

Nano Tree based Power Generation for intelligent Street light control, Coin based charger and Garbage Control

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Abstract: This paper is based on the natural existence of the Flora and replicates it in the form of a Nano Tree consisting of artificial leaves, and also needles from grasses, including water based plants, to generate electrical energy. This method not only foresees an economical and efficient way to harvest solar radiation and wind energy via incorporation of thermo- photovoltaic and piezoelectric materials but also reveals a method for affixing artificial leaves that can harvest and capture solar radiation, wind energy and energy generated from falling rain and hail, providing an aesthetically pleasing and natural looking artificial leaves and needles that can be affixed to trees, plants, shrubs and water based plants. The main advantage of these Solar Nano leaves is that these leaves can convert more energy than the solar panels.

Keywords: Nano tree, Battery, LDR, IR Sensors, Micro controller, Relay, street lights, Wi-Fi.

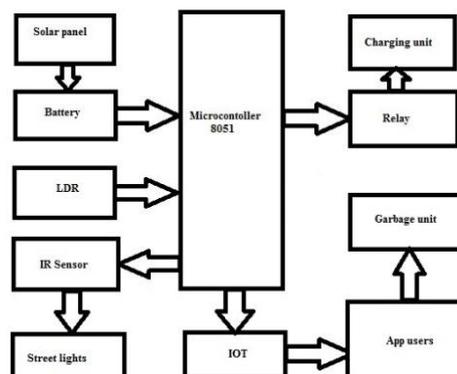
I.INTRODUCTION

Nano tree is an artificial tree which makes use of renewable energy from sun and wind. It utilizes three different energy generation technologies such as photovoltaic, thermoelectric and piezoelectric. Intelligent lighting control and energy management system is a perfect solution for energy saving especially in public lighting management. Smart coin based mobile charging system that charges your mobile for particular amount of time on inserting a coin.

II.PRINCIPLE OF PIEZOELECTRICITY

Piezoelectricity is a simple concept to generate electricity that comes from pressure. In this paper the exact meaning of the term, in order to create a sustainable energy resource by using light, heat and wind is used. When the force is applied from the outside, resembling the wind blowing the leaves, a potential difference is created on the spot, hence mechanical stresses appears in the leaves, twigs, stems and branches. This process can then generate millions of Picowatts, which efficiently can be converted into electricity. The stronger the wind, the energy produced will be more, distinguished during the day. Nano leaves reflect the green light in sunlight and use photoelectric nano spheres to convert the rest of the visible light into electricity. Thermoelectric nano wires/ antennas convert heat from infrared light, or thermal radiation, into electricity throughout the day, since the earth continuously absorbs thermal radiation and then re-radiates it, even after dark. It was also found out in the research that with the right material shape and size, nano antennas could harvest up to 92% of the energy at infrared wavelengths.

III.BLOCK DIAGRAM



IV. WORKING

a) HARDWARE COMPONENTS:

- Nano Leaves-a Solar cell or photovoltaic cell is placed in between the two transparent conducting layers of silica which will act as a body of the leaf, so that sunlight falls on the solar cell, the solar energy gets converted into electrical energy.
- Battery-12v dc lead-acid battery is used to store the electrical energy from all leaves, twigs & is stored at the bottom of the tree.
- LDR-LDR stands for “Light Dependent Resistor” are also called as the photo transistors. When light hits the device they produce photons. These make the photons jump into the conductive band and thereby conduct electricity.
- IR Sensor-IR stands for “INFRARED” Sensor is an electronic instrument which is used to sense certain characteristic of its surrounding by either emitting or detecting infrared radiation.
- Microcontroller-A 8051 Microcontroller is a circuitry of microprocessor & in addition it has built in 4Kb ROM, 128 Bytes RAM, 4 I/O Ports, 32 General purpose register & 16 bit timers which is connected to a supply of 5V.

In this project Microcontroller works as follows

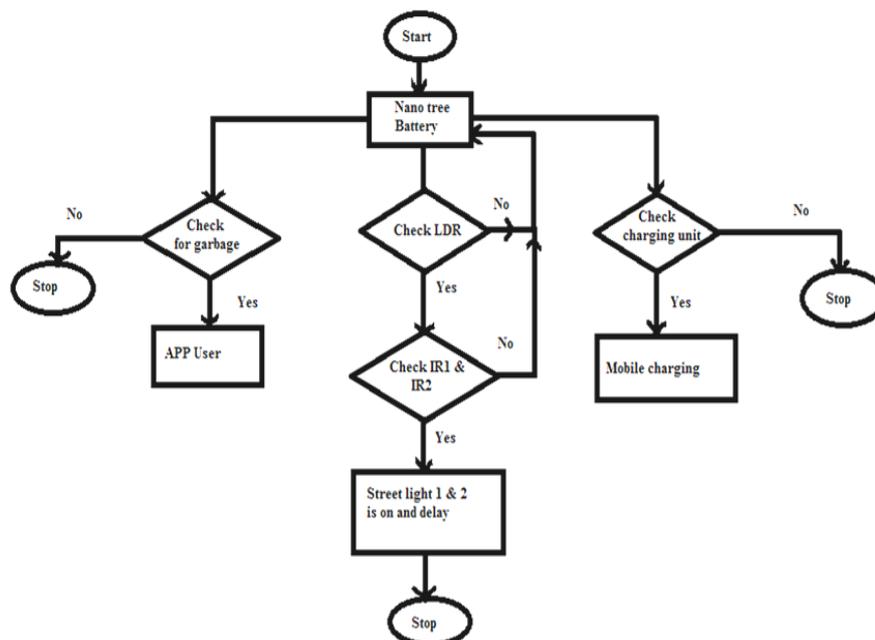
- Street Light:-when the signal is received to Microcontroller as per the instruction of the program a signal sent to IR sensor and then street light will turn on.
- Charging unit:- An IR sensor is placed inside the charging unit, when the coin gets detected this signal is sent to the microcontroller, as per the instruction set the mobile gets charged for certain duration depending upon the delay time set in the relay.
- Garbage:-Two IR sensors are placed in the garbage unit one at the level of 40% and the other at 80% respectively. When the garbage is at the level of 40% signal is sent to microcontroller through IOT using WIFI a alert message is sent to the APP users. Similarly, when the garbage level is at 80% a final message to the garbage disposal is sent.

SOFTWARE:

Description:

- Kiel micro version 4 – Kiel Micro Vision is a free software which solves many of the pain points for an embedded program developer. Compilers are programs used to convert a High Level Language to object code.
- Embedded C – Embedded C is a set of language extensions for the C programming language
- Flash magic – Flash Magic is a PC tool for programming flash based microcontrollers from NXP using a serial or Ethernet protocol while in the target hardware.

V. FLOWCHART



VI. APPLICATIONS

The photovoltaic, piezovoltaic and thermo voltaic energy harvesters are linked to individual junction boxes, from where they are amalgamated and fed collectively into an inverter. This converts the electricity from Direct Current (DC) into Alternating Current (AC) the electrical power now being suitable for domestic or industrial use. The manufacturers of the system estimate that a six meter area of Nano leaves canopy will generate enough electrical power to supply an average household.

There are many places where the artificial trees and shrubs can be positioned as noted below;

- Deserts - The power supplied by these trees —planted in the desert can be used to power desalination plants to produce fresh water from seawater and brackish water aquifers. This water can then be used for drinking and land irrigation, without any environmental damage to the fragile desert environment. Trees can be planted alongside oases and over fresh water aquifers, with the electricity produced used to power down- whole pumps, enabling water to be piped to other locations. When planted along the desert roadways, trees will supply shade as well as protection from the sun, wind, and sandstorms.
- Parks, Recreation Grounds, and Golf Courses - The electricity produced can be used to charge electrically powered ground maintenance vehicles such as grass cutters as well as electrically powered hand tools like grass trimmers and pruning shears.

When planted on golf courses the power produced can be used to charge golf buggies as well as electrically powered ground maintenance vehicles.

- Office Car Parks and Industrial Units - Trees planted in these locations will not only supply electrical power for the office and industrial units, but add aesthetic qualities to an otherwise drab area, whilst providing shade from the wind and sun.

VII. CONCLUSION

Photovoltaic solar energy constitutes a viable alternative as storing system to charge mobiles and street lighting schemes. Especially rural zones isolated remote villages not connected to the power grid. Garbage disposal schemes in urban areas have been a base to maintain health, hygiene beautification of a city which can be partially dealt with from the implementation of our project work.

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