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Bin That Think's

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Abstract:
Through the history, the significant amount of solid waste generated by humans was due to low population density and low levels of the exploitation of natural resources. But in today's scenario due to increase in population there is increase in garbage.Proper disposal of garbage is necessary to make environment clean, but improper disposal of garbage leads to various issues like health problems, hazards, pollution and thus affects the environment. Pollution contains contaminants that cause instability, disorder, harm or discomfort to the ecosystem. Because of pollution the growing countries and most populated cities are severely affected. Our environment is spoiling due to lack of ignorance and cleanliness. The importance of adequate waste removal and management facilities to improve the health and wellbeing of the city's population is highly effective. The main aim of this paper is to solve the environmental problem due to improper disposal of garbage and to make environment green, to maintain better health and hygiene of the people.

Keywords: *IR sensor, Gas sensor, Moisture sensor.*

1. Introduction

The environment quality is deteriorating in many developing countries due to inadequate municipal solid waste management. Factors that contribute to the increase in solid waste are increase in population and increase in urbanization. The solid wastes from industrial, commercial and institutional establishments such as hospitals, market waste, yard waste and street sweepings is non-hazardous. Waste management in the developing countries is an acute problem for their urbanization and economic development. Haze and air emissions are the other issues that have received extensive public attention. These anthropogenic sources are generated from indiscriminate dumping of toxic and hazardous wastes, which being raised the sensitive issues both in terms of quantity and quality. The main problems of the existing solid waste collection process and management system are as follows.

- Lack of information about the collecting time and area.
- Lack of proper system for monitoring, tracking the trucks and trash bin that have been collected in real time.
- There is no estimation to the amount of solid waste present inside the bin and the surrounding area due to the scattering of waste.
- Lack of quick response to urgent cases like truck accident, breakdown and longtime idling.

In our daily life, we see many pictures of garbage bins that are being overfull and the garbage from the bins, spilling out results in pollution. Pollution is the introduction of hazardous chemicals and other contaminants into the environment. This has a great impact on health and hygiene of the people as many mosquitoes and flies breed on the waste.

The classification of solid waste based on the sources of waste can be classified as three types. They are municipal solid waste, overall construction waste and special waste. The Municipal solid waste is again classified as domestic waste, commercial waste and industrial waste.

1.1. Domestic Waste

It is the non-hazardous waste that is generated by the actions or activities that are involved in our day to day life such as floor sweeping, broken glass, food waste etc.Because of domestic waste landfills are created by land dumping.Land dumping involves the mass dumping of waste into a designated area.

1.2. Commercial Waste

It is the waste arising mainly for the purposes of trade or business such as activities taking place in shops, hotels, offices, markets but does not include the house hold, industrial and agricultural waste.

1.3. Industrial Waste

It is the waste that is generated from the materials that are considered as useless during industrial activities such as industries, mills and mining. This type of waste is generally collected by private waste collectors but some industries directly deliver the industrial waste to the landfills for disposal.

2. System Modeling

2.1. Transmitter Unit

In the present scenario waste management has been one of the major problems to the environment. An effective and efficient technology is required in order to maintain a safe and green environment. The proposed method is very helpful for timely removal of waste from the garbage bins. This method involves the usage of three sensors namely infrared sensor, moisture sensor and gas sensor. Thesesensors are attached to the garbage bins that are placed in the public places. The infrared sensor senses the level of the garbage and when it reaches the threshold level i.e. the level of the sensor, an indication is sent to the PIC 16F877A controller that a particular garbage bin needs an attention to empty it by the worker. In the same waywhen the moisture sensor sensessome moisture in the bin when the wet waste is deposited and the gas sensor senses some unpleasant or toxic smell from the bin an indication is sent to the PIC16F877A controller.In the transmission side the microcontroller receives the information and transmits the data using encoder and radio frequency (RF) transceivers as shown in fig 1.

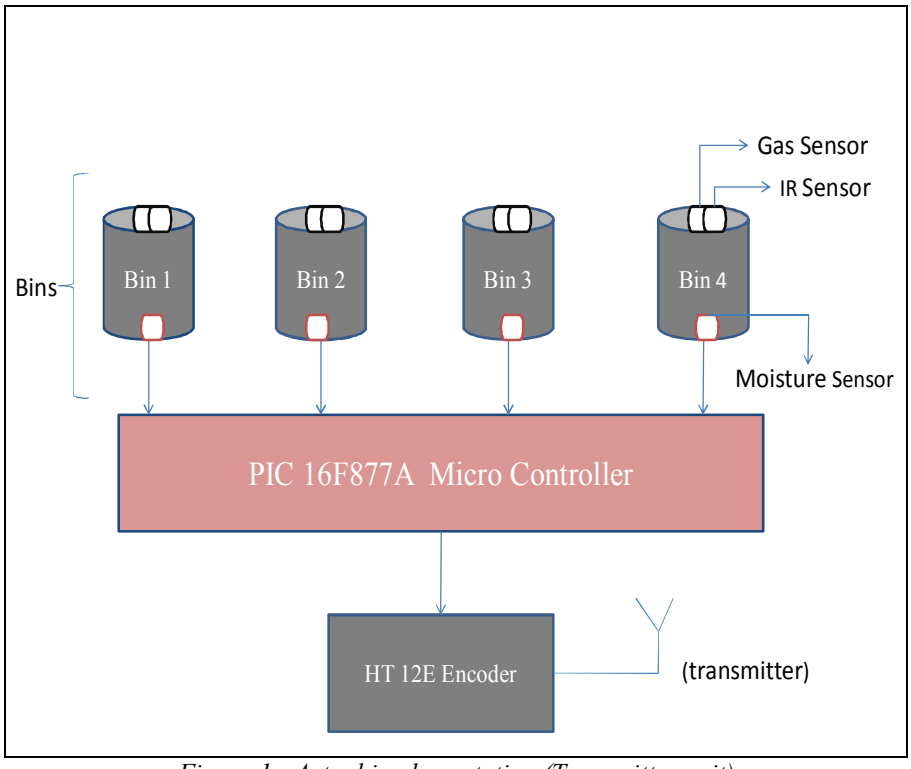

Figure 1: Actual implementation (Transmitter unit)

2.2. Receiver Unit

On the receiver side the information is received using radio frequency (RF) receiver and the data is decoded using decoder. The decoder will send this informationusing radio frequency (RF) transceivers to the microcontroller that is present on the receiver side and with the help of the controller the data will be displayed on the LCD indicating the garbage bin number which needs an immediate attention by the worker and the type of the waste deposited in it is known depending on the sensor that is detected as shown in Figure 2.

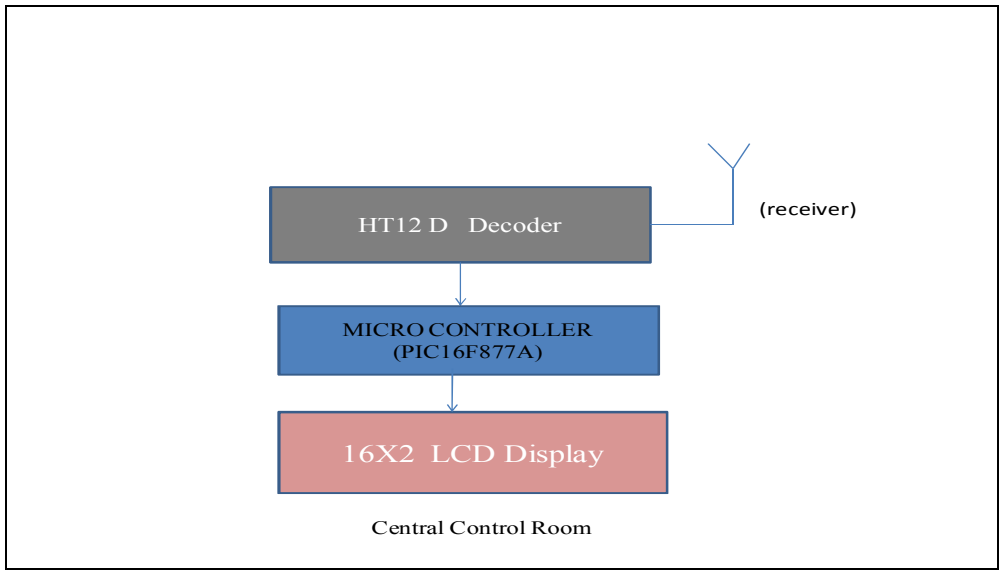

Figure 2: Actual implementation (Receiver unit)

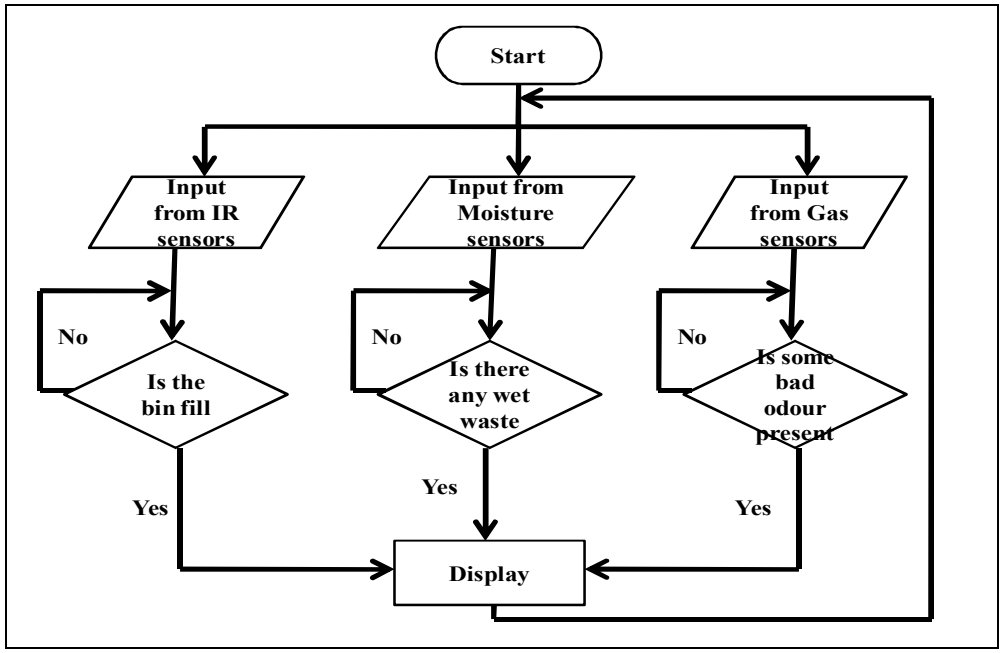

Figure 3: Flowchart of the system

The flowchart explains the idea of the project. The input to the sensors is the waste and when the sensors detect the waste then the sensor output goes high and it is displayed on the LCD display. If the output of the sensor is low then the control will be at the sensor itself until it goes high and the LCD display refreshes in order to show the output.

3. System Design

The heart of the project is the sensors used. There are three sensors that are used for the implementation and they are explained as follows.

3.1. IR Sensor

An infrared sensor is an electronic instrument that uses the infrared radiation by emitting to sense the characteristics of its surroundings. A transmission medium such as atmosphere, vacuum or optical fiber is required by the IR sensor to sense the infrared rays. These sensors are also capable of measuring the heat that is emitted by an object.IR sensor uses an LED which produces light of wavelength in the infrared region, when the object is close to the sensor the light is reflected back into the light sensor. Infrared radiation extends from the nominal red edge of the visible spectrum at 700 nm to 1mm. This range of wavelengths will have a frequency range of 430THz and 300 GHz.

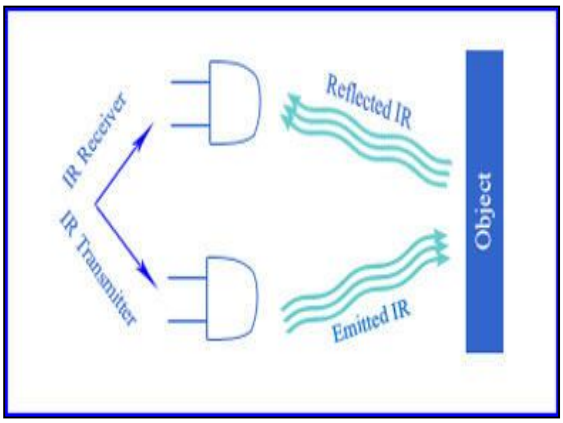

Figure 4: Infrared Sensors

3.2. Moisture Sensor

The sensor used in this project is the resistive humidity sensor. These sensors measure the change in electrical impedance. This sensor consists of noble metal electrodes deposited on a substrate. The substrate is coated with a conductive polymer. When the sensor absorbs the water vapour, the ionic functional groups are dissociated and the electrical conductivity will increase.

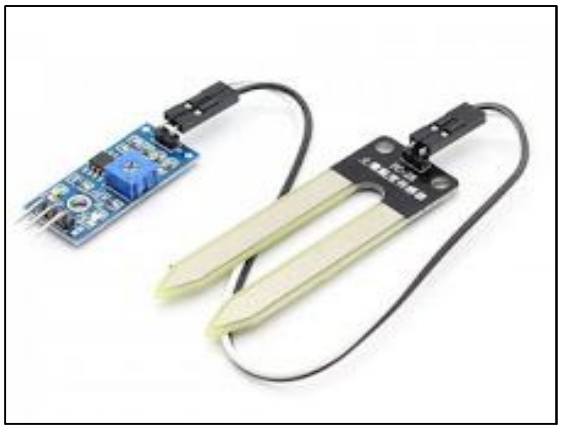

Figure 5: Moisture Sensors

3.3. Gas Sensor

The sensor used is MQ-6 liquid petroleum gas sensor (LPG). The sensitivity material of MQ-6 is SnO2. It has lower conductivity in clean air. When toxic smell is detected by the gas sensor, the sensors conductivity would increase with the gas concentrations increasing. The MQ-6 can detect from 200 to 10000ppm of gas concentrations. The response time of the sensor is very fast and it has high sensitivity towards various gases. The output of this sensor is an analog resistance value. This output is connected to the ADC of controller which converts into digital value for the functioning of controller.

Figure 6: Gas Sensors

4. Results

Initially when power supply is given to the liquid crystal display it shows as “Go green amrita”.

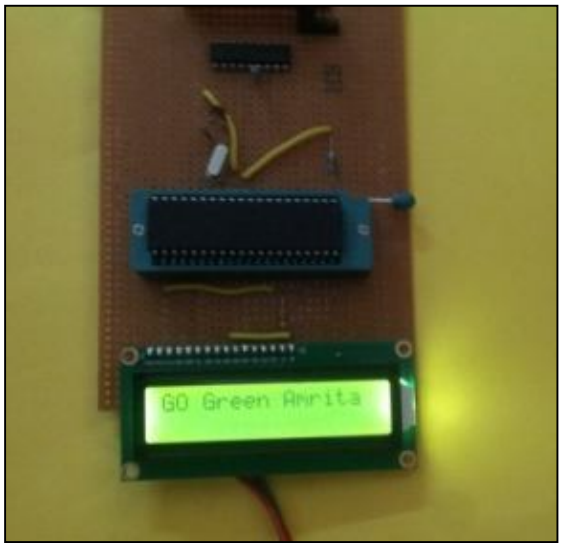

Figure 7: LCD display as go green amrita

When the IR sensor senses or detects the level of the sensor it shows a grid below the no of the bin that is filled to the sensor level. The figure 8 shows that the bin 1 is filled with waste and the IR sensor attached to the bin is detected and the display shows that bin1 is filled with a grid symbol under bin1 and it has to be cleared.

Figure 8: Bin 1 is filled by level sensor and display is shown on LCD

When the wet waste is deposited into the bin1 the moisture sensor detects and it shows that wet waste has been deposited and the LCD display is as shown in figure 9.

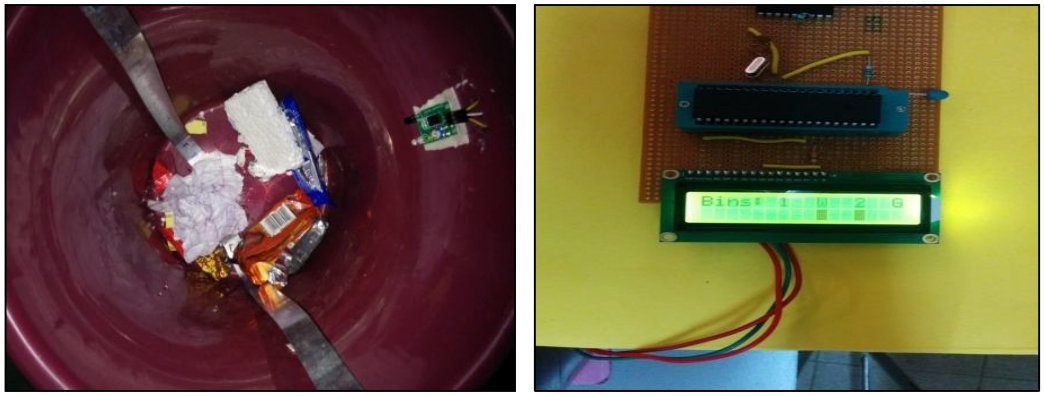

Figure 9: bin1 is filled with wet waste and displayed on LCD

W indicates that wet waste and the grid under W shows that wet waste is deposited into the bin and it has to be cleared. In the same way when toxic or some unpleasant odour is detected by the gas sensor it shoes a grid under G. G indicates that gas sensor is active and the grid is that some waste with toxic smell is deposited.

5. Conclusion

Waste Management is a crucial issue in which everyone needs to put the responsive immediate action without any delay. The proposed method is able to monitor the different types of waste deposited in a bin by using the three sensors i.einfrared, moisture and gas sensors. Based on these sensors we are able to identify the type of waste deposited and the priority to empty a particular bin such as whether the bin is containing wet waste which is detected by moisture sensor or the waste with some unpleasant smell detected by the gas sensor from a bin than the bin containing only dry waste which is detected by infrared sensor. It would help us for timely removal of the waste resulting in a green and pleasant environment. The benefit that this project has is the use of simple technology like RF trans- receivers with an advantage of low cost and efficiency. Thus this project holds the belief that overflowing of the trash on the streets could be avoided.In future we can try to segregate both the wet and dry waste using servo motors. This concept can be used in Municipal Corporation, offices, colleges and many more places. The project is so economical that it costs around Rs3000 and MQ-6 gas sensor is used because of the fast response time to detect the gas. Moisture sensor is economical and IR sensor is used to detect the level of the garbage and there will be no interface with other signals present in the air.

6. Acknowledgement

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7. References

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