

**AUTOMATION OF DRY AND WET WASTE COLLECTION  
MONITORING OVER GSM**J. Shiva Charan<sup>1</sup>, P. Vijaya Aditya Varma<sup>2</sup>, G. Rishi Raj<sup>3</sup>, C.Venkata Narasimhulu<sup>4</sup>,<sup>1234</sup>Department of ECE, Geethanjali College of Engineering and Technology, Hyderabad, India

**Abstract**—This project is designed for the effective dry and wet waste collection using Embedded System. The littering of garbage bins makes serious unhygienic conditions in any type of surroundings. It leads to several health issues. To overcome this problem and make the waste management system more efficient and reliable, we need a smart solution similar to the smart waste management and hence that is designed in this project work. In this project, the level of waste inside the garbage bin is monitored with the help of proximity sensors. A microcontroller is interfaced with the GSM modem to transmit messages when the dust bin is full. The garbage bin is divided into separate sections as per need. This will improve the segregation process. It is noticed that garbage bin gets overflow because of irregular removal of garbage. So, when the garbage bin is full, automatically a message in the form of SMS is sent to the dust collecting vehicle person through GSM. The vehicle will come to the garbage bin and will be automatically stopped to collect the garbage from the bin. Once the garbage collecting vehicle is stopped, automatically the garbage bit will be lifted up and the garbage will be dumped into the vehicle. Once the dumping process is done, again a message is sent to the dust collecting vehicle person and the vehicle will be started collecting the garbage.

**Keywords**-Microcontroller 89C52, Liquid Crystal Display(LCD), Infrared(IR) Sensors, Global System for Mobiles(GSM), H-Bridge, Limit Switch.

**I. INTRODUCTION**

Waste management is one of the primary issues that the world faces irrespective of the case of developed or developing country. The key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. In turn, it leads to various hazards such as bad smell, ugliness to that place which may be the main cause for the growth of several diseases. To avoid all such hazardous scenario and maintain public cleanliness and health this work is mounted on a smart garbage system. The main theme of the work is to develop a smart intelligent garbage alert system for a proper garbage management [1]. This idea proposes a smart alert system for garbage clearance by giving an alert signal to the municipal department for instant cleaning of dustbin based on the height of garbage filling. This process is monitored with the IR sensors which are interfaced with Microcontroller to check the level of garbage filled in the garbage bin and sends the information to the municipal department through GSM modem once the garbage is filled. The LCD screen is used to display the status of the level of garbage collected in the bins. The whole process is upheld by an embedded module integrated with GSM Facilitation. In the project work, the garbage bin is portioned and the dry/wet waste is sensed through the sensors in the pipe mechanism. Whenever any of the bins i.e., dry one or the wet one is full, automatically SMS will be sent to the concern authorities to clear the bin. The real-time status of how the waste collection is being done could be monitored by the municipality authority with the aid of this system and if necessary remedial/alternate measures could also be adapted. Assembling a general architecture for the IoT is a difficult task, because of the large variety of devices, link layer technologies, and other services that may be included in such a system.

**II. LITERATURE SURVEY**

A trend of significant increase in municipal waste management has been recorded worldwide. This has been found due to population growth rate, industrialization, urbanization and economic growth which have ultimately result an increase solid waste generation. Most of the urban solid waste in Indian cities and towns is landfilled and dumped. Our Project deals with the most blistering topic i.e. waste segregation. An efficacious management needs to be materialized for a better planet to live in. Hence, with our cost-effective project proposal, we try to bring in the change. It deals with the minimization of blue-collar method utilization for the exclusion of waste into an automated panache. An automation of this style not only saves the manual segregators of the numerous health issues, but also proves to be economical to the nation. Besides, this system utilize low cost components for the successful segregation of most types of waste. When installed in apartments or small colonies, it proves to be beneficial in sorting the waste at the site of disposal itself. This is the objective of our project [2][3]. An efficient waste management system is the need of the hour. This automatic waste management is one small step towards building an efficacious and economic waste collection system with a minimum amount of human intervention. However as is the case with many automated systems, this model also has a few limitations.

### III. PROPOSED ALGORITHM

The main aim of our proposed project is to segregate dry and wet waste separately and dumping the garbage material into a vehicle track and keeping in point of view of apartment approach, we had designed this project. In this section, we describe the block diagram of the system and Keil  $\mu$ Vision software.

#### 3.1 Block Diagram:

In this project, pipes with a large diameter are arranged to an apartment for dry and wet waste dumping, where dry waste will be dumped at the right side of the apartment and wet waste will be dumped at the left side of the apartment. In order to know whether the waste material is dry or wet, we had arranged dry and wet sensors at both sides of the apartment, made up of electrodes which detect whether the waste material is dry or wet.

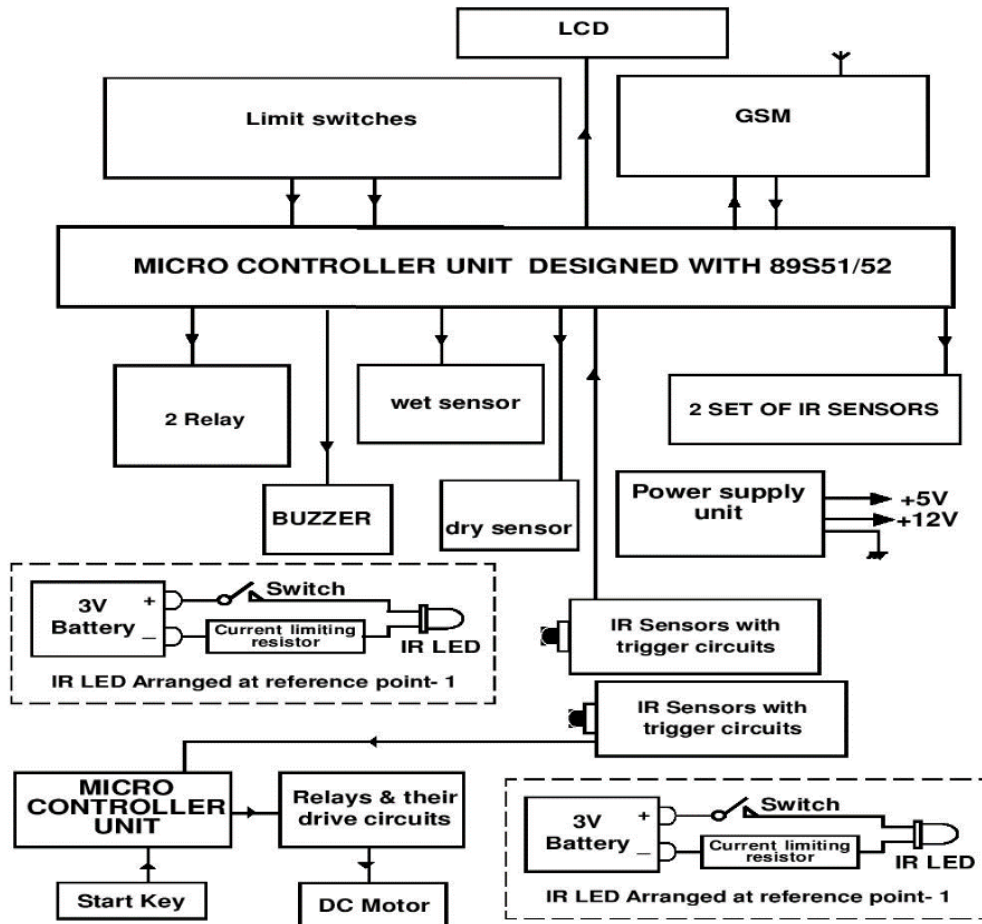


Fig 1: Block diagram of the project

Fig.1 shows the proposed block diagram which is based on the microcontroller ATMEL 89C52 with various inputs and outputs. If we dump dry waste into a wet waste pipe or wet waste into a dry waste pipe, then the buzzer will get activated that denotes dumping process went wrong. The key component which we had used in our proposed project is ATMEL 89c52 version microcontroller which has 256bytes of RAM and 8 KB of ROM. The CPU within-built peripherals on a single chip is Microcontroller. As we had used pipes of larger diameter whatever the waste material which we drop will directly get dumped into the dustbin. Initially, LCD displays DRY WASTE EMPTY and WET WASTE EMPTY. In dustbin we had used IR Sensor i.e., An IR transmitter and an IR receiver which is used to detect an obstacle i.e., a waste material between an IR transmitter and an IR receiver, this will denote whether the underground bin is EMPTY or FULL. This will be displayed on LCD screen as well as a message will be sent to a dust collecting boy through GSM that DRY WASTE FULL and WET WASTE FULL. In this model, we had designed a vehicle track with start key, ATMEL 89C52 microcontroller [4], Relays and their drive circuits with a DC Motor, 3V battery with IR transmitter is arranged to a vehicle track and IR receiver with trigger circuits is arranged to a vehicle destination point which we can observe in the

Fig.1. When IR transmitter and IR receiver come in a line of sight the vehicle gets halt. Once vehicle gets halt, to another side of vehicle track we had arranged a 3v battery with an IR receiver and to apartment site an IR transmitter is arranged so that when IR transmitter and IR receiver come in line of sight, automatically dumping process will be done with the help of H-bridge, DC motor run in clock-wise direction a waste material will get dumped into a vehicle track. Once dumping process is done, dustbin again reassumes its home position with the help of H-bridge, DC motor which rotates in anti-clockwise direction and reassume its home position with the help of limit switches. Once dumping process is done, again an SMS will be send to the owner that WORK IS DONE & WASTAGE IS REMOVED.

### **3.2 Software used:**

For this project, a software used is known as “Keil  $\mu$ Vision5 IDE”. The  $\mu$ Vision5 IDE from Keil Software combines project management; make facilities, source code editing, program debugging, and complete simulation in one powerful environment.  $\mu$ Vision5 helps you get programs working faster than ever while providing an easy to use development platform. The editor and debugger are integrated into a single application and provide the seamless embedded project development environment. It is very easy to work with Keil if you know how to write the programs in “C” or assembly language [5].

## **IV. RESULT ANALYSIS**

The results obtained in this project were analyzed and are shown in the hardware section.

### **4.1 Hardware Result:**

The proposed prototype model of our project is shown in the fig 2 given below,



*Fig 2: Proposed prototype model*

The results are shown in the form of GSM messages when the wastage is filled and cleared in the bin are shown below,

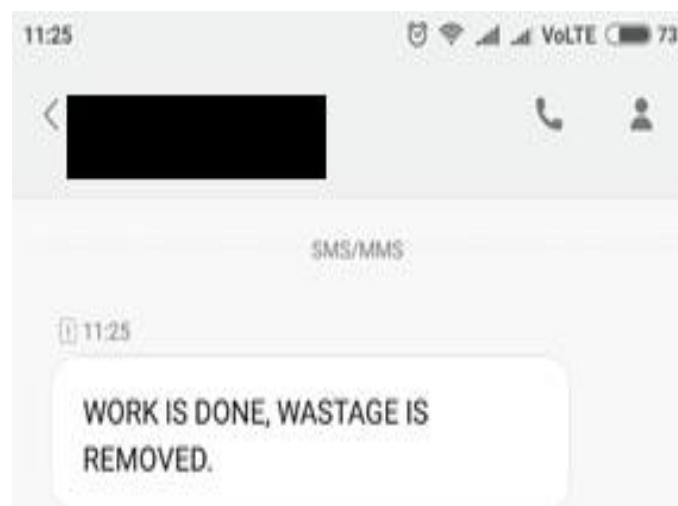


**Fig 3: GSM message when the dry bin is full**



**Fig 4: GSM message when the wet bin is full**

As shown in the fig.3 and fig.4 we can observe the GSM messages that if the garbage bin is full, automatically a message through GSM is sent to the dust collecting person to his number that DRY WASTAGE IS FULL and WET WASTAGE IS FULL.



**Fig 5: GSM message when the garbage is cleared**

As shown in the fig.5, we can clearly see that once the dumping process is done, a message is sent to the owner that WORK IS DONE, WASTAGE IS REMOVED.

## V. CONCLUSION AND FUTURE SCOPE

The project work Titled “**Automation of dry/wet waste collection monitoring over GSM**” is successfully designed & developed, and a demo unit is fabricated and the results are found to be satisfactory. Since it is a demo module, we have considered for one garbage bin only and according to that LCD panel is used for displaying the garbage level in the bin. But when the system is utilized for real applications the garbage bins of all the localities can be monitored. In this project, an integrated system of GSM modem, IR Sensors is introduced for efficient and economic garbage collection. The developed system provides the database for garbage collection time at each location. We analyzed the results which are available currently for the implementation of IoT. By implementing this model, we will avoid overflow of waste from the container in a residential area which is previously either loaded manually or with the help of the loaders in traditional trucks. It can automatically monitor the garbage level and sends the information to collection truck. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for solid garbage collection process monitoring and management for green environment.

With the advancement in technology, various models depending upon the requirement of an individual or a certain group of people can be implemented. Not only a time saving but also a proper organized technique can be implemented.

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