



NANO TREE STREET LIGHTING SYSTEM

Dr Soumya Naik P T¹, Naziya Farhath C H²

¹ Head, Prof of CSE, Computer Science, City Engineering College

² Student, Computer Science, City Engineering College,

Bangalore, India

Abstract: It proposes an innovative power generating system with optimized management and efficiency. Its innovative power generating system with optimized management and efficiency. The system allows substantial energy savings with increased performance and maintainability. The main purpose of this project is to solar power generation using solar Nano tree. By using this system energy consumption is reduced.

Keywords -- Solar Tree, Renewable Energy, Nanowire, solar cell, Solar Energy.

1. INTRODUCTION

In the world the utilization of energy is increasing day by day and therefore we required the renewable energy sources which is pollution free and easily available like sun light. Sun light is utilized by solar panels but when we required an array of panels the land requirement also increases which arises as a problem. For solution of this problem and for getting more energy we use solar trees. In these trees basically there are solar panels which are arranged in Fibonacci series for getting more energy and the requirement of the land is less. Because of less requirement these are easily installed, and these can be used in straight lighting, home supplies and in industries etc. The sun light easily available so these are very beneficial there is no worry of availability of sun light in future because till the end of the world this is also available.

Meaning of the TREE in Solar Trees

T= Tree generating

R= Renewable

E=Energy and

E= Electricity

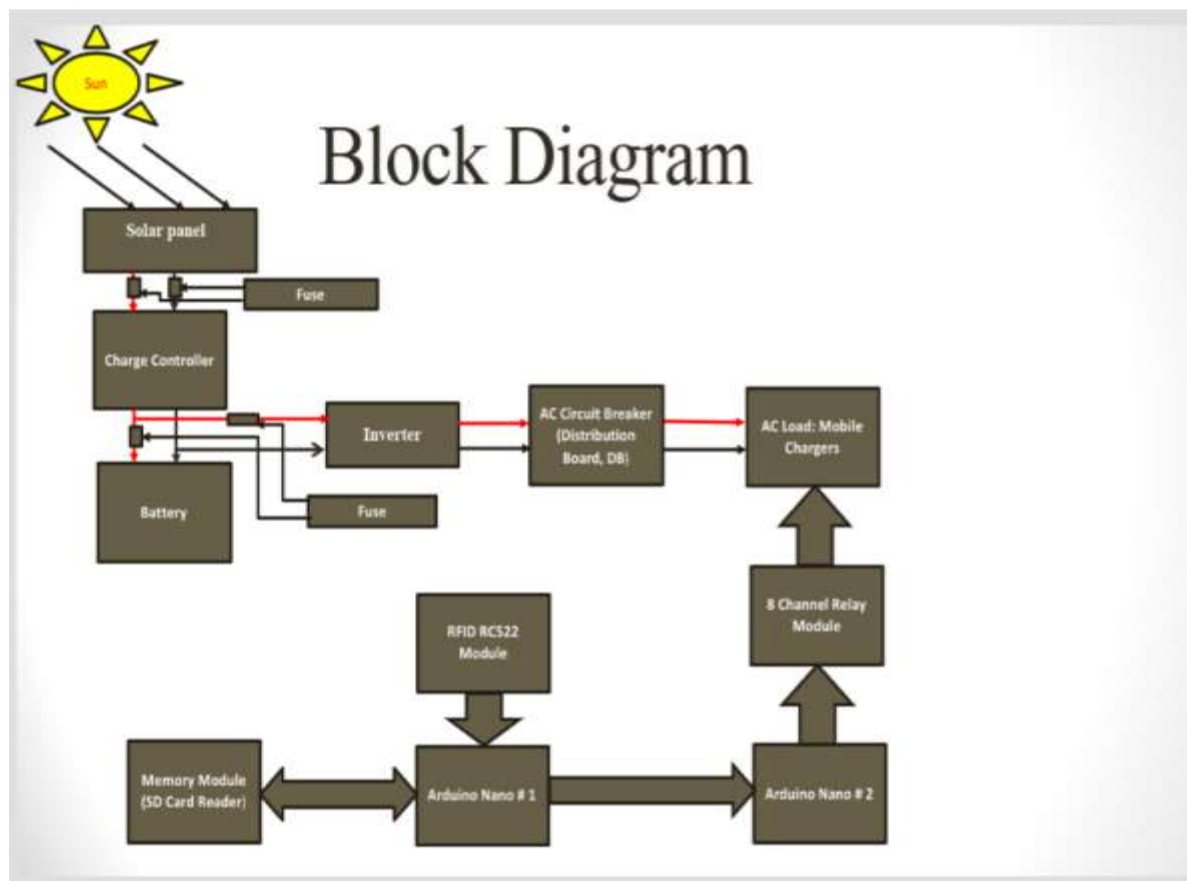
The reason why we call these trees as Solar Trees: The original trees are utilizing the sun light and the minerals like water and making their own food and this process is called Photosynthesis. Like original trees the solar trees utilize sun energy and produce the energy which is used by the people of the society. These working phenomena are same that's why we called these as solar trees.

History of Solar Trees: In 1998 these are introduced first time as solar artwork on roads and public places. Then this technology is adopted as solar trees. In Europe these are used from many years. In 2006 in Europe the energy consumption is 10%. 2000 billion kWh is used from solar trees and 2900-million-ton carbon is eliminated. In October 2016 solar trees are used in Vienna, Austria. These are also used in Graz, Austria.

Solar power: According to the calculations made by scientists the sun gives 3.7×10^{26} watts of energy into the space and on the earth total amount of this energy is 5×10^{10} parts is reached. The energy grabbed by earth is 1.7×10^{17} watts and we can't utilize whole the energy till now. We utilized only small part of this energy. The radiation reached to the earth are of EM waves of wavelength of about 0.25-3 microns which can be utilized in many ways and in solar cells and in solar trees by photovoltaic conversion.

In this conversion we use solar panels which are made of solar cells by semiconductor materials. When the sun light falls on the semiconductor which is of NPN type. In this the N type has majority charges as electrons and the P type having the minority charge carriers as electrons. When light falls on the solar cells the photons reach at the junction and enables the electrons to break the junctions and the energy is produced. This is called photoelectric effect. Because of the flow of electrons, the electricity is produced in form of dc which is converted in ac by inverters.

The solar energy is also converted by using nanowire solar cells. These cells are made of semiconductor material Indium phosphide – generally used as substrate of epitaxial InGaAs. This works like an antenna that uses sun light and produce the energy. Nanowire crystals having the cylindrical structure with diameter of 10,000 part of a human hair. The nanowires are developed for quantum computers. Their efficiency of utilizing the sun's radiation is more than the simple solar panels. The diameter of the nanowires is less than the wavelength of the rays of the sun it causes the resonance around the nanowire because of this the energy of sun is more concentrated and the more energy is produced or converted through the nanowire.



Block Diagram

II. HISTORY

- In 1800 solar energy plans developed.
- In 1839, Alexandre Edmond discovered the photo voltaic effect.
- In 1941, Russell ohl invented solar cell.
- Solar cell foundation, which began in 2008 by Rein Triefeldt
- In 2012, Ross Lovegroove designed the solar tree.

III. LITERATURE SURVEY

WangYongqing,HaoChuncheng,ZhangSuoliang;HuangYali;WangHong in 2021 Design of Solar LED Street Lamp Automatic Control Circuit

Dr. Suwarna Torgal in 2016 Concept of Solar Power Tree. The paper detailed Solar Power Tree that generate large amount of energy by capturing very small land area throughout the year. Silicon-crystalline Photo-Voltaic (SPV) mounted on tall pole which direct convert solar energy into electrical energy by means of the photo voltaic effect. In the world, oil is running out and it is estimated that 80% of the world's supply will be consumed in our lifetimes.

Deepak M. Patil, Santosh R. Madiwal in 2016 Design and Development of Solar Tree For Domestic Applications. Solar Power Tree provides better alternative to flat mounting of PV systems. For domestic lighting and other applications use of Solar Tree is more relevant when PV system is to be used. In this article load or energy requirement of small house in India is estimated to 1.75kWhr/day.

Sushma Gupta, Monish Gupta in 2015 The Benefits and Applications of Solar Tree with Natural Beauty of Trees. This paper presents Solar Tree implementation as alternate source of energy in urban cities. A new idea of a solar tree design us in Nano wire solar cell is presented. Nano wires possess high physical light absorption properties which can be improved tremendously Hence we can say that it is a revolutionary urban lighting concept and these technologies lead to the development of high efficiency solar energy.

Bhuvaneswari, R. Rajeswari in 2013 Design a Solar Tree Using Nanowire Solar Cells.

Costa,M.A.D.;Costa,G.H.;dosSantos,A.S.;Schuch,L.;Pinheiro,J.R in 2009 A high- efficiency autonomous street lighting system based on solar energy and LED'S. This work presents an autonomous street lighting system based on solar energy as primary source, batteries as secondary source, and lighting emitting diodes (LEDs) as lighting source. This system is being presented as an alternative for remote localities, like roads and crossroads. Besides, it presents high efficiency, because all power stages are implemented in DC current.

IV. COMPONENTS OF SOLAR TREE

- **PV Modules:** PV cells are energy-harvesting technologies that transform solar power through PV effects into convenient energy.
- **Batteries:** Batteries are one of the costliest elements and an essential part of solar energy systems.
- **Inverters:** Smart inverters are power electronic instruments with advanced features in external software that control the inverter's behavior as connected to the grid
- **Cables and Connections:** Cables of outstanding mechanical strength are necessary to provide stable connections between the modules for use in environments with high mechanical stress, dry and wet weather, elevated temperature conditions, and high solar insolation.
- **Frame Structure:** The metal structure is subject to the innovator, how it can branch or what height it reaches, and the trees' dimensions.

V. SYSTEM REQUIREMENTS

HARDWARE TOOLS

- ARDUINO Microcontroller
- Relay
- Lcd display
- Battery
- Ldr sensor
- IR sensor

- Node MCU
- Solar panels

SOFTWARE TOOLS

- Arduino IDE
- Language: Embedded C

ADVANTAGES

- Low maintenance and low power consumption.
- No fuel required.
- Less manpower required.
- Light Sensors use have high sensitivity and are easily implementable.

VI. CONCLUSION

Solar tree sounds like the perfect solution for our future energy needs. Solar tree is a revolutionary urban lighting concept that represents a perfect symbiosis between pioneering design and cutting-edge eco-compatible technology. The tree design made 50% more electricity and the collection time of sunlight was up to 50% longer. it helps the environment, saves money, cheap to use and you can have them on your homes. It's free and last for lifetime and environment friendly.

To fulfil the increasing energy demand of the people and saving of land. This project is very successful one this can provide electricity without any power cut problem. The extra energy can be provided to the grid.

VII. RESULT

There is solar tree is latest initiative towards the renewable energy by occupying less space. We are producing much amount of electricity. Our solar system uses latest technology panels called as mono crystalline panels, which is more efficient than others. Design of the solar tree is made in such manner that it grabs more sunlight to produce the electricity. We are using seven panels out of them. First four are connecting in series and remaining three are connected in series. These series connected panels are connected in parallel. The connections are producing amount of power, which is easily fulfilling the basic demand.



VIII. APPLICATIONS

The nanotechnology plays a vital role in major application areas. This Nano tree has also been used in various places like,

- Deserts
- Office car parks
- Recreational grounds
- Industrial units
- Charging purposes in electric vehicles
- In the field of golf, courses, and resorts.
- In urban and rural areas
- Applicable in recreational park, city parks
- In penthouse, balcony veranda, private gardens
- Applicable on highways
- In deforested areas
- It is used for street lightning.
- It is used for domestic supply.
- It is applicable for industrial power supply.
- It can also be useful for continuous power supply.
- It is used in batteries, charging of mobile phones, laptop tablets.
- Wireless data transmission.

IX. REFERENCE

- [1]. Virginia Polytechnic Institute and State University, “Installation under way for university’s first major solar panel system | News | Virginia Tech,” Virginia Tech News, 2012. .
- [2]. A. Sahay, V. K. Sethi, A. C. Tiwari, and M. Pandey, “A review of solar photovoltaic panel cooling systems with special reference to Ground coupled central panel cooling system (GC-CPCS),” Renewable and Sustainable Energy Reviews. 2015.
- [3]. F. Hyder, K. Sudhakar, and R. Mamat, “Solar PV tree design: A review,” Renewable and Sustainable Energy Reviews. 2018.
- [4]. S. Dey, M. K. Lakshmanan, and B. Pesala, “Optimal solar tree design for increased flexibility in seasonal energy extraction,” Renew. Energy, 2018.
- [5]. R. and C. of D. S. E. Technologies, “Review and Comparison of Different Solar Energy Technologies,” GENI, 2012.
- [6]. B. Parida, S. Iniyar, and R. Goic, “A review of solar photovoltaic technologies,” Renewable and Sustainable Energy Reviews. 2011.
- [7]. International Renewable Energy Agency (IRENA), Renewable Power Generation Costs in 2017. 2018.
- [8]. S. Energy et al., “Units and symbols in Solar Energy,” Sol. Energy, 2002.
- [9]. W. Cao et al., “‘Solar tree’: Exploring new form factors of organic solar cells,” Renew. Energy, 2014