REAL TIME SOLID WASTE MONITORING AND MANAGEMENT SYSTEM: A CASE STUDY OF KANPUR CITY

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Abstract: Solid waste management is one of the most challenging issues, which are facing a serious pollution problem due to the huge quantities of solid waste. This paper presents a development work for solid waste monitoring and management system. This research developed a component monitoring system with the aim of achieving an effective waste management system. With this system we will able to monitor the collection and transportation system and manages the process. It provides real time information of solid waste from generation point to disposal site. The development consistsof new technologies which may be beneficial to encourage the researchers to work towards further improvement of the present system. These technologies are good enough to ensure the practical and perfect for solid waste collection and transportation monitoring and management for greener environment. Thedevelopment ofthe application with identification and communication technologies such as RFID and GSMuses some software packages.
Keywords: Real time; solid waste; monitor; management; RFID; GSM.

1. INTRODUCTION

Generally, the solid waste is defined from household's refusal and non-hazardous solid waste is from industrial, commercial and institutional establishments such as hospitals, market waste, yard waste and street sweepings (GAIA, 2003). In the developing countries, waste management is becoming an acute problem as urbanization and economic development increase leading to larger quantities of waste materials (Fadel, 2006). This paper presents an innovative approach to monitor and manage the solid waste collection and transportation system. Waste management is the collection, transportation, processing, recycling or disposal of waste materials, the ones produced by human activity, try to reduce their effect on human health or amenity.

The main problems of the existing solid waste collection and transportation process and management system are as follows:

• Lack of the proper system for monitoring the trucks, trash bins, rickshaws and houses.

• Lack of information related to collection time and area.

- No quick way to response the consumer's complaints.

2.   OBJECTIVES OF THE STUDY

The study was undertaken with the following objectives:

- Assessment of existing system for solid waste

- Development of a real time system

- Establishment of an efficient plan for monitoring the solid waste collection and transportation system

3.   METHODOLOGY

The present system has been divided into three modules. First module has an integrated system planning for the solid waste monitoring and management system. Second module has software module to manage the overall information. Third module includes GSM and RFID technology based monitoring system. This system has five major units: houses, rickshaw, waste bins, trucks and workstation and three important components are GSM network modules, RFID readers and tags. Fig. 1 provides a brief overview of the system.

Fig. 1 Overview of monitoring system

The structure of proposed system is developed using RFID and GSM technologies for solution of existing sanitation problem. A common RFID system consists of tags, readers, software and middleware. The low frequency RFID which is used for solid waste management consists of reader and passive frequency tags. Each tag has its own identity. These tags are mounted on the house dustbins and waste bins. The identity of each tag is broadcasted to a reader with the same frequency and the same tag protocol. To energize the tag, the antenna gets energy from the reader's signal, the antenna then sends the data from the reader. The reader is equipment that reads the data from the compatible tags. Exact location of the tags is identified through communication between tags and reader. These data can be

transferred to a server through a GSM network, by which, the movement of the vehicle can be tracked and traced. The general ability of a server connected to workstation that can receive the information about each component is the essence of this novel technology.

In the present study, Kanpur city was selected with the aim of covering all the zones. It is the biggest industrial city of Uttar Pradesh, situated at the bank of national river Ganga and fifth largest city in India. It is famous as leather capital of India. The total area covered by Kanpur Municipal Corporation (KMC) is 260 sq.Km. and total population is 27.74 Lacks (according to 2011 census).

4. RESULTS AND DISCUSSION

RFID tags could provide an individualized environmental footprint for retail products that would differ based on where the product is sold. As a product travels from the factory to the distribution center and store, it will pass a range of RFID sensors. A database could collect the transportation history of product as well as information on the transportation mode. RFID technology has been very helpful in collection and transportation of solid wastes in many areas. Waste collection rickshaws are outfitted with RFID system to identify the household through an RFID tag on the waste bin. Each residential container is identified by the rickshaw and each waste bins identified by the rickshaw and trucks both equipped with an RFID reader. Application of this technology in MSWMS improves the efficiency of the system. The proposed system generates the reports of solid waste collection and manage information related to each unit of this system. After analyzing the information, Fig. 2 displays the real time status of the area in the map view edition as:

Fig. 2 Real time status of areas

5. CONCLUSIONS

This paper has provided an automatic real time system for solid waste monitoring and management process which is crucial for efficient real time systems. We are successful to

develop all the phases which are working with high efficiency and the results obtained are meeting the accuracy.

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