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IOT BASED SMART GARBAGE MONITORING AND COLLECTION SYSTEM

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ABSTRACT

Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid all such situations we are going to implement a project called IoT Based Smart Garbage and Waste Collection bin. These dustbins are interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on the page of desktop application.. Hence the status will be updated on to the page. Major part of our project depends upon the working of the sensor that shows the status of the bin at an interval and based on the data retrieved the action is taken. Once the bin is full and to be cleaned urgently, the central system provides a route scheduling algorithm that defines the nearest route to reach the bin. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision such that the bins are cleaned in a short span of time.

INTRODUCTION

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown from user - user interaction to device – device interactions these days. The IoT concepts were proposed years back but still it's in the initial stage of commercial deployment. Home automation industry and transportation industries are seeing rapid growth with IoT. Yet not many articles have been published in this field of study. This paper aims in structuring a state of the art review on IoT. The technology, history and applications have been discussed briefly along with various statistics. Since most of the process is done through the internet we must have an active high speed internet connection. The technology can be simply explained as a connection between humans- computers-things. All the equipment's we use in our day to day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. By this way we can monitor environment changes remotely from any part of the world via internet. This systems architecture would be based on context of operations and processes in real-time scenarios. Smart collection bin works in the similar manner with the combination of sensors namely weight sensor and IR sensor that indicates its weight and different levels respectively. The IR sensors will show us the various levels of garbage in the dustbins and also the weight sensor gets activated to send its output ahead when its threshold level is crossed. This details are further given of the microcontroller (ARM LPC2148) and the controller gives the details to the transmitter module (Wi-Fi module). At the receiver section a mobile handset is needed to be connected to the Wi-Fi router so the details of

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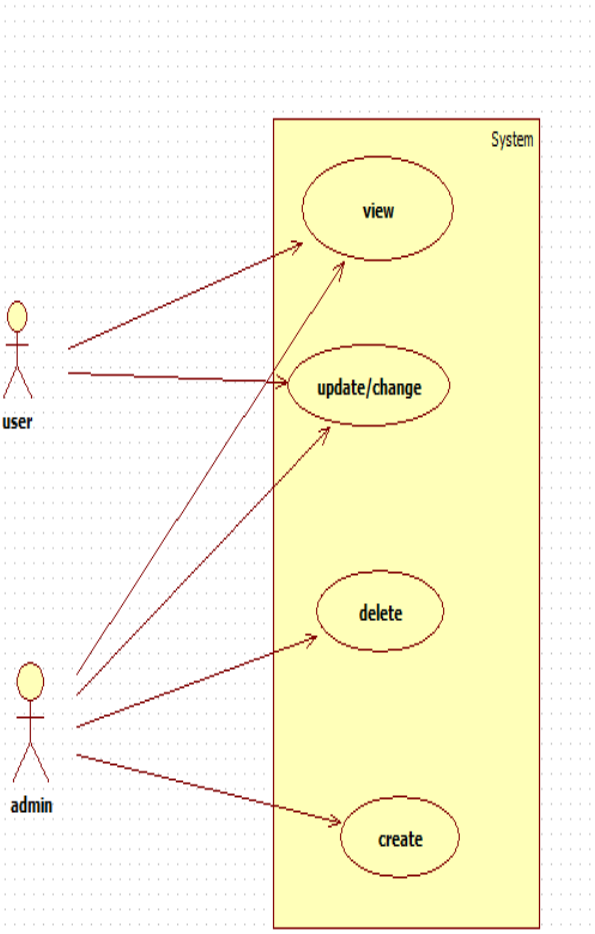
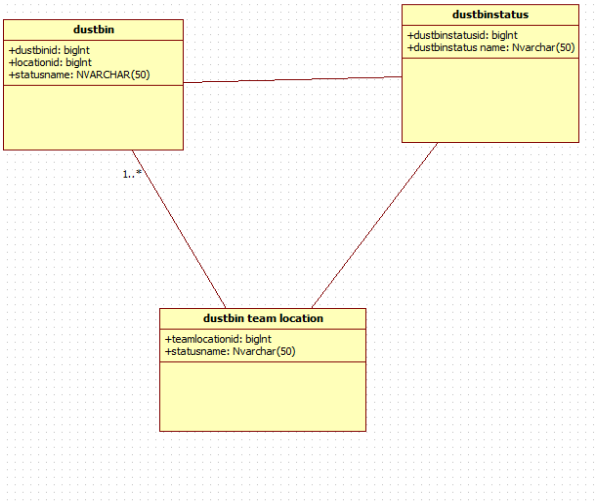
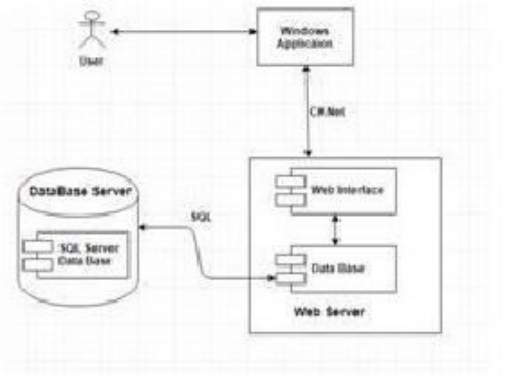
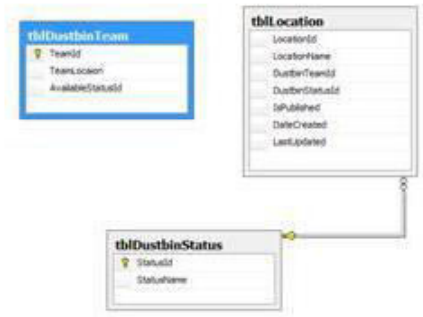
the garbage bin is displayed onto the HTML page in web browser of our mobile handset.

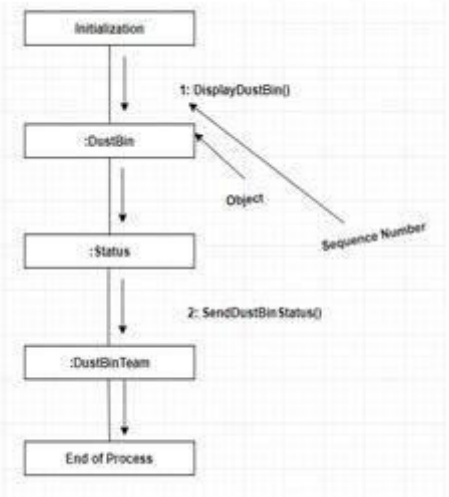
Model working











LITERATURE REVIEW

This is not an original idea, for the implementation of smart garbage bin; the idea has existed for many years, After the IoT field finding its grip in our lives. This is, however an original plan for designing a

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smart garbage bin with weight sensor, IR sensor and Wi-Fi module for transmission of data.

[1]. A State of the Art review on Internet of Things by P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V. Parthasarathy. It gave the idea of IoT subject and addition details about IoT. The proper smart environment and various applications.

[2].Internet of Things: Challenges and state-of-the- art solutions in Internet-scale Sensor Information Management and Mobile analytics by Arkady Zaslavsky, Dimitrios Georgakopoulos. This paper gave us the details about mobile analysis and sensor information management that will help in data segregation of various dustbins.

[3]Top-k Query based dynamic scheduling for IoT- enabled small city waste collection by Theodoros Anagnostopoulos, Arkady Zaslavsky, Alexey Medvedev, Sergei Khoruzhnicov. It gave us the concept of dynamic scheduling required for the cleaning of dustbin and the Top-k query led us to priority based cleaning of dustbins

[4]City Garbage collection indicator using RF(Zigbee) and GSM technology. This paper gave the details for the module required for the transmission of the data to the receiver side and also the main channel follow of the project. Initially we used GSM technology for our project but later on decided to us Wi-Fi module for the ease of data transmission.

[5]Smart Garbage Management System by Vikrant Bhor, Pankaj Morajkar, Maheshwar Gurav, Dishant Pandya. It provided us with additional details and designs needed for flow and management of garbage while collection

[6]IoT-Based Smart Garbage System for efficient food waste management by Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, Sehyun Park. This paper gave the overview working of the IoT based smart garbage bin and the food management.

Proposed System

Considering the need of modern technology the smart garbage bin can expensive but considering the amount of dustbin needed in India, expensive garbage bin would not be a prior experiment that is why we have decide to use based sensors to reduce its cost and also make it efficient in applications.

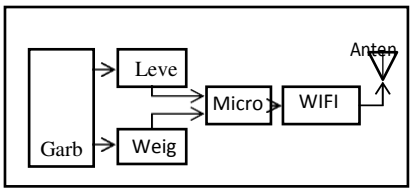
System Architecture

Microcontroller ARM (LPC2148)

The LPC2148 microcontrollers are based on a 32/16 bit ARM7TDMI-S™ CPU. With real-time emulation and embedded trace support, that combines the microcontroller With 32 kB, 64 kB and 512 kB of embedded high speed Flash memory.

IR Sensor (TSOP 1738):

This IR Sensor gives indicates the level of garbage filled in dustbin and IR Sensor are planted at three different levels on the surface of dustbin to show us the actual level



of garbage present in it.

Fig. 1 Transmitter

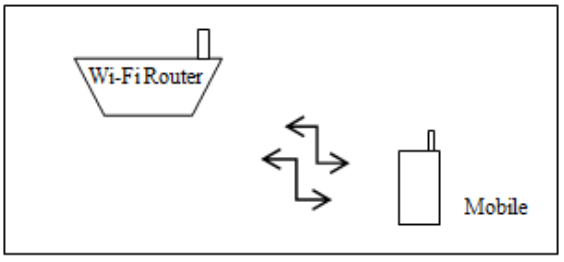


Fig. 2 Receiver

Weight Sensor:

The weight sensor is used for detection of amount of garbage in dustbin. It

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works on the principle of piezo-resistivity. It is RoHS complaint.

Wi-Fi Module:

b/g/n protocol, Wi-Fi Direct (P2P), soft-AP, Integrated TCP/IP protocol stack. Wi-Fi Module helps us to send the details of the dustbin at the receiver side.

Test cases and Results:

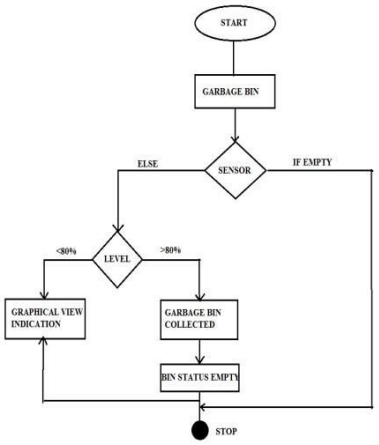
1) Dustbin when empty - 0% (when 1st level IR Sensor gives output)
2) Dustbin half – 50% (when 1st level and 2nd level IR Sensor gives output)
3) Dustbin full – 90% (when all three level sensors gives output)
4) Dustbin is heavy- when threshold weight of dustbin is crossed (weight sensor gives output)

CONCLUSION:

This project work is the implementation of smart garbage management system using IR sensor, microcontroller and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the

overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the smart garbage management system makes the garbage collection more efficient. Such systems are vulnerable to plundering of components in the system in different ways which needs to be worked on.

Flow chart:



Future enhancement:

Smart dustbin helps us to reduce the pollution. Many times garbage dustbin is overflow and many animals like dog or rat enters inside or near the dustbin. This creates a bad scene. Also some birds are also trying to take out garbage from dustbin. This project can avoid such situations. And the message can be sent directly to the cleaning vehicle instead of the contractor's office

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