

MODELLING OF LIGHTENING ARRESTING SYSTEM USING SOLAR PANELS AND HARVESTING THE ENERGY IN BATTERY AND UTILISING THE SAME FOR PRODUCTION OF ELECTRICITY

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Introduction:

Lightning is a brief high-current discharge caused by inconsistency in the clouds or between the earth and the clouds. It's extremely hot, and it can raise the temperature of the air around it to 5 times that of the sun's surface. Because of this heat, the air pressure resonates and increases fast, resulting in the thunder that follows a lightning strike. The mechanism of lightning is quite complex. Lightning can be categorized into different categories based on the ends of the flash channel: intracloud, cloud to cloud, and cloud to ground.

The arrangement of P-V cells in a conceptual framework for installation process is known as a solar panel or solar cell panel. The solar panels create dc voltage using light from the sun as a form of energy. Both positive and negative charge are present in solar cells. Solar panels can absorb the light caused by lightning. Solar energy has the potential to be ecologically benign, acceptable, and cost-effective in the long term. The usefulness of solar energy has risen due to recent advances in manufacturing processes. The light from the sun is a sustainable form of energy that is also noise and pollution free. A lightning arrester rod can be used to trap lightning. Lightning protection devices can be implemented on buildings to prevent them from lightning strikes. When a flash of light hits a building, the lightning arrester rod is engaged, and the lightning is discharged and diverted into the earth properly.

Fossil fuels such like coal, natural gas and oil are used to generate electricity, which emits massive volumes of carbon dioxide, as well as smaller amounts of methane, nitrous oxide into the environment. Greenhouse gases are the term coined to these gases. Global warming is produced by these gases, which cause climatic changes. It also causes respiratory ailments as a result of smog, air pollution. Many health issues occur as a consequence of air pollution induced by the combustion of fossil fuels. As a corollary, alternative sources of energy are required. The lightning bolt, the light emitted by lightning can be absorbed by lightning arrester tower, solar panel and this energy can then be harnessed and also used to generate electricity.

Objectives:

1. To protect the building without getting collapsed from lightening.
2. To trap the lightening energy by means of solar plate
3. To convert the lightening energy (direct current) into alternating current.
4. To harvest the alternating current in the batteries.
5. To use the produced alternating current for the various purposes of the building.

Methodology:

1. On the roof of the building, a solar panel and a lightning arrester tower will be installed next to each other.
2. In-order to generate the voltage obtained during a bolt of lightning strike a step-down transformer has been installed.
3. The input to the step-down transformer is given by a normal house-hold socket (230 volts).
4. As the step-down transformer implemented is of 12 volts capacity, the input given to it (230 volts) will be reduced to 12 volts.
5. The input given from a house hold socket will be in the form of AC (Alternating current). We need to convert it into DC (Direct Current) because the voltage obtained from the lightning strike will be in the form of DC.
6. To convert the voltage from AC to DC a bridge rectifier should be connected to the step-down transformer.
7. The output from bridge rectifier board will be connected to the booster and buck-converter (regulator) board.
8. Booster increases the voltage to the required capacity if the obtained voltage is less and buck-converter reduces the voltage to the required capacity if the obtained voltage is more.
9. As our system is designed to have a voltage of 12 volts and as we have implemented a step-down transformer of 12 volts, the input and output of both booster and buck-converter will be 12 volts itself.
10. The output wires are taken.
11. On the other side a table lamp can be used to generate the light acquired during lightning on the solar panel.
12. When the light falls on the solar panel, the voltage obtained can be boosted maximum till 12 volts in our designed system by the usage of a booster.
13. The output wires are taken and are connected to the output wires of the other part (step-down transformer).
14. A common over-lapped wire which has the combined output of step-down transformer part and solar panel part should be connected to the battery.
15. By this way the battery gets charged from this system and even when the main supply is off the battery can be able to supply electricity to the houses.

16. Hence by implementing this system we can use lightning energy as a new renewable source of energy.

Conclusions:

The following conclusions were drawn from experimental results:

1. This system is safe because without harvesting the entire lightning energy we will be harvesting only the energy which is required for our building.
2. When there is no any external power supply the battery/generator which we have used acts like inverter to supply power to the houses.
3. The light which is obtained during lightning can be taken by the solar panel immediately and there are no side effects in this system as the solar plate is eco-friendly and economical.
4. This system can be implemented in places where there is more lightning intensity so that energy can be harvested efficiently and can be used further. By using lightning as a renewable source of energy to generate the electricity the emission of greenhouse gases into the atmosphere gets reduced and also the electricity costs of the building will be lessened.

Scope For Future Works:

1. To study on how efficiently we can implement this system.
2. To study on how we can practice safety measures.
3. To study on the places where to implement this system.

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