



IOT BASED WASTE MANAGEMENT FOR SMART CITIES

Yogeswari G

Information Technology, Rajalakshmi Engineering College, Chennai, India
yogeswari2212@gmail.com

Venubavithra P

Information Technology, Rajalakshmi Engineering College, Chennai, India
bavithrajun96@gmail.com

Mrs. Poornimathi K

Information Technology, Rajalakshmi Engineering College, Chennai, India
poornimathi@rajalakshmi.edu.in

Abstract— In the present world, The dustbins are placed on the roadside and dustbins are overflowing. This overflows of dustbin is due to the increase in the population and the wastage from hotels, industries etc. These kinds of dustbins will make our environment ugly and cause much disease to the public. To avoid this situation the proposed system is introduced for waste management and the multiple dustbins from the different areas throughout the cities are connected using IOT technology. This is implemented to place in the smart cities. In this dustbin is provided with low cost embedded devices and it will sense the level of dustbin, and then it is sent to the municipality officer. Then it will send the information to the truck driver to collect the waste. Ultrasonic sensor will sense the level of dust in dustbin.

Keywords- 8051 microcontroller, RF module, IR Sensors, RF Transmitters, Intel Galileo Gen2, RF Receiver.

I. INTRODUCTION

Things (Embedded devices) that are connected to Internet and sometimes these devices can be controlled from the internet is commonly called as Internet of Things. In our system, the Smart dust bins are connected to the internet to get the real time information of the smart dustbins. In the recent years, there was a rapid growth in population which leads to more waste disposal. So a proper waste management system is necessary to avoid spreading some deadly diseases. Manage the smart bins by monitoring the status of it and accordingly taking the decision. There are multiple dustbins are located throughout the city or the Campus (Educational Institutions, Companies, Hospitalet). These dustbins are interfaced with micro controller based system with IR Sensors and RF modules. Where the IR sensor detects the level of the dust in dustbin and sends the signals to micro controller the same signal are encoded and send through RF Transmitter and it is received and decoded by RF receiver at the Central System (Intel Galileo) and an Internet connection is enabled through a LAN cable from the modem. The data has been received, analysed and processed in the cloud, which displays the status of the Garbage in the dustbin on the GUI on the web browser.

Here we are classifying waste into 3 categories:

- Biodegradable waste
- Recyclable waste
- Plastic waste

Whenever the garbage is full information can be send to the concerned authority to clean the bin. Here we use a low maintenance recent communication development like GSM. GSM is used in the project as a communication back bone for the whole system for various reasons like low cost, easy to implement and less signal deterioration. Hence these networks can work even with very low power. Suppose this project is being implemented in a city and the different garbage bins placed at different locations within a city send messages indicating the garbage levels in the respective bins to a local corporation office and at the same time to the head office as well.

II. IMPLEMENTATION

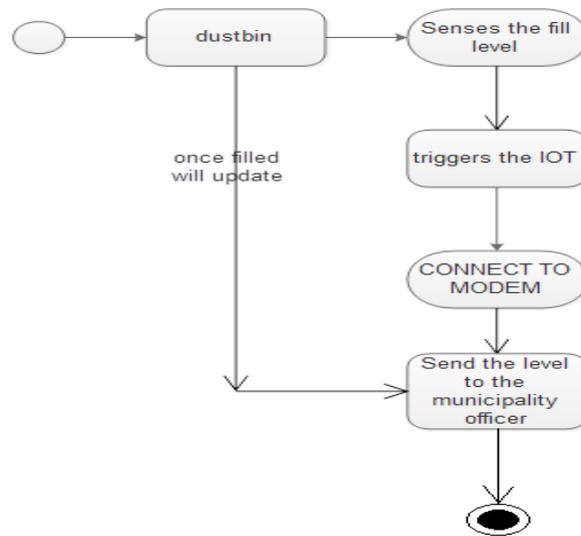
In this the normal dustbin is made as a smart dustbin. In this module the WiFi is connected to the dustbin. The wifi module is attached to the dustbin to connect the dustbin located at different places. Internet is used to transfer the information about the dustbin level to the municipality officer through web browser. The dustbin is divided into three levels based on their height. Then connect the IR Sensor to the dustbin. The IR is connected to the dustbin ,it consist of resistor one is used for sensing, other is used for processing and transfer of the level to the RF module for transmitting. The IR Sensor is used to detect the level of waste in the dustbin. An Infrared (IR) sensor is used to detect level in the dustbin. After detecting the level of dustbin the LED present in the IR Sensor will glow. This indicates that the dustbin is full. In this way the dustbin can be monitored and implemented as smart dustbin.

III. WORKFLOW

The project module is divided into two parts Transmitter section and receiver section. Here in the transmitter section 8051 microcontroller is used, RF Transmitter and sensors these are attached to the dustbin and the sensors are used to detect the level in the dustbin whether the dustbin is full or empty. The sensor senses the content of the dustbin and sends the signals or the data to the microcontroller. The microcontroller reads the data from the sensor and send to the web browser as well as the truck driver will receive the notification message from the filled dustbin.

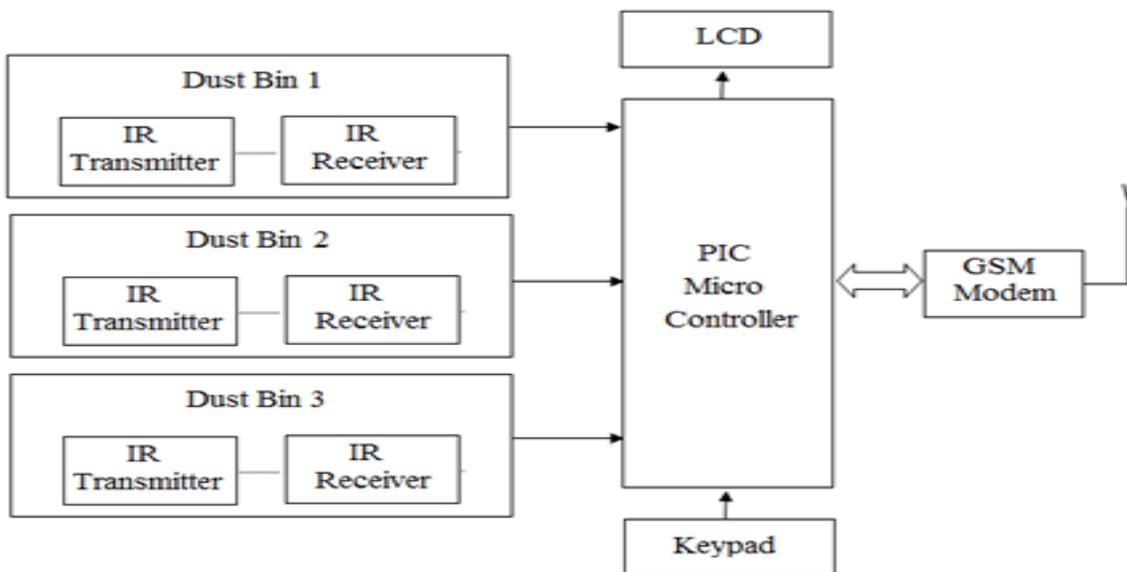
Workflow Diagram

The general workflow as follows:



IV. ARCHITECTURE

4.1 Diagram



4.2 Report Generation

This is the most important aspect in this project where the reports can be generated based on internet using IoT. The following information's are considered in the report:

- Dustbin
- Wireless adaptor
- Microcontroller
- Ultrasonic sensor
- Transformer

V. Conclusion

This IoT based waste management is very useful for smart cities in different aspects. In cities there are different dustbins located in the different area's and dustbins get over flown many times and the concerned people do not get information about this. Our system is designed to solve this issue and will provide complete details of the dustbin located in the different areas throughout the city. The concerned authority can access the information from anywhere and anytime to get the details. Accordingly they can take the decision on this immediately.

VI. Acknowledgements

We are very thankful to our project supervisor **Mrs.K.Poornimathi** for her invaluable guidance, ideas, advice and encouragement for the successful completion of this project and constantly guiding us and motivating us throughout the course of the project. We express our gratitude to our parents and friends for extending their full support to us.

References

- [1]. 1. M. Al-Maaded, N. K. Madi, Ramazan Kahraman, A. Hodzic, N. G. Ozerkan Overview of Solid Waste Management and Plastic Recycling in Qatar, Springer Journal of Polymers and the Environment, March 2012, Volume 20, Issue 1, pp 186-194
- [2]. 2. Islam, M.S. Arebey, M. ; Hannan, M.A. ; Basri, H.,"Overview for solid waste bin monitoring and collection system" Innovation Management and Technology Research(ICIMTR), 2012 International Conference, Malacca, 258 – 262
- [3]. 3.Raghumani Singh, C. Dey, M. Solid waste management of Thoubal Municipality, Manipur- a case study Green Technology and Environmental Conservation (GTEC 2011), 2011 International Conference Chennai 21 – 24.
- [4]. 4. R. Siva Kumar ,E-Tracking Sysetem For Municipal Solid Waste Management Using RfID
- [5]. Technology, International Journal of Advanced research in Electronics, Communication & Instrumentation Engineering and Development Volume: 1 Issue: 2 08-Feb-2014,ISSN_NO: 2347 – 7210.
- [6]. Latifah, A., Mohd, A. A., & NurIlyana, M. (2009) . Municipal solid waste management in Malaysia: Practices and challenges. Waste Management, 29,2902-2906.
- [7]. 6.Hand Book Os Solid Waste Management – By Mithal Publications
- [8]Central Pollution Control Board, Delhi,"Municipal Solid Waste Management" 2000.
- [9] Maher, A., Hannan, M. A., & Hassan. A. (2009), "Solid Waste Monitoring and Management using RFID, GIS and GSM" Proceedings of 2009 Student Conference on Research and development (SCORed2009), 16-18 Nov. 2009, UPM Serdang, Malaysia.
- [10] Hannan, M., A., Arebey, M., Basri, H. (2010). "Intelligent Solid Waste Bin monitoring and Management System", Australian Journal of Basic and Applied Sciences, 4(10): 5314-5319, 2010, ISSN 1991-8178
- [11] Visvanathan, C., Ulrich, G., "Domestic Solid Waste Management in South Asian Countries – A Comparative Analysis", 3 R South Asia Expert Workshop, 30 August - 1 September, 2006 Kathmandu, Nepal
- [12] Rahman, H., Al-Muyeed, A. (2010). "Solid and Hazardous Waste Management", ITN-BUET, Center for Water Supply and Waste Management.
- [13] Flora, A. (2009) "Towards a clean environment: A proposal on sustainable and integrated solid waste management system for universiti Kebangsaan Malaysia". Report from Alam Flora.
- [14] Daniel V., Puglia P. A., and M. Puglia, "RFID-A Guide to Radio Frequency Identification", Technology Research Corporation, 2007
- [15] Proceedings of 2009 Student Conference on Research and development (SCORed2009), 16-18 Nov. 2009, UPM Serdang, Malaysia