SMART WASTE MANAGEMENT SYSTEM USING IOT

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Keywords:

Dry waste, Wet waste, Smart waste segregation, IoT

Introduction:

The amount of waste produced everyday by the industries and the households is increasing at an appalling rate, and the major reason for this is soaring use of packaged items, textiles, paper, food, plastics, metals, glass etc, thus management of this refuse becomes a crucial part in our everyday life.in most of the developed countries there are many efficient techniques which are used for the proper management of this waste, but in some countries especially the developing ones the careless attitude of people towards maintaining clean surroundings, along with this many issues such as no stringent laws for using the biodegradable materials, no proper environ policies ,no laws for sustainable development are the seed for the fatal results of waste management. Due to the increasing waste, the public bins which are used for collecting this waste are overflowing, the locality is jumbled of trash, causing not only malodorous streets but also a negative impact on the health and environment.

We segregate the waste at our homes for ease at processing and recycling. We observed trash vans come irregular to homes creating a despoliation of households. Due to this many civilians empty their overloaded dustbins in open spaces. This in turn increases environmental pollution. The waste is a great hassle for our health and the environment it has many effects which are dreadful. Trash is breeding ground for bacteria, insects, flies these flies are the same that roam around the eatable and drop the off springs. Thus they increase the risk with food poisoning, typhoid, gastroentetritis, salmonella, the insects cause malaria dengue etc.

Here a waste management system is introduced in which each dumpster is embedded in a monitoring system which will notify the corresponding personal if the dumpster is full. In this system, it is also possible to separate wet and dry waste into two separate containers. This system provides an effective solution to waste management problem.

Objectives:

1. To ensure the protection of the environment through effective waste management.

2. Ensure separation at source in all metropolitan and local municipalities.

3. Preventing pollution and ecological degradation.

4. To protect the health and wellbeing of people by providing an affordable waste collection service.

Methodology:

Smart Waste Management System is a system which provides a solution to separate dry and wet wastes and also share information through internet to help in better monitoring of the system. The steps involved in building the system are as follows:-

- **Step 1:- Identification of the wastes.** This prototype model focuses only to separate dry and wet wastes. So to identify the types of waste, an IR sensor is used to sense an object near it and capacitive soil moisture sensor to measure the moisture content. When only IR sensor sense, it identifies as dry waste, and if both IR sensor and capacitive soil moisture sensor senses or detects, it identifies the waste as wet waste. This is how it identifies dry and wet wastes and gives signal to arduino.

- **Step 2:- Programming of arduino**. Programming of arduino is done using arduino IDE with embedded C. There are various libraries included like ESP8266_Lib.h for Wi-Fi module etc. Coding is done in such a way that takes sensor value as input and accordingly gives instructions to rotate servo motor and also displaying output in LCD.

- **Step 3:- Using appropriate sensors**. IR sensor is used to detect the presence of waste, capacitive soil moisture sensor is used to detect the amount of moisture content in the given waste and Ultrasonic sensors are used to detect the amount of wastes in the garbage bin so as to prevent it from overfilling.

- **Step 4:- Rig up of circuit**. After choosing appropriate sensors, next step is to rig up the circuit according to the circuit diagram.

- **Step 5:- Testing of the circuit**. Testing of circuit is the last step by giving various types of wastes (dry and wet) and validating if the sensors are correctly identifying and dumping the waste in correct dustbin.

The working of the model starts with detection of the waste and for that sensors are required to sense the type of waste. The arduino is the main component which gives the instructions to the servo motor to rotate either clockwise or anti-clockwise to dump the waste in the respective dustbin. The sensors sense and give signal to the arduino which further rotates motor. Also, a LCD Display is used to display the message regarding the status of waste.

Also, ESP8266 Wi-Fi module is used to incorporate IoT to share information over internet to help higher authorities in better monitoring.
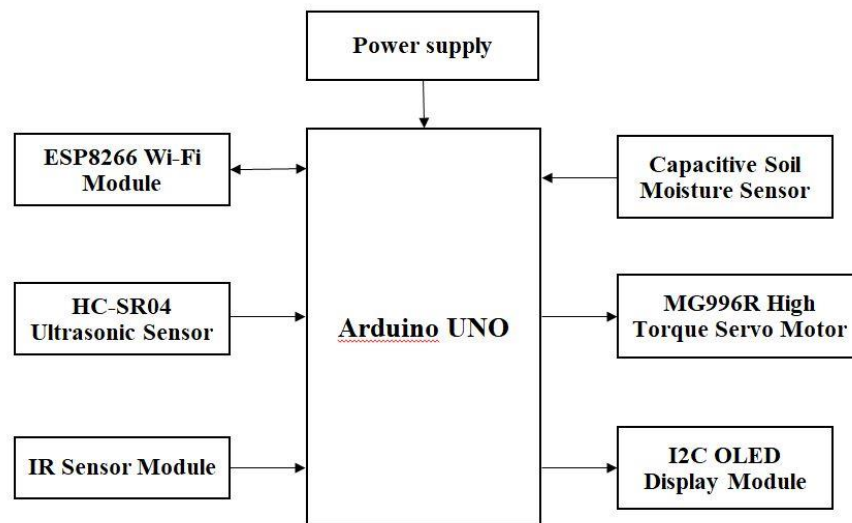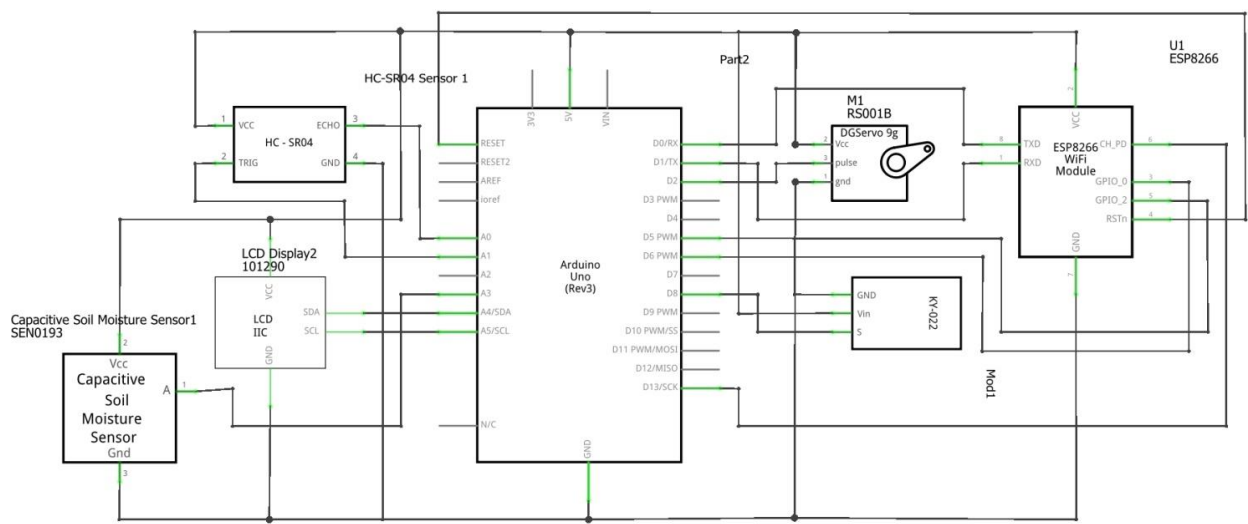

**Fig: 1 Block Diagram**

Fig: 2 Circuit Diagram

The circuit diagram is given in the above figure which depicts the interfacing of different components like sensors, LCD display, servo motor etc., to arduino. The sensors are the inputs to the arduino and output are the servo motor, Wi-Fi module and LCD display.

Conclusion:

The smart waste management system using IoT is successfully built. This proposed method aims at building a prototype model which is able to provide a technical solution to the waste management problem which will effectively separate dry and wet wastes. This model, Smart Waste Management System (SWM) effectively employs IR sensor to identify dry waste items, and capacitive soil moisture sensor along with IR sensor to differentiate between dry and wet wastes. This system is integrated with ESP8266 Wi-Fi module for IoT applications so as to access information through internet to help higher authorities in better

monitoring. This system can be effectively deployed at source in all metropolitan and local municipalities.
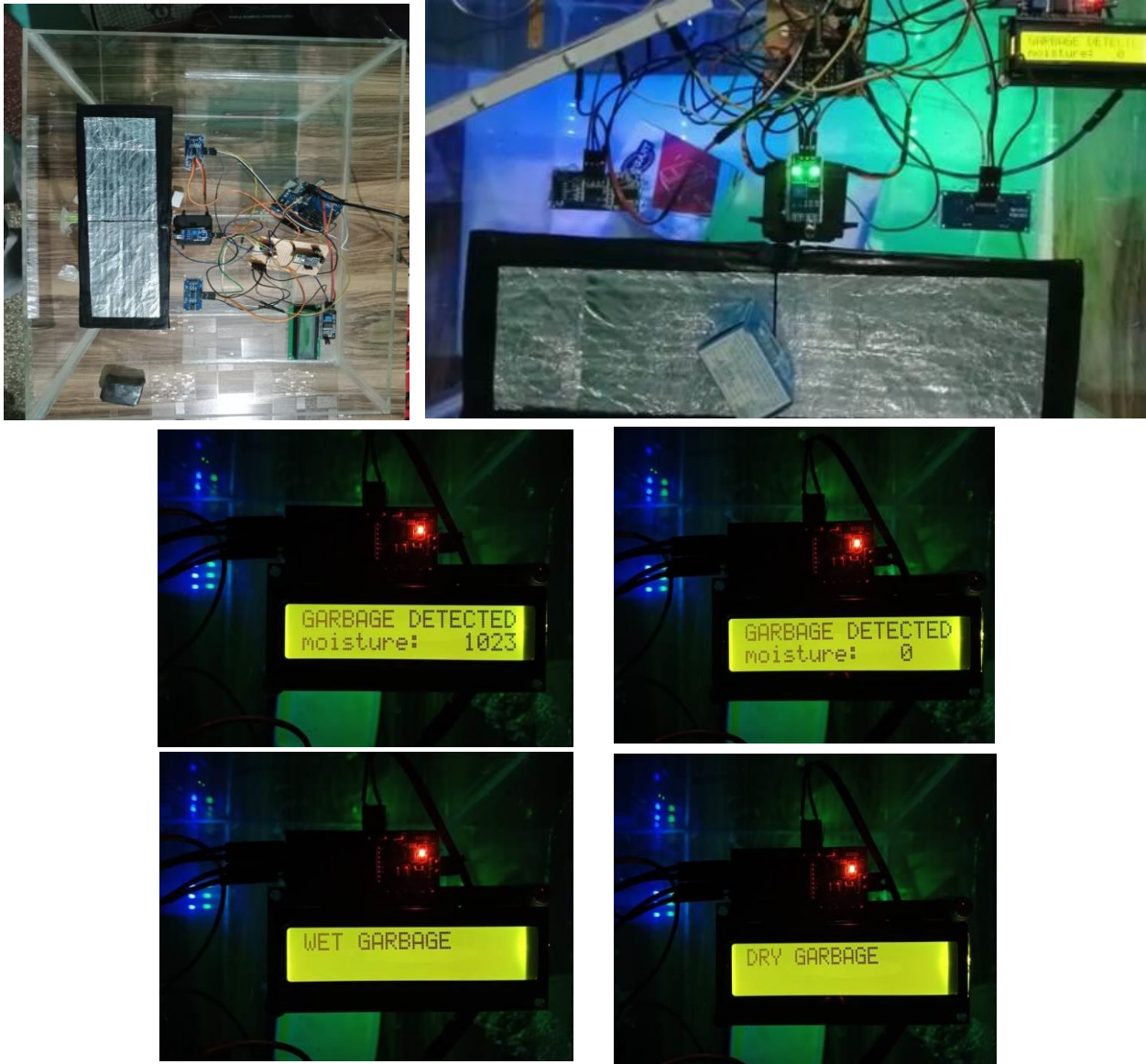
Scope for future work:

1. More numbers of separations can be done like metals, plastics, glass etc., with appropriate technology. GSM contraption to intimate to the nearest industry to use the metals collected.

2. Further, plastic can be segregated from the collected dry waste and can be processed based on their types, grades and colors.

3. Solar panels can be fixed to the body of the dustbin for power requirement.

4. By using this proposed scheme will be helpful to easily achieve our mission clean India.

5. Provisions can be made for on spot decomposition of wet wastes.