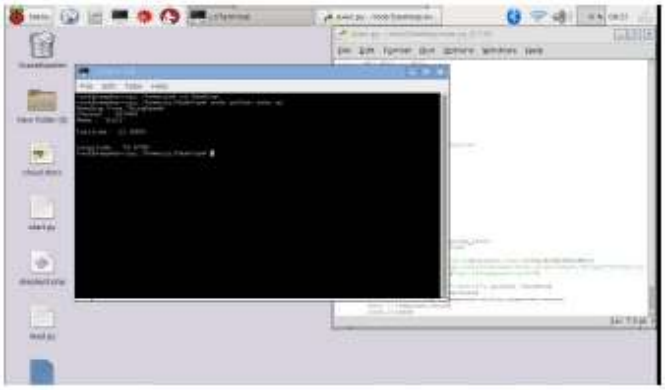

Figure 4. Latitude and Longitude values of bin1

B. Writing values to MySQL

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The values are placed in the MySQL database after the completion of the python script. Throughout Figure 5, the bin1 and base station values can be identified in the table. The bin2 meaning is omitted because it is just partly filled.

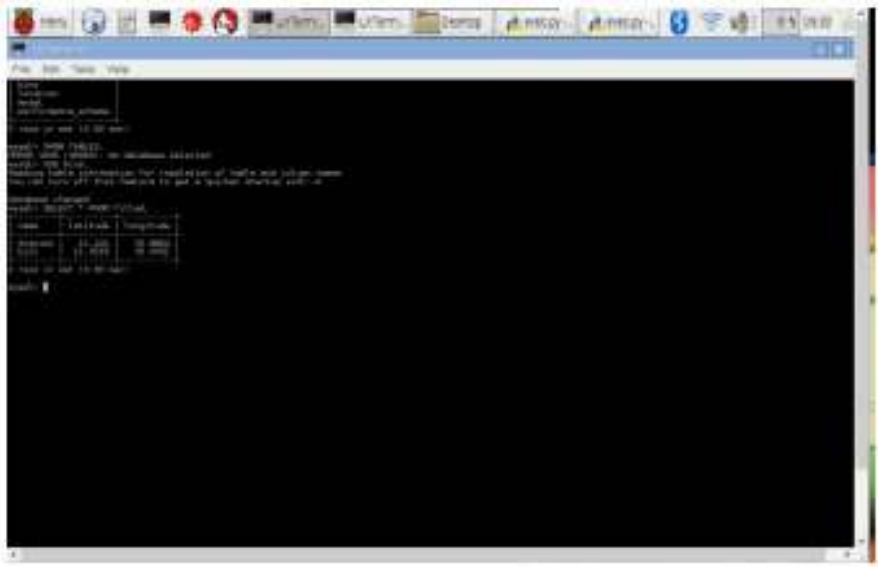

Figure 5. Values stored in the MYSQL Database

C. Screenshot of the webpage

Because bin2 is not complete, its position is removed. The Raspberry Pi memory is processed and the application is working. As run, the items in the database and a chart are shown. It displays the positions markers in the database and the path that links the markers on the screen.Figure 6 indicates that the path from the site server and the bin1 filled in station(A) is plotted.

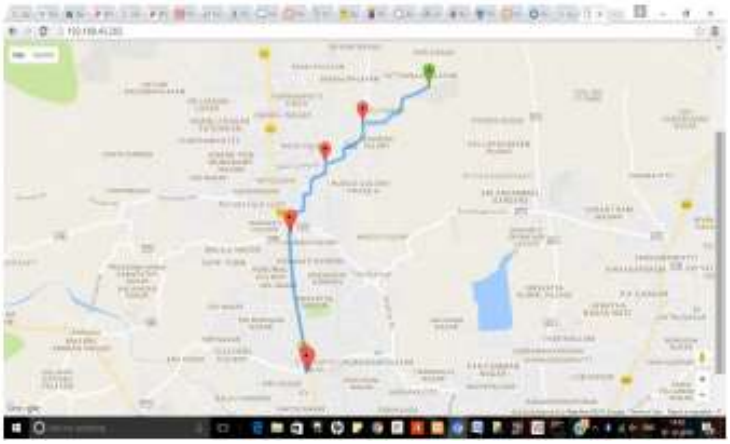

Figure 6. Web page Displaying the map with the route

V CONCLUSION

Via its intelligent waste management program, the person's power required to enforce conventional waste management systems is that effectively. It also avoids emissions when the waste container is kept unattended by raising the likelihood of having a waste disposal. The amount of time and money that has been expended removing waste from across the region has also been greatly reduced. As the dynamical approach to gather all the waste cans

is also seen in this initiative, the usage of money is held to a minimum and not used on undesirable places. Compared with the previous methods, the resource usage is greatly high. The chart indicates the shortest route such that costs for visiting all the basins in a defined region are reduced.The ESP8266 NodeMCUmicrospeed controller can be improved by utilizing a renewable energy source. Solar cells are other types of electricity that can be used. Even, without cloud, sensor data can be transmitted directly from the ESP module to the Raspberry Pi through Wi-Fi. MQTT or AMQP protocols may be used for direct data transfer between the two microcontrollers.

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Received: 23 Dec 2019 | Revised: 05 Jan 2020 | Accepted: 27 Feb 2020