



Garbage Monitoring and Management using Sensors, RF- ID and GSM

Nimmi Pandey¹, Shubhashree Bal¹, Gajal Bharti¹, Amit Sharma¹

¹UG, Students, Government Engineering Collage, Bharuch, Gujarat Technological University, Ahmadabad, INDIA

ABSTRACT:

After a dedicated survey and keen observation, it was found that the developing eastern countries are lagging behind in context of cleanliness and hygiene as compared to the developed countries. Deadly Swine Flu is an ongoing example. The death rate is much higher due to unhygienic conditions. In order to cope up with the situation, Shree Narendra Modi, PM of India has presented a unique example of a way to achieve cleanliness by launching a campaign popularly known as SWACCHHA BHARAT ABHIYAN (Clean India Mission) in which every individual irrespective of post and authority, has to maintain clean surroundings. But it is almost impossible to do so in the contemporary busy world. And here comes the miracle of science and technology.

Keywords: Garbage management, sensors, messages, control unit, communication, trash bin, cleanliness

I. INTRODUCTION

While doing the research work and interviewing the common people and the government authorities associated with the garbage management (Municipal corporations) of various places, few very common things turned up: A nation always possesses rules, regulations and technologies but the matter of grave concern is that the linking factor is missing, faithful following of duties by the officers and low grade workers is nowhere to be seen. Here arises a urgent need of developing a system which can handle the situation intelligently before it's too late^[3,4].

The invention named "Garbage Monitoring and Management using Sensors, RF- ID and GSM" is very much related to society welfare and health. It is a scientific and faithful approach to achieve a garbage free, disease-free and healthy locality by providing the local government with a system which uses number of basic technologies at reasonable price.

The project can monitor the level of garbage and can send information regarding it to the control room. In this entire system, metal sensor, IR sensor, RF ID and TAG^[2] and ultrasonic sensor are going to play a crucial role. The sensors include a pair of diodes: IR diode which emits Infra red radiations which fall on the garbage and get reflected back to the circuit and are detected by photo diode. When number of such pairs of diodes are fixed on the walls of the dustbin, the various levels of garbage in the dustbin are detected. The Ultrasonic sensors work on the principle of emission and detection of ultrasonic sound waves (greater than 20KHz) and thus detect the level of garbage. The RF ID TAG and READER work on the principle of electromagnetic induction and used for object detection purpose^[1]. The RF module is a communicating device which communicates between two locations on matching the frequencies. GSM is a Global System for Mobile which can send and emit the messages to and from various parts of the world. So by completing this project and by making use of it, it is possible to solve the problem of improper collection of garbage by municipal staffs and it will work in favor of good health of society.

II. WORK PLAN AND SELECTION OF TOOLS.

In order to achieve the task, the project is divided into two parts:

A. Software:

- **BASCOM:** Language for programming ATMEGA 16(AVR) Controller and interfacing other components with the controller.

B. Hardware:

- **SIM 300 GSM Modules:** To send notification via SMS to the particular van unit.
- **IR Photo Sensor:** To measure the level of the filled garbage in the van.
- **Light Emitting Diode (LED):** To indicate location of the vehicle on the map.
- **Liquid Crystal Display (LCD):** To display notification about the vehicle.
- **RF Module:** Communicates between trash bin unit and the van unit.
- **Metal sensor:** Senses the presence of metals in the trash bin.
- **RF-ID and READER:** To identify the objects based on a particular pre-assigned number^[1]



Figure 1. IR and Photo diodes [7]



Figure 2. GSM Modem[6]

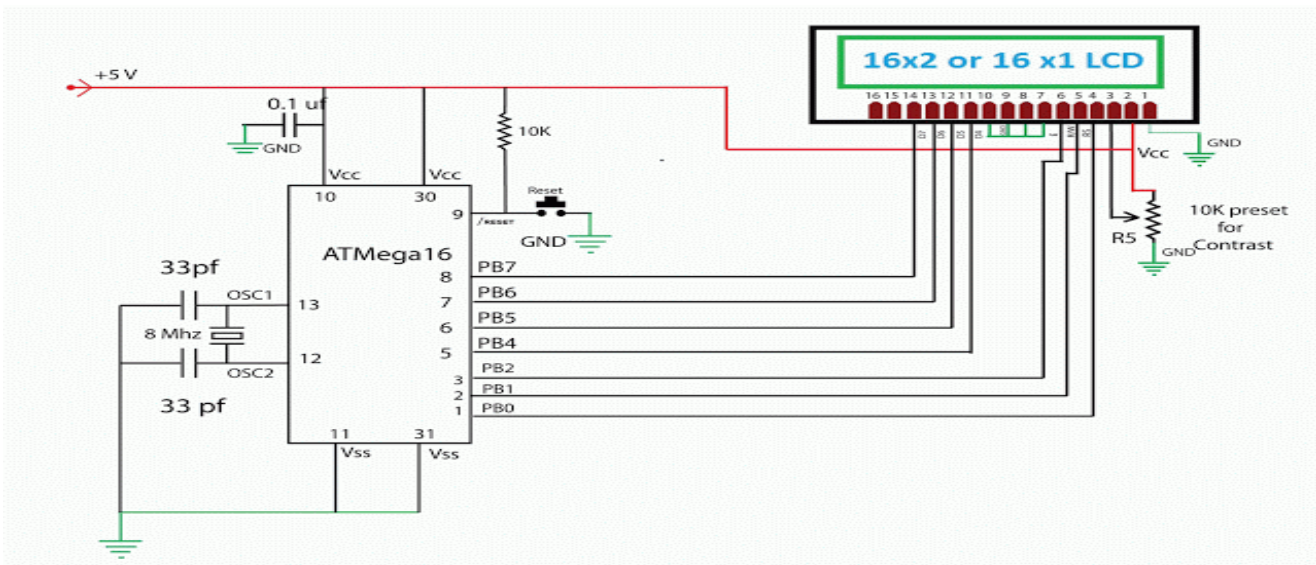


Figure 3. Interfacing Microcontroller with LCD [8]

Entire project works at three levels as stated earlier. The first being the TRASH BIN UNIT is employed with different types of sensors. The first one is IR and PHOTO sensors to monitor the level of garbage. These are basically the light sensitive diodes which respond toward the intensity of light and generate the corresponding voltage output. Next is ULTRASONIC sensor which works on the principle of reflection of radiation. It is to improve the accuracy of the level detection. Third type of sensor is metal sensors which are meant to inform about the presence of metals so that the separation of harmful and heavy metals can be done on the initial stage of garbage management itself rather than to extend it to the later stages and thus saving a lot of amount for the government. The installed LED and LCD serve the purpose of indication of level of garbage. And last but not the least the RF module which is a communicating device between TRASH BIN UNIT and the CONTROL ROOM UNIT. Hence, the TRASH BIN UNIT, by using different sensors sense the physical condition of the bin, converts the physical signals to electrical signal and finally into digital signals for the microprocessor (ATMEGA 16) to process upon. Along with the display of the physical conditions on LCD and LED, RF module sends the information to the control room. At the head quarter of the garbage collection department a CONTROL UNIT is installed which is equipped with RF module (2.4GHz) 1124. The messages sent by the trash bin unit is received when the frequency of the trash bin and the control room is matched.

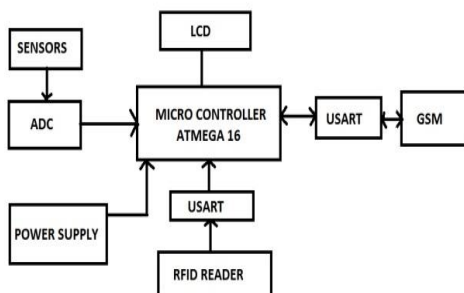


Figure 4. Block diagram of Trash bin unit

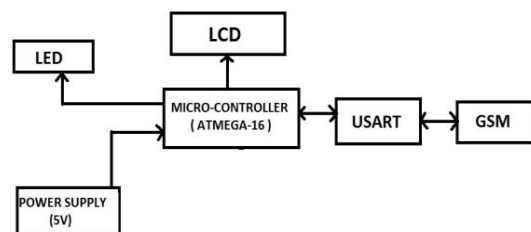


Figure 5. Block diagram of control unit

III. DATA BASE MANAGEMENT SYSTEM

Each and every activities of the all the units: Trash bin, Control room and the Van Unit can be recorded and stored in a database management system for the proper management of the system .This ensures all the working staffs are under supervision. This can avoid ignorance and unfaithful behavior of the staffs [3].

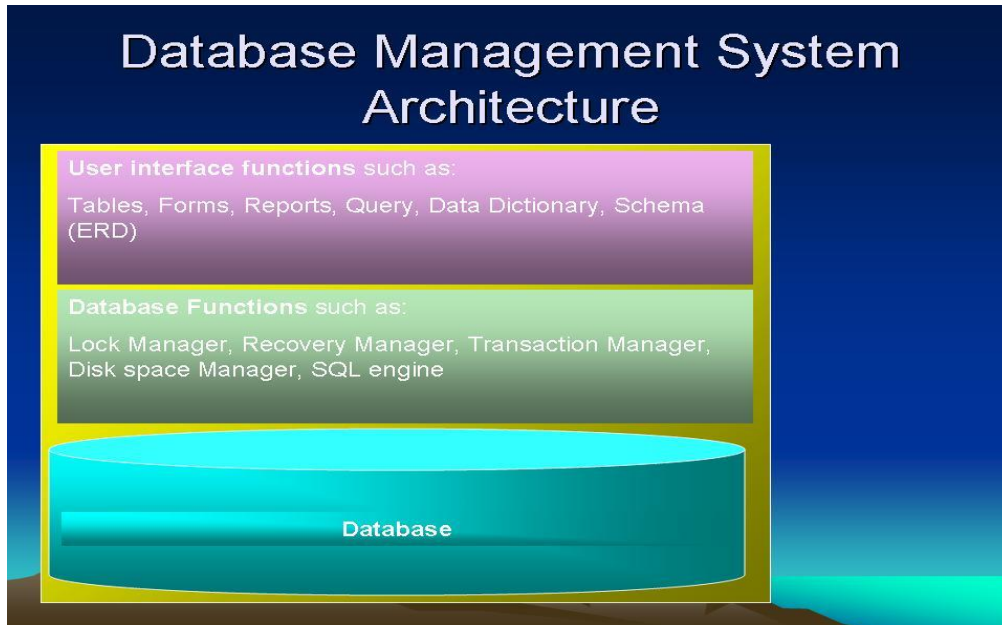


Figure 6. Database Management System^[9]

ACKNOWLEDGMENT

Some great personalities are really dedicated to help out the seeking students and they extend their helping hand in any way they can do. Municipal corporation authorities of various places provided us valuable information and real time experiences of garbage management. They even provided us with number of opportunities to attend National level seminars under Ministry of Urban Development which helped us to scale our project to the National level and motivated us to do something for the society. They even shared their experiences, loop faults and requirements with us and promised for future assistance and help. Moreover our internal and external guides were the source of inspirations and their time to time encouragement led us to the place where we are.

CONCLUSION

With the help of this system we will be able to keep a track on almost all the government service vehicles to ensure that they carry out their services faithfully. These will help in proper functioning of the service sectors of the government that will contribute for a healthy environment to the citizens of the nation.

References

- [1] Kim, Donghyun, "A designated query protocol for server less mobile RFID systems with reader and tag privacy", Tsinghua Science and Technology, Vol.17, No.5, pp.521-536, Oct.2012R. Weinstein, "RFID: A technical overview and its application to the enterprise", IT Professional, Vol. 7, pp. 27 -33, May-June 2005.
- [2] Lee, H., Kim, J., "Privacy threats and issues in mobile RFID", Proceedings of the First IEEE International Conference on Availability, Reliability and Security, Vienna, Austria, April 20- 22, 2006.
- [3] X. Zhang and M. Tentzeris, "Applications of Fast- Moving RFID Tags in High-speed Railway Systems," International Journal of Engineering Business Management, 3(1), pp. 27-31, 2011.
- [4] Municipal Authority of Ankleshwar
- [5] Municipal authority of Bharuch
- [6] <http://www.emsysedukits.com/sim300-gsm-gprs-modem-p-189.html>
- [7] <http://www.stab-iitb.org/resources/images/thumb/a/a4/SLF1.jpg/250px-SLF1.jpg>
- [8] <http://www.circuitvalley.com/2012/09/atmel-avr-lcd-16x2-interfacing-hd44780.html>
- [9] https://ipt12.wikispaces.com/file/view/Database_Management_System.jpg