

AUTO-BIN

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Abstract: With increase in population there is an increase in the quantity of garbage, which is carelessly handled. This may lead to many environmental problems. Therefore, a project is developed which will help us to solve this problem of waste management up to a certain extent. An auto-bin, for the storage of garbage is developed, which will automatically open when anyone approaches to it for throwing garbage, and then closes. It will display the level of the garbage to easily identify about its state. If the dustbin is full, then it will notify the user whoever is monitoring that auto-bin by sending a text message, so that user can take desired action. Along with it, there is a web application for the auto-bin which will continuously display the contents of the auto-bin, about its current levels and also the entire history. By referring this web application, anyone can get to know about the status of the auto-bin, from anywhere and at any time.

Keywords: Auto-bin, Level Indicator, Automatic Opening, Ultrasonic Sensor

1. Introduction

With increase in population there is an increase in the quantity of garbage, which is carelessly handled. This may lead to many environmental problems. Therefore, a project is developed which will help us to solve this problem of waste management up to a certain extent. An auto-bin, for the storage of garbage is developed, which will automatically open when anyone approaches to it for throwing garbage, and then closes. It will display the level of the garbage to easily identify about its state. If the dustbin is full, then it will notify the user whoever is monitoring that auto-bin by sending a text message, so that user can take desired action. Along with it, there is a web application for the auto-bin which will continuously display the contents of the auto-bin, about its current levels and also the entire history. By referring this web application, anyone can get to know about the status of the auto-bin, from anywhere and at any time.

2. Literature Survey

In [1], they have proposed a smart trashcan which has auxiliary bin attached to the primary bin that enlarges when the primary bin is full, and it also sends notification to local waste management companies to collect the bins when they are 90% full. This percentage value could vary according to the location, for example if it is in a high trafficking area, it can be reduced to 70%. One of the more feasible solutions would be to incorporate sensors into trash bins in-order to detect trash levels and send out corresponding signals to indicate the overflowing trash. Weight and infrared sensors acting as transmitters can be used in this situation to detect the weight and level of trash in the bin and transmit signals to the waste management companies to collect the trash using the fastest and shortest route possible. The Ultrasonic sensors built into the trash can lid will continuously detect the level of trash inside the trashcan.

Fig. 1. Sensors in the smart trash can If the level of trash in the trash can, measured from the top, reaches 10% or less, then the trash can will communicate with waste management companies using GPRS (General Packet Radio Service) and will update the information on the cloud where the data can be collected and analyzed. Fig. 3 shows the electrical circuit components of the smart trash can.

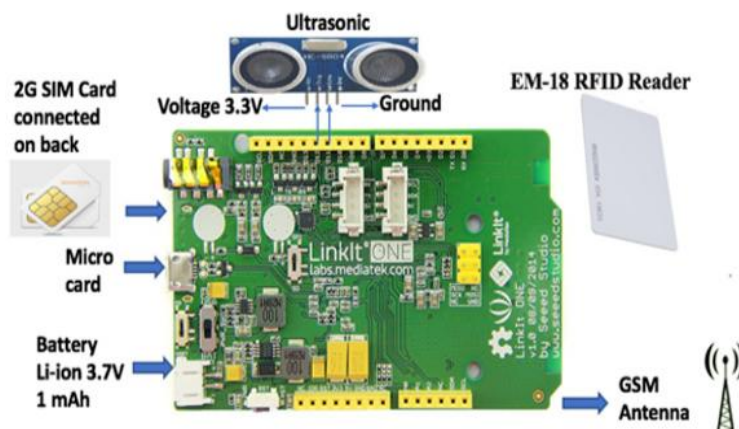


Figure 1. Circuit of the controlling module 1

In [2], the authors composed the system with following components:

- Smart Trash Bins: Smart Trash Bins compose of sensors and communication technology. This unit is attached to the top of the bin, under the lid. These sensors will sense fill level status of the bin as well as gas present in the bin and report these values to the workstations.
- Workstations: Each region contains a workstation at the municipal office. These workstations receive and stores the data sent by the smart bins in that region in real-time.
- Wi-Fi module: The Wi-Fi module is used to send information about waste level and gas presence in the bins to the workstations.
- Web Interface: This is where we can access and view reports, estimated pick-up dates.
- Sensing: The sensing unit will consist of two sensors. These will include fill level sensor. The fill level sensor will measure the level of waste in the bins. This fill level sensor will use ultrasonic waves for distance measurement.
- Microcontroller: This will be the processing unit for the embedded system at the bins. This will be used for controlling sensors and send information via network. The microcontroller will be interfaced with an ultrasonic ranging module HC-SR04 which provides 2cm-400cm noncontact measurement function, the ranging accuracy can reach to 3mm. The module includes ultrasonic transmitters, receiver and control circuit.
- Power supply: The Power supply will provide electrical power for the microcontroller. It is the most important part of the embedded system.

In [3], RFID-based Real-time Smart Waste Management System by authors Belal Chowdhury, and Morshed U Chowdhury explained the Smart waste management system which uses RFID (Radio Frequency Identification) for specifying unique identity to the dustbin. RFID is a modern and fast growing mobile technology that uniquely and accurately identifies a RFID tag (waste tag) attached to, or embedded in, a waste bin (e.g., garbage). In each dustbin has been assigned with a unique RFID, using that specific RFID the administrator of the municipal area or the person who has been in charged for collecting the waste can detect the amount of waste generated and facilitated smart waste management system. The administrator can easily able to search for a particular dustbin i.e., a user or client or the 'Adhar' card number or a house number by using it on waste tag by "Write to Waste Tag" button. An RFID waste tag can take away from the dustbin which is totally password protected and ensures data security.

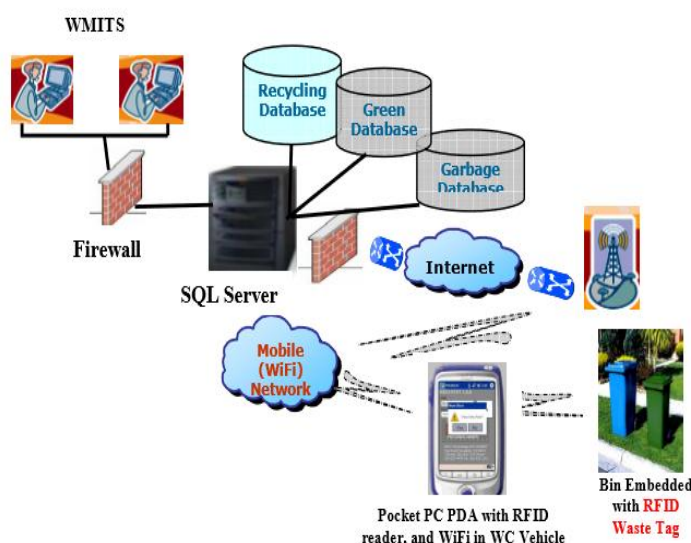


Figure 2. Main Components of RFID and sensor-based waste management system

3. Research Elaboration

The auto-bins are designed using ultrasonic sensor to check the level of the garbage and automatic opening of the auto-bin by measuring the distance of the person approaching towards bin as the opening of the auto-bin will be embedded with the sensors.

Auto-bin is the developed upgradable version of the normal dustbin, in which once a bin is full it sends a notification in the form of a text message to the registered user regarding the current condition of that particular bin. The authority then gets aware about the status of auto-bin by the notification, which helps them to determine its state, that it is full and can take the required and desired action. The dustbin will not open if it is full. Only the desired user who wish to empty it can open it by sending a command as OPEN.

Along with this, there is a web application which will continuously display all the information related to the auto-bin. It will keep a record of when the dustbin was cleaned earlier. Whenever the user wants to know about the status of the auto-bin they can access the web application for the same as this application will display the dynamic values of the level of the garbage in the auto-bin. It may give a rough idea about the auto-bin in case of an emergency.



Figure 3. Sensors in the smart trash can

4. Conclusion

In this project, a practical system for automatic opening and monitoring the level of garbage of the auto-bin is developed. This project implements real time waste management system. This system will help to inform the status of the auto-bins in real time. In this project, the information of the dustbin can be accessed from anywhere and at any time. It can send the notification to the user to empty the dustbin whenever it is full. By implementing this project there will be a decrease in the manual monitoring and gives a smart solution.

References

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