TuijinJishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 44 No.6 (2023)

Waste Food Shredder Com Postmaker Machine

B. Bhavsingh[1], PVR Girish Kumar[2], Dr. R. Sudarshan[3], P. Sudheer Rao[3]

1Assistant Professor, Geethanjali College of Engineering and Technology, Hyderabad, T.S, India.

2Sr.Asst Professor, Geethanjali College of Engineering and Technology, Hyderabad, T.S, India.

3Associate Professor, Geethanjali College of Engineering and Technology, Hyderabad, T.S, India

Abstract

Kitchen refused food items like vegetables, green leaves, eggshells, meat, boiled rice, all sorts of fruit peels, etc, (the list is endless) is known as kitchen waste or organic waste. A waste converter is machine used for the treatment and recycling of this wet organic material in a manner of cutting them in to a small piece using manual shredder and sterilizing the waste by heating the material at low temperature to kill the hazardous bacteria by which healthy compost will be produced which can be used as soil compost. A tool or machine which can be used for cutting above said materials in to small pieces, here manually operated mechanism is used as a separate device. After cutting the organic waste, it must be poured in to the separate container made of acrylic sheets. The idea of using clear acrylic sheets is to see through the process, for this purpose, hard sheets of 4mm thick are used. Not only kitchen waste, garden waste like green grass, flowers, leaves, etc, also can be converted in to compost. PIC 16F676 processor is used to measure the temperature through LCD. This IC is having built-in-with ADC such that additional ADC is not required for converting analog data produced by the temperature sensor in to digital. To prove the concept practically, one medium size container will be fabricated with Acrylic and metal angles structure. All sides of the container will be constructed with acrylic sheets to see through the process. With the help of a manually operated shredder, solid dry organic waste can be pulverized to make in to small pieces. Sterilization process is considered to kill the bacteria, for this purpose hot air blower is used and this device is energized and reenergized independently through relay wired with IC555 timer chip.

Keywords*: Shredder blades, fertilizer, vegetable.*

Introduction

Organic waste Material that is bio degradeable and comes from either a plant or an animal. Organic waste is usually broken down by other organisms over time and may also be referred to as wet waste. Most of the time, it is made up of vegetable and fruit debris, paper, bones, and human waste which quickly disintegrate. In which green waste produced from the crops and domestic kitchens available in great quantity. Green waste, also known as "biological waste," is any organic waste that can be composed. It is most usually composed of refuse from gardens such as grass clippings or leaves, and domestic or industrial kitchen wastes.)1 Green waste does not include things such dried leaves or food. Such materials are rich in carbon and considered "brown wastes," while green wastes contain high in concentrations of nitrogen. Green waste can be used to increase the efficiency of many composting operations and can be added to soil to sustain local nutrient cycling. Green waste is an integral part of many manufactured top soils, as it provides both nutrients for growing plants and increases the volume of manufactured top soils. Its woody components do not decompose quickly, so they provide the bulk that is necessary for supplementary top soils. Mixing industrial wastes such as fly ash or coal dust with green waste to create artificial

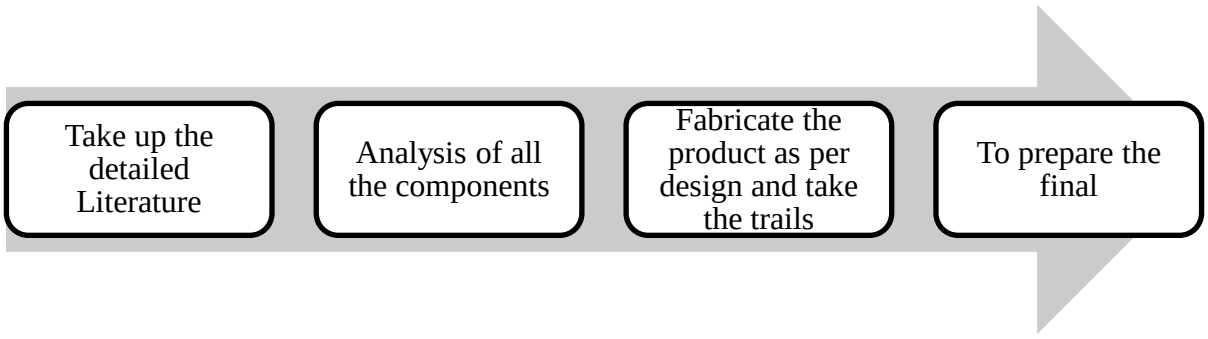
topsoil not only facilitates the repurposing of industrial debris and keeps it out of landfills, but it also allows the nutrients in green waste materials to be cycled back into the environment. By utilizing fly ash in conjunction with green waste, manufactured soils are able to increase their water holding capacity while simultaneously recycling refuse materials that might otherwise take up space in a landfill. This allows fly ash and green waste to increase local soil nutrient levels and promotes natural nutrient cycling processes.2) Now coming to the waste composting machine, it can be said as a converter and is a self-contained system capable of performing the following functions like pasteurization (the partial sterilization of a product, such as food waste to make it safe for soil consumption and improve its keeping quality) of organic waste. Sterilization is the process of making something free from bacteria or other living microorganisms of pathogenic or biohazard waste of a bacterium means virus or other microorganism which causing disease. In addition to the above process, shredding and pulverization (Pulverization, crushing or grinding) is the process of applying an external force to a (solid) material of a certain size to destroy it and reduce it into pieces that are smaller than the original size.3) It is essential to convert the green waste or food waste in to useful compost for the soil. Pulverization means, a solid substance making it to in the form of tiny loose

Composting

Composting Compost is organic matter that has been decomposed in a process called composting.4) This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner. Compost is rich in nutrients. It is used, for example, in gardens, horticulture (Horticulture is the science or art of cultivating fruits, vegetables, flowers, etc), urban agriculture and organic forming. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, and as a natural pesticide for soil. Now coming to the project work, here one prototype module is constructed for demonstration purpose which includes all required processes like Sterilization, mixing the materials and Pulverization. Here pulverization will be done manually using manual operated vegetable cutter.5) This is a separate unit and it is not attached to compost making mechanism. Sterilization process is carried over using hot air blower and it is not energized continuously. It will be energized and de-energized using IC555 timer chip. The timer chip output is used to drive 2 relays and these relay contacts are used to energize dc motor and hot air blower independently. Out of both these two devices any one remains in energized condition and the other remains in off condition. Both devices will be energized and de-energized one after another in a sequence.6) The processing electronic circuit is constructed with 555 timer chip, pic16f676 microcontroller chip, dc motor, temperature sensor, LCD, relays, etc. The DC motor used here is intended to shuffle the organic material through a revolving mechanism coupled with motor shaft. The pulverization process is carried separately and here manual operated mechanism is used7). Finally the sterilization mechanism is constructed with hot air blower which will be operated at 220v single phase supply source. For this purpose low wattage hair drier is used. Supply to these devices are provided through relay contacts such that according to the pulse duration or time sequence generated by the timer chip, above devices are energized and de-energized for a specific time sequence, means these devices are not powered continuously. The detailed description of these devices and their process sequence is explained in next chapter8). Similarly other subjects related to the organic waste converter are also explained individually in following chapters. The act of heating the organic material is conducted with hot air blower, since it is a prototype module low power hot air blower is used. In fact to kill bad bacteria or fungus, the material must be heated at the rate of around 600 C continuously for specific time. If the temperature is greater than that, food waste may not be useful as compost because of dead proteins or protein less waste9). The definition of a protein is a substance that has amino acids, compounds and carbon, hydrogen, oxygen, nitrogen and sometimes sulfur and is found in many type of foods (weather it is veg or non-veg) and green leaves. An example of a protein is the type of nutrient found in meats. These proteins may burn due to the high temperature and hence organic material must be heated at low temperature. The concept presented here can be said as recycling bin, means the bin itself converts the waste food in to compost. To make fine compost, the wet waste food must be dried by shuffling it and it has to be grinded to convert solid waste in to small pieces10). The temperature measuring cum display unit is constructed with PIC series microcontroller chip, for this purpose PIC16F676 is used. This is a 14 pin IC and it is built with internal ADC such that additional A to D converter is not required for converting the analog data

generated by the temperature sensor. The temperature sensor used here is LM 35 which is intended to measure and display the hot body temperature of Power resistor. This chip is programmed to measure and display the temperature value in digital through LCD which is interfaced with PIC controller. PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller, and then it was corrected as Programmable Intelligent Computer. The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems. WASTE FOOD SHREDDER COMPOST MAKER MACHINE Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The following is the general and brief introduction of microcontroller chips. Microcontrollers are increasingly being used to implement instrumentation system. It is therefore important to understand Microcontroller based systems well. Today, microcontrollers have become an integral part of all measuring instruments. Dedicated system that use microcontrollers, have certainly improved the functional, operational and performance-based specifications. The architectural changes in instrumentation and control systems where and are due to the computing and communication capability of the Micro controller devices. Micro controller must be treated as a tool for computing and communication; Knowledge of microcontrollers is meaning full and very rewarding if it is applied to design a product that is useful in the industry or for the society in general Any Micro-controller, that functions according to the program written in it. Here the program is prepared in such a way, so that the system performs the function of displaying the cold body temperature of TEC module. The program is nothing but an instruction set, this is often prepared in binary code, & are referred as machine code, there by this software is called as machine language. Writing a program in such a code is a skilled and very tedious process. It is prone to errors because the program is just a series of 0's and 1's and the instructions are not easily comprehended from just looking at the pattern. An alternative is to use an easily comprehended form of shorthand code for the patterns 0's and 1's. Micro controller can read and it can store the information received from the remote-control unit. Micro-controllers are dedicated to one task and run one specific program. The program is stored in ROM (read-only memory) and generally does not change. Methodology shown in below.

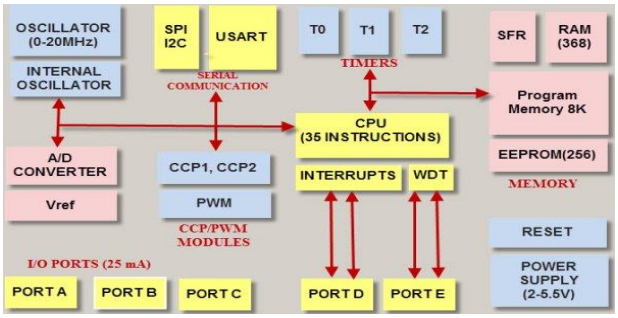
Methodology



PIC16F676 Microcontroller chip:

It is an 8-bit CMOS PIC Shown in fig 1(a)microcontroller, based on Flash and developed by Microchip. It comes in 14-pin interface with high-performance RISC (Reduced Instruction Set Computer) CPU that makes it an ideal choice for most of the electronic applications that are widely related to embedded systems or industrial automation. This tiny chip incorporates everything we need to develop individual projects. Memory space and a number of pins are little less as compared to other controllers in the PIC community.

However, flash-based technology makes this device compatible with external devices..



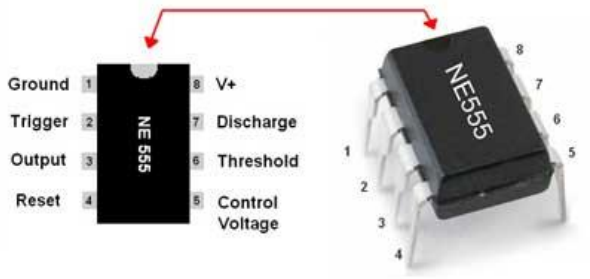


Fig1 a) PIC16F676 Pinoutb) 555 Timer chip

555 Timer chip

The 555 timer IC is an integrated circuit (chip) shown in fig 1 (b)used in a variety of timer, pulse generation, and oscillator applications. The 555 can be used to provide time delays, as an oscillator, and as a flip-flop element. Derivatives provide up to four timing circuits in one package. Introduced in 1971 by American company Signe tics, the 555 is still in widespread use due to its low price, ease of use, and stability. It is now made by many companies in the original bipolar and also in low-power CMOS types. As of 2003, it was estimated that 1 billion units are manufactured every year.

DC Motor:

DC motor take direct current voltages as input and convert it into rotation movement. D Cmotors usually have two wires and can be powered directly from battery or DC power supply. DC motor can also be powered through driver's circuit that can regulate the speed and direction ofthe motor.

Table1: Current Flow

Voltage	12VDC
OperatingCurrent	Operating200MAmps
Speed	30RPM

LM35 temperature sensor

From the fig 3operating temperature range is from -55°C to 150°C.The LM 35'slow output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It has its applications on power supplies, appliances, etc.

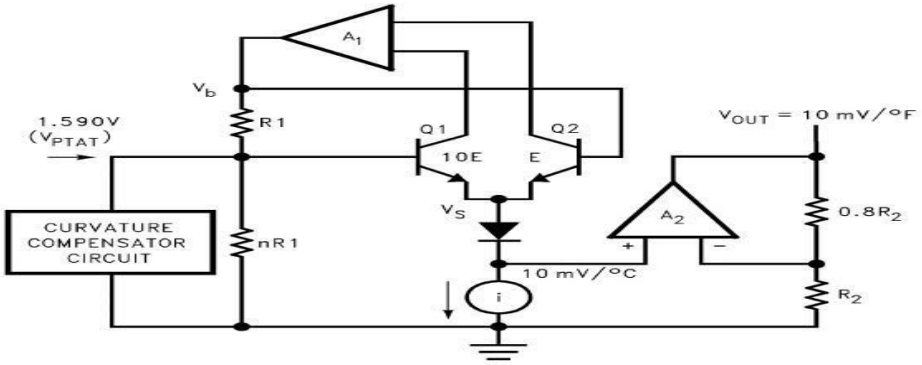
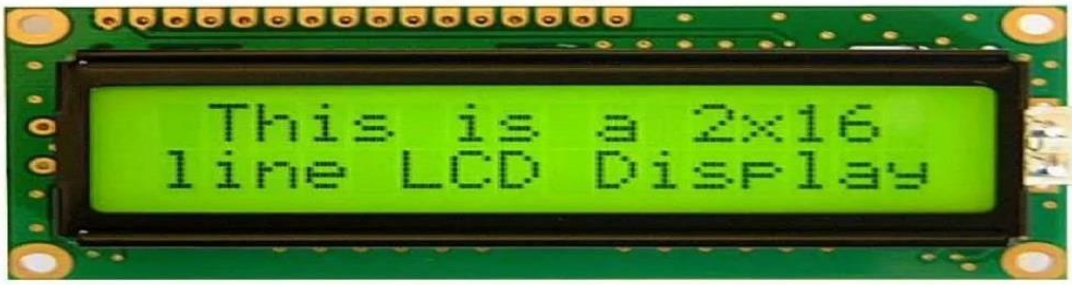


Fig 3 :LM35 temperature sensor



LCD:

Fig 4 : LCD

TABLE 2Machine Running Process Coding

	Commandto LCDInstruction
1	Cleardisplayscreen
2	Returnhome
4	Decrementcursor(shiftcursorto left)
6	Incrementcursor (shiftcursortoright)
5	Shift display right
7	Shift display left
8	Display off, cursor off
A	Display off, cursor on
C	Display on, cursor off
E	Display on, cursor blinking
F	Display on, cursor blinking
10	Shift cursor position to left
14	Shift cursor position to right

18	Shift the entire display to the left
IC	Shift the entire display to the right
80	Force cursor to beginning of first line
CO	Force cursor to beginning of second line
38	2 Lines and 5x7 Matrix

Fig6:Acrylic box

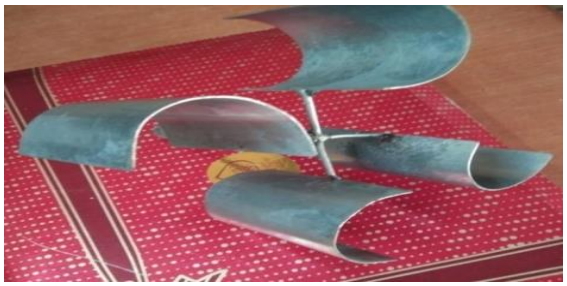


Fig 7 :Shuffling blade

Experimental Setup:

SHUFFLING BLADES

Procedure of the running composting machine:

1) The main objective of the project work is to convert the kitchen waste into organic compost

The system designed here is very useful for farmers.

2) Kitchen waste like outdated vegetables, green leaves, eggshells, bones etc.

3) In addition to this plant waste of green waste also can be converted into compost

4) The main purpose of this mechanism is to kill the had bacteria by heating the shredder material into a certain temperature of 60 to 70degrees

5) The bad bacteria can be killed, whereas the vitamins, proteins, minerals present in the waste material remains in safe condition, which is very useful for the soil to strengthen it

6) To rise the temperature, hot air blower is used and it will be energized and deenergized at a interval of very 5 or 6 seconds such that the material inside the boxwill not be heated continuously. If the material is heated continuously it may spoil due to high temperature.

7) To display the temperature one small embedded system is installed to measureand display the temperature in degree centigrade.

8) The embedded system is designed with PIC16F676 micro controller chip. This is having internal ADC (Analog digital convertor) such that addition ADC is not required for converting that analog data produced by the temperature sensor into digital.

9) The purpose of using DC motor is to rotate the shuffling mechanism at low speed whereas in AC motor it is not possible because it runs at high speed.

10) The DC motor used in this project is rated as 10rpm.

11) Operating voltage: 12V

12) This motor is design with internal gear mechanism internally such that the speed will be reduced and torque will be increased.

13) The main power supply is derived from 12V step down transformer, 1 transformer is used to drive the DC motor and other transformer is used to embedded system.

14) The output of the transformer is converted to DC using rectifiers because the entire electric circuit includes DC motor operates at DC voltages.

15) NE555timer is used to switch ON and to switch OFF DC motor and hot air blower one after another in a sequence. These two devices are driven through hrelays

Applications:

1. Application of the converter is common in centralized waste conversion centers,where large machines process waste on an industrial scale. MSW (Municipal solid waste)or infectious waste, depending on the type of plant, is sterilized and converted into asterilizedorganicandinorganic,innocuousend-product.Machinesusedinsuchlarge-scaleapplications process between 1,000 and 4,000 kg of waste per hour. At the end of eachcycle, lasting as little as half-hour in Converters (that are capable of grinding), and thepulverized, sanitized, and dehydrated product is off-loaded and segregated for other uses.Some of the product is routed for use in pulp production, composting, or refuse-derivedfuel.
2. Applications outside of waste treatment centers are increasingly common due to the portability and simplicity of modern converters. Hospitals are alarge beneficiary of converter technology, which allows for the immediate treatment of potentially infected hazardous waste at its source. Hospitals and clinics equipped to have a zero hazardous waste footprint operate by having a converter placed on every floor where single uses an itary items such as needles, scalpels, bandages, and blood bags are immediately converted into innocuous product. In addition to the marked improvement in sanitation, on-site treatment of hazardous waste allows operational cost savings for these facilities. The government of Tuscany, Italy for example calculated an annual figure of 8 MillionEurothat was saved by turning to on-site treatment of medical hospital waste.
3. Super markets and food producers (who dump unused food waste in municipal landfills at arate that is alarming many conservationists) have found a use for converter technology. By processing unused and decomposing food matter together with packaging and other refuse on site, super markets have achieved improvements interms of waste disposal costs. This is in addition to improvements in public perception, which had been seriously critical of the amount o wastes enttoland fills by food stores. In the UK alone 6.7 millionmetrics. tons of food waste go into landfills each year, resulting in 8 million metric tons of CO2 being emitted.
4. Farms, slaughterhouses, and other food producers are likewise becoming more involved in on-site waste conversion. Larger installations especially, where garbage hauling is a major and expensive operation, currently have economic and legislative incentives to move towards operating own converters. Recent drives toward environmentally conscious or "green" technologies have even provided government budgets for such installations.

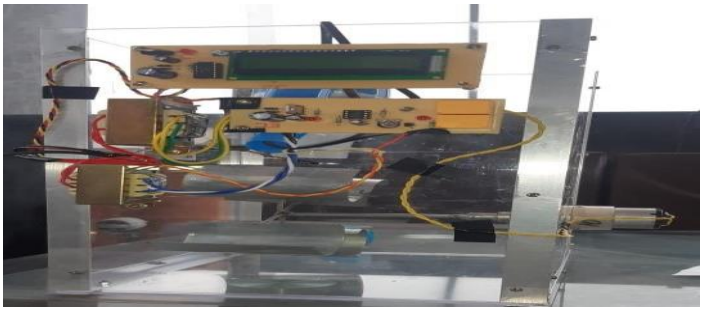


Fig 8 Composting Machine

Conclusions

"Organic waste compost machine" is completed successfully, results are found to be satisfactory. This is an innovative and first of its kind in modern type of waste converter concept. In Europe many countries are using these organic waste compost machines, it is an essential device for the hotels and restaurants, because every day they produce huge quantity of food waste and hence their governments declared that these machines are mandatory for the above said organizations. Recently in our country also, in many states especially in major cities, municipal corporations are forcing the owners of hotels and restaurants to use these machines to maintain clean environment. Not only hotels, in domestic front also it is an essential device for each and every home.Organic waste converter machine is a system used to do process of composting in an easy manner. Composting is the decomposition of organic waste by bacteria, and fungi in the presence of oxygen and the result it gives is an organic fertilizer popularly known as compost. After invention of this Machine, composting process becomes easy. This machine turns out large amount of biodegradable solid waste into compost. Before its invention, composting is done at homes and it takes much time in giving the results.There are wide variety of machines are in use, the concept presented here is intended to make wet compost which can be stored for later use in many ways. These dayswastefoodconvertersaregainingpopularityduetotheusefulactivityofrecyclingprocess.

SCOPE

1)By increasing the cutting speed the efficiency can be increased. By using it properly the output efficiency & productivity can be increased.

2)The machine can be made movable in the floor by lifting the machine because of its light weight and which can move more freely with out any problem on the floor.

3)By increasing the size of the cutting chamber more amount of crop residue can be continuously feed in the machine cutting chamber. Thus ultimately a movable bigger size, weight, more productive & well efficient machine can be added to the future scope.

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