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"SMART WASTE MANAGEMENT SYSTEM USING IOT"

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Abstract-Addressing environmentally safe management of waste is becoming increasingly a challenging task. The predicament of the rate at which waste is generated due toincreasing populations is also contributing to this challenge. One possible approach for effectively handling waste can be achieved by source reduction and recycling. The waste management is one of the challenges in the smart cities. Garbage collection is one of the most critical problems faced by Municipal Corporation. While implementing the waste management in cities the biggest challenge is the management of waste in cost optimal way with high performance. The current process of collecting the waste, separating it and transporting the containers everyday which is a complicated process. The waste containers are typically placed in the public areas. Without well management, the waste containers may be overflowed or give off unpleasant smell, which affect the public health. This project proposes a smart waste management system, by using the IoT (Internet of Things) technology.

***Key Words*: Interenet of Things,smart waste management**

1.INTRODUCTION

Management and disposal of waste is a challenge in today's world. The dumping of garbage wastes at open landfill sites is the common method of disposal. The disposal method of dumping in open land sites has an adverse effect on the environment. Due to dumping of waste in such an open environment it affects the health of human beings and also life of plants & animals. The method used to treat the disposal of waste into water leads to contamination of surface and groundwater. It gives rise to diseases which affect the living things in environment. Disposing waste in water spreads unhygienic conditions. This process breaks down the beauty of the environment. In India waste collectors play a crucial role in recycling process in many cities. Many waste collectors have chances of getting prone to various diseases. The job of rag pickers (waste collectors) is a hectic task, also to eliminate the process of rag picking; it can be automated at the waste disposal zone by segregating at early stage. Until the waste is completely recycled its economic value is not realized. There are several advancements in technology which has allowed reusing and recycle the waste. Generation of biogas for use of household works is possible due to waste management at small level. To increase the potential of recovery and recycling, the waste can be separated into various types such as wet, dry, metallic waste, etc. Metal detectors can also be used for detection of metallic waste. The collected waste is the source of different useful gases and fertilizers. The dry waste can be segregated further and can be reused and recycled. At present there are waste separation plants present on large scale, it is better to separate waste at collection level. By separating the waste during collection level, the quality of waste would be higher for recycling process. Hence the job of human waste collectors is reduced. Internet of Things (IoT) is among the technologies by means of which one can transfer data from one device to another using any type of network, at anytime and anywhere.

Separation of waste is difficult task to do. It has to be cost efficient and easy to implement. This project proposes a system which segregates wet and dry waste and manages it.

1.1.1 PROPOSED METHODOLOGY

We propose a smart waste collection system on the basis of level of wastes present in the wastebins. The data obtained through sensors is transmitted over the Internet to a server for storage and processing mechanisms. It is used for monitoring the daily selection of wastebins, based on which the routes to pick several of the wastebins from different locations are decided. Every day, the workers receive the updated optimized routes in their navigational devices. The significant feature of this system is that it is designed to update from the previous experience and decide not only on the daily waste level status but also the predict future state with respect to factors like traffic congestion in an area where the wastebins are placed, cost-efficiency balance, and other factors that is difficult for humans to observe and analyze. Based on this historical data, the rate at which wastebins gets filled is easily analyzed. As a result, it can be predicted before the overflow of wastes occurs in the wastebins that are placed in a specific location. Depending on economic requirements specified at early stages, the optimized selection of wastebins to be collected is expectedto improve collection efficiency.

Smart Waste Management Algorithm

Inputs: Amount of Wastes generated ; Number of Wastebins embedded with IoT devices; Capacity of Wastebins; Nearest-neighbor shortest path algorithm for finding the optimized routes; **Output**: Optimized routes to visit and empty identified Wastebins; **Description**: 1: install several wastebins at multiple locations in the city; 2: embed each of wastebins with IoT devices; 3: define threshold value for wastes for each of the wastebins; 4: collect the wastes in the wastebins; 5: send the collected data (using algorithm 3) over the Internet to the servers; 6: store and process the information in the server; 7: calculate and send the optimized routes to send the vehicles for waste collection using algorithm 2; 8: empty the wastes from the identified wastebins; 9: use the collected data for monitoring daily selection of wastebins; 10: predict future traffic in specific location as per algorithm 4; 11: update the optimized routes in navigational devices;

2. LITERATURE SURVEY

1. A Smart IoT System for Waste Management

AUTHORS - Whai-En Chen, Yu-Huei Wang,Po-Chuan Huang, Yu-Yun Huang, Min-Yan Tsai.

PUBLISHED IN - 2018 1st International Cognitive Cities Conference (IC3)

ABSTRACT

The waste management is one of the challenges in the smart cities. The waste containers are typically placed in the public areas. Without well management, the waste containers may beoverflowed or give off unpleasant smell, which affect thepublic health. This paper proposes a smart wastemanagement system, by using the IoT (Internet of Things) technology.

2.Waste Management Improvement in Cities using IoT

AUTHORS - Shivam Jagtap, Aditya Gandhi, Raviraj Bochare, Ashwinkumar Patil, Ajitkumar Shitole

PUBLISHED IN - 2020 International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC) GLA University, Mathura, UP, India. Feb 28-29, 2020

ABSTRACT

Garbage collection is one of the most critical problems faced by Municipal Corporation. While implementing the waste management in cities the biggest challenge is

the management of waste in cost optimal way with high performance. The current process of collecting the waste, separating it and transporting the containers everyday which is a complicated process. This paper deals with the concept of waste management and the smart system for waste management with higher benefits to the society. The proposed system for waste management will use various sensors for sensing the type of waste and separate the waste in different categories and actuator to inform the management to collect the waste container. This system will save money and time compared to the already available process of waste management and also improves the society cleanliness.

3.Recycle.io: An IoT-Enabled Framework for Urban Waste Management

AUTHORS - Eyhab Al-Masri, Ibrahim Diabate, Richa Jain, Ming Hoi Lam and Swetha Reddy Nathala

PUBLISHED IN - 2018 IEEE International Conference on Big Data (Big Data)

ABSTRACT

Addressing environmentally safe management of waste is becoming increasingly a challenging task. The predicament of the rate at which waste is generated due to increasing populations is alsocontributing to this challenge. One possible approach for effectively handling waste can be achieved by source reduction and recycling. The problem, however, improving the collection of waste can be costly particularly during the source separation process after waste is collected. It would be desirable if there exists a mechanism that can help municipalities, local governments or waste management companies to monitor in real-time sources of violations prior to the waste collection process. In this paper, we introduce recycle.io, an Internet of Things (IoT)-enabled waste management system that is based on a server less architecture that can identify these sources of violations. Using recycle.io, it is then possible to track the violations geographically which can help local governments, for example, to improve or enforce tighter regulations for waste disposal. Our recycle.io system uses Microsoft Azure IoT Hub for device management. Throughout the paper, we demonstrate usefulness of using our approach for urban waste management in smart cities.

4.Smart Waste Management using Internet-of-Things (IoT)

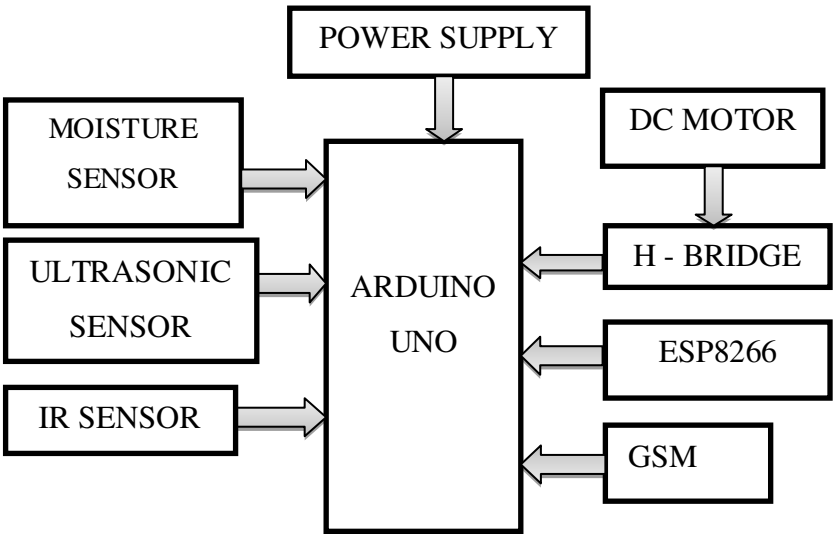
AUTHORS - Gopal Kirshna Shyam, Sunilkumar S. Manvi, Priyanka Bharti

PUBLISHED IN - 20172nd INTERNATIONAL CONFERENCE ON COMPUTING

ABSTRACT

To make the cities greener, safer, and more efficient, Internet of Things (IoT) can play an important role. Improvement in safety and quality of life can be achieved by connecting devices, vehicles and infrastructure all around in a city. Best technological solutions can be achieved in smart cities by making different stakeholders to work together. System integrators, network operators and technology providers have a role to play in working with governments to enable smart solutions. But, building such solutions on an open, standards based communications platform that can be continuously used is a challenge. We present a waste collection management solution based on providingintelligence to wastebins, using an IoT prototype with sensors. It can read, collect, and transmit huge volume of data over the Internet. Such data, when put into a spatio-temporalcontext and processed by intelligent and optimized algorithms, can beused todynamically manage waste collection mechanism. Simulations for several cases are carried out to investigate the benefits of such system over a traditional system. We try to replicate the scenario using Open Data

BLOCK DIAGRAM AND EXPLANATION



The above block diagram shows the blocks of waste management system. Power supply plays a very important role in any device, the power supply what we get is 230V AC supply. Now as per the hardware requirements each hardware consists of different voltages i.e. 5V, 3.3V and few have 12V so dividing the voltages is done using this power supply by using an IC called 7805 i.e. voltage regulator. And then comes the microcontroller, the microcontroller used here is Arduino uno, this was the suitable and which had very less complexity in coding. All the hardware components used here is interfaced with the Arduino board for the functionality of the device to work properly. Each hardware is programmed as per the flow of the project. Ultrasonic sensor is used to detect the level of the dustbin i.e. how much it is filled. Moisture sensor used to detect whether the waste put is a dry waste or the wet waste. Dc motor is used to segregate the waste i.e. dry and the wet. ESP8266 it is a Wi-Fi module which connects to the cloud and the project for the updates of the dustbin. Also a metal proximity sensor is also used to detect meal waste and gets dumped into the metal waste bin. Also a metal proximity sensor is also used to detect meal waste and gets dumped into the metal waste bin. With the GSM module a message is been sent if the dustbin is full, to the control room with the location of the dustbin so that it makes easy to the waste collector to easily pick it up in a shortest path.

HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS

- ARDUINO UNO
- POWER SUPPLY
- ESP8266
- ULTRASONIC SENSOR
- DC MOTOR
- H-BRIDGE
- MOISTURE SENSOR
- METALPROXIMITSENSOR
- IR SENSOR

SOFTWARE REQUIREMENTS

- ARDUINO IDE
- EMBEDDED C
- BLYNK

EXPERIMENTAL RESULT

In this project we use BLYNK Application to get the notification from smart bin whether bin is full or not.When the bin is full it sends the notification to authorized person.

Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

Now imagine: every time you press a Button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

Base on the sensing data, the waste collection company can efficiently obtain the waste status and automatically schedule the waste collection.

CONCLUSION

The proposed smart waste management not only detects the amount of waste but also detects the metal waste too. Since the waste in the containers is non-smooth, in this system infrared instead of ultrasonic is suggested to adopt for waste detection. Base on the sensing data, the waste collection company can efficiently obtain the waste status and automatically schedule the waste collection. In this way, the daily waste collection becomes an active service. Through the effective waste collection route, the operational costs such as the fuel and the manpower can be saved.

FUTURE SCOPE

Future work will include the path optimization technique to reduce fuel consumptions and provide better transition system in metropolitan cities. Also segregation of different types of wastes such as e-waste, plastic, metal, etc. can be included in our system. Peripheral work of project is based upon on the future for development of smart cities and overall development of our country in terms of hygiene issues.

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