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Generate electric current from the natural photosynthesis of a plant

Generacion de corriente eléctrica a partir de la fotosíntesis natural de las plantas

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Abstract

Plants are capable of producing their own food through photosynthesis, an extremely complex chemical process that groups of scientists around the world are trying to replicate in their laboratories. It is what is known as "artificial photosynthesis" and, although it is still in the research phase, it will be useful to generate less polluting energy. Solar energy intervenes in photosynthesis -which the plant converts into chemical energy and, later, into nutrients-, CO2 or chlorophyll, but what interest's scientists above all is water and the two elements that form it, hydrogen and oxygen. And it is that, one of the objectives of artificial photosynthesis is to imitate the process by which this liquid is broken down into hydrogen and oxygen molecules, as occurs in natural photosynthesis: the hydrogen formed could be used in the future as fuel in motor vehicles to replace oil.Plants carry out their photosynthesis in two stages, a so-called bright one that depends on sunlight, and another called dark, in which reactions that do not need sunlight take place.

Photosynthesis, Energy, Fuel, Sunlight

Resumen

Las plantas pueden producir su propio alimento a través de la fotosíntesis, un proceso químico extremadamente complejo que grupos de científicos de todo el mundo están tratando de replicar en sus laboratorios. Se trata de la denominada "fotosíntesis artificial", y aunque todavía está en fase de investigación, servirá para generar energía menos contaminante. La energía del sol interviene en la fotosíntesis, que la planta convierte en energía química y luego en nutrientes, CO_2 o clorofila, pero lo que más interesa a los científicos es el agua y los dos elementos que la componen, hidrógeno y oxígeno. Uno de los objetivos de la fotosíntesis artificial, es imitar el proceso de descomposición de este líquido en moléculas de hidrógeno y oxígeno como en la fotosíntesis natural: el hidrógeno resultante puede usarse como combustible en los vehículos de motor en el futuro, reemplazando al petróleo. Las plantas realizan su fotosíntesis en dos fases, una denominada luz, que depende de la luz solar, y otra denominada oscuridad, donde se producen reacciones que no requieren de la luz solar.

Fotosíntesis, Energía, Combustible, Luz Solar

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Introduction:

Electrical energy is a form of manifestation of natural energy and is of great importance for human beings, however, the industrial sector is the one who requires a large amount compared to the average residential consumption.

Fossil energy resources, as their name indicates, have a limited amount to be used by mankind, since they are of a non-renewable nature. It is estimated that within 50 years the extraction of oil will be compromised, due not only to its use in the electrical area, but also to the excessive use of disposable plastics.

The high consumption of hydrocarbons worldwide leads to pollution of air, land and water at very high levels, with serious results for the ecosystems and living beings that inhabit the planet. The increase in electricity demand leads to continuous research in alternative energies, focusing on renewable energies, in order to supply the electricity requirements in a distributed generation system at low power according to the particular conditions of each consumer.

The continuous advances in the applied research of renewable energies such as Photovoltaic Systems and Wind Farms, opened the door to the use of natural resources for the acquisition of electrical energy, a first resource employed was the use of organic waste to take advantage of the calorific power of these at the time of combustion.

Generating electricity from such a necessary resource for mankind as vegetation, without compromising the organic structure of nature, would be the beginning of the evolutionary development of the species, this idea emerged no more than a decade ago, resulting in a promising future, where so far loads that do not require more than 5 volts have been connected, however the technology is still far from being considered for loads that require more electrical power.

Problem

In all the places of our planet there has been a great problem about electrical energy, as well as environmental pollution.

In this project we investigated how to generate electrical energy from plants to obtain a clean energy that does not pollute the environment, arises from the need to solve the problem in the distribution networks of electrical energy in the world. There are populations all over the world where they do not have electric energy. This project will solve the problem of electric energy and will be applied in a field in order to see and obtain the results to what extent we can obtain electric energy so that it can be useful.

Objective

Generation of electrical energy through the natural photosynthesis process of plants.

Specific objectives

– Sum of plant voltages
– Sum of plant loads
– Obtaining focus energy

Theoretical framework

Photosynthesis is a metabolic process carried out by some cells of autotrophic organisms to synthesize organic substances from inorganic ones. This process converts light energy captured by leaves into stable chemical energy.

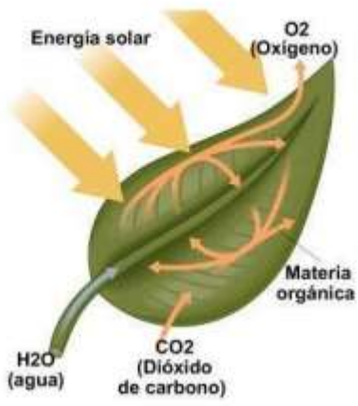

Figure 1 Photosynthesis as a metabolic process

Photosynthesis is carried out in two stages: The light stage, in which light energy is used to synthesize ATP and NADPH, and the carbon-fixing stage, in which the production of sugars necessary for plant growth takes place.

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Photosynthetic organisms capture light through a network of pigments that are located in the chloroplast thylakoids forming light-harvesting complexes, which flow down an energy slope to a special pair of energy-collecting chlorophyll molecules that together with associated proteins constitute the reaction center. When the chlorophyll or reaction center receives energy from the molecules, it excites one of its electrons and jumps out to the electron transport system next to it, thus initiating a flow of electrons.

In the process of photosynthesis, plants expel a series of residues in the form of metabolite molecules, subsequently a series of bacteria or microorganisms break these molecules to release electrons, which will be captured through the electrodes for electrical generation. Carbon dioxide is fixed and released as root exudates by plants and used by microorganisms that return carbon dioxide to the atmosphere. Microorganisms use the anode as an electron acceptor to obtain metabolic energy. These electrons flow, due to the potential difference, from the anode through an electrical circuit with a charge or a resistor to the cathode, thus generating electricity that can be used.

The size of the plant and its ability to generate metabolites directly affects the amount of electrons released, so theoretically it is a scalable method, which can be used in a small pot as well as on the roof of a house, even an urban garden or a larger park.

Definition of voltage

The voltage is the physical capacity that has an electrical circuit, because it drives the electrons to the length of a conductor, ie, the volt conducts electrical energy with greater or lesser power, because the voltage is the electrical mechanism between the two bodies, based on the fact that if the two points establish a contact flow of electrons can happen a transfer of energy from both points, because the electrons are negative charges and are attracted by positively charged protons, but also the electrons are rejected each other by having the same charge.

Definition of charge

The amount of electricity in a body, the excess or shortage of electrons, is called electric charge.

Definition of a series circuit

A series circuit is a connection configuration in which the terminals or terminals of the devices (generators, resistors, capacitors, inductors, switches, among others) are connected successively, that is, the output terminal of a device is connected to the input terminal of the next device.

Definition of a parallel circuit

The parallel circuit is the model used in the electrical network of all homes, so that all loads have the same voltage.

Battery

The main function of the battery is to promote the starting of the starter motor**,** entering later in action the alternator.

Methodology

Population or Sampling

The population is composed of farmers from the municipality of Tehuipango, Veracruz. The sample obtained consisted of 32 people, 28 men and 4 women.

Type of study

Survey

Market study

Definition of the product/service.

This project will not be placed in a market, for which a natural place is needed to demonstrate it by testing its functionality. This project was carried out with the purpose of lighting places where there is no access to electricity.

Analysis of supply and demand (Surveys)

A survey was conducted in the municipality of Tehuipango, Veracruz, where the project applications will be carried out, and the following results were obtained.

Of the 32 people where the survey was applied, most of them accept the idea derived from the fact that the place where they live does not have electricity.

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Project engineering

The size of the project if it is installed in a fixed place occupies a place of 1 square meter but it can also be installed anywhere so that it does not take a specific space, we can hang the plants in front of a house as several people have it without giving much importance is only a matter of putting an irrigation system or if not also manually is recommended that the plants are always in a garden or in front of it, obtaining the radiation of the sun so, the plant will get much more voltage and a better quality of light.

Results obtained

Results

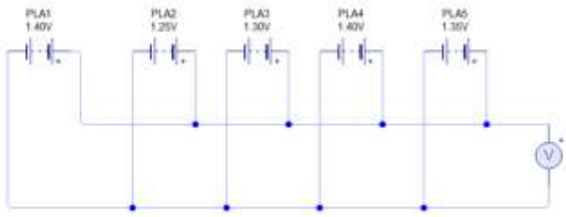

Figure 2 Voltage diagram

In this diagram we see how our project makes the current and voltage add up as well.

Formula

Vn= Vn+Vn+Vn+Vn+Vn…….Vn=V
V=V1+V2+V3+V4+V5
V=1.40V+1.25V+1.30V+1.40V+1.35V
V= 6.7 V

The result given by the different types of plants of smaller size approximating a height of 10 cm and a diameter of .50 is 6.7V. Calculations were made to determine the intensity and resistance of the ground.

Earth resistance = (0.50 ohms)

Voltage =6.7 v

Formule

$$I = \frac{V}{R}$$

Replacement

$$I = \frac{6.7v}{.50\ ohms} = 13.4\ Amperes$$

This is the intensity gives us for our project means that, if we got some good results for this project, so we have much more for the future of this project.

Results obtained and discussion

The results obtained were in the plant called honeycomb where 1.40 volts are generated per day exposed to the sun, when there is a variability in the presence of sun only generates 1 volt, these results are achieved by installing a parallel circuit so that the loads can be added.

The following images show the material used for our process of energy production through photosynthesis.

Figure 1 floor

Figure 2 galvanized wire netting

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Figure 3 plastic pot

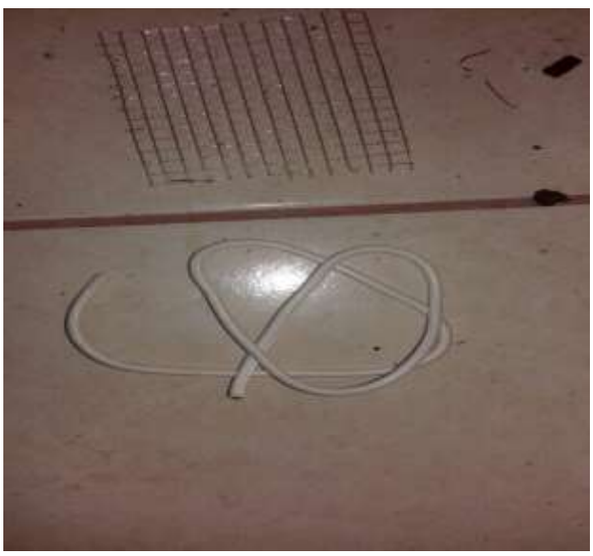

Figure 4 wire 16 gauge

Figure 5 electricity generating plant

The following figures show the results obtained from the following plants

Figure 6 daisy plant 1.41 volts

Figure 7 daisy root

Figure 8 daisy root

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In the image of Figure 8, the change of voltage due to weather variability is shown. The whole circuit was installed in parallel so that there is a voltage summation obtaining a utility of electrical energy.

Figure 9 daisy root

Figure 10 Demonstration

Figure 11 light bulb on daisy root

Conclusions

By means of the present project it has been demonstrated the obtaining of electric energy through the installation of a circuit in backyard plants, considering that it can be viable the production of energy for the benefit of the communities that do not have an infrastructure of the public network, specifically this prototype was developed in the municipality of Tehuipango, which belongs to the mountain range of Zongolica in the state of Veracruz, an area of very high marginalized.

It is concluded that the larger the size of the plants generate a higher voltage in a space of about 3 square meters where we can distribute 18 plants, generating 1 volt/plant capable of lighting a 3 or 5 watt bulb. Considering that the present project is real, the best alternative is the storage of energy by means of our proposal of installation of circuits in plants.

Acknowledgements

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