Smart waste management using Internet-of-Things (IoT)

Publisher: IEEE

Published in: 2017 2nd International Conference on Computing and Communications Technologies (ICCCT).

Date of Conference: 23-24 February 2017.

AUTHORS:

Gopal Kirshna Shyam; Sunilkumar S. Manvi; Priyanka Bharti

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 [5][6][7]. 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 providing intelligence 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-temporal context and processed by intelligent and optimized algorithms, can be used to dynamically 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 from the city of Pune, India stressing on the opportunities created by this type of initiatives for several parties to innovate and contribute to the development of Smart waste management solutions.

Smart Waste Management System using IoT

Authors: Prof. S.A. Mahajan, Akshay Kokane, Apoorva Shewale, MrunayaShinde ,Shivani Ingale

With rapid increase in population, the issues related to sanitation with respect to garbage management are degrading immensely. It creates unhygienic conditions for the citizens in the nearby surrounding, leading to the spread of infectious diseases and illness. To avoid this problem, IoT based "Smart Waste Management" is the best and trending solution. In the proposed system, public dustbins will be provided with embedded device which helps in real time monitoring of level of garbage in garbage bins. The data regarding the garbage levels will be used to provide optimized route for garbage collecting vans, which will reduce cost associated with fuel. The load sensors will increase efficiency of data related to garbage level and moisture sensors will be used to provide data of waste segregation in a dust bin. The analysis of ceaseless data gathered will help municipality and government authorities to improve plans related to smart waste management with the help of various system generated reports.

i. This paper shows how the smart waste management using IoT can be implemented. This proposed system assures the collection of garbage soon when the garbage level reaches its maximum level.
ii. The system will thus provide accurate reports, increasing the efficiency of the system. The real-time monitoring of the garbage level with the help of sensors and wireless communication will reduce the total number of trips required of GCV and thus, will reduce the total expenditure associated with the garbage collection.
iii. Thus, the dustbins will be cleared as and when filled, giving way to cleaner city, better infrastructure and increased hygiene.

IoT-Based Smart Waste Bin Monitoring and Municipal Solid Waste Management System for Smart Cities

Authors: Tariq Ali, Muhammad Irfan, Abdullah Saeed Alwadie & Adam GlowaczThe devices are wirelessly connected with the central hub to transmit the information about the bins filling level with the existing location. The significant advantage of the system is to collect waste material on time in order to avoid the overflow of bins that would help in saving the environment from pollution.

Implementation of spatial smart waste management system in Malaysia

Published: 8th IGRSM International Conference and Exhibition on Remote Sensing & GIS (IGRSM 2016)

Enevo one is a comprehensive logistics solution that saves time, money and the environment. It uses wireless sensors to measure and forecast the fill-level of waste containers and generates smart collection plans using the most efficient schedules and routes. The solution provides up to 50% in direct cost savings. Receive automatically generated schedules and optimised routes which take into account an extensive set of parameters future fill level projections, truck availability, traffic information, road restrictions, container and content types the vehicle can collect etc. New schedules and routes are planned not only looking at the current situation, but considering the future outlook as well. Enevo using WSN and Ultrasound sensor for measuring the fill level of waste container.

Smart Waste Bin with Real-Time Monitoring System

Authors: Norfadzlia Mohd Yusof1, Mohd Faizal Zulkifli , Nor Yusma Amira Mohd Yusof , Azziana Afififie Azman.

The control station contains the central server which hosts the web server, database, SMS notification system in Figure 4 and a webbased waste bin real time monitoring system in Figure 5. The data sent by the smart waste bin is received by the control station and stored in the database server. Control station runs two systems which handle different jobs. The systems are SMS notification system and web-based was bin monitoring system.

IOT Enabled Smart Waste Bin with Real Time Monitoring for efficient waste management in Metropolitan Cities

Authors: Manju Mohan, Kuppan Chetty Ramanathan, Vijayram Sriram, Mohd Azeem

Waste bins are part of our lives for decades and mostly its condition are overflowing due to improper waste dumping, collection and management, which leads in foul smell and unhygienic condition, thus inherently results in environment pollution. Therefore, in this paper, design of a Waste Bin with real time monitoring is presented and a smart waste management system is proposed using the recent technical advancements of automation and Internet of Things (IoT). The capacitance sensor in the bin continuously monitors the level of the bin in real time and communicates to the central cloud where the bins are connected. Ultrasonic sensor is used to open and close the lid of the bin whenever the persons are nearby the bin. Such smart bins are connected to the cloud, where the bin status are communicated, recorded and monitored by the local bodies through and android app or a centralized server. Thus the designed smart bin and proposed waste management system have better level of smartness compared to existing ones in metropolitan cities in a centralized manner.

Smart Waste Management System for Crowded area

Authors: Rasha Elhassan, Mahmoud Ali Ahmed.

In implementing the smart cities the great challenge is how to manage waste with low cost and high performance. Waste has a negative impact in the society quality which smart city aims to improve it. Makkah and holy sites [Mona, Arafat, and Muzdalifah] are very congested areas where waste management is a big challenge. Three factors make it a big challenge, behind its natural, small area, short period of time and the increasing of the Pilgrimages' member. The process of collected wastes, separated it, and transports the containers daily and quickly to avoid any prospect of a spread of diseases is a complex process. This paper aims to study the concept of the waste management and proposed smart systems for waste management system with recycling .The proposed system will use the sensors technique insite the

container, as a lower level, to separate the waste into 4 categories [food, plastics, papers, and metal] and use actuator at a top level to inform the management system to collect the container. The proposed system will save time, money and efforts compared to the recent process of the waste management system and improve the society quality as all

Improved Smart Waste Management for Smart City

Authors: Edin Golubovic, Yasin Acikmese.

In the system advocated above, the fusion of sensors, identification technology, and internet connectivity will lead to a uniquely smart disposal trash bin. Together with the cloud, these trash bins would become irreplaceable elements in the waste management cycle where the collection, transportation, storage, and recycling of waste could be automated. The use of RFID technology in waste collection services not only increases the efficiency of waste management through automation but also increases environmental responsibility which is one of the pillars of the Smart City.