

# Artificial Solar Oxygen Tree

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**Abstract:-** Urbanization and Industrialization are a driving force for a country's progress. The need for industrialization is growing at a faster rate. Industrialization requires space; this happens at the cost of deforestation, increasing pollution, degradation of quality of oxygen, risk of human health and other living creatures, etc. Also, the requirement of energy and resources are reaching heights. Hence, we need to find alternative ways to fulfill the demands. One of the possible solutions to avoid these problems is the implementation of a system that uses a renewable source of energy to serve different purposes. This project therefore aims at developing such a system called "Artificial Solar Oxygen Tree". It mainly uses an electrolysis kit to generate oxygen artificially. The energy to the kit is provided by PV Modules that convert solar radiation into electricity which is used for the decomposition of water into Hydrogen and Oxygen. Oxygen is released in the air and Hydrogen is stored as fuel. The water used for the electrolysis process is waste water. This system can incorporate various other features like LEDs and Temperature sensors. An LCD panel can be used to display temperature, humidity, battery level, advertisements, etc. To make these various aspects work, we have used a microcontroller as it is a device that is capable of handling the entire system altogether. The microcontroller controls the various conditions according to what the system demands. Required energy is obtained through PV modules and a rechargeable battery is used to store energy.

**Keywords:-** Solar Tree, PV Modules, Electrolysis, Temperature Sensor, Battery, LCD.

## I. INTRODUCTION

Trees are a part of the Human Cycle and play a major role in our life. They are our source of Oxygen. They produce Oxygen naturally by absorbing the Carbon Dioxide from the environment. But with the increasing problems of lack of land for Industrialization, people are cutting down trees not only for creating land available for Industries but also for producing paper, furniture, building supplies and other uses. As a result, oxygen levels are dropping with reduced number of trees. This leads to smog in air due to low oxygen levels and also respiratory problems for human beings as well as animals and other natural habitats. Other than the measures like carpooling and reducing use of fossil fuels, the most efficient way to control air pollution is to use Solar Oxygen Tree. Undoubtedly, Solar Energy is a great source of Energy. There is a great need to harness and spread awareness regarding this source of energy. The idea behind using photovoltaic modules is that it uses sunlight to

convert solar energy directly into electrical energy and it also does not leave any residual elements that may lead to air pollution. Also, It is a renewable source of energy. The main aim of this project is not only to decompose water into oxygen and hydrogen and releasing the gases but also to prevent air and water pollution to a great extent. Artificial Solar Oxygen Tree has lower power consumption, constitutes of various inexpensive components like processors, protection modules, battery, sensing units consisting of various sensors, level indicators, process kits including Electrolysis Kit, other interfacing components along with power sources in a tiny and robust package onto a multipurpose processor. This device is capable of working autonomously for long period, even with no maintenance and can adapt to various changes in atmosphere and outer environment. It consists of a TFT Touchscreen panel to display the various required fields of the system and also to ease the maintenance for technicians. It is a cost-effective method to limit the ongoing problem of pollution and scarcity of amount of oxygen needed in atmosphere.

## II. OBJECTIVE

This dissertation focuses on generating oxygen artificially with the use of solar energy. The main objective of this dissertation is to generate awareness among people about advantages of renewable resources. We all know that people are using non-renewable resources a lot. This will have many consequences as if its consumption is limited it may get extinct in near future. So, we have to find alternate measures for limiting the use of non-renewable resources to generate oxygen and reduce pollution. We have also focused on utilizing waste water for electrolysis process. We know that waste water from societies or industries is released into various water bodies like rivers, lakes and even seas. These hazardous chemicals when released into water is not only fatal for aquatic habitat but also leads to water pollution. Thus, we will be creating awareness to release water into water treatment plants and to use this treated water for electrolysis process. Along with oxygen, hydrogen is also generated during this process which can be used further. Hydrogen is also known as future fuel, it has n' number of applications. In this dissertation we also provide alternate ways of generating electricity with the help of renewable resources. The objective is to use less electricity. In this dissertation we have investigated that people in rural areas does not have easy access to electricity so this project can help them in providing electricity and oxygen required and can also be used as street light during nights.

### III. PROBLEM STATEMENT

➤ *Air Pollution*

Air pollution is one of the major issues the world is facing today. There is an increase in carbon dioxide content in the atmosphere, which has led to global warming and other serious issues. In urban areas, air pollution increases. The content of oxygen in atmosphere is not sufficient enough for such large population. Due to this there is a misbalance in the ratio of oxygen and carbon dioxide which has adverse effects on humans. This gives rise to generate oxygen artificially.

➤ *Water Pollution*

Waste water from the buildings and industries are flushed into the sea and other water bodies which is a major issue. This affects the underwater life as well as humans living near to such polluted water bodies. River Ganga is the best example to show the effects and causes of water pollution. It is polluted heavily due to the practices of human beings. If the water from industries and buildings is filtered and treated then used for electrolysis it won't affect the water bodies in the surrounding.

➤ *Lack of Land*

The demand for land keeps on increasing with increase in population. This increasing demand is fulfilled by chopping of the trees in our surrounding. In metropolitan cities like Mumbai and Delhi it is nearly impossible to plant trees and maintain them. Delhi has 11,297 living per square kilometer, which makes Delhi as the most populated location in India. It is not possible to plant trees in the surroundings or to have gardens in such locations. Hence, we have come up with artificial solar oxygen tree which generate oxygen like trees. It requires less maintenance and less space compared to trees. This would help to some extent.

➤ *Deforestation*

Oxygen is most important factor in the environment. Oxygen is utilized by almost all the living organisms. Trees are the only living thing which consumes carbon dioxide and releases oxygen in the atmosphere. 18 million acres of forest is being cut down every year globally. This is a huge number which led to number of environmental issues. We humans cut down the forest for paper, furniture, building supplies, and other purposes. Due to deforestation one of the major issues is decreasing level of oxygen. This creates a misbalance in the ratio of oxygen to carbon dioxide.

### IV. FUNCTIONAL UNITS

Different components used to build the project are mentioned below with general description. Generalized Block Diagram is shown below.

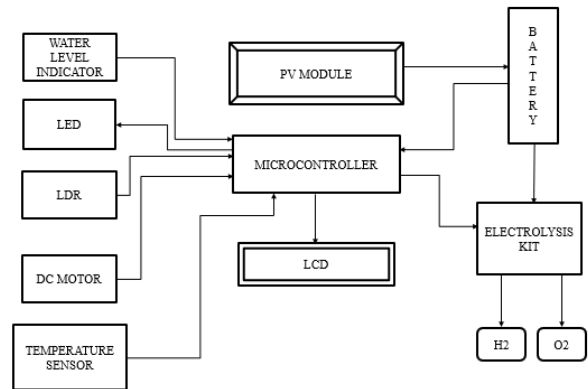


Fig 1:- Proposed Block Diagram

➤ *Photo Voltaic Modules*

It converts solar energy into electrical energy. They are made of number of solar cells are wired together to form a module. These solar cells are made up of semiconducting material with non-reflective layer and tough glass on the top. We have used 6 PV modules for our project. Their output is 12V, 1.5A.

➤ *B. Electrolysis Kit*

When voltage is applied to the electrodes water undergoes the decomposition reaction and splits into hydrogen and oxygen. Two graphite electrodes are used, during the process hydrogen is obtained at the cathode and oxygen is obtained at anode. Electrolysis of pure water requires high potential hence, salts are added as a catalyst to increase the efficiency.

➤ *C. Battery*

It consists of one or more cells whose chemical reactions create a flow of electrons in a circuit. we have used 12V,7.5Ah SMF (Sealed maintenance free) VRLA (Valve regulated lead acid) battery. A flooded or wet cell battery utilizes electrolyte as sulphuric acid which is a dangerous acid if spilled or externally comes in contact to anything. VRLA batteries don't contain any such liquid, as their electrolyte is formed as gel and absorbed by separator sheets.

➤ *D. Temperature Sensor*

Temperature sensors are used to detect the temperature of the surrounding. The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical output comparative to the temperature(in °C). It can measure temperature more correctly in comparison to a thermistor. This sensor generates a high output voltage than thermocouples and may not need amplified output voltage. The LM35 has an output voltage that is proportional to the Celsius temperature.

#### ➤ E. TFT Touch Screen

A TFT touch screen is a combination device that includes a TFT LCD display and a touch technology overlay on the screen. TFT screens, are a type of active matrix LCD display capable of displaying millions of high-contrast, clear and bright color pixels. In our project, this panel will be used to display various conditions of the system like battery percentage, temperature, etc.

#### ➤ F. Light Emitting Diode

It is a two terminal semiconductor device which emits light when active. It consumes less power and has low maintenance. They are also cost efficient. We have used LED strips with LDR which helps our project to work as a street light during dark.

#### ➤ G. Light Dependent Resistor

LDR is a light dependent resistor. Its resistance decreases as the intensity of the light increases. When the intensity of light falling on the LDR decreases, the street lights will be turned on.

#### ➤ H. Relay

Relay are electromagnetic switches. They control one electrical circuit by opening and closing contacts in another circuit. An electrical contact is a component found in relays. Normally Open (NO) contact is a contact that is open or in a non-conductive state when it, or device operating it, is in non-energized state. Similarly, Normally Close (NC) contact is in a closed or conductive state in non-energized state. A total of four relays were used in the circuit.

#### ➤ Microcontroller

Microcontroller will be used to control the entire process of the system. All the devices are interfaced with this central component.

### V. METHODOLOGY

Solar energy is converted into electricity by using PV Modules. This energy is then stored in rechargeable battery. This battery is used as a source for the whole system. This system also consists of electrolysis kit which carries out the process of electrolysis of water that decomposes water into oxygen and hydrogen. LDR will detect the intensity of light falling on it and accordingly it will turn on the LEDs at night. Even temperature sensors have been used to detect the temperature of the surrounding i.e. if the temperature exceeds a certain point then it will trigger relay to stop the supply given to the electrolysis kit. The water which will be received by the electrolysis kit will be obtained by using the pump and motor. Depending upon the capacity of electrolysis tank, the motor is stopped when the tank is full with the help of microcontroller. This pump and motor also work on the rechargeable battery. Touchscreen panel is used to display parameters like Temperature, Level of water, Battery level, etc. Touchscreen panel is also used in advertisement purpose.

### VI. EXPECTED RESULTS

The Electrolysis process is expected to be efficient enough to produce good amount of oxygen. Its other features should also work in a controlled manner with the help of microcontroller. The system should be able to turn on the lights in dark and display correct temperature and work accordingly. The LCD should be able to display the right information. The battery should be able to run the system all day long.

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