

# Arduino Based Automatic DC Solar Cooler System

Ritisha Bagde<sup>1</sup>, Amrapali Sakhare<sup>2</sup>, Akash Shekar<sup>3</sup>, Tulshidas Kokode<sup>4</sup>, Karan Chaudhari<sup>5</sup>, PROF. P.P. Panchbhai<sup>5</sup>

<sup>1,2,3,4,5</sup> *Jaidev collage of engineering and management, Nagpur*

**Abstract-** This paper focuses on air conditioning system using renewable energy source and whole system operates on the DC source using solar PV system or solar PV cell. Solar energy is world reach energy source and it is easily available in nature also it is clean and non-pollutant. It contains the design and construction of automatic operation performance like automatic speed control, automatic ON and OFF of fan as well as pump by using Bluetooth system, sense the water level along with water end buzzer with the help of arduino kit. DC motors are used to operate fan and water pump mechanism, DC battery and solar power are more suitable for saving electricity, charger controller is used to protection giants overcharging and over voltage. Solar air conditioning system specially designed for Indian climate. The power consumption is very major issue in India and the papers solve the problem of power consumption especially in the case of air conditioning and refrigeration.

**Index Terms-** Solar panel, Charger controller, Battery, Arduino kit, DC Motors.

## I. INTRODUCTION

In 21st century is rapidly becoming the perfect energy storm, new society is faced with volatile energy price and increasing environmental concerns as well as energy supply and security issues. Supplying energy demand is the greatest challenges facing mankind in the 21st century the conventional sources are coal, petroleum and natural gases have been the main energy resources the ignition of fossil fuel produces the bi products which are pollutions the environment of the earth. This has already raised concerns over potential supply difficulties, depletion of energy resources and ozone layer, global warming, green house emission and climate changes etc. Are some of the throats to the environment most plenteous energy resource available to nature is solar energy, used of solar energy is old. In resent year air conditioning and dehumidification has become

necessity in commercial and residential areas in the summer, season the consumption of electricity is increases because of the high and more uses of air conditioning system. Renewable energy means it is source of electric power generation available in different form and different area, the solar energy available on earth is apply 1000 w/m<sup>2</sup>. Solar PV module generates electricity from solar radiation with the help of photons. Photons are nothing but package of energy used for direct current (DC) generation by solar panel cell and we get one positive and one negative terminal output.

Non conventional energy generated by using wind, tidal, solar geothermal heat and biomass including farm and animals waste as well as excreta. These entire sources are renewable and does not effect on environment. Solar energy is abundantly available in nature and it can be use for many purposes. A complete solar cooling consists of more individual component, each working to provide cooling, but each serving their own purpose. Typically solar cooling system include heat rejection loop. Heat rejection loop are used to provide cooling.

Air conditioning is the process of removing heat and moisture from the interior and an occupied space, to improve the comfort of occupants. In general, air conditioning which also can be called as refrigeration is defined as any process of heat removal. To produce the process, it requires energy where the sources are commonly used gas and electricity. With increasing gas and electricity tariffs, solar energy becomes attractive once. The system has been installed. Solar energy or non conversional energy source is more suitable for the sub-tropical cities because of lack of electricity and also the cost of electricity

## II. WORKING AND DESIGN

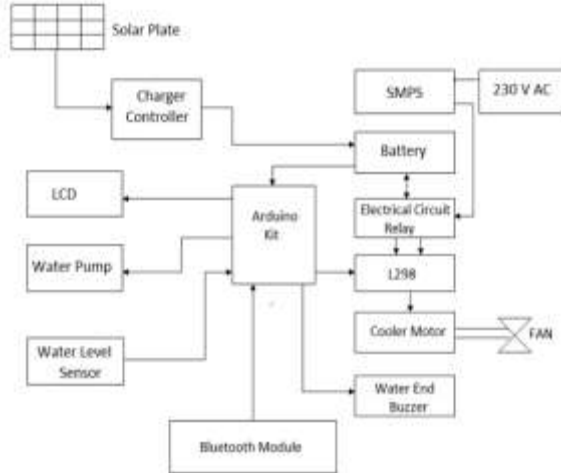


Fig: Block Diagram of DC Solar Cooler

Solar panel consist of number of silicon cell, when the sun ray comes into the solar panel, it generate the voltage signal and these voltage signal is given to charger controller or charging circuit. Charge controller is use for protection against the overcharging and over voltage. In charge controller, the voltage signal from the board is gathered together and store in battery. There are two tank provided, one at top and another one at the bottom. The design and construction upper tank is large and the water level sensor is being fitted to this tank. The purpose of water is saving and also power saving. One more water level sensor is being connected on bottom tank for sensing the water end or the bottom tank with the help of the arduino or microcontroller chip. A fan is provided at the centre of the tank in such way that the supply for the fan is coming from the battery which is stores the current from the solar panel and this fan are operated by on automatic ON/Off system with the help of Bluetooth module or system. When the water falls from top to bottom due to gravity, the fan is made to run, so cool air will be supplied all the way through. At the bottom of the tank, there will be DC pump which pumps the water again to the top tank. The power for the DC pump and motor is coming from the battery connected to the solar panel

### III. METHODOLOGY

The working of this project are mainly categorized in following point

- Solar Energy Conversion -: The solar energy is produced from the sun by producing solar radiation having photons, its help to generate

electricity. Photons means nothing but package of energy generated from solar light, this sun rays converted into the electric energy by using solar PV module or PV cells. The photon energy spot through light and solar panel is generated electricity is called as DC energy generation.

- Automatic Operation By Using Arduino -: In an advance automatic system technology are developed in various areas, so we also try to use automatic operation of cooler. That means DC motor operated automatically and functions like speed control ON/OFF operation can be done by using Arduino kit. We used ON/OFF motor operation automatically for human comfort, also used to automatic indication device like water level sensor and water end buzzer etc.
- Analysis of Energy Source -: Following figure is indicated the percent type of available electric energy conversion source today's in India

Table 1:- Available electric energy conversion source today's in India

Source	Percentage
Solar	22%
Hydro	6.9%
Natural Gas	21.2%
Wind	56%
Nuclear	4.8%
Coal	28.5%
Oil	31.3%

- Air Cooling Generation by Fan: - The energy is from of solar energy in DC electric operated motor by centrifugal fan, its help to generate cooling or air conditioning system. The fan converts with cooling pads and water flow at specific rate. As fan sucks the hot air from outside the atmosphere to cooling pad, thus heat transfer.

### IV. RESULT

In this paper we have experimentally studied on advance DC solar air cooler. The speed of motor is shown below.

Table 2: Speed of Motor

Sr. no.	Level	Speed in RPM
1	Fast	1450
2	Slow	860
3	Medium	550

The whole system operates on DC source and the water level sensor and water end buzzer are working successfully and in proper manner. The LEDs show the proper operation of motor speed and also gives the signals for water level sensor operation and water end buzzer operation. The entire software operations is being stream line by arduino kit in proper manner.

#### V.FUTURE SCOPE

The future expansion for this project can be studied without connecting battery and also can be connected buck boost converter. Synchronism of AC and DC can also be study on the same module.

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