

Design a Fabrication of low cost Solar Powered Trash Compactor for Smart cities

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Abstract: Population has been increasing day by day and so pollution also been increasing day by day and in order to maintain the pollution in systematic manner we are developing a smart dustbin for the purpose of serving/managing the waste. In this project we aim to develop a solar powered trash compacting smart dustbin which takes the help of sensors which are incorporated with the microcontroller. The battery is the power source for this circuit, which uses solar energy to get charge and provides power to the circuit as per the requirement. In this report we will study design procedure and implement a small scale model of the garbage bin which will show the demo working of the model.

I. INTRODUCTION:

In recent years, urbanization is progressing day by day. At the same time, there is an increase in waste. Waste disposal was an important issue to consider. Waste compaction is the process of compressing or compressing waste. The various composition processes of waste cause soil pollution, water pollution and air pollution. Now, the waste of the day is placed above the level for decomposition. In our country, many people leave garbage and garbage, causing environmental pollution, problems, and ecosystem problems. Waste management topics include household waste collection and management, landfill management, and oversight of legal frameworks to protect human health and ecosystems. The most important changes include the privatization of municipal waste management and the adaptation of new technologies such as trash cans and fully automated collection vehicles with compression capacity. Garbage management and disposal issues are evident in many aspects of our society, from carnivals and summer town festivals to the flood of trash cans at fast food restaurants. People often try to pack their trash into the trash can, which is already struggling to flatten a pile of trash. To solve this problem, we propose an automatic garbage compressor that manages the amount of garbage and notifies you when the trash can needs to be emptied. Using a trash compressor instead of regular trash can increase the amount of trash that can be placed in a trash can of the same size. Even more convenient, the compactor detects when the bin is full and automatically compresses the debris as needed.

II. LITERATURE SURVEY:

1. Fady E. F. Samann, “The Design and implementation of smart trash bin”, Academic Journal of Nawroz University(AJNU), Research gate, January 2017. They developed, a economical design of an waste intelligent container for small-scale cases. The system powered by battery to support power bank and solar cell panel. finally, a system implemented successfully within acceptable overall cost for the intended application.
2. Ranjeet Kumar Jha, Durgesh Sharma, the analysis was done on the hostel waste generated in the month of June 2018. It was found that the space required for waste disposal reduced around 60 % as well as the composting material use as a conditioning and fertilizing material for soil.

III. OBJECTIVES:

- This prototype garbage bin monitors the garbage level and compress to allow further garbage to put inside hence it receives more waste than conventional type.
- This garbage bin communicates with concerned authorities by sending the message to unload the waste by using GSM technique.
- This project work reduces the manual interventions and reduces the cost of municipal vehicle fuel cost.

IV. METHODOLOGY:

Methodology is the method for understanding the Object of work/project, state of problem, design procedures, work process with accurate results. Jack mechanism is the main/premiere element of this project.

The below block diagram consists of following four units-

- Input Unit.
 - Controlling Unit.
 - Processing/Work Unit.
 - Output Unit
- A. Input Unit- With respect to input unit we have to two major inputs that can be one is Electrical in put which is required for the machine to operate and the other input is the waste which we put inside the dustbin.
 - B. Controlling Unit-As per the block diagram for the control purpose we have used the microcontroller as the controller. This will be able to control the signal getting from ultrasonic sensor and IR sensor. And this it gives the necessary input to motor to operate.
 - C. Processing / Work Unit- Processing unit mainly consists of motor and the jack mechanism which is used for compressing the waste. After getting the signal from

control unit the motor will turn on and operates the jack which will compress the dust inside the bin.

D. Output Unit- In this unit we are required to get the proper output which we have as our objective that is whatever the waste which we have dumped in the bin should be compressed as per our requirement. And the text message should be received for clearing/emptying the bin through GSM module.



Fig 1: Block Diagram of Compactor Bin

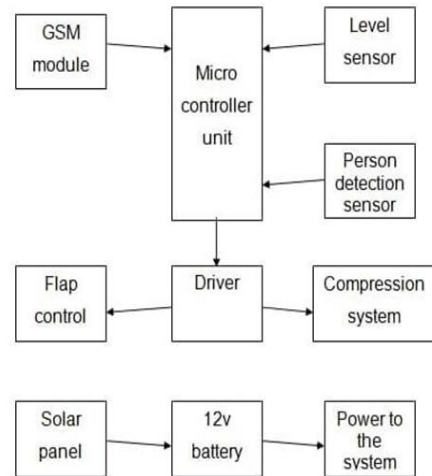


Fig 2: Solar Powered Compactor Bin

The main aim of this project is to detect the waste at certain level and start the compression action for this we need the power supply to give the power to the components of a compressor and the components which require power are motor, sensor, and microcontroller. So to provide a continuous power supply we are using a solar panel which charges the battery whenever the sunrays falls on solar panel and that battery gives the continuous power supply to the components of the compressor.

Smart dustbin which has microcontroller is been interfaced with a IR sensor and Ultrasonic sensor , IR sensor is used for detecting the level of waste and ultrasonic sensor is used to detect the person coming near the Dustbin, whenever Ultrasonic sensor detects the person it gives the signal to servo motor through microcontroller and hence the servo motor starts and opens the door of the dustbin so that person can through the waste inside the dustbin the door of the dustbin will remain open till the person moves/goes away from dustbin.

Whenever the dustbin becomes full the IR sensor which is placed at the top of the bin will activate and send the signal to the motor through microprocessor and the dc motor will run for 30 seconds in one direction and will run in reverse direction for 30 seconds, as the motor is coupled with the compressing mechanism it compresses the waste whenever the motor starts.

We have used a GSM module to send the information regarding the condition/status of the dustbin, so whenever the dustbin becomes full it sends the message to the authority to empty dustbin only after unloading the waste. The machine will start working.

LED's are used for showing the status of bin whenever the bin becomes completely filled the red led will glow that shows the user must empty the bin.

V. RESULT :

More waste can be deposited at less land fill area. India is a populated country so a huge amount of waste is generated on a daily basis. By the compaction we can reduce the volume of waste i.e. more space is available for the waste to deposit. We can collect a large amount of solid waste at a time in a single waste bin so it can reduce the cost of container and labour. Using a solar trash compactor we can reduce the overall cost of waste disposition from city to land fill area by compaction. Solar energy is environmentally friendly and freely available to drive the compactor.

VI. CONCLUSION:

Succeeded in manufacturing a waste compression tank for solar power generation. Implementation of solar compacting bins saves power and time. The trash can runs on a used battery. Batteries also need to be safe, efficient and long lasting. Uses solar energy as an energy source. Used near hotels, beaches, public areas, and roads. Therefore, the purpose of this project is to manufacture solar trash cans. Price plays an important role because it is intended for commercial use. To address this, cheap and efficient components are used. Trash can also use batteries for power, so batteries need to be safe, efficient and long lasting. During standby time when the bottle is not in use, the battery lasts for more than a day.

Second, we need to consider possible consequences in order to gain a better understanding of the technology and its appropriate applications. This project uses some complex parts and requires rigorous testing for a successful implementation. This design combines electrical and mechanical components to perform tasks that cannot be performed by using only one of them. However, by using the right parts and the right way, we were able to successfully design the trash can for the waste compressor and achieve our goals.

VII. REFERENCES:

- i. Nesreen Alsbou, Mohamed Abdul Samad, Mohammed Alhashem, Alaeddin S. A. Abuabe, Dept. of Engineering & Physics University of Central Oklahoma. 2018.
- ii. Prof. P. P. Gawade, S. B. Ingale, G. P. Jadhav, A. B. Patil, R. R. Patil, S. S. Ingale. International Advanced Research Journal in Science, Engineering and Technology, November 2017.
- iii. Compactor for Space Toilet, NASA Technical Reports Server (NTRS), David (Inventor), 2017-01-01 6. Microbial Characterization Space Solid Wastes Treated with a Heat Melt Compactor, NASA Technical Reports Server (NTRS), Michael, 2012- 01-01.

- iv. Yusuf, N.M., Jidin, A.Z., Rahim, M.I,“Smart garbage monitoring system for waste management”, MATEC Web of Conferences Engineering Technology International Conference, vol. 97, EDP Sciences (2017), p.01098.
- v. Issac, R., Akshai, M,“SVASTHA: an effective solid waste management system for Thiruvalla Municipality in Android OS”, Global Humanitarian Technology Conference: South Asia Satellite, GHTC-SAS, Trivandrum, India, IEEE (2013), pp. 254–259
- vi. Development of the Plastic Melt Waste Compactor- Design and Fabrication of the HalfScale Prototype. NASA Technical Reports Server (NTRS), Fisher, John, 2005-01
- vii. FaddyE.F.Samann, AcademicJournalofNawrozUniversity(AJNU),August 2017.