"ARTIFICIAL SOLAR OXYGEN TREE"

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1. ABSTRACT

The reduction in oxygen levels is being felt all over the world. Oxygen deficiency leads to mental and physical disorders not only in humans but also in sea creatures. Planting trees in urban areas is almost impossible with so many skyscrapers and industries already being there. The artificial solar oxygen tree would compensate for this loss to some extent at least. The artificial solar oxygen tree systems follow the sun throughout the day to maximize energy output. The artificial solar oxygen tree is a proven different-axis auto switching technology that has been custom designed to integrate with solar modules and reduce system costs. The multiple Solar panels generates up to 25% more energy than fixed single axis mounting systems and provides a bankable energy production profile preferred by utilities.

Aim: Design & Implementation of "Intelligent Artificial Solar Oxygen Tree Using Embedded Technology"

2. INTRODUCTION

There can be no denying in the fact that solar energy is an effective source of power, one that is going to serve us for long. Despite the need to harness this energy, very little research has been conducted to make photovoltaic cells cost effective and thereby available for utilization by masses for their various devices. Photovoltaic cells use sunlight and convert it directly to electricity without leaving any residual elements that can pollute the environment, and is therefore believed to be energy source that could be available to mankind. This project can generate and releasing pure oxygen in the atmosphere using renewable resources. In addition to it, hydrogen gas is produced which is stored and has potential to be used as fuel later. We believe that such a design will not only aid in supplying pure oxygen to urban environment but also meet lighting demands of developing and developed cities. All the waste water from the buildings is gushed out into the sea thereby ruining the sea life and collection of unnecessary waste in the sea. This would prove harmful to all of us. The waste water from the complexes when filtered and electrolyzed would not only help in generating oxygen and hydrogen but also reduce the sea pollution to a great extent.

3. PROBLEM STATEMENT

A] Increasing population: In today's world, our environment is facing a lot of stress because of increasing population and development. The problem is more severe in developing nations like India. The need of the hour is to implement eco-friendlier projects or plants that can provide advanced technology solutions, preferably by means of renewable energy and have least or no negative impact on environment. The biggest challenge is to implement this technology in Indian cities as we know the population is a lot more in this country

and hence the environment is more polluted.

B] Cutting of trees: Trees are very important part of life on earth as they provide oxygen by consuming carbon dioxide, which is essential for survival of almost all living organisms on Earth. However, currently, humans are cutting down billions of trees for paper, furniture, building supplies, and other purposes. The number of trees is decreasing while the population of humans is growing rapidly. Thus, the oxygen levels are falling while the concentration of carbon dioxide in air is increasing.

C] Air Pollution: Air pollution is a major issue for almost all countries across the world. Air pollutants can lead to respiratory illness in humans and animals, create acid rains and deplete the ozone layer.

D] Sea pollution: All the waste water from the buildings is gushed out into the sea thereby ruining the sea life and collection of unnecessary waste in the sea. This would prove harmful to all of us. The waste water from the complexes when filtered and electrolyzed would not only help in generating oxygen and hydrogen but also reduce the sea pollution to a great extent.

E] Lack of Land: Flat or roof top mountings of PV systems require large area or land. Scarcity of land is greatest problem in cities and even in villages in India. Planting trees in urban areas is almost impossible with so many skyscrapers and industries already being there. The artificial solar oxygen tree would compensate for this loss to some extent at least.

4. METHODOLOGY

1. The solar panels were placed on 2-3 Ft tall solar tree which has 5 branches. Each branch carries one solar module. The arrangement of solar tree Spiralling Phyllataxy technique is used in designing of Solar Tree.

2. The solar energy was converted into electrical energy by PV modules. This energy was used to charge the rechargeable batteries. We used one battery of 12v. The diodes were connected in circuit in such a way that they prevented the reverse flow of energy, i.e., flow of electricity from batteries to solar modules.

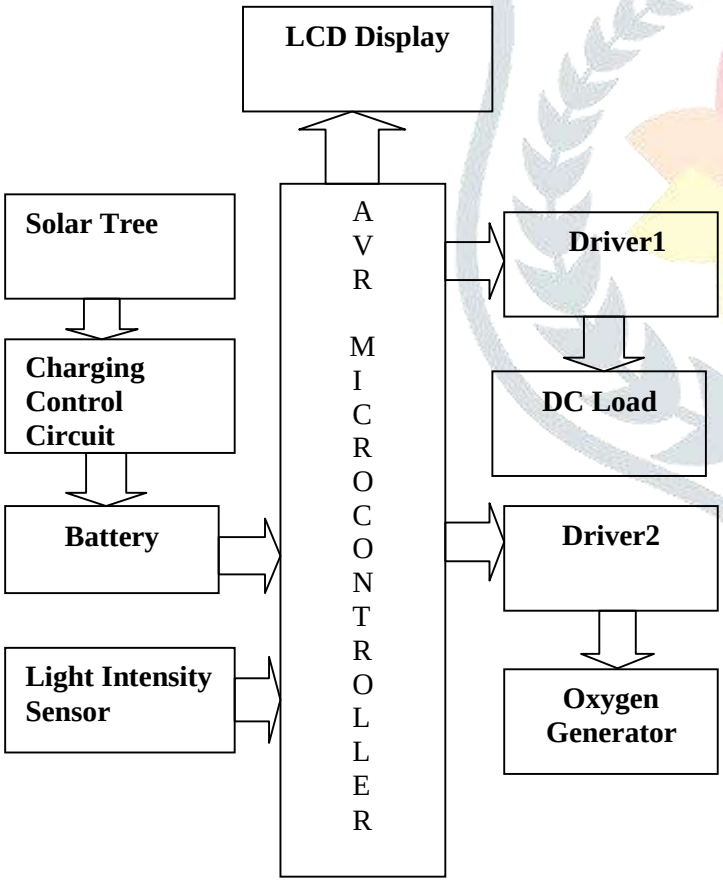
3. The main impulsion is to design a high quality solar tree. It consists of three main constituents which are the inputs, controller and the output. Photo resistor or Light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000000 ohms, but when they are illuminated with light resistance drops dramatically. LDR‟s have low cost and simple structure.

4. An Electrolysis kit was placed next to the solar tree. The kit contained two steel electrodes to carry out electrolysis. We used waste water for electrolysis by mixing it with small amounts of sodium hydroxide because electrolysis of pure water occurred very slow or not at all. The NaOH acted as a catalyst in separation of oxygen and hydrogen from water.

5. The identification of gases produced by decomposition was done by collecting these gases in two different anode and cathode rods.

6. The AVR Microcontroller Atmega328 IC performed all the controls in the system. It was programmed using embedded C. To obtain the desired result we require a system which is reliable, secure and also efficient. The system requires compact package of hardware and software. It must fulfill the necessary qualities such as real-time continuous monitoring and exact statistic series. It must support mobility and less power.

5. BLOCK DIAGRAM AND DESCRIPTION



Basic design of the project is shown in the diagram. This project consists of AVR Microcontroller, Light intensity sensor, LCD Display, DC load driver1, Solar tree, charging control circuit, battery and oxygen generator. The solar energy was converted into electrical energy by PV modules. This energy was used to charge the rechargeable batteries. We used one battery of 12v. and it send the signal to AVR Microcontroller. Photo resistor or Light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits and send the signal to AVR Microcontroller. AVR Microcontroller is programmed to receive the sensors signals and depending on conditions occurs DC bulb will be controlled through Driver circuit board. LCD display is used for display an information purpose. The oxygen generator is used to measure the plant oxygen & the temperature of the surroundings.

Solar Tree:

The arrangement of solar tree Spiraling Phyllataxy technique is used in designing of Solar Tree. For tracking maximum power from sun this Technique helps the lower panels from the shadow of upper ones. The efficiency of the plant can also be improved by this technology.

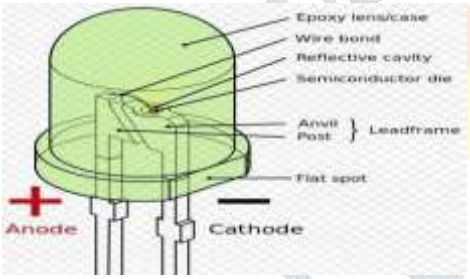
The solar energy was converted into electrical energy by PV modules. This energy was used to charge the rechargeable batteries. We used one battery of 12v. The diodes were connected in circuit in such a way that they prevented the reverse flow of energy, i.e., flow of electricity from batteries to solar modules.

Light Intensity Sensor:

The main impulsion is to design a high quality solar tracker. It consists of three main constituents which are the inputs, controller and the output. Photo resistor or Light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000000 ohms, but when they are illuminated with light resistance drops dramatically. LDR"s have low cost and simple structure.

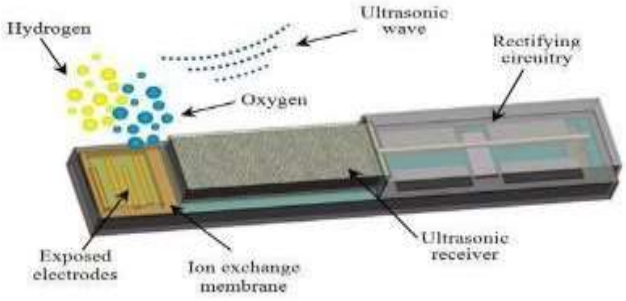
LED Load or DC Bulb:

An LDR was used to control the activity of LED lights. LDR gave us the value of intensity of light (lux). When the reading of the measured value fell below the set point value, the LED lights glowed.



Oxygen Generator:

During electrolysis, it was noted that the production of hydrogen gas was more than that of oxygen. This was confirmed by equation 2 (decomposition of water). Remember that the use of sulphuric acid is essential for electrolysis. The pure water decomposes very slowly or does not decompose at all. $2\ H_2O\ (l) \rightarrow 2\ H_2\ (g) + O_2\ (g)$……... (2) The amount of gas produced depends on the pressure and concentrations. It also depends upon the amount of current supplied to the electrolysis jar. Assuming standard conditions, we calculated the amounts of oxygen and hydrogen produced in one hour on decomposition of water by a battery when no other component was connected to the battery. Electric charge in 12V battery = 7.5Ah. and AVR microcontroller.



	8051	PIC	AVR
SPEED	Slow	Moderate	Fast
MEMORY	Small	Large	Large c
ARCHITECTURE	CISC	RISC	RISC
ADC	Not Present	Inbuilt	Inbuilt
Timers	Inbuilt	Inbuilt	Inbuilt
PWM Channels	Not Present	Inbuilt	Inbuilt
Software	Keil Compiler license software	MP Lab license software	Arduino open source software
Cost	High cost	High cost	Low cost

AVR Microcontroller

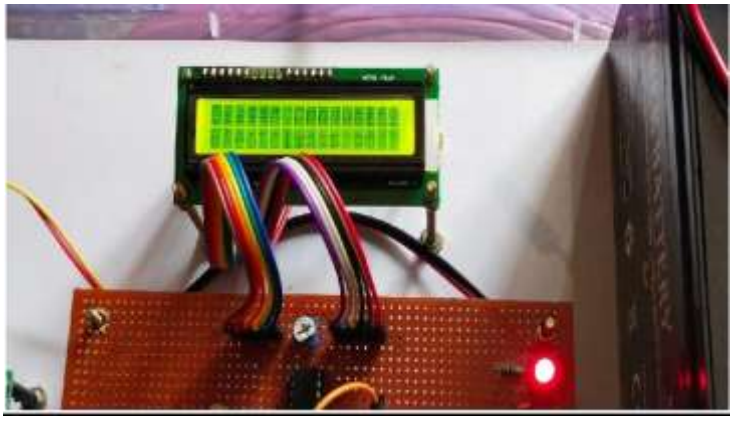
AVR Microcontroller is heart of the project. Embedded C language is used to do the programming. The **AVR** is a modified Harvard architecture 8-bit RISC single chip microcontroller which was developed by Atmel in 1996. The AVR was one of the first microcontroller families to use on- chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time.

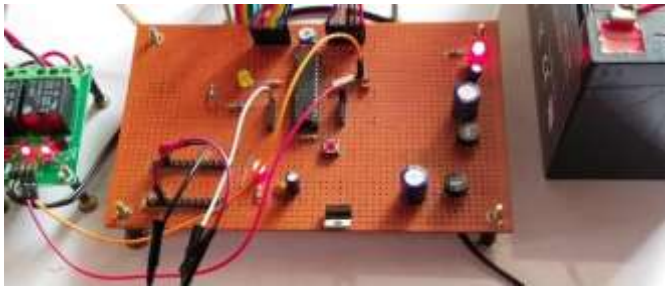
History of AVR

AVR was developed in the year 1996 by Atmel Corporation. The architecture of **AVR** was developed by Alf- Egil Bogen and Vegard Wollan. AVR derives its name from its developers and stands for **Alf-Egil Bogen Vegard Wollan**

AVR is an 8-bit microcontroller belonging to the family of Reduced Instruction Set Computer (**RISC**). In RISC architecture the instruction set of the computer are not only fewer in number but also simpler and faster in operation. The other type of categorization is CISC (Complex Instruction Set Computers).

RISC microcontroller, also known as **A**dvanced **V**irtual **R**ISC. The AT90S8515 was the first microcontroller which was based on **AVR architecture** however the first microcontroller to hit the commercial market was AT90S1200 in the year 1997.





What's special about AVR?

They are fast: AVR microcontroller executes most of the instructions in single execution cycle. AVRs are about 4 times faster than PICs, they consume less power and can be operated in different power saving modes. Let's do the comparison between the three most commonly used families of microcontrollers. A liquid crystal display (commonly abbreviated LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power. In this project LCD Display is used for monitoring purpose. RESULT

The module will design and demonstrate using AVR Microcontroller development board, five solar panel 3v each with electrolysis to produce oxygen & hydrogen.

6. CONCLUSION

The solar energy was converted into electrical energy by PV modules. This energy was used to charge the rechargeable batteries. We used one battery of 12v. and it send the signal to AVR Microcontroller. Photo resistor or Light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits and send the signal to AVR Microcontroller. AVR Microcontroller is programmed to receive the sensors signals and depending on conditions occurs LED or DC bulb will be controlled through Driver circuit board. LCD display is used for display an information purpose. The oxygen generator is used to measure the plant oxygen & the temperature of the surroundings.

7. ACKNOWLEDGEMENT

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8. FUTURE SCOPE

Intelligent Solar Oxygen Tree Using Embedded Technology will design & demonstrate using AVR Microcontroller ATMEGA-328 IC. This IC is reprogrammable in the feature we can add more applications on the same AVR Microcontroller development board using Embedded C code. AVR Microcontroller. Photo resistor or Light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits and send the signal to AVR Microcontroller. AVR Microcontroller is programmed to receive the sensors signals and depending on conditions occurs LED or DC bulb will be controlled through Driver circuit board. LCD display is used for display an information purpose.

9. REFERENCES

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