IOT Based Refuse Reuse Recycle Technique for Zero Waste Management

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Abstract : In almost all parts of the world there is no a proper solution for the disposal of waste. There is no proper monitoring and maintenances. The trash may overflow at times and make the city look unclean as well as it leads to the spread of various infections. If the trash pertains for more than a week in the same place it leads to the release of various toxic gases which may affect the children and old age people living in that area. The main idea of this project is to maintain the city clean by a proper collection of waste and not allowing it to overflow. At the same time, it makes utilization of biodegradable waste as natural manure to enhance crop production with the help of the bokashi composting technique. This method effectively increases crop production all over the world by 40%. So, it reduces the risk of disposing waste or dumping it under the water.

IndexTerms - PIC microcontroller, GSM, Servo motor, LCD display, DC motor, Infrared sensor, Dustbin, Mobile phone.

I. INTRODUCTION

In India, almost 60 million tonnes of waste are generated every year. Out of these, only 20% of waste is treated and the remaining 80 % of waste is either dumped as landfill into the earth or in most cases it is burnt. Both of these cases cause great disaster to the earth. Burring the waste deep into the ocean may lead to depletion of water organisms and burning of waste might cause depletion of the ozone layer.

The major problem faced all over the world is the scarcity of food. Totally 11% of the Earth's land area is utilized for agricultural purposes. Nowadays, the remaining agricultural area is also destroyed due to the construction of various buildings and it is also destroyed due to various natural disasters. If this situation prevails there will be a dramatic decrease in crop production. The usage of artificial manure may lead to decreased crop production and produces unhealthy crops that would be harmful for human consumption

To maintain the city clean and reduce the deposition of waste onto the earth and at the same time to increase the total crop production by 40% it paves way to go for the REFUSE REUSE RECYCLE concept.

There are 3 types of composting techniques like

1.Normal Composting,
2.Vermi Composting,
3.Bokashi Composting

But the first two has the following drawback. The biodegradable trash thus obtained is again segregated into GREEN AND BROWN trash and mixed up in a 50:50 ratio. They must be exposed to air whenever needed and needs sunlight at times. There is a chance of forming anaerobic bacteria which might be harmful to live beings. Due to all these complications, advised to adopt the BOKASHI COMPOSTING technique. Where an alternate layer of BOKASHI POWDER and trash is mixed up and placed in an airtight container and it is left undisturbed for 2 weeks. The extract thus obtained can be sprayed onto the crop which act as a natural fertilizer and increases the crop yield by 40%

II. LITERATURE SURVEY

In the former adopted methods, there was a hole dug inside, above which a polythene bag was covered. The biodegradable waste followed by a layer of cow dung and phosphate powder is sprinkled evenly. Then the setup is covered by a layer of cow dung and is left undisturbed for a period of 3 to 4 weeks. Now cracks start developing in its above layer at that time earthworm is introduced into its cracks. The top surface is covered with a layer of polythene bag and is checked periodically and water is sprinkled above it to avoid dryness. After a period of 4 to 5 weeks the earthworm digest all the degradable waste and turns it into manure and the corresponding manure is segregated from earthworm using a sieve and is packed and stored in a cool dry place. The casting analysis revealed that cow dung slurry along with paper and organic waste is converted into manure that is used to enrich the soil value by a small amount and reduction in C: N ratio make the plant to uptake quire people on duty.

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III. PROPOSED METHOD

In this concept, there is a separate bin for degradable and non-degradable trash. There is an infrared sensor fixed in the trash, when the trash gets filled up an alert message is sent to the mobile phone of the garbage collector with the help of GSM. The degradable trash is collected and is sent for further process. An infrared sensor is attached to the conveyor belt which runs with the help of dc motor. The degradable trash and bokashi powder are fixed to the servo motor.

The ultrasonic sensor along with 4 led is attached as an arm to the servo motor. When the upcoming bin is detected with the help of an infrared sensor the trash opens and is filled up to the first led blinks. The time when the led blinks a delay up to 2 to 3 minutes is given and the bokashi powder is sprayed with the help of a blower. After the delay, the trash opens and gets filled in the bin until the led blinks.

The same process is repeated until the trash gets filled up to a certain level. Once the trash gets filled up the infrared sensor stops the working of a servo motor and an alert message is sent to the garbage collector with the help of a gsm module. The respective bin is taken to the composting plant for further process. The bokashi tea thus obtained at the later stage can be sprayed onto the crops. It acts as natural manur e which is used to enrich the soil content and increase the crop yield by 40%

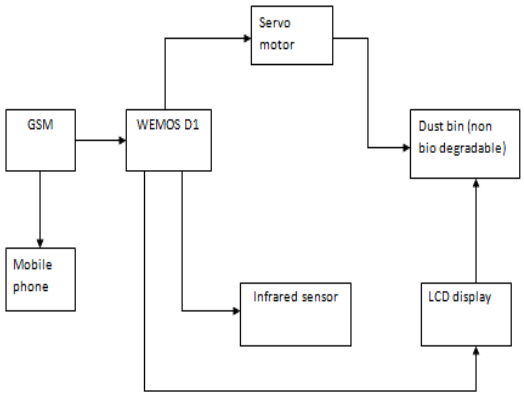

Fig. 1block diagram of degradable and non degradable trash

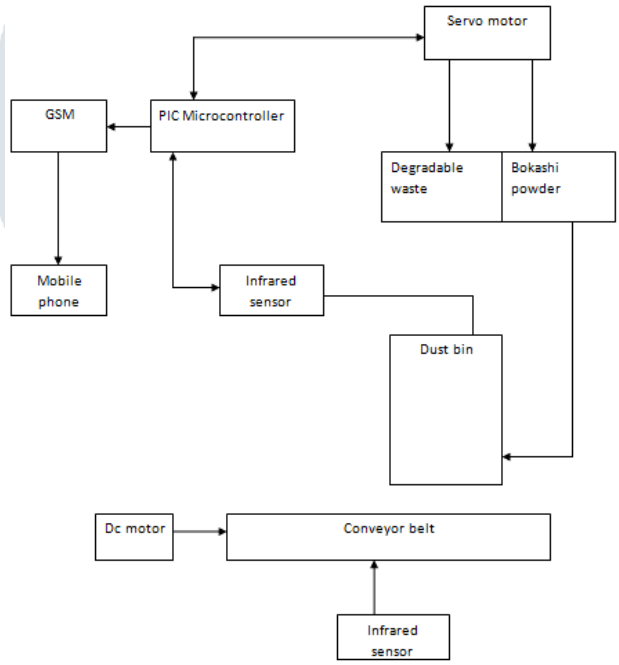

Fig. 2 Block diagram of RRR concept

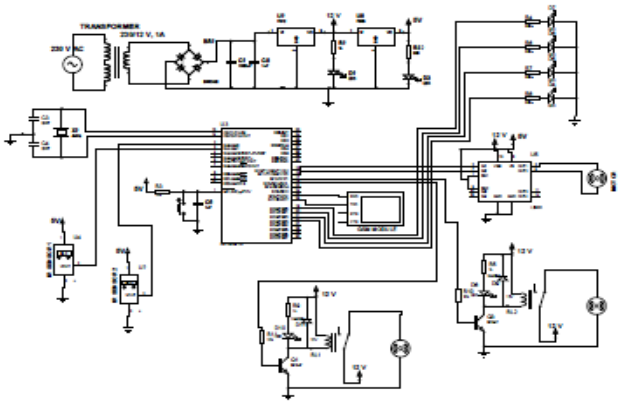

Fig. 3 Schematic diagram of transmitter

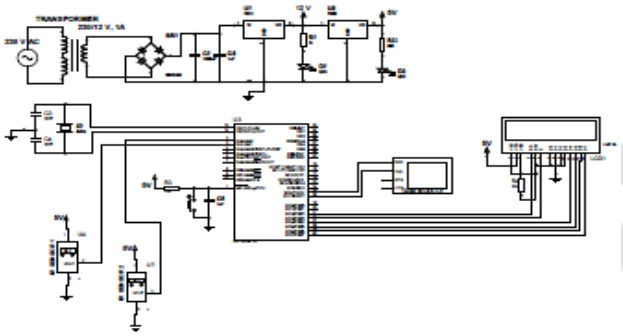

Fig. 4 Schematic diagram of receiver

Bokashi is sometimes a dry organic material that may be created with totally different ingredients. It's a method within which it converts waste into an organic matter that's helpful for the soil modification. It's accustomed add nutrients to the soil and increase its texture. The scraps like fruits and vegetable peel off, paper product, tea bags, and therefore the alternative meat things will be added to the bokashi bin. It's an associate anaerobic method that depends on inoculated bran to ferment the room waste. It doesn't turn out any inexperienced house gases or heat. It preserves scraps in a very semi rotten state for turning it into manure later. It acts as a wonderful device and turns the waste into a portion of valuable natural plant food.

Finally, the by-product bokashi tea will be sprayed on to the crops that produce healthy crops additionally as increase its production. In the below flow chart, when the IR sensor detects the bin, it turns on and automatically the dc motor turns off and the bin gets placed directly below the servo motor. The servo motor consists of degradable trash and bokashi powder placed on its side. With the help of Arduino, the servomotor can tilt at +90 and -90 so that an alternate layer of trash and powder gets filled up. The powder is sprayed evenly with the help of a blower. Once when the process gets over an alert message is sent to the mobile phone to the garbage collector with the help of GSM.

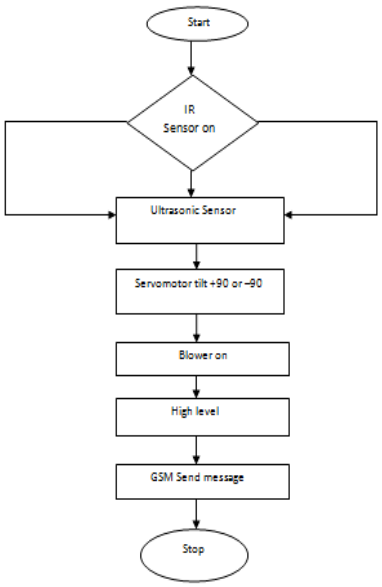

Fig. 5 Flow chart

Iv. HARDWARE DESCRIPTION

PIC microcontroller
PIC stands for Programmable Interface Controllers which was designed to carry out a variety of tasks . Its main features include USART, RAM, EEPROM, ADC, LCD, timers etc., They can be programmed to be the timer or to control the production line. They are found in many devices like phone, alarm systems, computer systems etc.,

Servo Motor
It is a linear actuator that allows for the control of either linear or angular position. It is used to achieve high speed at high torque. It is used in position-controlled surfaces like elevators, gripper, etc., Here, it is used to control the flow of trash and bokashi powder

DC Motor
It is won't to convert power into energy. Its movement is created by electromagnetism. The square measure three sorts are Series DC motor, Shunt DC motor, Compound DC motor. It's used chiefly in house applications additionally as in electronic devices. In our project, it's wont to management the movement of the belt.

Infrared Sensor
It is a sensor that is used to measure the heat of an object at the same time detects its motion. It is used to sense the object by either emitting or transmitting radiation. It is used in industry as well as television to interpret the signals. The IR sensor used here is to detect the bin and to turn off the DC motor and to turn on the servo motor.

GSM
GSM stands for international System for Mobile Communication. It's an open cellular technology that is employed for sending mobile voice and information services. It uses TDMA technique for sending signals**.** It's accustomed send AN alert message to the portable of the rubbish collector once it becomes full.

LCD Display
LCD stands for liquid shows**.** It's a flat panel show that uses light weight modulating properties of liquid crystals. They emit a back lightweight or reflector to provide
picture in monochrome. It finds its applications in screens of TV, laptop, mobile, tablets, etc., The various kinds of alphanumeric display panels are square measure, Twisted Pneumatic alphanumeric display IPS panel technology VA panel Advanced Fringe field change.

LED
LED stands for Light Emitting Diode, it emits light when current is passed through it. The color of the light is determined by the energy required for the electrons to cross the bandgap of the semiconductor. They are often used as indicator lamps and in the seven-segment display. They have low energy consumption, longer lifetime, smaller in size and faster switching. They find its application in traffic signal, camera flashes, aviation lighting, etc.,

WEMOS D1
Wemos d1 is an wifi module that has an operating voltage of 3.3v. Its function is similar to that of NODEMCU. In this project it is used to send an alert message to the garbage collector with the help of gsm module.

v. FINDINGS AND CONCLUSION

This refuse reuse recycle concept is a new idea whereby, the trash is collected and filled up in the bin automatically with the alternate layers of bokashi powder with the help of an ultrasonic sensor and servo motor. After the completion of one bin, the next one follows with the help of dc motor attached to the conveyor belt.
When the trash gets overflown it leads to spillage of trash in the road due to which the city make look untidy and the garbage may also release toxic gases that is is not suitable for inhaling and it may lead to spread of various diseases.
To sort all these problems, suggests to go for refuse reuse recycle concept. Here there is a separate level monitoring system to maintain the trash level and the trash is undergone a separate process to make it as a manure with the help of various system which is useful for the development of smart city.

vI. FUTURE SCOPE

In future, they can develop trash that can automatically sense and separate the degradable and non-degradable trash by its own and doesn't need any manpower
The plastics thus obtained can be undergone a further process so that, it can be changed into a valuable product that is used for smart city development

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