WASTE MANAGEMENT IN IOT ENABLED SMART CITIES

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I.   ABSTRACT

In the present day scenario, many times we see that the garbage bins or Dust bins are placed at public places in the cities are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness; to avoid such a situation we are planning to design "IOT Based Waste Management for Smart Cities".

In this proposed System there are multiple dustbins located throughout the city or the Campus, these dustbins are provided with IR sensors which helps in tracking the level of the garbage bins and an unique ID will be provided for every dustbins in the city so that it is easy to identify which garbage bins is full. When the level reaches the extreme level, the device will send the information of the level along with the specified ID provided. The status of the garbage in the dustbins is displayed on the web page. These details can be accessed by the concern authorities from their place with the help of Internet and an immediate action can be made to clean the dustbins.

Keywords: ARM 7 TDMI-S, GPRS, RFID, GPS IR sensors, IOT etc.

II.   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 Internet of Things (IOT). Internet has become the crucial part of each individual. Most of the people are reliable on internet. The IOT concepts were proposed years back but still it's in the initial stage of commercial and industrial deployment. This project IOT solid waste management system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses IR sensors placed on the top of bins

to sense the garbage level and continuously compare it with the garbage bins depth. The system makes use of ARM microcontroller, RFID Module, LCD screen, GPRS module for sending data.
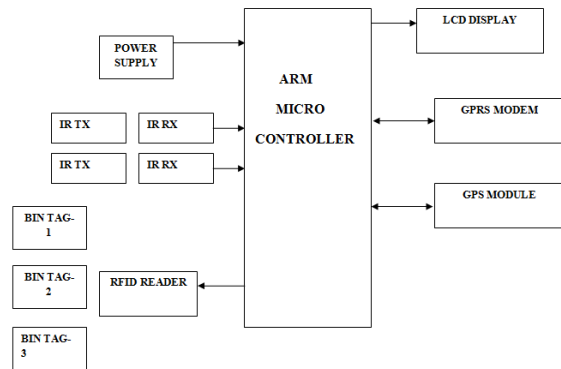
III. BLOCK DIAGRAM

Fig (3.1) System block diagram

SYSTEM OVERVIEW

The system we are using IR sensors for monitoring garbage level in the dustbin, if the dustbin is full then microcontroller will send the update on IOT. Also we are using RFID module to check whether garbage is collected or not. Here RFID tags are place in the garbage dustbin and RFID reader in placed in vehicle, so whenever vehicle will come to collect garbage at that time RFID read the garbage dustbin using RFID tag present in particular area and it will send information about the garbage collection as well as its location to the authority. To sending the information we are using IOT technology so that we can monitor collection of dustbins from anywhere.

Microcontroller:

Fig (4.1) Microcontroller

The μC is the final decision making body on the system. The logic is developed and then the program is burned inside the microcontroller and the other peripherals are accessed via microcontroller only. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high-performance and very low power consumption. In this system controller is the most important part.

GPRS Modem:

The General Packet Radio Service (GPRS) modem will communicate with microcontroller using serial communication. The modem is interfaced to microcontroller using MAX 232, a serial driver. The Global Packet Radio Service is a TDMA based digital wireless network technology that is used for connecting directly to internet. GPRS module will help us to post data in the web page directly.
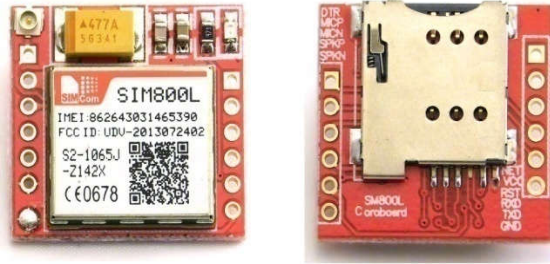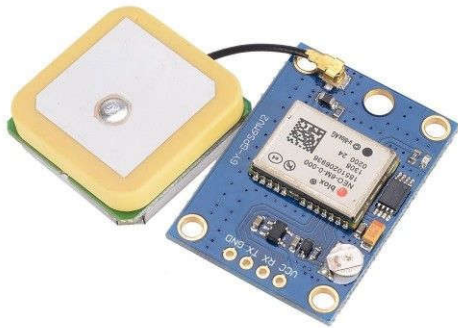
Fig (4.2) GPRS modem

GPS Module:

Fig (4.3) GPS Module

A Global Positioning System (GPS) is used to track location so it will directly communicate with satellite, so that satellite track current location and it will gives longitude and latitude as co-ordinates, by using these co-ordinates we can track current location. In this project, GPS modem get the signals from the satellites and those are given to the microcontroller. The signals may be in the form of the coordinates; these are represented in form of the latitudes, longitudes and altitudes.

RFID Module:

Fig (4.4) RFID Module

Radio Frequency Identification (RFID) is a generic term for non-contacting technologies that use radio waves to automatically identify people or objects. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in combination with an "RFID reader". Radio Frequency Identification (RFID) is the latest technology that is being adopted to track and trace materials, including books.

IR Sensor:

The Infra Red (IR) LED is used as the IR transmitter, which is connected by using the resistor logic as shown in the schematic. The IR receiver is connected by using the transistor logic whose collector is connected to the base of the transistor. The base of the transistor is connected to the photo diode through the resistor.

IV.　　RESULTS

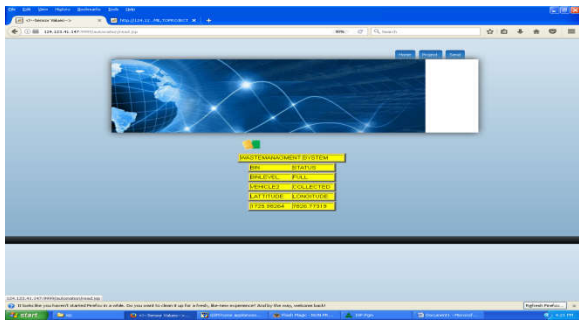Fig (4.1): Dustbin level is full vehicle1 is collected to latitude and longitude.

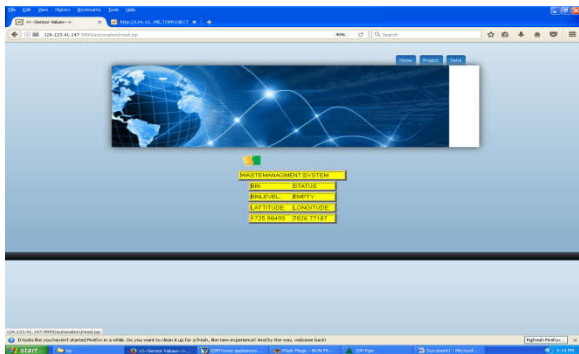Fig (4.2): Dustbin level is full vehicle2 is collected to latitude and longitude.

Fig (4.3): Dustbin level is empty only latitude and longitude is given.

Fig (4.4): Dustbin level is full only latitude and longitude is given.

V.　　CONCLUSION AND FUTURE SCOPE

Using this system we can easily know the status of the dustbin whether the dustbin is collected or not. In many cities, the garbage collection vehicles visit the area everyday but sometimes garbage collection peoples won't collect. Our System will inform the status of each and every dust dustbin in real time so that the concerned authority can monitor whether collection is done or not. Environmental pollution is causing a lot of distress not only to humans but also animals, driving many animal species to endangerment and even extinction. We have implemented the real time waste management system, Due to the use of the digital dustbin our city will keep clean. Using this project we can easily trace dustbin vehicle as well as the location of the dustbin.

The system required internet connection for monitor dust bin and in this system the main drawback is that the maintaining of IOT things

of dustbin and giving longer power supply to run IOT device, so that we get no interrupt services.

The scope for the future work is this system can be implemented with time stamp in which real-time clock shown to the concern person at what time dust bin is full and at what time the waste is collected from the dustbins.

VI.   REFERENCES

[1] M. Fazio, M. Paone, A. Puliafito, and M. Villari. "Heterogeneous Sensors Become Homogenous Things in Smart Cities", IEEE 6th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS), 2012, pp. 775-780.

[2] C. Balakrishna, "Enabling Technologies for Smart City Services and Applications", IEEE 6th International Conference on Next Generation Mobile Applications, Services and Technologies (NGMAST), 2012, pp. 223-227.

[3] S. Suakanto, S. H. Supangkat, Suhardi, and R. Sarasgih, "Smart City Dashboard for Integrating Various Data of Sensor Networks", IEEE International Conference on ICT for Smart Society (ICISS), 2013, pp. 1-5.

[4] R. Carli, M. Dotoli, R. Pelegrino, and L. Ranieri, "Measuring and Managing the Smartness of Cities: A Framework for Classifying Performance Indicators", IEEE International Conference on Systems, Man, and Cybernetics (SMC), 2013, pp. 1288-1293.

[5] C. Tao, and L. Xiang, "Municipal Solid Waste Recycle Management Information Platform Based on Internet of Things Technology", IEEE International Conference on Multimedia Information Networking and Security (MINES), 2010, pp. 729-732.

[6] D. Anghinolfi, M. Paolucci, M. Robba, and A. C. Taramasso, "A dynamic optimization model for solid waste recycling", Waste Management, vol. 33 (2), 2013, pp. 287-296.

[7] M. A. Hannan, M. Arebey, R. A. Begum, and H. Basri, "Radio Frequency Identification (RFID) and communication technologies for solid waste bin truck monitoring system", Waste Management, vol. 31 (12), 2011, pp. 2406-2413.

[8] Lingling H., Haifeng L., Xu X., Jian L., "An Intelligent Vehicle Monitoring System, Based on Internet of Things", IEEE 7th International Conference on Computational Intelligence and Securi-ty (CIS), pp. 231-233, Hainan, December, 2011.

[9]. Nuortio T., Kytojoki J., Niska H., Braysy O., "Improved route planning and scheduling of waste collection and transport", Journal of Expert Systems with Applications, vol. 30 (2), pp. 223-232, February, 2006.