



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 Issue: V Month of publication: May 2018

DOI: <http://doi.org/10.22214/ijraset.2018.5323>

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Implementation of Street Light Monitoring System Using Nano Tree

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Abstract: From millions of years, natural trees and plants are harvesting energy from the environment and they do this efficiently. Our aim of invention is to mimic this concept called as bio mimicry. This invention relates to the form of leaves, non materials and shape which allows the Nano tree to harvest energies from the environment like wind energy, solar radiation, sound energy that converts all these energies into electricity. The main objective in this paper is to design and implement automatic control and monitoring of street light. This paper deals with the designing of a lightening system in which it targets the energy saving and automatic control of the street light which is economically affordable and immediate remedy of fault detection or complaint. Moreover, there is an elimination of errors occurred due to manual operation. Also the street lights can be switched ON/OFF automatically using IR sensors that are embedded in the pole circuit of the street light. The performance and life of the street light will be increased with these facilities.

Key points: Arm7, Nano tree, solar panel, Piezo electric plate, IR sensor.

I. INTRODUCTION

Now a day's much debate has been going on in scientific world about the phenomenon of global warming and how mankind can avoid the global warming by taking the precautionary measures. By realising this situation steps have been taken to reduce the fossil energy and use the renewable energy sources like solar energy and wind energy etc. Till today we are generating the energy by using the wind mills (only the effect of wind) or solar panels (only the effect of solar energy). So in this paper we are using two energy sources in the same module but till now no one has combined two form of energy in a single tree. And by using these two energies surely we can generate more electrical energy from this model. In this paper we are demonstrating how a Nano tree will generate the electrical energy by using both wind and solar energy. In order to construct the Nano tree the fore most steps is to construct the Nano leaves. The Nano leaf will have a two conducting layer at the top and bottom of the leaf. Between these two layers we are placing the solar panel on the leaf, which is of thin film photo voltaic layer to convert the sunlight into electrical energy and thin film thermo voltaic layer to convert thermal radiation and the Piezo electric plates to convert the wind energy.

A. Overview

In India which is a developing country, there is a large requirement of electrical energy. Still in some of the rural areas in our country suffering from insufficient supply of electrical energy. So there is a need of reducing the energy consumption for lighting the street light with proper maintenance. Emissions which are related to energy are responsible for 80% of air emission and home, for the most critical global environmental impacts and hazards, including changes in climate, deposition of small and particulates. Lighting in the offices are the largest load but the energy consumption is low when compared to the personal costs. Therefore it is neglected. Based on the study global grid based electricity consumption for lighting was about 2750 TW in 2006, which was equal to the 20% of total energy is consumed by global. In European countries about 50% of electricity is reserved for office building lighting. This 50% of electricity is shared between hospitals, factories and residential building. For hospitals it's around 20-30%, for factories 10-15% and 15% for schools. So in order to reduce the wastage of electricity intelligent lighting control and energy saving system is essential. By automatic control of lighting system with dimming circuit we can achieve about 40% of energy savings and it reduces the 50% cost of the light maintenance. The lamp life is also increased by 25%, so each lamp switched ON/OFF automatically.

B. Objective

- 1) Power Generation Using Nano Tree
- 2) Power generation Using Wind (Piezo Electric)
- 3) Automatic controlling of street lights.
- 4) Day and night condition checking.

- 5) IR's which detects the vehicle then Particular Street light will be on.
- 6) Controlling Of vehicle beams.

II. PROPOSED METHODOLOGY

The block diagram shown below consists of all the important blocks that are needed for the working of this project.

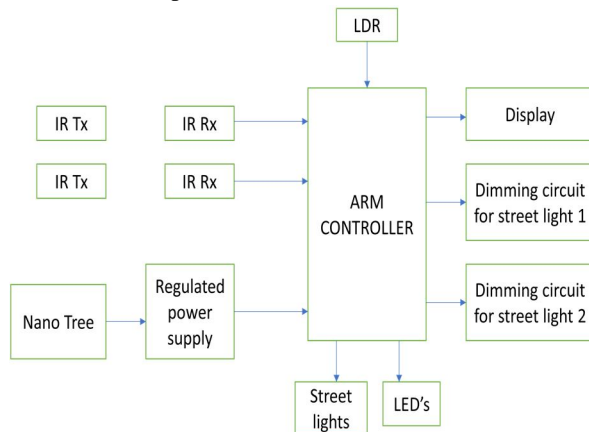


Fig 1: Block diagram of proposed system

In this project we are using Solar panel for generating power and it will be stored into the rechargeable battery from that we are giving power supply to the street lights. In this automatic mode operation we are using LDR Sensor for measuring light intensity for switched ON or OFF the street light using relays. The working can be clearly explained in this paper by considering the pole lights.

- A. The main aim of the project is to automatic switch ON/OFF the street light by sensing the vehicle.
- B. In this project IR's are used for sensing the vehicles.
- C. Initially the street lights are in OFF state by using the LDR'S.
- D. As the IR senses the vehicle the street lights associated with respect to that sensor will switch ON and OFF after certain time.
- E. Automatic control of vehicle beam when they approach each other.

In order to construct the Nano leaves we need solar panel, thermo voltaic cell, piezo voltaic cell and photo voltaic cell. The construction of Nano leaves is very easy. In this first of all we are creating two transparent conducting layers of silica which will act as the outer body of the leaf. After this we are placing one solar cell in between these two layers which is used to convert the solar energy into electrical energy then we are placing the Piezo voltaic cell, thermo voltaic cell and photo voltaic cell. These all the cells are interconnected to the highly conducted metal film to complete the circuit for the flow of electrons and protons. The piezoelectric generator is placed on the bottom of the leaf which is used to convert the stress due to rain and wind into the electrical energy. Now these leaves are connected to the twigs of the artificial tree. Then these small twigs are connected to the stem of the tree with the means of the piezoelectric crystal to convert the stress of the twig also into electrical energy. The electric energy from the all leaves and twigs is stored at the bottom of the tree any using storing device.

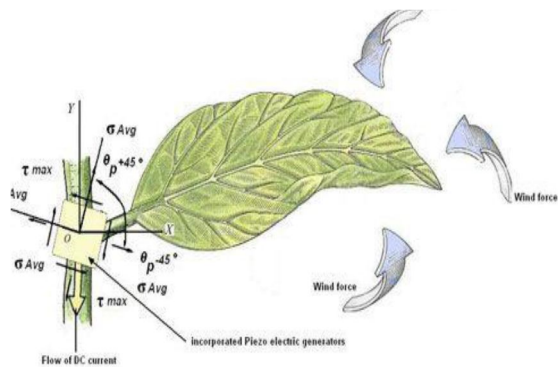


Fig 2: Absorption of three natural effects in one leaf

When the force from the outside, like the wind blowing the leaves [with the volume a little or a lot]. Pd on the spot, mechanical stresses appear in the leaves, twigs, stems and braches. This process can then generate millions of watts.

III. COMPONENTS

A. Arm7 Microcontroller

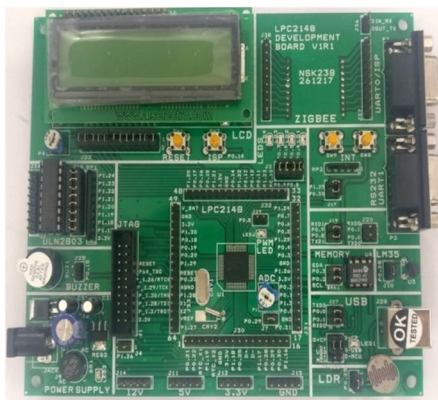


Fig 3: LPC2148 Microcontroller

The above fig shows LPC2141/48 microcontrollers which are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation, where the high speed flash memory that are ranging from 32kb to 512kb are combined microcontroller.

A 128-bit wide memory and it has unique accelerator architecture enables the 32-bit execution code at the maximum clock rate.

The 16-bit Thumb mode reduces the code by 30% with minimal performance of penalty, for the critical code size applications.

Since the main feature of LPC2148 is small size and less power consumption, for the ideal applications where the key requirement is for access control.

B. Solar Panel

The energy which is generated from the natural resources like sunlight, wind, rain and tides are the renewable energy. These natural resources are renewable and can be naturally restored. For all practical applications, these renewable sources can be considered for conventional fossil fuels and inexhaustible resources. The global community has provided the renewable energy sources for the growth and development. The organizations are adopting the CDMs (Clean Development Mechanisms across the world. main factor that is working for fossil fuels are the rapidly decreasing reserves of fuels, and there combustion leads to the pollution. The renewable sources are much cleaner and also produce more energy when we compared with the fossil fuels without any effect of harmful pollutions.



Fig 4: Different Solar Modules

IV. RESULT AND DISCUSSION

The main aim of this paper is to use solar panel to generate the solar energy from the sun light. We are using 6 solar panels; each solar panel has a capacity of 2v. These solar panels are placed on the Nano leaves (to absorb the sun energy) and also we are using Piezo electric plates to convert wind energy into electrical energy. The solar panel and Piezo electric plates are connected in series using positive and negative terminals. Also we are making use of filter papers to absorb the harmful gases present in the environment.

The energy which we are generating from the Nano tree are stored in 12v battery, at the positive end of the battery we placed a diode to avoid reverse flow of electrical energy.



Fig 5: General setup

This shows the experimental setup of Nano tree, as our aim in this paper we implemented the Nano tree using solar panels and Piezo electric plate. In which each solar panel is of 2V and we are using 6 panels which has a capacity of generating 12V electric power.

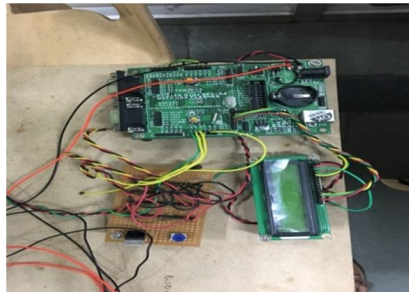


Fig 6: Controller unit of street light

Above figure shows the control unit of street light, in which it automatically monitors the ON/OFF condition during day and night. It also monitors the intensity of the street light depending on the intensity of the vehicle.



Fig 7: Practical output

During day time the street light will remain OFF and during night time it turns ON. IR sensor is placed near the street light which detects the vehicle and the LED1 turns ON. The condition of the street light is displayed on the LCD.

V. CONCLUSION

These Nano trees are eco friendly artificial trees, which are making use of the renewable energy from the sun along with the wind, which are more effective and environmentally gathering solar radiation and the wind energy.

A Nano leaf has wide range potential. By using such a technology, power producing solar panels can be applied to just about any down town. In this paper we integrate Nano tree technology with the automatic control of street lighting system. By this we can



generate the energy and also we are saving the electrical energy by automatic control of pole lights. The proposed system is appropriate for pole lighting system in rural as well as urban areas where traffic is low at all times.

VI. ACKNOWLEDGEMENT

I am very grateful to my institution, SJB Institute of Technology, for having provided me with the facilities for successfully completing paper on the literature for “Implementation of street light monitoring system using Nano tree” and providing me all the necessary facilities for successful opportunity to show my gratitude to my guide Mrs. Latha S Dept. of ECE, SJBIT, for her valuable guidance.

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