Automatic Waste Management

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ABSTRACT

With an increase in population, the situation of cleanliness with relevancy garbage management is degrading hugely. The overflow of garbage publicly areas creates unhealthful condition within the surroundings. It is going to unfold many serious diseases amongst the folks living close. It conjointly degrades the valuation of the realm. To avoid this and to boost the improvement, Garbage Management System is projected during this paper. This paper presents a system to spot a garbage full condition which is able to be set by sensors (weight and level) during a timely manner and to alert the area |room} concerning constant. The role of the room is to seek out the current standing of auto and to send the SMS to the motive force alongside garbage container's position. The motive force would then attend a given location and collect the rubbish. With the assistance of the system, we are able to offer an answer to this problem in Garbage Management System.

Keywords— *Sensors, Garbage management, Control room*

1. INTRODUCTION

Management of garbage is a major challenge in urban areas throughout the world. The industrialization, urbanization and an increase in economic status and activities have increased the quantity of garbage and altered its contents. These problems are due to lack of technical expertise, financial constraints and legal provisions. Environmental regulations, technological advancements, and emphasis on resource conservation and recovery have greatly reduced the environmental impacts of municipal solid waste (MSW) management. The management of garbage involves: storage at the source of generation, management at waste generation level, primary collection, street cleansing, and temporary storage at locality level, regular and periodic transportation of this temporarily collected waste to disposing sites

In the absence of effective and efficient garbage management, the garbage generated from various human activities, both industrial and domestic, can result in health hazards and have a negative impact on the environment. Understanding the garbage generated, the availability of resources and the environmental condition of society are mandatory in developing an appropriate garbage-management system. [1]

The main purpose of the proposed system is to achieve the following:
- Improve existing garbage management system with the help of sensors and embedded system.
- Reduce unwanted overflow of trash, to facilitate timely removal of trash.
- Increase efficiency in the emptying process of containers in terms of logistical cost and customer satisfaction.

The block representation of proposed Garbage management system is shown in the following figure:
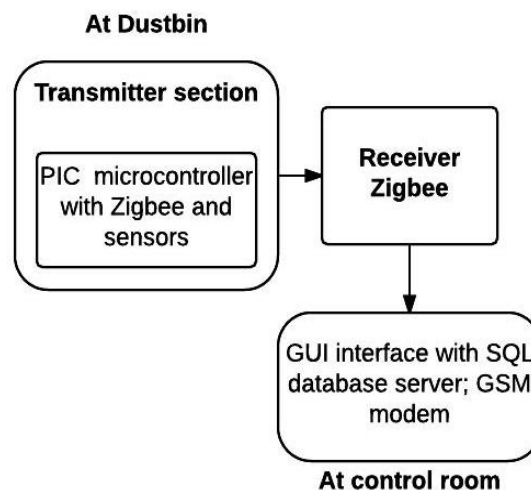

Fig. 1: Block diagram of the system

2. PRESENT GARBAGE MANAGEMENT SYSTEM
In urban areas, the rate of waste generation is about 760,000 tons on a daily basis and is anticipated to rise by about 1.8 million tons per day by the year 2025. Government of India have struggled for years to find a way in order to manage the country's ever-increasing amount of trash. According to a survey carried out in 1994, the garbage generated in Mumbai is 5800 tons per day. The MCGM (Municipal Corporation of Greater Mumbai) operates a huge fleet of 983 Municipal and Private Vehicles for the collection of waste making about 1396 trips each day. Solid Waste Management (SWM) expenditure outlay in the year 2007-08 is Rs.10479.3 Million. But still, there is an overflow of garbage in many areas. [2]
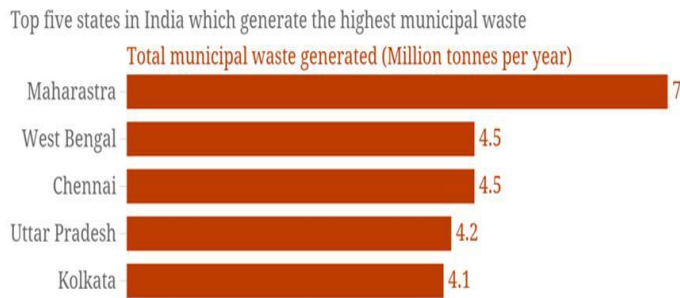
Fig. 2: Statistics of Municipal waste generated in different cities [3]

In actual practice, waste management is given the last priority and the duties are either not performed or poorly performed. Consequently, the city has to face many problems related to the environment and sanitation. The concurrent effects of a fast national growth rate of a large and dense residential area and a pressing demand for urban environmental protection create a challenging framework for garbage management.

Problems faced by Present Garbage Management System [4]:
- Collection of garbage is done on a weekly basis, no alarm system on garbage full condition resulting in the waste spill over on streets.
- The systematic and scientific storage of waste at source is not in practice.
- Extremely inefficient garbage management using the old and obsolete system, technology for storage collection processing, treatment and disposal.

3. SYSTEM METHODOLOGY

(a). Transmitter section of System
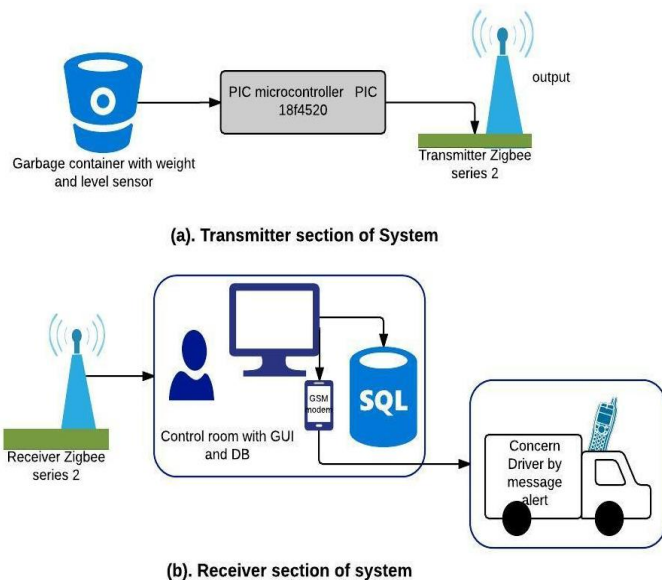
(b). Receiver section of system
Fig. 3: System appearance

In the proposed system shown in Fig. 3, the communication between garbage container and control room takes place through ZigBee module. Each container is assigned a unique identification number. The transmitter module is present at the bottom end of each container which consists of transmitter ZigBee, PIC microcontroller, weight and level sensors. The control room is furnished with receiver ZigBee which will collect data depending on the status of weight and level sensors from transmitter ZigBee module. Then updating of the database takes place at the control room as which container is full or emptied. As the garbage container gets full, a message is sent using the GSM module to the truck driver.

4. SOFTWARE USED
The problem with the text editor and the command-line compiler are that we lose a lot of productivity through manual processes. So, we used Visual Studio Professional 2010 software for making a graphical user interface. Some of the features of the software are listed below:

Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications for all platforms supported by Microsoft Windows, Windows Phone, .NET Framework.

It includes a code editor that supports syntax highlighting and code completion using IntelliSense (the code completion component) for variables, functions, methods, loops and LINQ queries.

Visual Studio includes a computer program that works each as a source-level computer program and as a machine-level computer program. Visual Studio options background compilation (also known as a progressive compilation). As the code is being written, Visual Studio compiles it within the background so as to supply feedback concerning syntax and compilation errors, that square measure flagged with a red wavy underline. [5]

The forms created in Visual Studio is shown in Fig. 3 that is employed as a graphical program at the room.
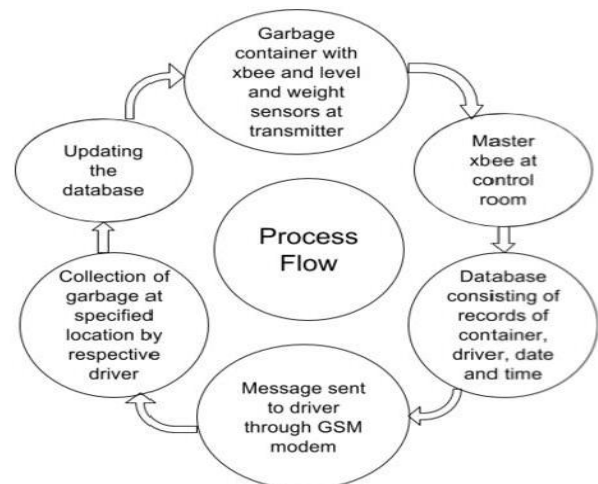
5. IMPLEMENTATION

Fig. 4: Process Flow

5.1 Transmitter section
The transmitter section of the system mainly consists of the following components:

5.1.1 Level and weight sensors: Cantilever mechanism is used for checking the condition of weight in the garbage container and IR sensors are used as level sensors as shown in figure 5.
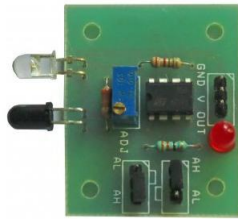

Fig. 5: IR Sensor (Level Sensor)

We are making use of IR sensor in High-level mode which means if there is no obstacle then the output will be LOW (0V) and detecting an obstacle changes the output as HIGH (5V) Level.

5.1.2 PIC microcontroller: PIC microcontroller (PIC18F4520 IC) is programmed using MPLAB software. Once the container is full which is detected by any of the sensor (weight or level) it will send the data to PIC microcontroller on pins RD0/PSP0 and RD1/PSP1 respectively.

5.1.3 Transmitter ZigBee: Zigbee is one of the global standards of protocol formulated by the significant task force under the standard IEEE 802.15 working group. Zigbee is typically used in low data rate applications which require secure networking and long battery life. Data received by PIC microcontroller will send the data to transmitter ZigBee.

Fig. 6: Implementation process

5.2 Control room
The data transmitted by transmitter ZigBee will be received by master ZigBee (wireless Communication) which is at the control room. At the control room, we have a user interface and different forms have been made using visual studio 2010 software. The database is connected using SQL server in visual studio 2010. As soon as data is received by master ZigBee it will be automatically updated in the database.

The database comprises of different records. These records will provide date and time, garbage container ID, the status of the container, Driver ID. Each garbage container has been assigned with a corresponding driver. When that particular garbage container becomes full a message will be sent automatically to the corresponding driver through GSM modem [6]. Then, the driver will go to the specified location, collect the garbage, and replace the earlier container with an empty one. As soon as that garbage container becomes empty it will be accordingly updated in the database.

6. RESULT

Fig. 7: Output results

This paper shows the implementation of an advanced garbage management system using IR sensors, microcontroller, Zigbee and GSM module. This system assures the cleaning of dustbin as soon as the garbage level reaches its maximum level or the condition for the weight is met. This system also helps us to monitor fake report and hence it can reduce corruption in the overall management system. Thus replacing manual static garbage collection system with dynamic garbage management system proposed in this paper would ultimately result in a cleaner environment and development of the country.

7. FUTURE SCOPE
We can implement the system with automatic trash compactor that manages the waste to a compact level. Once the compactor senses the garbage container is full, it will compact the trash automatically as needed to avoid overflow. The system can be made more economical and eco-friendly with the help of solar panels.

8. REFERENCES
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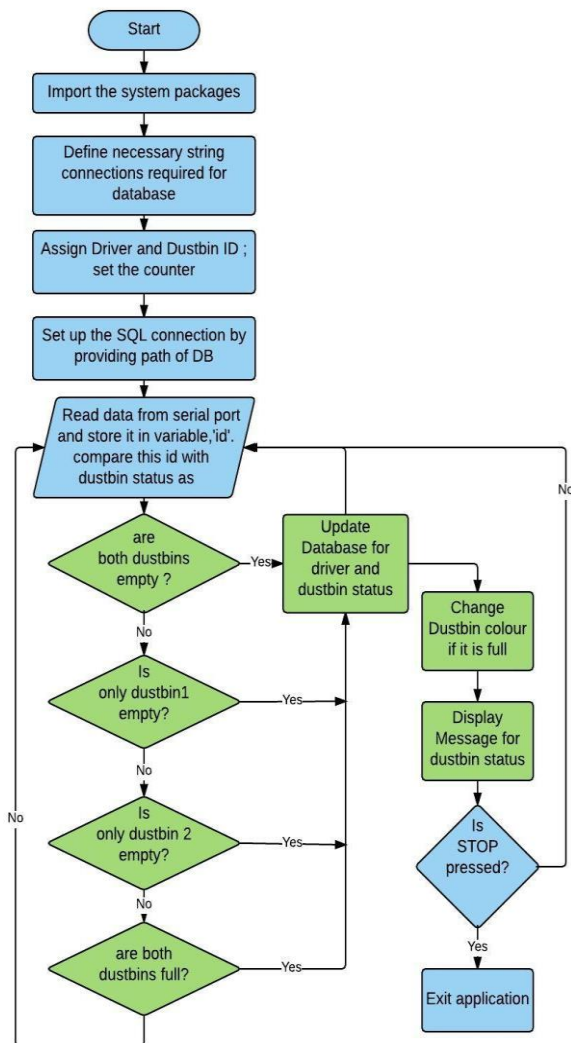[4] "Problems of Solid Waste Management in Indian Cities" http://www.ijsrp.org/research-paper-0313/ijsrp-p15129.pdf

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