

POWER GENERATION USING NON-CONVENTIONAL ENERGY SOURCES

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ABSTRACT

Electricity has become a need of every single human, demand of electricity increasing day by day. This new generation needs lots of electrical power for their different operations. Due to this many sources are wasted and exhausted in a large amount. There are various ways to generate electricity. The human waste foot energy is being used to produce electricity this would be a great evolution in electricity generation.

When we walk then some of energy is wasted in the form of vibrations we can convert this energy or vibrations into energy using piezoelectric crystals. The use of piezoelectric crystal is to produce the electric output from surrounding vibrations.

Piezoelectricity refers to the ability of some materials to generate an electric potential in response to applied pressure. Embedded piezoelectric crystals provide the ability to convert the human walking energy into the electric current due to the exerted pressure.

Solar power to produce electricity is not the same as using solar to produce heat. Solar thermal principles are applied to produce hot fluids or air. Using both of non-conventional energy sources we can generate the power or energy.

I. INTRODUCTION

India is fast growing country in the world. In recent years the electricity demand in India is increasing rapidly because of fast growing industry. 1.4 billion still has no access to electricity (87% of whom live in the rural areas) and 1 billion that only has access to unreliable electricity networks. We need smart and practical approaches because energy, as a driver of development, plays a central role in both fighting poverty and addressing climate change. The government of India's make in India campaign will introduce more industry in India then there will be acute demand for more and more reliable power supplies. The energy sources in India is mainly Coal(56.65%), hydro(19.13%), Gas(9.2%), Nuclear(2.32%), Oil(0.58%) and other renewable sources(12.9%). From all above the renewable energy sources are free and can be easily utilize to have more energy.

The existing system has several disadvantages like solar energy and piezoelectric energy that are being in the system as an energy source can supply the load only for a particular period of time. A major drawback of the existing system is the charging of energy from the solar and piezoelectric is not always available.

II. LITERATURE SURVEY

Nowadays, electricity has become a need of every single human, demand of electricity increasing day by day. This new generation needs lots of electrical power for their different operations. Due to this many sources are wasted and exhausted in a large amount. There are various ways to generate electricity. The human bio-energy being wasted if it can be made possible for utilization it will be very useful energy sources. The human waste foot energy is being used to produce electricity this would be a great evolution in electricity generation. The average human can take 3,000 - 5,000 steps a day.

Similarly, solar energy is present throughout the day but the solar irradiation levels vary due to sun intensity and unpredictable shadows cast by clouds, birds, trees, etc. The common inherent drawback of vibration and photovoltaic systems are their intermittent natures that make them unreliable. Solar energy is the viable source of renewable energy over the last two-three decades. It is now used in variety of fields such as industries, domestic purpose. Solar energy system is designed to collect maximum power from sun and to convert into electrical power.

When a source is unavailable or insufficient in meeting the load demands, the other energy source can compensate for the difference by combining these two intermittent sources.

When we walk then some of energy is wasted in the form of vibrations we can convert this energy or vibrations

into energy using piezoelectric crystals. The use of piezoelectric crystal is to produce the electric output from surrounding vibrations. These materials have the ability to absorb mechanical energy from their surroundings, usually ambient vibration and transform it into electrical energy that can be used to power other devices.

III.OBJECTIVE

The principle objective of this project is to utilize energy in home by monitoring different conditions using different sensor as well as calculate the generated energy using renewable energy sources. Then calculate the total energy consumes and expends will lead to energy budget. It's a very easy way to save energy and cost in your home. Energy budget system helps you easily, comfortably control your heating, ventilation, and air conditioning systems as well as lights, blinds, and many other devices around your home with generation of energy as well. For you, that can mean up to 30% less heating energy used and lower CO₂ emissions for your home. The innovative system design not only makes it especially simple automate room conditions, but also harmoniously blends in into environmentally surroundings, even into exclusive interiors. An energy budget will lead to balance sheet which calculates your energy expenditure against energy generated means to reduce your energy bill.

IV.METODOLOGY

Power Supply:-

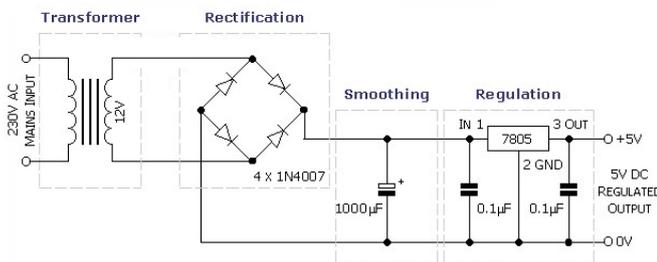


Fig: Circuit Diagram of Power Supply

A) Design of step down transformer:-

The following information must be available to the designer of the transformer.

- 1) power output.
- 2) operating voltage.
- 3) Frequency range.
- 4) Efficiency and regulation.

Size of core is one of the first consideration in regard of weight and volume of a transformer. This depends on type of core and winding configuration used. Generally following formula is used to find Area or Size of the Core.

$$A_i = \sqrt{W_p / 0.87}$$

Where A_i = Area of cross section in square cm.

W_p = Primary Wattage.

For our project we require +5V output, so transformer secondary winding rating is 9V, 500mA.

So secondary power wattage is,

$$P_2 = 9 * 500\text{mA}$$

$$= 4.5\text{Watt}$$

So,

$$A_i = \sqrt{4.5 / 0.87}$$

$$= 2.4$$

Generally 10% of area should be added to the core.

So,

$$A_i = 2.8$$

a) Turns per volt:- Turns per volt of transformer are given by relation.

$$\text{Turns per volt} = 100000 / 4.44 f * B_m * A_i$$

Where,

F = Frequency in Hz.

B_m = Density in Wb / Square meter.

A_i = Net area of the cross section.

$$\text{Turns per volt} = 50 / A_i$$

$$= 50 / 2.8$$

$$= 17.85$$

Thus the turns for the primary winding is,

$$220 * 17.85 = 3927$$

And for secondary winding,

$$9 * 17.85 = 160$$

b) wire size :- As stated above the size is depends upon the current to be carried out by winding which depends upon current density. For our transformer one tie can safely use current density of 3.1 Amp / sq.mm.

for less copper loss 1.6Amp/sq.mm or 2.4sq.mm may be used generally even size gauge of wire are used.

R.M.S secondary voltage at secondary to transformer is 9V. so maximum voltage V_m across secondary is

$$= 9 * 1.141$$

$$= 12.727\text{v}$$

D.C output voltage V_m across secondary is,

$$V_{dc} = 2 * V_m / \pi$$

$$= 2 * 12.727 / 3.14$$

$$= 8.08 \text{ V}$$

P.I.V rating of each diode is

$$PIV = 2V_m$$

$$= 2 * 8.08$$

$$= 16.16 \text{ V}$$

Maximum forward current, which flow from each diode, is 500 mA. So from above parameter, we select diode IN4007 from the diode selection manual.

B) Design of filter capacitor:-

Formula for calculating filter capacitor is

$$C = \frac{1}{r} \sqrt{3} * I * F * R_1$$

Where,

r = ripple present at output of rectifier, which is maximum 0.1 for full wave rectifier.

F = frequency of AC main.

R_1 = input impedance of voltage regulator IC

$$C = \frac{1}{r} \sqrt{3} * 0.1 * 50 * 28$$

$$= 1030 \mu\text{f}$$

$$= 1000 \mu\text{f}$$

Voltage rating of filter capacitor should be greater than the i/p V_{dc} i.e. rectifier output which is 8.08 V so we choose 1000µf / 25V filter capacitor.

COMPONENT	DETAILS	Specifications
Transformer	Step down	I/P voltage: 230V,50Hz AC

O/P voltage: 12V AC

Rectifier Full wave bridge rectifier Diode-1N4007

Maximum current:500mA

Filter Capacitive filter Capacitor-1000uF

Regulator 7805 V_{in} maximum- 16.16 V

output DC voltage- +5V

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Filter	Capacitive filter	Capacitor- 1000uF
Regulator	7805	Vin maximum- 16.16 V output DC voltage- +5V

Charging Circuit :

1) solar system :

Given :

Voltage :18v

Current :1A

Using this parameter we can calculate the power using following formula :

$$P=V*I$$

$$P=18*1=18V$$

Battery required 12V power supply but due to current tolerance we give the 14V to the battery.

So using the divider circuit step down the voltage 18V to 14V.

2) Piezoelectric Sensor :

i) A single Piezoelectric sensor gives the 2 to 4V .We are using the 3*3 array so gives the 18 to 36V AC ,but battery require DC so using the half wave rectifier diode we can convert the AC to DC voltage.

V. CONCLUSIONS

The project "POWER GENERATION USING NON CONVENTIONAL ENERGY SOURCES" is successfully tested and implemented which is the best economical, affordable energy solution to common people.

This can be used for many applications in rural areas where power availability is less or totally absence.

As India is a developing country where energy management is a big challenge for huge population. By using this project we can drive both A.C. as well as D.C loads according to the force we applied on the piezoelectric sensor.

Drawback of this project is the efficiency of this project. Theoretically we get voltage two times more than what we get practically.

VI.FUTURE SCOPE

In future this method will be a promising method for generating eco-friendly electricity. We also contribute this method at common places like home entrance gates, parking area, bus stands etc. This method will exploits different areas of electricity generation.

VII. REFERENCES

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