

## Design And Implementation of Garbage Bin Management with Location and Sms Alerts Using Gsm And GPS

Umamaheshwari Pujari, Mamatha Aluri

Department of Electrical and Electronics Engineering

Sree Dattha Group of Institutions, Hyderabad, Telangana, India.

### Abstract

Garbage bins remain uncollected for long periods of time putting the lives of marketeers at risk in an event that there is Cholera outbreak especially during the rainy season. This happens because the Kitwe City Council does not have a system that monitors the garbage levels and notifies the Central Office. To avoid such a situation, this project proposes the design and implementation of a GPS and GSM Based Garbage and Waste Collection Bin Overflow Management System using GPS and GSM technology in providing real time information on the status of the garbage bins, i.e., when they are full so that appropriate action can be carried out. The system notifies the person (Truck Driver) in charge of garbage collection by sending a short message (SMS) and telling them where the full bin is exactly located. Again, after some time the system notifies the Central Office that the message has been sent to the Driver. This development will ultimately save a lot of time especially when the council does not have to go and check the level of garbage in the bin. Besides, it will timely prevent the overflow of garbage since garbage will be collected on time. That is, the council will collect garbage only when it is time to do so rather than routine where even half-full bins are collected.

**Keywords:** Garbage bin, GPS, GSM, SMS alerts.

### 1. Introduction

Environmental problems are raised by modern cities for waste collection and disposal [1]. Therefore, smart waste management systems became essential for cities that aim to reduce cost and manage resources and time [2]. Currently, the trend is shifting towards smart devices and internet of things (IoT) solutions to overcome common problems such as waste management issues [3]. Optimizing the process of trash collection is the main purpose of the smart solutions provided by industry. However, the cost of applying such solutions is still relatively high [4]. The purpose of this work is to present a cost-effective smart trash bin for localized and small- scale cases, such as small parks, university campus and hospitals. The literature of this paper will present a literature review of past related papers and commercial solutions. Then methodology and methods section will explain the work of the system and all the hardware and software used in this work, besides the design of the smart trash bin. Finally, the results of tests will be discussed followed by conclusions and future work.

### 2. Literature Survey

Mohd et al. [5] supposed to generate and send the warning messages to the municipality via SMS when the waste bin is full or almost full, so the garbage can be collected immediately. Furthermore, it is expected to contribute to improving the efficiency of the solid waste disposal management. Samann et al. [6] implemented successfully with an acceptable overall cost for the intended application. The system performance was found satisfactory according to the obtained test results. Pardini et al. [7] proposed a

solution (hardware, software, and communications) that aimed to optimize waste management and included a citizen in the process. The system followed by an IoT-based approach where the discarded waste from the smart bin is continuously monitored by sensors that informed the filling level of each compartment, in real-time.

Vamsi et al. [8] proposed an important application for daily usage and is named as Smart Garbage Monitoring and Disposal Support System (SGMDSS). SGMDSS monitored the garbage bins located at different locations and notified about the level of garbage accumulated in the garbage bins through an android mobile application to the cleaning personnel for disposal and provided the shortest path to the garbage bin location that is almost filled. Bhuvanewari et al. [9] presented an IoT based garbage monitoring system using Thingspeak, an open IoT platform. With this system, the administrator can monitor and scheduled garbage collection more efficiently. A prototype has been developed and tested. It has been found to work satisfactorily. The details are presented in this paper. Umopathy et al. [10] presented a smart waste monitoring method is advised to prevent this and increase cleaning, to figure out where the waste is complete. Under this technique, the dustbin's waste level is measured by sensors and information is transmitted through the GSM and GPS module to the official mobile station. Wi-Fi Module is used to track waste levels online at the control room. Arduino Processor uses network modules to link sensor systems.

### **3. Proposed System**

Whenever the garbage is full information can be sent to the concerned authority to clean the bin. 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. This project uses the ultrasonic sensor module, GSM Modem, the RPI PICO Microcontroller and Liquid Crystal Display (LCD). Without a smart waste management system, any smart city is incomplete. In the proposed system, the level of waste material in the garbage bin has been detected with the help of ultrasonic sensor and it will continuously communicate to the authorized control room through GSM module. Microcontroller is used to interface the sensor system with GSM system. A GUI is also developed to supervise the desired formation related to the garbage for various selected locations.

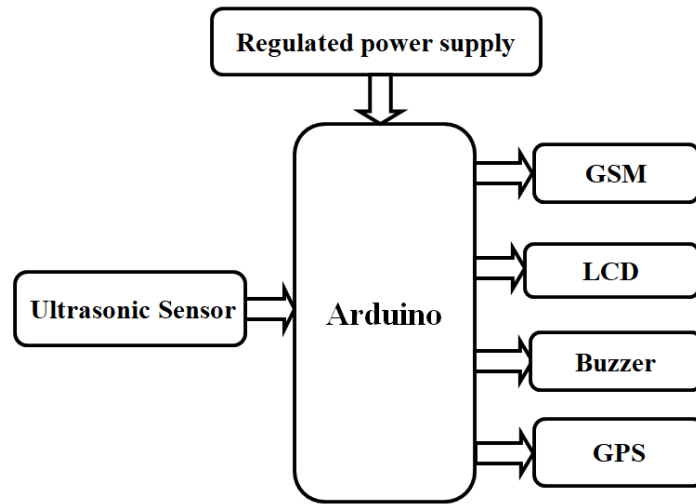


Fig. 1: Proposed block diagram.

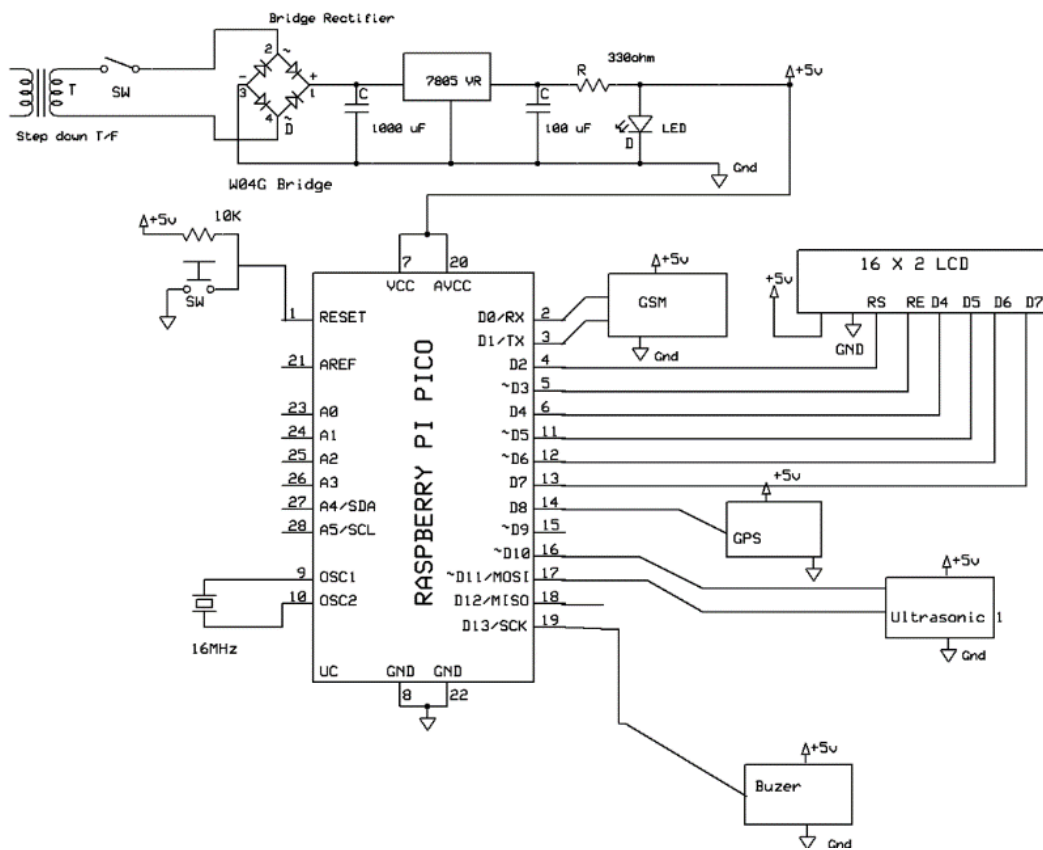


Fig. 2: Schematic diagram of proposed system.

#### 4. Results

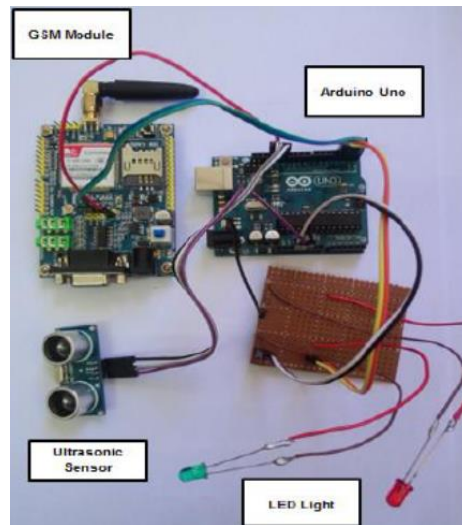


Fig. 3: All connections of hardware.



Fig. 4: Green LED is turned on when waste reaches the level of 70% full.



Fig. 5: SMS sent by the system when waste reaches the level of 70% full.



Fig. 6: Red LED is turned on when waste reaches the level of 70% full.



Fig. 7: SMS sent by the system when waste reaches the level of 90% full.

All connection component of hardware in this system  
All connection component of hardware in this system  
All connection component of hardware in this system  
All connection component of hardware in this system  
All connection component of hardware in this system

## 5. Conclusion

The system can monitor the garbage level in the bin, avoid the overflow of garbage by notifying the collector via an SMS and give the precise location. The system provides an efficient and effective way of garbage collection. The proposed future works: • Inclusion of the control room will effectively help monitor the garbage level from the Central Office • Integrating the system with an application-based website to have an exact location on the map.

## References

- [1] B. Chowdhury and M. U. Chowdhury, "RFID-based Real-time Smart Waste Management System," in Australasian Telecommunication Networks and Applications Conference, 2007, no. December, pp. 175–180.
- [2] A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, "Internet of Things for Smart Cities," IEEE Internet Things J., vol. 1, no. 1, pp. 22–32, 2014.
- [3] F. Mattern, "From smart devices to smart everyday objects," Proc. Smart Objects Conf., no. April, pp. 15–16, 2003.
- [4] BigBellySolar, "CNN-Solar Powered Trash Compactors," 2010. [Online]. Available: [https://www.youtube.com/watch?v=8e8Be9rq\\_C8](https://www.youtube.com/watch?v=8e8Be9rq_C8).

- [5] Mohd Yusof, Norfadzlia & Jidin, Aiman Zakwan & Rahim, Muhammad. (2017). Smart Garbage Monitoring System for Waste Management. MATEC Web of Conferences. 97. 01098. 10.1051/mateconf/20179701098.
- [6] F. Mattern, "From smart devices to smart everyday objects," Proc. Smart Objects Conf., no. April,
- [7] Samann, Fady. (2017). The Design and Implementation of Smart Trash Bin. Academic Journal of Nawroz University. 6. 141-148. 10.25007/ajnu. v6n3a103
- [8] Pardini, K.; Rodrigues, J.J.P.C.; Diallo, O.; Das, A.K.; de Albuquerque, V.H.C.; Kozlov, S.A. A Smart Waste Management Solution Geared towards Citizens. Sensors 2020, 20, 2380. <https://doi.org/10.3390/s20082380>.
- [9] T. M. N. Vamsi, G. Kalyan Chakravarthi, P. Lanka, and B. Divakar, "An IoT Based Smart Garbage Monitoring and Disposal Support System," 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), 2021, pp. 438-442, doi: 10.1109/ICCMC51019.2021.9418289.
- [10] T. Bhuvaneshwari et al., "Internet of things (IoT) based Smart Garbage monitoring system", Indonesian Journal of Electrical Engineering and Computer Science, vol. 20, no. 2, pp. 736-743, November 2020.
- [11] K Umopathy et al 2021 J. Phys.: Conf. Ser. 1964 062064