

SMART GARBAGE DUSTBIN MANAGEMENT SYSTEM USING IOT

Shyam Joseph A¹, Koushika B², Jothika SP³, Mohit Babu J⁴

^{1,2,3,4} Department of Electrical and Electronics Engineering,
Sri Ramakrishna Engineering College, Coimbatore, India.

¹shyamjoesph.antony@srec.ac.in, ²koushibalu12@gmail.com, ³jothikasp.10@gmail.com, ⁴mohitbabu@gmail.com

Abstract—Swachh Bharat Abhiyan is a national campaign by the government of India. The aim of this mission is to present this country as a perfect country. With the introduction of Internet of Things (IOT) devices, it's possible to gather the massive amount of garbage. Within the metropolitan cities, it's impossible to see each and each place where the rubbish bin is full or not. So, we have introduced a system using IR sensor and load cell. This technique is a sensor based dustbin levels monitoring system. Supported the knowledge from the sensors, the system will identify the rubbish status automatically. IR sensor detects the rubbish level with in the dustbin. Load cell is a sensor which intimates about the weight of the load placed on it and also protects the dustbin from getting damage. If the dustbin is full, the information will automatically give message to the municipality authority through IOT webpage. IOT module is interfaced to the AVR microcontroller through which the information is out there within the internet.

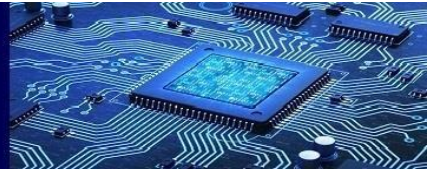
Keywords—AVR microcontroller, IR Sensor, Load Cell, IOT Module, IOT Webpage.

I. INTRODUCTION

Waste management is one among the first causes that the planet faces irrelevant case in developed or developing country. The matter with in the waste management is that the rubbish bin at the general public area gets overflowed well beforehand before the commencement of subsequent cleaning process. It results in various hazards like pollution and bad odour there to place which can be the basis of cause for the spread of various diseases. To avoid all such harmful scenario and maintain public cleanliness and health we have introduced a IOT based smart garbage dustbin management system. This technique may be very innovative system which can help to stay the cities clean. The most theme of the project is to develop a sensible garbage level develop a sensible intelligent garbage level monitoring for a correct garbage management. This technique monitors the rubbish level within the dustbin by using IR sensor and load cell. IR sensor and cargo cell informs about the content of the rubbish collected within the garbage dustbin via IOT website.

II. LITERATURE SURVEY

In [1], the ZigBee, GSM (Global System for Mobile Communication) and ARM7 is employed to make the Integrated system to watch the waste bins remotely. The sensors are placed within the common garbage bins placed at the general public places. When the garbage reaches the extent of the sensor, then that indication is going to be given to ARM7 controller. The controller will give indication to the driving force of garbage pickup truck on which garbage bin is totally filled and wishes urgent attention. ARM 7 will give indication by sending SMS using GSM technology. In [2], they came to some extent. It is important to know the societal concerns over the increased rate of resource consumption and waste production and thus the policy makers have encouraged recycling and reuse strategies to



scale back the demand for raw materials and to decrease the number of waste getting to landfill. In [3], it is being proposed during this paper that introduction of an integrated system combined with an integrated system of frequency Identification, Global Position System, General Packet Radio Service, Geographic data system and web camera will solve the matter of of solid waste. They also analysed the particular performance of the system. In [4], this paper objective of the study was to work out the characterization of the waste and therefore the current system of management activities. The paper highlights the summary of the present municipal solid waste management (MSWM) system of municipality and it concludes with a couple of suggestions, which can be beneficial to the authorities to figure towards further improvement of the present management systems. within the proposed system describes that the extent of garbage within the dustbins is detected with the assistance of sensor systems and communicated to the authorized room through GSM system. Microcontroller is employed to interface the sensor system with GSM system. A GUI is the specified information associated with the rubbish for various selected locations. This may help to manage the rubbish collection efficiently. The network of sensors enabled smart bins connected through the cellular network generates an outsized amount of knowledge, which is further analyzed and visualized at real time to realize insights about the status of waste round the city. This paper also aims at encouraging further research within the topic of waste management.

III. METHODOLOGY

A. Components description

AVR microcontroller belongs to Atmel's AVR series microcontroller family. AVR microcontroller is also known as ATmega32 microcontroller. ATmega32 microcontroller possess 40 pins and 32 I/O pins. Those 32 I/O pins are configurable as Digital I/O pins. ATmega32 is capable of handling analog inputs. It has one successive approximation type Analog to Digital convertor. An Infrared (IR) sensor is employed to detect the level of garbage present within the dustbin. An IR sensor consists of an emitter, detector and associated circuitry. A beam load cell is one among the kinds of load cell only found within the weighing industry. Beam load cells operate as simple cantilevers that flex slightly when subjected to a force or weight. It converts force or weight into an electrical signal by way of strain gauges.

B. Working

Smart garbage dustbin management using IOT is employed to the monitoring of garbage bins remotely. The input to the circuit is applied from the regulated power supply. The ac input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier may be a pulsating dc voltage. So as to urge a pure dc voltage, the output voltage from the rectifier is given to a filter to get rid of any ac components present even after rectification. Now, this voltage is given to a transformer to get a pure constant dc voltage. IR sensor detects the extent of garbage within dustbin. Load cell gives information about the load of the rubbish within the dustbin. When the bin is full the load cell gives information to the microcontroller. AVR microcontroller will give information to the municipality department through IOT webpage using Wi-Fi IOT module. IOT module is interfaced to the AVR microcontroller through which the information is out there within the internet.

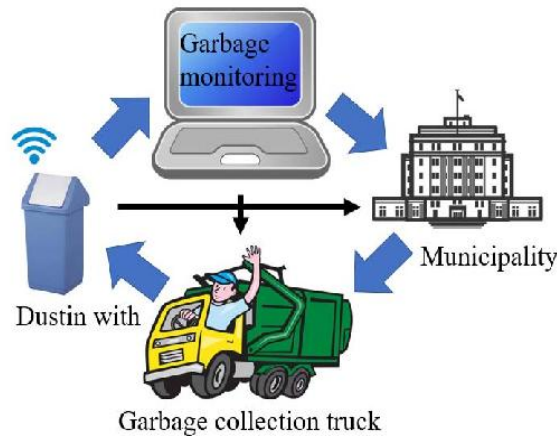
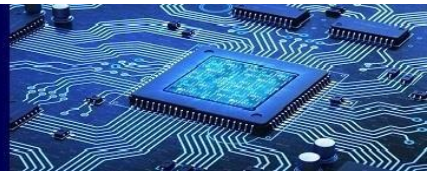


Fig. 1 Model of the Smart Garbage Dustbin Management System Using IOT

C. Functional block diagram

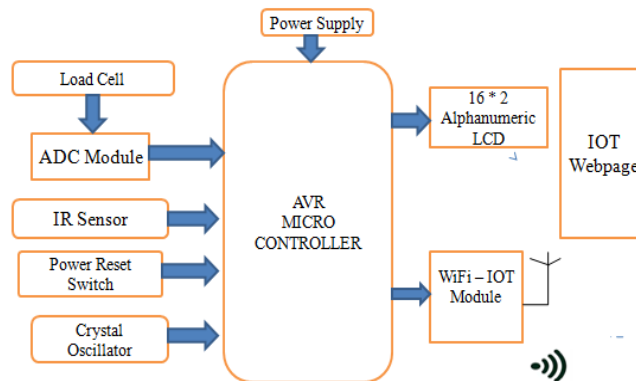


Fig. 2 Block Diagram of Smart Garbage Dustbin Management System Using IOT

In this block diagram the load cell is connected to the ADC module to weigh the garbage present in the dustbin. IR sensor is used detect the level of the garbage and it gives information to the microcontroller. AVR microcontroller gives information to the WiFi IOT module and displays the weight and level of the garbage present in the garbage bins.

D. Circuit diagram

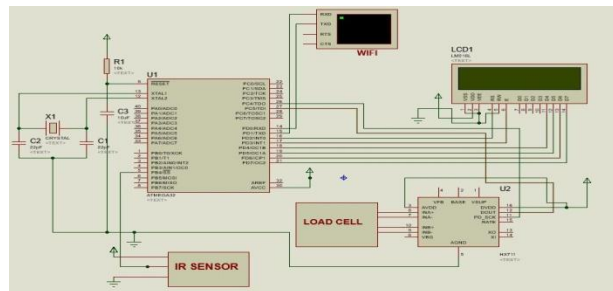
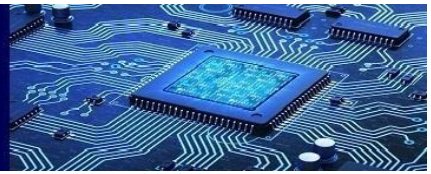


Fig. 3 Circuit Diagram of Smart Garbage Dustbin Management System Using IOT



IV. RESULT AND DISCUSSION

This IOT based waste management is very useful for smart cities in different aspects. We have seen that, incities there are different dustbins located in the different areas and dustbins get over overflow 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. The following results are obtained from this work,

- Avoids overflow of garbage in the bin
- Transmit the information wirelessly to concerned.



Fig. 4 Hardware Snapshot of the Smart dustbin

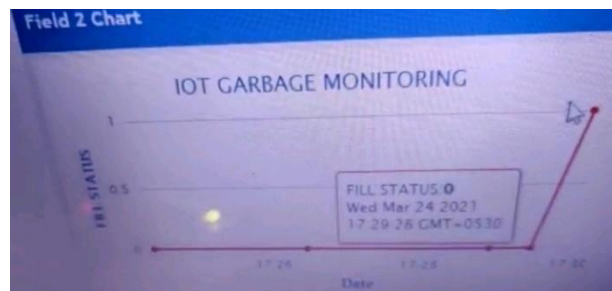


Fig. 5 Graph shows that the dustbin is empty



Fig. 6 Graph shows that the dustbin has load



V. CONCLUSION

We have implemented real time waste management system by using smart dustbins which will check the fill level of smart dustbins whether the dustbin are full or not. In this system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person and he/she can take a decision accordingly. By implementing this proposed system the cost reduction, resource optimization, effective usage of smart dustbins can be done. In major cities the garbage collection vehicle visit the area's everyday twice or thrice depends on the population of the particular area and sometimes these dustbins may not be full. Our System will inform the status of each and every dust bin in real time so that the concerned authority can send the garbage collection vehicle only when the dustbin is full. 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 smart dustbins.

REFERENCES

- [1] KanchanMahajan, "Waste Bin Monitoring System Using Integrated Technologies", International Journal of Innovative Research in Science, Engineering and Technology, Issue 3 , Issue 7 , July 2014.
- [2] M. Al-Maaded, N. K. Madi, Ramazan Kahraman, A. Hodzic, N. G. Ozerkan , An 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.
- [3] 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.
- [4] Raghmani 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.
- [5] Vikrant Bhor, "Smart Garbage management System International Journal of Engineering Research & Technology (IJERT), Vol. 4 Issue 03, March-2015 2000.
- [6] Narayan Sharma,, "Smart Bin Implemented for Smart City", International Journal of Scientific & Engineering Research, Volume 6, Issue 9, September-2015.