Intelligent Waste Segregation and Monitoring System

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Abstract:
Population growth and rapid urbanization means bigger and denser cities and increased municipal solid waste generation. The segregation, handling, transport and disposal of waste are to be properly managed so as to minimize the risk to the health and safety of patients, the public and the environment .The economic value of waste is best realized when it is segregated . This project proposes to segregate the dry waste and wet waste at the household level. The level of the garbage collected in the container is monitored using ultraviolet sensor. This is monitored at the control system office. Adding to it, a zonal area around the roadside garbage container is created using the load sensor concept, to monitor if garbage spills out of the container.

Keywords: segregation, dry and wet waste, ultrasonic sensor, zonal area

I. INTRODUCTION

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. In India, rag pickers play an important role in the recycling of urban solid waste. Dependency on the rag pickers can be diminished if segregation takes place at the source of municipal waste generation. When the waste is segregated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery, and consequently, recycled and reused. The wet waste fraction is often converted either into compost or methane gas or both. The benefits of doing so are that a higher quality of the material is retained for recycling which means more value could be recovered from the waste. The prime need of a smart lifestyle begins with cleanliness begins with dustbin. A society will get its waste dispatch properly only if the dustbin are placed well and collected well .Considering the fact, that the problem of efficient waste management is one of the major problems of the modern times, there is an utmost need to address this problem.Here we have figured out a new model for the municipal dustbins which intimates the center of municipality for immediate cleaning of dustbin.Currently there is no system of low cost, compact segregation of dry, wet and metallic wastes at a household level. The purpose of this project is the realization of a compact, low cost and user friendly segregation system for urban households to streamline the waste management process. When the waste is segregated into simple stream such as wet and dry it becomes easier to recycle them and reuse them .We aim in just doing that, separating this recyclable solid waste and putting them into individual bins so that they can be distinguished and use separately. It is a step forward towards making the waste collection process automatic and efficient in nature. Whenever the waste bin gets filled this is acknowledged by placing a RF transmitter at the waste bin, which transmits it to the receiver at the desired place in the area or spot. The received signal indicates the waste bin status at the monitoring and controlling system. In our system we have divided the overall system into four sections: The wet-dry separation, the container unit, the zonal area, the control unit.

II. LITERATURE SURVEY

Very less work is done in the field of sorting biodegradable and non-biodegradable waste. Previously, metal detector or optical sensor are used to sort only plastics or metals and waste particles but in this work biodegradable waste includes papers, fruit waste, vegetable waste, leaves and non- biodegradable waste includes metal, glass , plastic is sorted. The following research papers describe the earlier work done in the design and development of smart waste sorting system.

Ruveena Singh, Dr. Balwinder Singh "Design and Development of Smart Waste Sorting System" The main goal of the system is to design and develop a sorting system that sorts the waste automatically. It is an eco-friendly automatic system. The smart waste sorting system sorts the biodegradable and non-biodegradable waste. The system starts when waste material is placed on the lid, then the sensor transmits the signal and that signal is received by the microcontroller, depending on the signal received the lid of system works. If the signal is transmitted by the metal detector then the lid tilts towards the bin that collect the non- biodegradable waste. If the signal is transmitted by the IR sensor then the lid tilts towards the biodegradable bin[1].

Narayan Sharma, NirmanSingha, TanmoyDutta "Smart Bin Implementation for Smart Cities". The proposed smart been designed will be sending data about the levels of garbage collected in different parts of the city/town. The system helps the garbage analyser to keep a check on every dustbin filled in exact location. This helps the garbage analyser to keep a check on every dustbin throughout the city at real time. It will help him

take accurate decisions and avoid the overflow of dustbins and use the resource more efficiently [2].

AmruthaChandramohanet.al.“Automatic waste segregator”. This paper proposes an automated waste segregator which employs parallel resonant impedance sensing mechanism to identify metallic items, and capacitive sensors to distinguish between wet and dry waste[3].

Kumar, L.M. et. al. "Embedded wireless- enabled low cost plastic sorting system for efficient waste management". In this paper, for the on-line and instantaneous identification of the consumer plastics the technique of Near Infrared spectroscopy has been used .NIRS enables quick identification and monitoring of the molecular or structural properties of the plastic under exploration. Further, to protect the personnel from unhealthy environments that was predominant in plastic recycling plants, wireless was interfaced which was capable of controlling the NIRS instrumentation remotely[4].

Twinkle Sinha, et.al. " Smart Dustbin" . This paper proposes a new model for municipal dustbins which intimates the centre of municipality for immediate cleaning of dustbin. This dustbin is also designed to compress the garbage periodically thus preventing the unnecessary occupying of dustbin's space by light weighted but space occupying garbage particles like sponges etc. A leaf switch is pressed by garbage when it reaches a particular level providing an indication[5].

M.K. Pushpa, Aayushi Gupta, Shariq Mohammed Shaikh, StutiJha, Suchitra V "Microcontroller Based Automatic Waste Segregator" A simple 8051 microcontroller forms the heart of the system. It controls the working and timing of all the sub sections so as to sort the waste into the three primary categories. It is designed to sort into categories, namely metallic, wet and dry, thereby making waste management more effective[6].

III. AIM AND OBJECTIVE

Aim:
To design a proper waste management system which will be able to efficiently segregate dry and wet waste.

Objective:
To separate waste at the houses in the society into dry waste and wet waste using a relay circuit driven by a comparator circuit. This waste is collected at the container. The container has a sonar sensor used to detect the level of the garbage collected into it. When garbage reaches a particular level, an indication to the control unit is sent using RF module. Also, an area besides the roadside garbage containers is implemented .This zonal area uses the concept of load sensor to indicate if any garbage spills out the container.

IV. BLOCK DIAGRAM

This section encompasses the design methodology of the waste management, which has a detailed description of the implementation of each block. The complete project is divided into three sections; society unit, container unit and control unit.
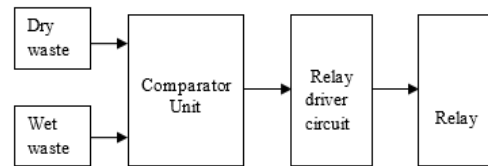

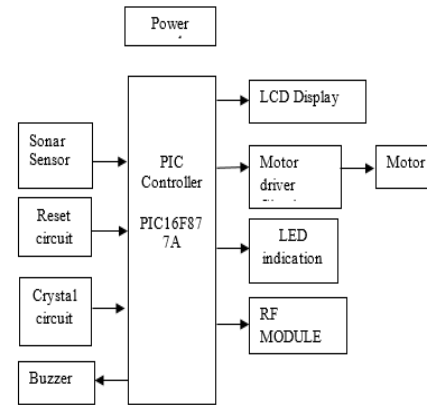**Figure.1. Block Diagram of Society Unit**
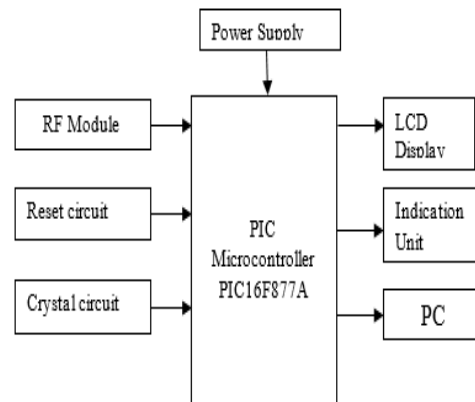

Figure.2. Block Diagram of Container Unit

Figure.3. Block Diagram of Control Unit

V. METHODOLOGY

The society unit comprises of the dry wet separation. It is shall be implemented using a comparator circuit. According to the output of the comparator circuit the output window shown with the help of a relay shall be ON or OFF. The container unit shall have a mechanism which indicates when the garbage level has reached a particular level and hence closes the lid of the container, so that no more garbage is put into it until the container is empty. Also an indication is sent to all society windows that the container is full, do not put garbage into the window until emptied. An indication to the control unit is also sent through the RF module. The containers at the roadside also can be monitored using same mechanism. Besides, it can also provide indication when garbage spills of the container. For this, the concept of load sensors is implemented. This has two metal plates, when garbage spills onto it, due to weight of the garbage onto it, the two metal plates come into contact and as an indication a buzzer is set on. The control unit is used to monitor

the containers in a particular area and when then the garbage collector vehicles are sent to collect the garbage. When the containers are emptied an indication is shown at the control unit. The control unit gets an indication from the containers of a specific area. Accordingly, garbage collection trucks are sent to the areas. Continuous monitoring of the garbage level in the containers helps to keep a check as to if the workers is doing their job with efficiency.
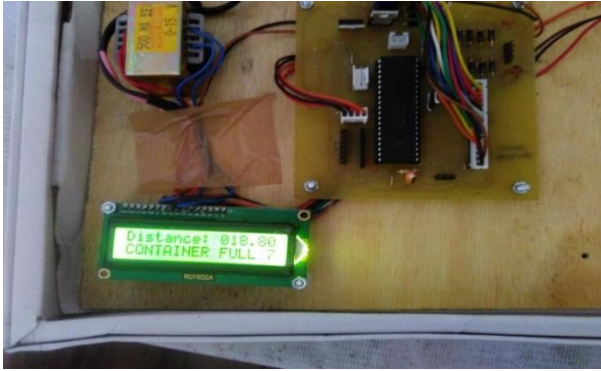
VI.   RESULT

Figure.4. Control Unit displaying container full

The sensor at the container unit detects the levels of the garbage collected in the container. The garbage level in the container is displayed at the control unit. The control unit carries out regular monitoring of the garbage level and accordingly empties it when full. Also indication at the container that garbage has been spilled out is given by using the concept of weight sensor. Fig 4 shows that when the garbage in the container is full a message to the control unit is sent through RF and is displayed at the control unit. The indication of dry and wet waste is also given at the society unit. Also, when garbage spills out of the container in the zonal area created, a buzzer indication is given to clean the zonal area.

VII.   CONCLUSION AND FUTURE SCOPE

Due to rise in urbanization the waste is increasing very fast. Therefore waste management is the vital need to protect the environment. The technological growth and innovation can contribute to this vital aspect to achieve environmental stability. To manage waste and monitor it properly at the base level are the compelling reasons for choosing these approaches. The base level sorting helps Municipal Corporation to dump it properly and recyclables can be recycled. This system is helpful in dry and wet waste separation, and monitoring the garbage containers. The system is an efficient step towards cleanliness. As it is being said that the technology which goes parallel with environment is the need of the hour. Our project is a step towards such green technology.

VIII. REFERENCES

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[5]. Twinkle Sinha, K. Mugesh Kumar, P.Saisharan "Smart Dustbin".

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