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Generation of Electricity from Agricultural Waste Materials Using Solar Thermal Panels

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ABSTRACT

This project explores a method for generating electricity from agricultural waste materials like grass, paper, leaves, etc. The process utilizes a controlled burning chamber and thermoelectric heating panels. The burning waste produces heat, which is then captured by the heating panels. These panels convert the heat energy into electricity, providing a clean and sustainable way to utilize agricultural leftovers. The project will investigate the efficiency of electricity generation using different types of agricultural waste and analyze the potential for powering small appliances or charging devices. The aim is to demonstrate a simple and eco-friendly approach to converting agricultural waste into a usable energy source.

1. INTRODUCTION

This project aims to convert agricultural waste materials, such as paper, grass, bark, and husk, into electrical energy. This energy will then be stored in a battery via a circuit and used to power the entire apparatus. The LED lightbulb is shown as being on. In this project, heat is produced when burning begins, and a heating panel begins to convert that heat into electricity, which is visible on a multimeter display. We can observe the amount of voltage generated by waste materials, and we successfully produce electricity. An automatic heating sensor on the output power supply causes the large LED bulb to light up, demonstrating to everyone how our invention operates in real time.

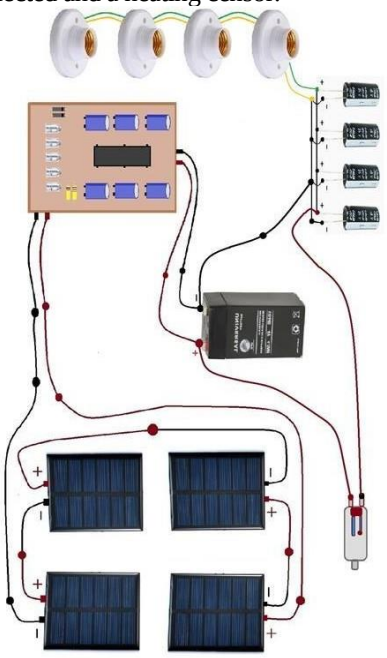
- Filter Pollution Control Filter

We provide an idea based on a pollution control system in this project. In this project, when smoke is generated, it travels via a pipeline to a water tank, where it collects carbon on the water's surface. Since water shouldn't heat, we use a water cooling filter to continuously cool the water. This is the only way we can control carbon pollution, as the smoke collects carbon on the water tank's upper surface.

2. LITERATURE REVIEW

This project idea was taken from the extraction of electricity from waste materials is the focal point of discussion in the International Research Journal of Engineering and Technology (IRJET), as outlined in Volume 09, Issue 06, dated June 2022. This esteemed journal, recognized for its Impact Factor value of 7.529 and ISO 9001:2008 certification, delves into innovative methodologies for converting waste into electricity. The process involves harnessing energy from various forms of waste, thereby contributing to sustainable energy production and environmental conservation efforts.

A circuit board with LED bulbs, resisters and diode connected to solar panel, and that circuit board is connected by a battery from which capacitors followed by big LED bulb is connected and a heating censor.



3. METHODOLOGY

The solar thermal panels will begin to gather the heat energy produced by the burning agricultural waste material in the burning box as soon as we start burning it.

Solar thermal panels have the ability to convert heat energy into electrical energy. The circuit box's led lighting will display the energy used to generate electricity.

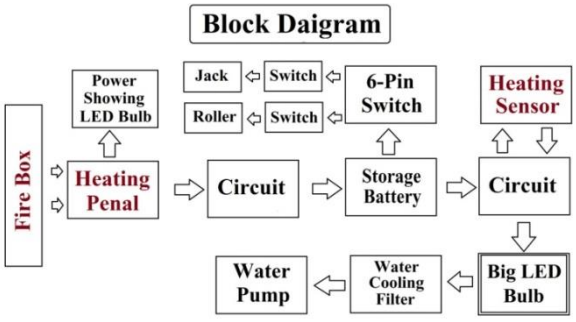
The batteries will receive the created energy. Because a diode is connected to the batteries, the electrical energy generated will not be dissipated back. With regard to the batteries and the LED lights and heat sensor,

The heat sensor will initiate conductivity, which will cause the battery to release energy and cause the LED lights to glow.

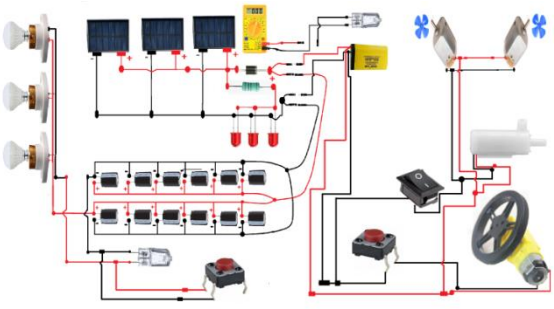
Also....., a carbon collector system is installed which will capture the maximum amount of CO2 gas emits from burning of waste and keep our environment healthy.

4. BASIC WORKING OF BLOCK DIAGRAM

This block diagram shows what happens when waste materials and fireboxes are burned. Heat is produced, and a heating panel begins to convert that heat into electricity. We can then see this electricity by looking at an LED bulb glowing, which indicates that the electricity has entered a circuit and is beginning to store power in a battery. Like flipping a light switch, the heating sensor activates when it becomes hot. This could make an LED light bulb turn on to show it's working. However, that's separate from air pollution control, which uses different filters to clean the air we breathe.



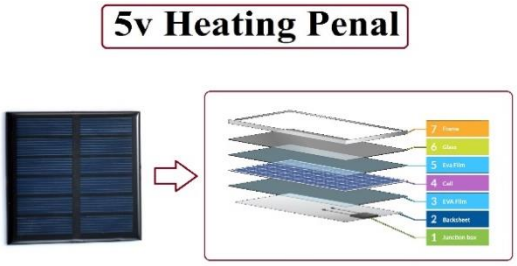
5. CIRCUIT DIAGRAM



6. Components

1) Solar thermal panel [Heating panel]:

A heating panel works differently than a traditional heater. Instead of warming the air, it emits invisible heat waves like the sun. These waves heat objects and people directly, making you feel warm faster. The warmed objects then radiate heat back into the room, keeping you comfortable for longer. This targeted approach can be more energy-efficient than heating the entire room of air.

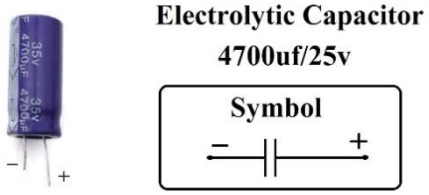


2) Heating sensor:

A heat sensor is a device that detects changes in temperature. It's like a tiny thermometer that can tell if things are getting too hot. These sensors are often used in fire alarms, where they trigger the alarm if they sense a rapid rise in temperature. They are also used in many everyday appliances, like ovens and toasters, to keep them from overheating.

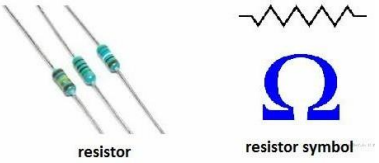
3) Capacitors:

A capacitor is like a tiny battery for electricity. It ha two metal plates separated by an insulator. When you connect it to a power source, positive charge builds on one plate and negative on the other, storing energy. Disconnect the power, and the capacitor holds that charge, ready to release it later like a mini power burst.



4) Resistor:

Resistors have a wide range of applications in electronic circuits, including the reduction of current flow, adjustment of signal levels, division of voltages, biasing of active components, and termination of transmission lines, among other rather important purposes.High power resistors that actually are able to kind of dissipate many watts of electrical power, particularly as heat, which is quite significant

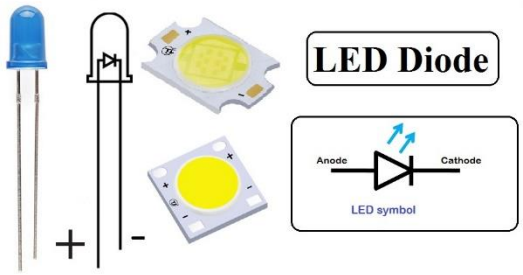


5) Battery:

A battery is a crucial component in converting chemical energy into electrical energy, playing a vital role in powering various electronic devices. It's essential to understand how the battery functions in order to efficiently utilize its capabilities in various applications.

6) 3V DC LED Buld:

3V DC LED Bulb We use for showing electricity generating for.



7) DC Motor:

RPM: 3000, Operating Voltage: 6V DC, Shaft diameter: 6mm with internal hole, Torque: 7 kg-cm No-load current = 60 mA(Max), Load current = 300 mA(Max).

8) DC Water pump motor:

RPM: 3000, Operating Voltage: 6V DC, Shaft diameter: 6mm with internal hole, Torque: 7 kg-cm No-load current = 60 mA(Max), Load current = 300 mA(Max).

RESULT:

In this project, solar thermal panels will collect the heat produced when we begin heating the waste material inside the jar box! Solar thermal panels are going to Gather thermal energy, transform it into electrical energy, and send it to the circuit board. It is built with capacitors linked in parallel and series to push energy into the battery and boost generated energy.

After the heating sensor detects heat, it will link the circuit to the LED bulbs' output, causing the bulbs to glow until the energy is stored.

The thermal sensor detects the production of energy. The lightbulb will remain illuminated throughout the process of energy generation and battery storage! Is there anything you can do with this stored energy?

Waste material is currently available everywhere; with a few simple steps, we can gather it all, and we can utilize this prototype to produce more energy for use In order to capture carbon and maintain the health of our environment, a carbon collector system is also built. This led us to the conclusion that, with some caution, producing electricity using this method is simple! This prototype aids in our understanding of waste management.

CONCLUSION:

The process of completely burning waste—either agricultural or municipal solid waste—while recovering heat to create energy, which is then converted into power using solar thermal panels. This leads us to the conclusion that energy is vital to our lives and that we should be aware of the processes involved in producing waste electricity.

For facilities that offer technical services Goals and maintenance tasks are crucial since the equipment's availability affects the service provided the most. This demonstrates how successfully electricity is created.

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