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Compost Manager

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Abstract *— With rapidly growing population there is increase in people's needs and consumption. This has resulted in dumping a huge amount of waste. These wastes consist of different waste materials that require different ways of treatment. Kitchen wastes are disposed by means of organic composting techniques. Manual composting of waste requires human workforce and it is not hygienic. Availability of technological advancements eases the process of composting. The proposed system has been designed to monitor the compost at regular intervals. The system monitors various important parameters such as temperature, moisture, pH, the level of compost in the compost bin. User can monitor the acquired data through a realtime database or by mobile app. The objective of this proposed system is to monitor the overall composting process to achieve odorless and perfect organic manure. This system will ensure effective waste management and also will speed up the process of natural composting without any human intervention.*

Keywords —***Temperature, Moisture, Realtime Database***.

1. INTRODUCTION

Composting is an aerobic method (involves the presence of air) of decomposing organic solid waste. Thus, it can be employed to recycle organic content. The cycle involves decomposing organic material into a humus-like substance called compost and it is a healthy plant fertilizer. Compost which is created in a natural way is abundant in vitamins and can be employed as manure. Composting organisms need four equally important elements to function effectively; they are nitrogen to promote the growth and replication of larger organisms for oxidizing the carbon, carbon to generate energy, oxygen to oxidize the carbon, water and the decomposition mechanism in appropriate quantities to sustain process without causing anaerobic conditions.

Adopting composting process results in various advantages. It enhances the quality of the soil by holding the dampness or moisture in the soil and also by preventing pest attacks and plant diseases. Composting balances the soil pH and also prevents soil from erosion. Also, reduces the need for chemical fertilizer. It boosts the growth of fungi and bacteria for breaking down the organic matter to form humus. Composting reduces methane emission from landfills and reduces carbon footprint.

2. METHODOLGY

The essential parameters are temperature, moisture and pH. These parameters are to be monitored at each stage of composting process over a regular period. Along with this, the height of the compost mixture in the bin is also monitored. To achieve these various sensors are used. The temperature of the mixture is monitored using temperature sensor. Moisture sensor measures the moisture values of the mixture and the pH value is acquired using pH sensor. Ultrasonic sensors are used for obtaining the level of the mixture in the bin.
The acquired data from the respective sensors are sent to the microcontroller which is then sent to database over Wi-Fi. The database is used to store the real time data from the sensors and then the data from database is sent to a mobile app and visualization tool. The mobile app and the visualization tool help the user to assess and analyze the condition of compost mixture in the bin with ease.

The data of essential parameters of the compost mixture is obtained from various sensors. The temperature of the mixture is acquired using the sensor DS18B20. The moisture value is obtained from capacitive moisture sensor and e the pH value of the mixture is measured using SEN0169 sensor. Due to microbial action, the compost mixture reduces in size. So, we use HC-SR04 to quantify this shift of compost mixture in the container.

The data obtained by the sensors is sent to the microcontroller Node MCU ESP-32S which is then sent to the database over Wi-Fi. The data can be uploaded only if the controller is linked to the specified network provided within the program. Once connection is established the data is uploaded to the firebase. To upload the data to the firebase a project has to be created in firebase console. Upon creating the project, real-time database is created, and the starting mode is selected as locked mode. The locked mode allows only authenticated applications to access the data. The database is secure and also provides user authentication.

Android app is created to monitor acquired sensor data. This is done using Android studio. To secure the data the app provides user authentication. The app also alerts the user if the values are not in the expected range

3. FUTURE WORKS

In future implementations, datasets from several bins can be collected and machine learning algorithms can be trained based on the collected dataset. Regression and classification models can be used to predict the total number of days in which the composting process gets completed. Also, the behavior of compost mixture can be predicted which aids in early problem identification and solving. Mobile application will be developed such that it supports all platforms (android, macOS etc.).
Custom based PCB can be utilized to develop the hardware module as a result, it lowers product cost. The efficiency of device can be improved by enhancing the algorithm which lessens the microcontroller computing.

4. RESUTS AND DISCUSSION

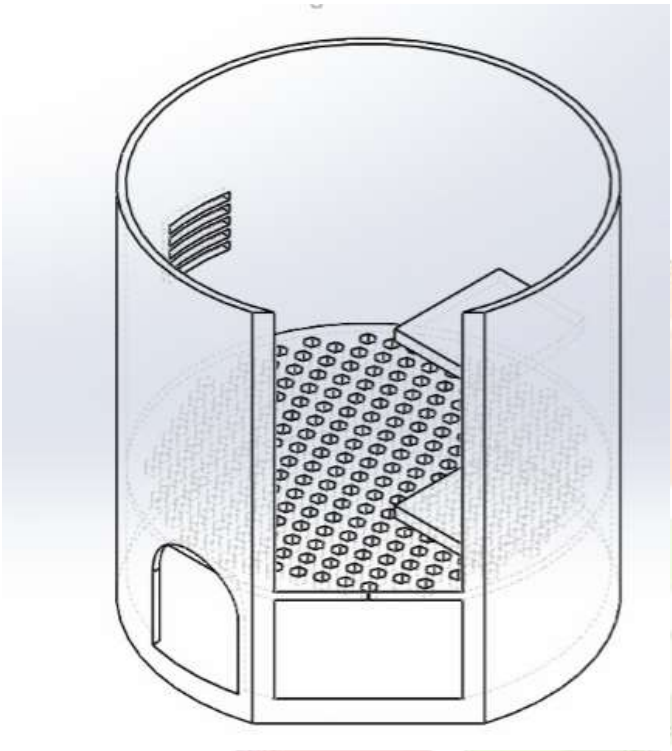

Fig-1: Simulation of Compost Bin

From the study it is known that the compost is ready only if the moisture level is about 35-40%, temperature should be about 28-32 degree Celsius and most importantly the compost should have the PH of 6-7.8. Our proposed System is used to achieve the correctness of all the above-mentioned criteria. It helps the compost users to know the level of compost without touching the waste that is being processed by the bin. Also, Compost Bin assumes a significant role in solid waste management in India as it is easy to use but it can be actualized at lower rate. Based on the study, it tends to be presume that composting is the most ideal approach to lessen or reuse the municipal solid waste and it causes not so much contamination but rather more valuable to condition just as economy when contrasted with the present techniques for assortment and removal. It has loads of advantages like lessen surface and water leachates, limit landfill space, methane discharge, and air contamination by burning of waste, transportation cost and so forth. It likewise lessens load on removal units. Manure acquired by this can be utilized as natural compost in farming field rather than using chemical fertilizer destroying the land.

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Model was implemented in a compost in its mesophilic phase and the below results were obtained

	Expected	Output
Temperature	44-52	48
Moisture	40-50	46.8
ph	4-5	4.21

6.REFERENCES

[1] Vrettos, G., Kazamias, G., &Lekkas, D. F. (2017, September). Smart Compost Monitoring System using Open Source Technologies. In *15th International Conference on Environmental Science and Technology Rhodes*.

[2] Sharma, K., &Garg, V. K. (2018). Solid-State Fermentation for Vermicomposting: A Step Toward Sustainable and Healthy Soil. In *Current Developments in Biotechnology and Bioengineering* (pp. 373-413).Elsevier.

[3] Ghadage, S. A., &Doshi, M. N. A. (2017, December). IoT based compost management (Monitor and acknowledgment) system: A review. In *2017 International Conference on Intelligent Sustainable Systems (ICISS)* (pp. 642-644).

[4] Nikoloudakis, Y., Panagiotakis, S., Manios, T., Markakis, E., &Pallis, E. (2018). Composting as a Service: A Real-World IoT Implementation. *Future Internet*, *10*(11), 107.

[5] Espinosa, A. G., García, A. C., & Aguirre, C. P. (2011, February). Design and construction of a composter for domestic use. In *CONIELECOMP 2011, 21st International Conference on Electrical Communications and Computers* (pp. 77-81). IEEE.

[6] A., A Wardhany, V. A., Hidayat, M. D. S., Subono, &Afandi, A. (2019). *Smart Chopper and Monitoring System for Composting Garbage.2019 2nd International Conference of Computer and Informatics Engineering (IC2IE).*

[7] Casas, O., López, M., Quílez, M., Martinez-Farre, X., Hornero, G., Rovira, C., &Girão, P. S. (2014). Wireless sensor network for smart composting monitoring and control. *Measurement*, *47*, 483-495.