IOT based dual axis solar tracker system

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ABSTRACT *Dual axis solar tracking system are more efficient because they track sunlight from both axes.The voltage and the current generated are used for other purposes and monitored using Iot by thinkspeak app.Light Dependent Resistors(LDRs) are used for sunlight detection. The solar panel is positioned where it is able to receive maximum light. As compared to other motors, the DC motors are able to maintain their torque at high speed.The effectiveness of output power which is collected by sunlight are increased and stored in a battery. Also all the sensor information is push through IOT cloud using ESP8266 WIFI Modem, which uses thinkspeak app pushing the data to user end.*

Key Words: : *Solar energy,dual axis,light dependent resistors,DC motor,WIFI modem,arduino,thinkspeak app.*

I. INTRODUCTION

In the past decade of years there is increase in demand for reliable and abundant electrical energy derived from renewable energy sources renewable energy plays important role in energy crisis of country. The government started to decrease the usage of conventional energy sources and encouraging people to use renewable energy sources like hydro and solar. One such example of renewable energy is solar power. Solar energy is a very large, inexhaustible source of energy. A solar tracker is a device used for orienting a photovoltaic array solar panel or for concentrating solar reflector or lens toward the sun. In this project, it's divided by two categories; hardware and software. In hardware part, light dependent resistor (LDR) has been used to trace the synchronize of sunlight by detecting brightness level of sunlight. For rotation part, standard DC motor has been selected. We determine the voltage and current in the solar panel.The energy fetched from the solar panel is further stored in the battery.

The power obtained are viewed in the LCD display and further viewed in the thinkspeak app using IOT. In software part, the code is constructed in embedded C programming and inserted in microcontroller.This project is designed for low power and portable application. Therefore, it's suitable for rural area usage. Moreover, the effectiveness of output power which collected by sunlight are increased.

II. EXISTING SYSTEM

Arduino Based Two Axis Solar Tracking by Using Servo Mechanism mentions about the variation in the solar energy occur daily due to variation in day night cycle and also because of seasonal variations throughout the year. Population of the world is increasing very rapidly. From past decade of years the non renewable energy sources like coal and oil are extinguishing and so it become serious problem for providing he reliable energy to the world. But solar energy plays important source of primary energy. In this project we propose dual axis solar tracking system by which it is possible to catch maximum amount of solar energy by using Arduino as main processing unit.

Disadvantages

1. No tracking
2. No history of maintenance
3. Less efficiency

III. PROPOSED SYSTEM

In this article we are going to make a Sun Tracking Solar Panel using arduino, in which we will use LDRs to sense the light and a DC motor to automatically rotate the solar panel in the direction of the sun light. This project is that Solar panel will always follow the sun light will always face towards the sun to get charge all the time and can provide the supply the maximum power.The power consumed in the solar panel are stored in the battery.The voltage and the current are determined using voltage and current sensor which is

connected to arduino.The LDR as the source input for arduino and the output is viewed in the LCD display and in thinkspeak app.The power production will be updated in server using IOT technology with help of ESP8266.

The IOT WIFI modem will act as a bridge between IOT cloud and our system, which uses THINKSPEAK APP for pushing the data to the cloud as well as user end such as smartphone application or using web page at PC.

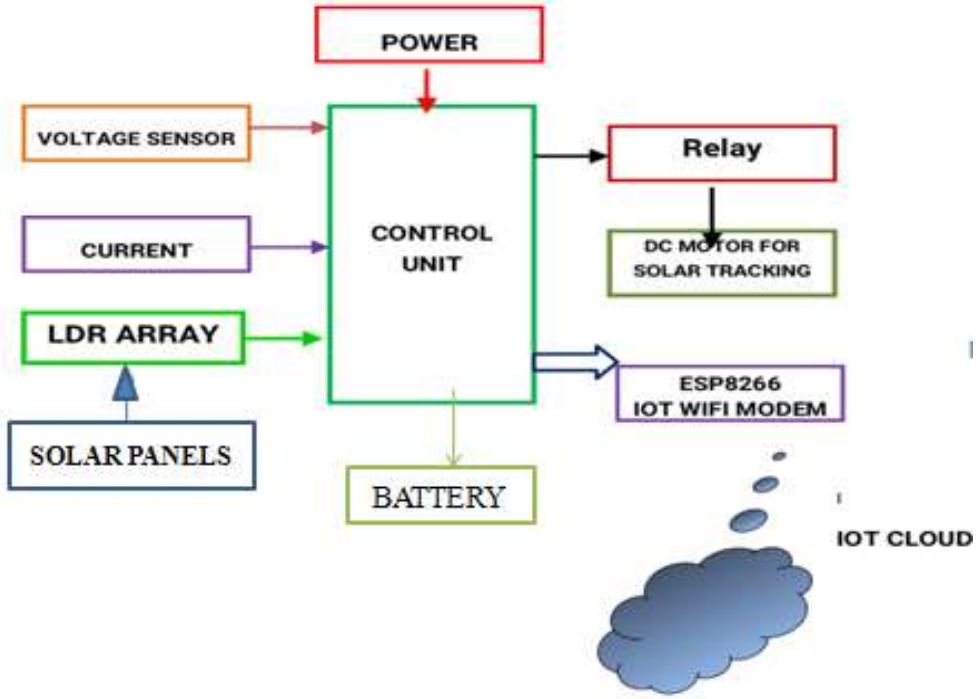

FIGURE 1 (a)PROPOSED SYSTEM DESIGN

FIGURE 1(b) USER END VIEW

IV. MODULE DESCRIPTION

- Interfacing the solar panel with LDR and DC motor
- Interfacing Microcontroller input to Sensors and output to the LCD,current and voltage sensors,adapter and WIFI modem
- Interfacing microcontroller to relay
- Interfacing solar panel to battery
- Interfacing microcontroller to current sensor and voltage sensor
- Interfacing WIFI modem to thinkspeak app

INTERFACING THE SOLAR PANEL WITH LDR AND DC MOTOR

Here we connect solar panel which can consume 10 watt of current through which we can get 85% of current.LDR are connected to solar panel and DC motor are connectedLDR is connected to the solar panel. On the other hand it is also connected to the DC motor.

FIG2(A)SOLARPANEL, (B)DCMOTOR, (C)LDR SENSOR

INTERFACING MICROCONTROLLER INPUT TO SENSORS AND OUTPUT TO THE LCD,CURRENT AND VOLTAGE SENSORS,ADAPTER AND WIFI MODEM

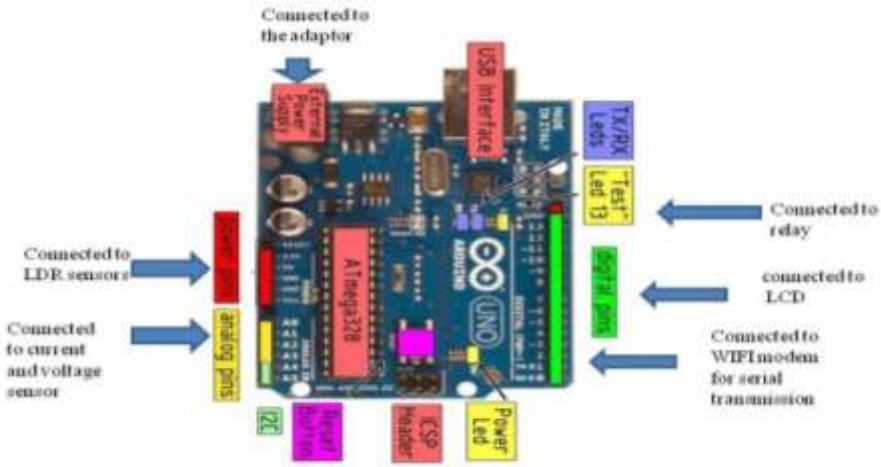

FIG3MICROCONTROLLER CONNECTIONS

INTERFACING MICROCONTROLLER TO RELAY

Relay is connected to microcontroller inorder to forward and reverse the panel through DC motor.By determining the light intensity in LDR,the relay helps to move forward and reverse.

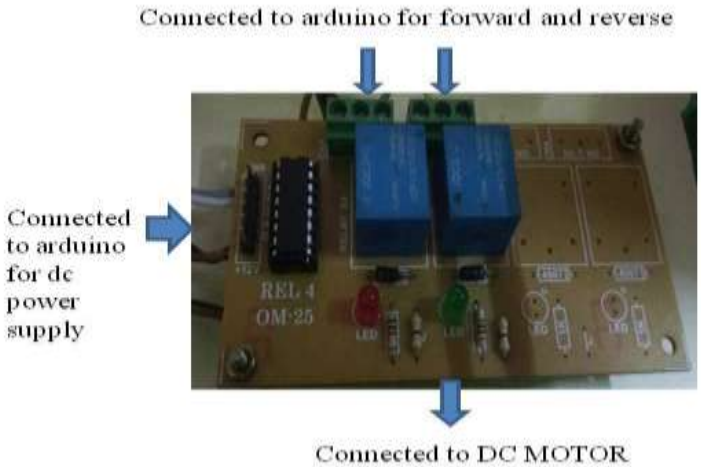

FIG4 RELAY CONNECTIONS

INTERFACING SOLAR PANEL TO BATTERY

The battery is rechargeable which is connected to solar panel through the protected diode.

FIG4 BATTERY CONNECTIONS

INTERFACING MICROCONTROLLER TO CURRENT SENSOR AND VOLTAGE SENSOR

The current and voltage are determined using these current sensors and voltage sensors.

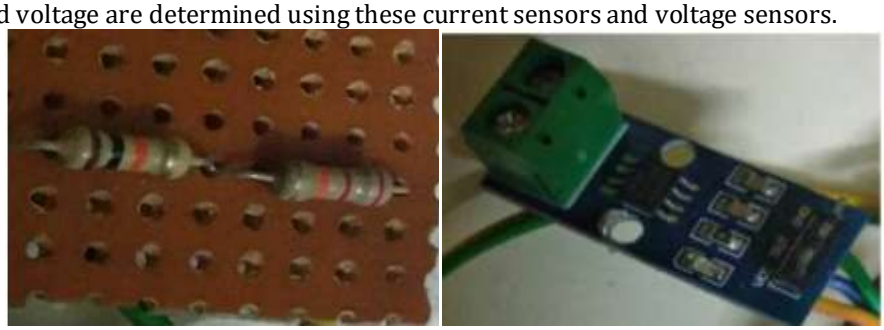

FIG5.VOLTAGE AND CURRENT SENSORS

INTERFACING WIFI MODEM TO THINKSPEAK APP

The WIFI modem is connected to arduino.It has been programmed to access via thinkspeak app.Thinkspeak is an MQTT protocol which is widely used in IOT.It works under publisher or subscriber principle and operates via a central broker. . They take mobile hotspot as user ID and password and get accessed.This means no direct connection between sender and the recipients but the data source report their data via a publish and all recipients interested in message receive the data

FIG6.WIFI MODEM

FIG7.THINKSPEAK APP

V. CONCLUSION

In this paper, the hardware of the dual axis solar tracking system design and implementation has been proposed. This system increases the efficiency of the solar panel. It is completely automatic and ensures minimum maintenance at low cost. Since, it is a dual axis system maximum efficiency can be obtained over a period of time. The installation and implementation of dual axis tracking system can be placedanywhere as

it does not depends on climatic conditions etc. It can be used in many applications such as automobiles, residential areas, industries, institutions etc. In order to place more number of panels, the systems have to be designed with moremechanical strength. The power consumption of the system can be reduced by improving the system design.

VI. FUTURE ENHANCEMENT

In the future,we can able to store maximum amount of energy and can able to use in large amount. Iot based solar tracker system can be utilized for both commercial purpose and also household purpose

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