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Segregation of Waste using IOT

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Abstract: In present scenario efficient waste management is the major objective of the country. Segregation of waste and creating awareness of different types of waste is new boom. Waste from the houses can be broadly divided into two categories dry waste and wet waste. It is recommended to have two separate dustbins in the house to keep wet waste from mixing up with its dry counterpart. Due to lack of awareness in citizens they prefer mix all the waste and disposed. It is just loss to ecosystem as well as individual health due to poisonous gas emission from waste. Bad smell spreads and may cause illness to human beings. It also leads to unhygienic environment and look of the city. In this proposed system smart dustbin will be created in which soil moisture sensor sense the moisture of waste and based on threshold value desired one will be enter as input. To achieve the overall scenario IOT technology will be used.

Keywords: Internet of Things; Solid Waste Management; Ultrasonic and IR Sensors; Micro-controller.

I. INTRODUCTION

In this world of Wi-Fi and 4G, the new wave of modern technology is Internet of Things commonly called as IOT. The real goal is to use every object as a part of the network, and not just embedding intelligence in smart phones and laptops. Sensor network technology play key role in IOT based devices.

Most people think that accumulation of waste starts once the garbage reaches the huge dustbin vans or the dumping grounds but in actual it starts right at your house. These smart bins will lead to proper waste management. In our system, idea is suggested where we can create dustbins that will accept the waste in segregate form only. The idea is to place two dustbins of different color at every street one for wet waste and one for dry waste. So even if it doesn't get segregate at individual level it can be done at street level. Both the dustbins are interfaced with micro controller base system and soil moisture sensors of certain numbers. This system is interfaced with LCD to observe the results. The data has been received, analyzed and processed, which displays the status of the Garbage which one is trying to feed, if found right then will accept it otherwise not. Also transfer of waste to dump yards can be tracked and real time status of waste can be viewed on GUI of the web browser.

II. LITERATURE REVIEW

M. Al-Maaded et al. presented recycling and reusability importance and solid waste management policies [1]. The generation, storage, collection and disposal techniques are also discussed. Parkash et al. proposed system in which sensors are placed in bins for calculating the level of garbage using GSM technology and ARM7 controller. This technology monitors the waste remotely [2]. The RF module is used for the purpose. Kanchan Mahajan et al. developed system in which the ZigBee technology is used which is one of RF module application [3]. Md. Shafiqul Islam et al. uses the combination of Radio frequency identification (RFID), Global position system (GPS), General Packet Radio Service (GPRS), Geographic Information system (GIS) and web camera are used to have more reliable system with higher speed data transmission than before [4]. Dr. Debmalya Bhattacharya1 et al. proposed the same system as used in [4] but instead of power supply using battery power supply use of solar power is suggested [5]. S.S. Navghane uses WIFI technology instead of GSM for indicating level of dustbin [6]. Abhimanyu Singh et al. developed system in which sensors used are IR sensors with PI2development board to communicate information to waste managers [7]. Jetendra Joshi developed a model in which waste management is done using cloud based system at remote site [8].

III. METHODOLOGY

The methodology for the proposed solution has been developed as shown in Fig. 1.

The idea is to use sensors not just for level indication, but also for sensing state of matter of waste being disposed. Our system suggests that used two bins one for solid waste and one for liquid waste collection. Solid waste predominantly, is any garbage refuse or rubbish that we make in our homes and other places. These include old car tires, old newspapers, broken furniture and plastics, paper, rubber, metals, leather, cloth rags, wire, glass and things etc. fall under the category of dry waste. Wet waste includes cooked and uncooked food, waste from fruits and flowers, fallen leaves, dust from sweeping and other eatable items.

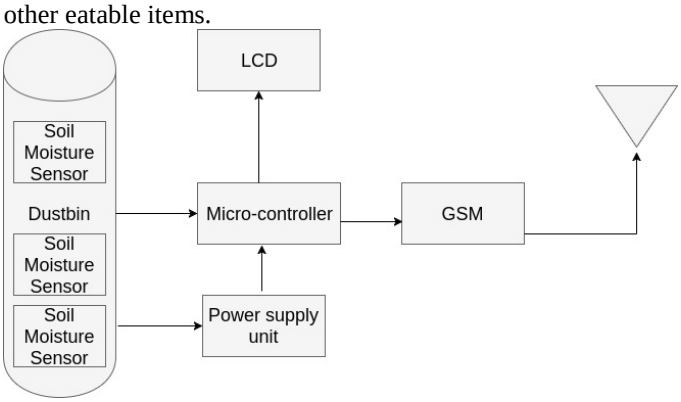

Fig. 1 Proposed Model

Soil moisture sensors are attached to dustbins. If the dustbin size is big, then more sensors will be needed. But the

necessary condition is that the number of sensor should be odd. The principle is every object will have certain amount of moisture. Sensor will calculate the moisture of every object (waste). Decide certain threshold value to differ solid waste from liquid waste. Say if threshold value is set to 10% for solid waste collection bin and more than this will be considered as liquid waste. Calculate the moisture level of all the waste input. Now that moisture content is calculated using all the soil moisture sensors.

Every sensor will have value of flag as zero and one. If the moisture content will be less than or equal to 10% then flag will give the value of one. If moisture content exceeds 10% then flag will give the value of zero. The value of all the sensors is observed. If flag value of one is more than waste will be input to solid waste bin else it will be input in liquid waste bin. The dustbin should have two levels. Top level will perform this calculation and if find right then certain slider which will dispose the waste to bottom. If the waste found to be input in wrong bin then it will throw it out in certain bowl. From that bowl one should disposed the waste in proper bin to be accepted. Micro-controllers will used to receive data from sensor. Micro-controllers processed data that data is processed and can be viewed on LCD. Though completely not achieved but yet the new start to segregation of waste can be observed. The amount of recyclable waste will surely be in more much amount as compare to current scenario. After that IR sensor will sense data once bins level gets complete. The bins will be emptied and can be tracked using WIFI and RFID technology.

System Architecture

Arduino Duemilanove

The Arduino Duemilanove ("2009") is a micro-controller board based on the ATmega168 or ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro-controller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Soil Moisture Sensor

The soil moisture sensor is used to measure volumetric water content of soil. The soil moisture sensor uses capacitance to measure the water content of the soil. This moisture sensor will be used to measure the moisture content of waste. Range: 0 to 45% volumetric water content in soil (capable of 0 to 100% VWC with alternate calibration).Accuracy: ±4% typical. Typical Resolution: 0.1%.Power: 3mA @ 5VDC. Operating temperature:–40°C to +60°C. Dimensions 8.9×1.8 cm×0.7 cm.

IV. ALGORITHM AND FLOWCHART OF PROPOSED MODEL

ALGORITHM:

Step 1: Start the experiment by taking two dustbins with sensors and other apparatus.
Step 2: Dispose the mix waste in bin.
Step 3: Calculate the moisture content.
Step 4: According to certain threshold if moisture content comes out to be greater than threshold in that case opens the liquid waste bin.
Step 5: If moisture content comes out to be less than dispose that waste out and store it in solid bin.
Step 6: Close the experiment.

The threshold value can be decided by iterative process. In our case we repeat the process and it is set as 10%.

Test cases and Results:

1) Dustbin moisture content – 0-10% (input in solid waste bin)
2) Dustbin moisture content – 10% (input in solid waste bin)
3) Dustbin moisture content – more than 5% (input in liquid waste bin)

Advantages of Proposed System

- Real time information on the state of the dustbin.
- Deployment of dustbin based on the actual needs.
- Cost Reduction and resource optimization.
- Improves Environment quality

-Fewer smells
-Cleaner cities

- Intelligent management of the services in the city.
- Effective usage of dustbins.

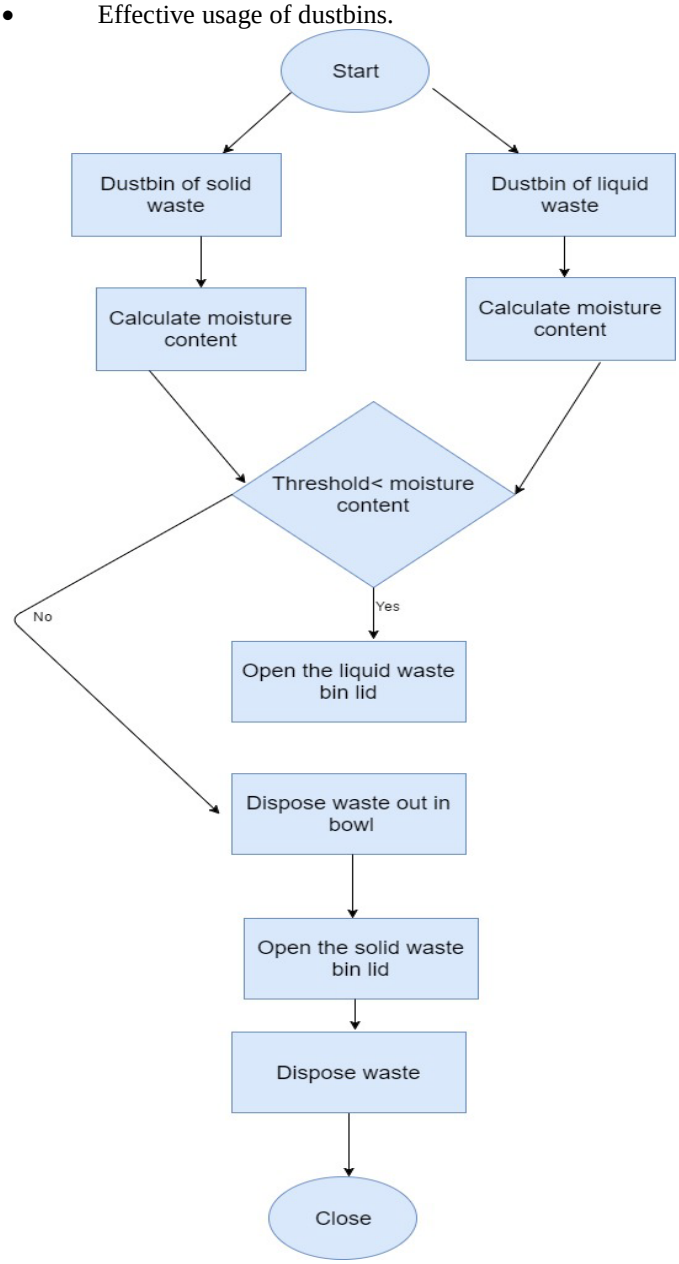

Fig. 2 Flow Chart of Proposed Model

V. CONCLUSION

This scenario will help the waste managers to recycle the waste in more appropriate way. To make it even better the power supply can be used using solar panels [5].These system can be implemented in waste bins which are placed in colony as well as huge places where dump yard are present, main motive is waste should be segregated. In one research it has been found that if waste of India will be recycled properly then it can be capable of giving country money in millions instead of investing money. With this the dream of developed India can be seen actually.

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