Solar Based Trap for Whitefly Affecting Dwarf Coconut Tree

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Abstract **- The project mainly aims in designing a system which is self-energized trap system for whitefly using renewable energy source solar energy to save the dwarf coconut trees from the whitefly. The trap system is designed based on the attracting techniques of whitefly. In this design fully use yellow color which naturally attracting the whitefly. To use the LED lights which attract the whitefly in night times which also in yellow color. And yellow sticky traps are designed inside the system. Here use the LDR to automatically turn on the LED lamp at nighttime there is no manual control. PIR motion sensor is used to automatically turn on LED at nighttime for irrigation purpose. A simple stand-alone PV system is an automatic solar system that produces electrical power to charge banks of batteries during the day for use at night when the suns energy is unavailable. A stand-alone small-scale PV system employs rechargeable batteries to store the electrical energy supplied by a PV panel.**

Index Terms **- Solar Energy, Charge controller, Arduino, LDR, Motion sensor, White fly.**

INTRODUCTION

Tamil Nadu, Kerala, Karnataka, and Andhra Pradesh are India's top coconut producers with the fruit integral to the coastal states economic, cultural, and tourism sectors. Coconuts are exotic, edible fruits produced in coconut trees. The coconut tree is a kind of palm tree with a single straight trunk and has been used for many purposes since prehistoric times. Every part has a use, including the fruits, wood, and leaves. Because of this, the trees are widely cultivated in many places in South India for both commercial and home use. Rugose spiraling whitefly (RSW) (Aleurodicus rugioperculatus Martin) is considered to have made its entry into India (Pollachi, Tamil Nadu, and Palakkad, Kerala) during 2016 from Florida (USA).

Fig.1.1. Whitefly

In warm or tropical climates and especially in greenhouses, whiteflies present major problems in crop protection. Worldwide economic losses are estimated at hundreds of millions of dollars annually Whiteflies feed by tapping into the phloem of plants, introducing toxic saliva and decreasing the plants' overall turgor pressure. Since whiteflies congregate in large numbers, drains the sap from the underside of the palm leaves, producing a significant amount of honeydew which settles on the susceptible plants can be quickly overwhelmed. The whitefly starts attacking from the lower leaves of the coconut palm. It upper surface of the next lower leaf leading to the growth of black sooty mould.

EXISTING SYSTEM

Farmers wash the leaf's using high pressure water pump. This method is ineffective, high cast and wasting water. Soaps have been used to control insects and combat pests for hundreds of years, but their effectiveness as pesticides has been scientifically established only recently. Recently, there has been increased interest in and use of these products. This change is due to a better understanding of how to use soaps most effectively and a desire to try insecticides that are easier and safer to use than many currently

available alternatives. How soaps and detergents kill insects is still poorly understood. Researchers have been studying how soaps work in combating pests. Some soaps simply wash off the outer waxy coating of the insect's cuticle, destroying its watertight quality and causing the insect to dry up and die. Other soaps have additional insecticidal properties that may affect the nervous system. These soaps appear to have toxic effect only against plant-eating insects and thus may spare beneficial insects such as ladybird beetles (ladybugs), lacewings, and predatory mites. In addition, high pressure sprays may wash some insects off the plant and other insects may be immobilized in soapy water, making them easier to rinse off the plants. Soaps will kill many insect pests, including aphids, mealybugs, whiteflies, spittlebugs, rose slugs, and soft scale on most houseplants, ornamentals, and fruit trees. But because soaps have little or no residual action, sprays should be applied at regular intervals until the population is controlled or eliminated. Soaps act strictly as contact insecticides, with no residual effect. To be effective, sprays must be applied directly to and thoroughly cover the insect.

Several insecticidal soaps are available over-the-counter for control of insects and mites. Available under a variety of trade names, the active ingredient of all is potassium salt of fatty acids. Insecticidal soaps are chemically similar to many household liquid hand soaps. However, there are many features of commercial insecticidal soap products that distinguish them from the dish washing liquids or liquid hand soaps that are sometimes substituted. In Existing system, The DC Source block consists of the dc input power source and a capacitor. The value of input is in the range of 12V. Switch Integrated with Coupled Inductor block consisting of a coupled inductor, a MOSFET switch and a diode. The coupled inductor primary has a series connected leakage inductor and a parallel connected magnetizing inductor. Output Voltage 1 Circuit consists of an auxiliary inductor, a diode and a filter capacitor. The value of output voltage 1 is 28V. Output Voltage 2 Circuit consists of a capacitor combination. In addition, the series connected diode and a filter capacitor is used. The value of output voltage 2 is 200V. Output Voltage 3 circuit consists of two MOSFET switches, two diodes and two capacitors. The value of output voltage 3 is -200V. Converters utilizing a single primary power stage and generating more than one isolated output voltage are called multi-output converters. The basic requirements are small size and high efficiency. High switching frequency is necessary for achievement of small size.

If the switching frequency is increased then the switching loss will increase. This decreases the efficiency of the power supplies. To solve this problem, some kinds of soft switching techniques need to be used to operate under high switching frequency. Zero Voltage Switched (ZVS) technique and Zero Current Switched (ZCS) technique are two commonly used soft switching methods.

Fig. 1.2. Existing system

This scheme is only suitable for the low output voltage and power application, and its power conversion is degenerated due to the operation of hard switching. A new dc–dc multi-output boost converter, which can share its total output between different series of output voltages for low and high-power applications. In this scheme, over two switches for one output were required, and its control scheme was complicated.

Besides, the corresponding output power cannot supply for individual loads independently. Chen investigated a multiple-output dc–dc converter with shared zero-current switching (ZCS) lagging leg. Although this converter with the soft-switching property can reduce the switching losses, this combination scheme with three full-bridge converters is more complicated, so that the achievement of high conversion efficiency is difficult, and its cost is also increased.

PROPOSED SYSTEM

In proposed system, The PV system is powered by the solar energy which is abundantly available in nature. The light incident on the PV cells is converted into electrical energy by solar energy harvesting means.

Usually for photovoltaic panel MPPT techniques are used, but here hysteresis controller is applied. The

hysteresis circuit is used, which extracts the maximum possible power from the PV modules and also limit current.

Photovoltaic power fed to battery for standard voltage and day-time usage, which is placed in between PV and converter. The voltage from battery is boosted by dc-dc boost converter and three different port will get supplied as per rated output voltage (8v, 12v, 20v) they were connected. The motivation for this project came from the countries where economy is based on agriculture According to a government order dated March 19, it said of the 25,000 hectares that is affected by rugose spiraling whitefly. Recent years our coconut tree formers suffering due to this whitefly attack so, this project must help for our farmers.

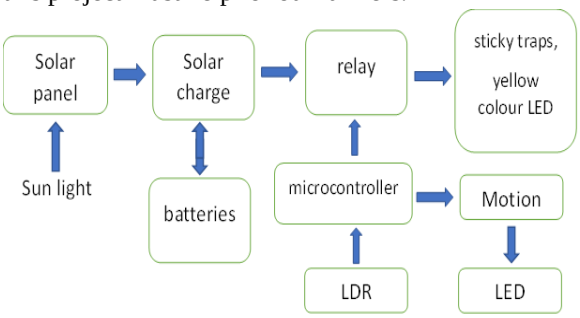


Fig.1.3. Proposed system block diagram

Multi-output charger that use to charge three different devices at a same time by renewable energy sources. In stand-alone system we can able to provide fluctuation free output to the load irrespective of weathers condition. To get the energy output of the PV system converted to storage energy, an efficient energy storage mechanism is required, which can be realized by the battery bank.

OBJECTIVE

The project mainly aims in designing a system which is self-energized trap system for whitefly using renewable energy source solar energy to save the dwarf coconut trees from the whitefly. The trap system is designed based on the attracting techniques of whitefly such as to use the LED lights which attract the whitefly in night times. In this design fully use yellow color which naturally attracting the whitefly. And yellow sticky traps are designed in system. The objective of the PV charger multi-output system is, to develop multi-output charger and compactable with highly efficient charger by renewable energy as solar energy. The proposed PV system provides an elegant integration of the solar PV to extract optimum energy from the source. It has been verified that unlike the conventional using the hysteresis controller for current limitation and excellent dynamic response. It is demonstrated that the proposed PV multi-output charger provides an efficient dc-dc boost converter that can be control by essential hysteresis controller and three different output loads.

CIRCUIT DIAGRAM

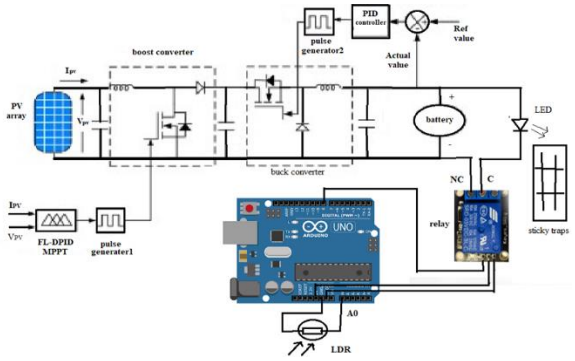
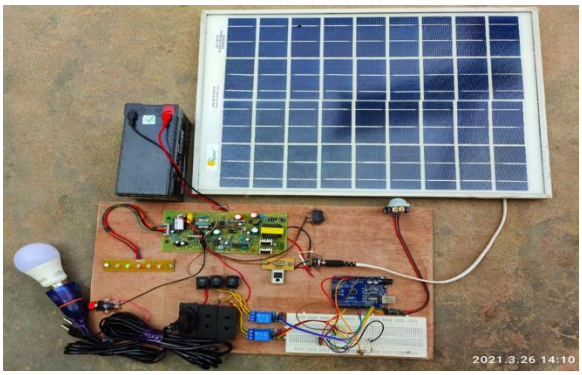
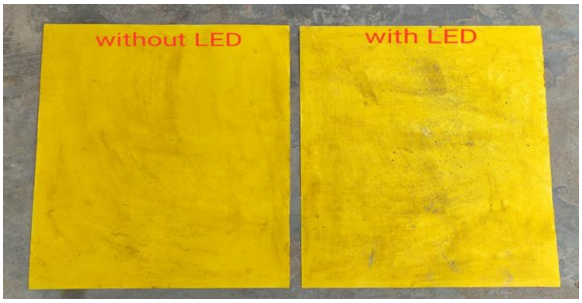


Fig.1.4. Circuit Diagram

PROTOTYPE



RESULTS



CONCLUSION

The annual coconut production of India is 2437.80 crore. The crop is cultivated in 20.98 lakh hectare. The crop contributes Rs 34,100 crore to GDP. More than one crore people depend on this crop for their livelihood. Recent years the Rugose spiraling whitefly attack on Dwarf coconut trees was increased the productivity also decreased and increase the poverty of farmers. In this project to overcome these problems to help our farmers and increase the productivity to contribute to the nation GDB.

REFERENCES

[1] S. Daniel and N. Ammasai Gounden, "A novel hybrid isolated generating system based on PV fed inverter-assisted wind-driven induction generators," IEEE Trans. Energy Convers., vol. 19, no. 2, pp. 416–422, Jun. 2017.

[2] J. Yao, H. Li, Y. Liao, and Z. Chen, "An improved control strategy of limiting the DC-link voltage fluctuation for a doubly fed induction wind generator," IEEE Trans. Power Electron., vol. 23, no. 3, pp. 1205–1213, May 2016.

[3] G. Tapia, A Tapia, and J. Ostolaza, "Proportional-integral regulator-based approach to wind farm reactive power management for secondary voltage control," IEEE Trans. Energy Convers., vol. 22, no. 2, pp. 488–498, Jun. 2015..

[4] J. Costa, H. Pinheiro, T. Degner, and G. Arnold, "Robust controller for DFIGs of grid-connected wind turbines," IEEE Trans. Ind. Electron., vol. 58, no. 9, pp. 4023–4038, Sep. 2016.

[5] C. Liu, F. Blaabjerg,W. Chen, and D. Xu, "Stator current harmonic control with resonant controller for doubly fed induction generator," IEEE Trans. Power Electron., vol. 27, no. 7, pp. 3207–3220, Jul. 2015.

[6] H. Xu, J. Hu, and Y. He, "Operation of wind-turbine-driven DFIG systems under distorted grid voltage conditions: Analysis and experimental validations," IEEE Trans. Power Electron., vol. 27, no. 5, pp. 2354–2366, May 2016.

[7] H. Nian and Y. Song, "Direct power control of doubly fed induction generator under distorted grid voltage," IEEE Trans. Power Electron., vol. 29, no. 2, pp. 894–905, Feb. 2017.

[8] A. Yazdani, A. Di Fazio, H. Ghoddami,M. Russo,M. Kazerani, J. Jatskevich, K. Strunz, S. Leva, and J. Martinez, "Modeling guidelines and a benchmark for power system simulation studies of three-phase singlestage photovoltaic systems," IEEE Trans. Power Del., vol. 26, no. 2, pp. 1247–1264, Apr. 2011.

[9] S. Eftekharnejad, V. Vittal, G. Heydt, B. Keel, and J. Loehr, "Impact of increased penetration of photovoltaic generation on power systems," IEEE Trans. Power Syst., vol. 28, no. 2, pp. 893–901, May 2013.

[10] N. Jin and Y. Jin, "High efficiency solar wind inverter with hybrid DC DC converter," U.S. Patent 2012 0170325 A1, Jul. 5, 2015.