MONITORING WEIGHT & LEVEL OF GARBAGE IN SOLAR POWERED DUSTBIN USING INTERNET OF THINGS (IOT) FOR SMART CITY

Neha Ashok Thakur [1,] Prof. Shashikant S. Hippargi [2]

[1] Dept of Electronics and Telecommunication Engineering, N. B. Navale Sinhgad College of Engineering, Solapur, INDIA.

[2,] Dept of Electronics and Telecommunication Engineering, N. B. Navale Sinhgad College of Engineering, Solapur, INDIA.

Abstract: -

Today, waste management from its inception to its disposal is one of the important challenges for the municipal corporations in all over the world. Dust bins placed across cities set at open places are flooding because of increment in the waste each day and making unhygienic condition for the citizens, to maintain a strategic distance from such a circumstance we have proposed wireless solid waste management system for smart cities which allows municipal corporations to monitor status of dustbins remotely over web server (mobile App) and keep cities clean very efficiently by optimizing cost and time required for it. As soon as dustbin has reached its maximum level, waste management department gets alert via Mobile App and SMS via gsm module placed at dustbin so department can send waste collector vehicle to respective location to collect garbage. The objective of the project is to enhance practicality of IoT based solid waste collection and management system for smart city.

Keywords: - IoT, Waste management, ESP8266, GSM, IR Sensor, Weight Sensor, Solar panel.

I. INTRODUCTION

A smart solid waste bin operates to ensure the efficient measurement of its status while consuming minimum energy as we providing power to dustbin using solar panel. At present, most of the cities around the world require challenging solutions for solid waste management, as there is rapid growth in residential areas and the economy. Solid waste management is a costly urban service that consumes around 30% of Municipal Corporation's annual budget in many developing nations. After various surveys and study done by numerous organizations it has been seen that factors affecting effective solid waste management are due to improper management and lack of cutting edge technology infrastructure.

Municipal authorities have inadequate resources for waste management institutions to effectively collect the waste generated. It becomes an excessive wastage of resources when bins are collected that are filled up partially. By optimizing the quantity and deployment of smarter technology for waste collection and management activities can be carried out very efficiently to reduce operational cost.

In today's connected devices era, Internet of things (IoT) technology is revolutionizing society in different domains like healthcare, industrial automation, automobile and smart cities. In this paper, we have proposed IoT internet of things based smart waste management system which allows waste management authorities to continuously monitor status of dust bins placed at different locations and as per the status take appropriate actions to collect it immediately and efficiently. This is not a unique thought, for the usage of keen trash container; the thought has existed for a long time, After the IoT field discovering its grasp in our lives.

Figure (1) Dust bin

II. PROPOSED SYSTEM OVERVIEW

Methodology

The developed automatic system offers the real time bin status data from two sensing systems: waste level sensing and weight sensing. Things (inserted gadgets) that are associated with the Internet and occasionally these gadgets can be checked from the web are regularly called as IoT i.e. Internet of Things. In this framework dustbins are arranged at different locations. The Smart clean dustbins are related with the web to get the ongoing status. IR sensor is settled at the highest point of the dustbin and is interfaced with NodeMCU(Node MicroController Unit). Weight sensor is settled at the base of the dustbin and is additionally interfaced with controller to recognize over weight of the junk filled in the dustbin. Both sensors send the signs to the controller. LCD is connected on dustbin so that it will easy to recognize filled level of dustbin. Whole dustbin is powered by solar chargeable battery. Proposed system consists of ESP8266, limit switch, IR sensors, LCD, GSM module and Mobile App.
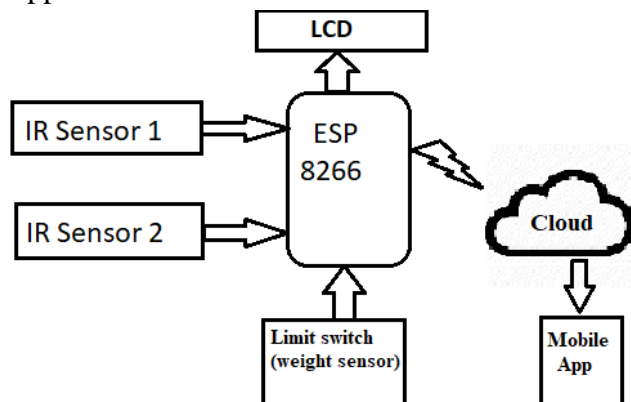

Figure (2) Block diagram of proposed system

IR Sensor:

IR sensor is used to check the level status of dust bin so to determine if it is full or empty. Emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, its resistance and correspondingly, its output voltage, change in proportion to the magnitude of the IR light received. This is the underlying principle of working of the IR sensor.
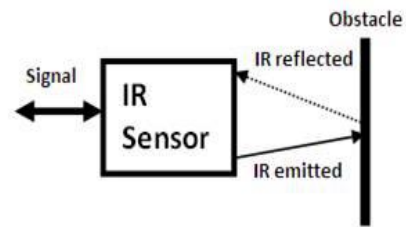

Fig (3) IR Sensor

Limit switch as Weight Sensor:

The weight sensor is used for detection of amount of garbage in dustbin. Limit switch also known as micro switch. In CNC, 3D Printing and RepRap Printers these switches are used as End Stops and to detect max and min limits of axis. In electrical engineering a limit switch is a switch operated by the motion of a machine part or presence of an object. They are used for controlling machinery as part of a control system, as a safety interlocks, or to count objects passing a point.[1] A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection.

Once limit switch will get pressed with the weight of dustbin we will consider that dustbin is heavy. Limit switch used for weight sensation just to protect dustbin weight sustain capacity.

Figure (4) Limit switch

Monitoring mobile App will help the garbage collection department to track for the exact location and amount of the garbage. The garbage vehicles can then unload the garbage from a particular location. The function of GSM is to send a message to the garbage collection department.

Firebase:

Firebase is a mobile and web application development platform developed by Firebase. Firebase Analytics is a cost-free app measurement solution that provides insight into app usage and user engagement. Firebase Storage provides secure file uploads and downloads for Firebase apps, regardless of network quality. We are stored our webpage for status monitoring of dustbin on firebase and that real-time status information of dustbin we are accessing from mobile App. So, with the help of this cloud storage monitoring dustbin status anytime, anywhere is possible. Firebase Storage is backed by Google Cloud Storage.
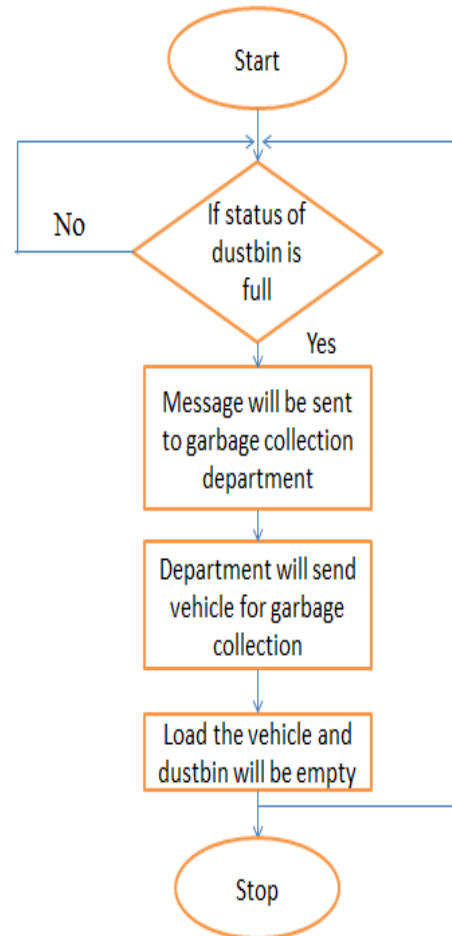
Figure (5) System flowchart

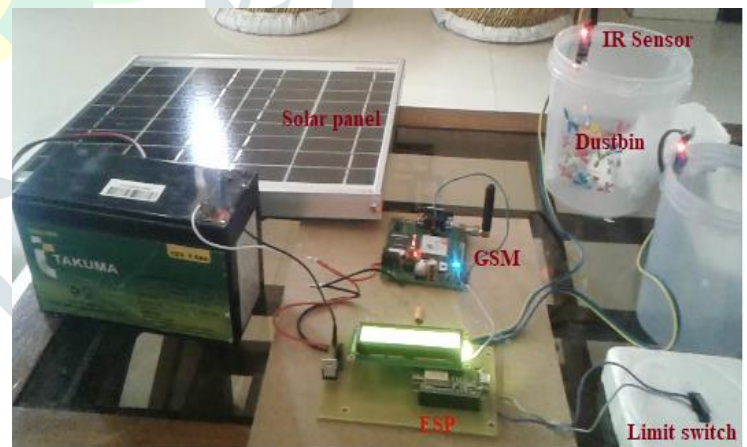**Experimental setup and implementation**

Figure (6) Experimental set up

III.   CONCLUSION

We have proposed real time waste management system by using smart dustbins to 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 authority can take a

decision accordingly. By implementing this proposed system the cost reduction, resource optimization, effective usage of smart dustbins can be done. This system indirectly reduces traffic in the city. 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.

ACKNOWLEDGEMENT

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