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Solar energy driven autonomous smart ultrasonic mosquito repeller system

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Jaspreet Singh ; Gurnoor Singh Brar ; Noorinder ; Simarjit Singh Saini ; Ekambir Sidhu

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Abstract

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Few hundred species of mosquitoes cause disease like malaria, dengue etc. In order to eradicate these malaises, people have resorted to many remedies like chemical repellents which causes nervous breakdown, increase blood pressure and also ravage crops in the fields. In order to overcome these plight, solar energy driven autonomous smart ultrasonic mosquito repeller system has been proposed. The proposed system is driven by solar energy employing dynamic offset feed mirror parabolic dish integrated with solar panel. The proposed system is harmless to human beings as it produces ultrasonic sound waves by utilizing piezoelectric effect. The frequency range of ultrasonic sound waves is above 20 kHz which are inaudible to human beings. The ultrasonic sound waves of frequency range 38 kHz-44 kHz are audible to mosquitoes and other insects. When mosquitoes and other insects communicate, they continuously sense ultrasonic sound waves from repeller through antenna present on their body, they get irritated and are forced to repel away from that area. The microcontroller Atmega 328P-PU is used to turn on and off the repeller. The proposed system can be effectively used to repel mosquitoes from lawns, city parks, universities campus and organizations. The proposed smart mosquito repeller system is effective within 255 square meters.

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Contents

I. Introduction

Mosquitoes have made humans suffer a lot as most of the diseases such as dengue and malaria are caused by mosquitoes. It was reported that around 96 million people were infected by dengue globally in 2010 [1]. The proposed system is used to repel the mosquitoes by ultrasonic repelling device to reduce the use of chemical repellent [2]. Different frequencies are used to repel different insects. Frequency range between 38 kHz-44 kHz used to repel the mosquitoes [3]. The solar energy is a renewable source of energy which can help in reducing the energy crisis in the world. Therefore, there is a strong need to harvest and utilize the solar energy [4]. Solar technology has a notable part in power generation, a lot of renewable energy can be captured by sun [5]. The rate at which sun rays are received is about 1300 watts power per hour per meter on earth every day [6]. But 30 percent of this potency is sent or reflected back, still it results in a reel staggering of 4.2 kilowatt-hours of energy per meter each day [7]. Since the conventional solar panels fixed at certain angle limits the area of exposure from the sun during the course of the day, the radiations of sun are scattered which limits the efficiency of solar system to large extent [8]. The research has been carried out to increase the solar energy harvesting efficiency by employing various techniques like cassegrain antenna system, gregorian reflector antenna system and sun tracking system [9]. The sun tracking system is a difficult problem and an area of research in today's world [10]. The proposed solar energy harvesting system is a combination of smart mirrored parabolic dish focusing system and electric powered tracking system which increases the efficiency of the overall system to a greater extent [5]. The clocking or tracking system has been employed as it has no effect of change in weather conditions like cloudy, foggy etc. The tracking of sun has been done on single axis in the direction from east to west. The solar energy of sun can be effectively harvested when it moves about 150 degrees east to west per day [11]. The proposed ultrasonic mosquito repeller system operates by harvesting the solar energy from sun by smart tracking of sun has been done on single axis in the direction from east to west. The solar energy of sun can

be effectively harvested when it moves about 150 degrees east to west per day [11]. The proposed ultrasonic mosquito repeller system operates by harvesting the solar energy from sun by smart mirrored parabolic dish focusing system during daytime and storing. The section II describes the design of proposed system. The section III illustrates the operation and working of the proposed system. The results have been discussed in section IV and V followed by conclusion in section VI.

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