SOLAR BASED REFRIGERATION SYSTEM

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Abstract— *In the present days depletion of ozone layer is increased due to release of Chloro Fluoro Carbons (CFC) it from refrigerators. Due to depletion of ozone layer ultra violet which is less harmful affects living substances. In this project electricity generated from the solar panel is transfer to the battery charger and then to the digital inverter. From the digital inverter signal is transfer to the refrigerator.*

1. INTRODUCTION

The major issue faced all over world is climate changing and global warming, the drastic increase in the emission of CO_2(carbon dioxide)within the last 30 years caused by burning fossil fuels has been major reason for the change of temperature and chlorofluorocarbon(CFCs) used in refrigeration systems are leaked from refrigerator. They drift around the lower layers of the atmosphere and they slowly start infiltrating into the upper layers. Then they reach the ozone rich stratosphere and undergo major chemical changes in the atmosphere.

Refrigeration technology is commonly used in domestic and industrial application. The most commonly used refrigeration technology consists of compressor, condenser, evaporator and throttling device which leaks chlorofluorocarbon (CFCs) in the upper atmosphere and they reach the ozone layer that undergo chemical in the atmosphere.

In order to replace these harmful effects, a proposed methodology solar panel is introduced. Here the refrigeration system works with peltier unit by means of solar energy which is low cost, consume low energy and it can be utilized by the remote village people. In this solar energy is given to the battery charger that increases the efficiency of solar energy and charges the battery without external power. The power from the battery is given to the digital inverter that converts AC to DC current and vice versa. Then the power is given to peltier unit which cools the system.

2. EXISTING METHODOLOGY

Refrigerator technology is commonly used in domestic and industrial applications. The compressor constructs the refrigerant vapour, raising its pressure, and pushes it into the coils on the outside of the refrigerator. When the hot gas in the coils meets the cooler air temperature of the kitchen, it becomes a liquid. The refrigerant absorbs the heat inside the fridge, cooling down the air.

3. PROPOSED METHODOLOGY

A proposed methodology based on solar panel is introduced. Consume low energy and it can be utilized by the remote village people. In this solar energy is given to the battery charger that increases the efficiency of solar energy and charges the battery without external power. Solar panel is producing 36 volt and power output ranging from 250 watts. The power from the battery is given to the digital inverter that converts AC to DC current.

Digital inverter works based upon pulse width modulation wave. Inverter technology has variable speed motor that change their speed as per the need thus saving 20-40% of electricity. In an "ON" "OFF" cycle of a regular refrigerator inside temperature varies throughout. But in case of inverter technology inverter is more stable energy or electricity consumption is much less when temperature stabilizes. The amount of the noise made by the refrigerator is much less in refrigerators with inverter technology as compared to the regular one.

4. BLOCK DIAGRAM OF PROPOSED SYSTEM
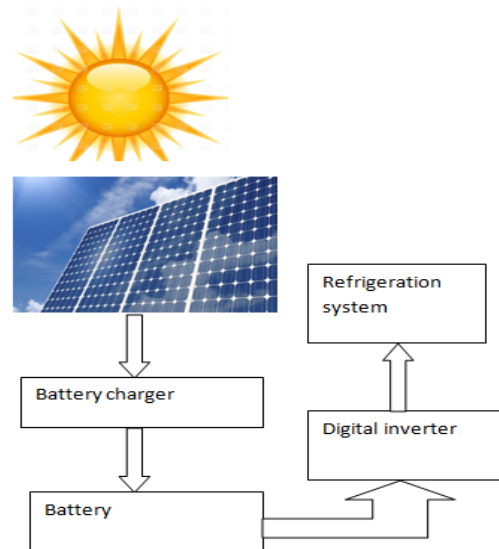
5. HARDWARE DESCRIPTION

A.   Solar panel

Solar modules use light energy from sun to generate electricity tested from mechanical through the photovoltaic effect. The sun light falls on the solar cell. Signal conditioning process is to generate electricity. Photovoltaic solar panel is used to converting solar energy into electrical energy.

B.   Battery charger

A battery charger is a device used to put energy into a secondary cell or rechargeable battery by forcing an electric current through it. The changing protocol depends on the size and type of the battery being charged. Battery types have high tolerance for overcharging and it can be charged by connection to a constant voltage source or a constant current source depending on battery type.

C.   Digital inverter

A digital inverter is used to converts AC to DC current vice versa. Solar panels into utility frequency alternating current that can be fed into local off grid electrical grid or used by local network. It use with photovoltaic system allowing the use of photovoltaic arrays including maximum power point tracking system and anti is landing protection, solar inverter use maximum power point tracking system to get the maximum possible solar cells has a complex relationship between solar irradiation temperature and total resistance that produces nonlinear output efficiency.
Refrigerator system is a process of moving heat from one point to other at control condition.

D.   DSP Processor

Digital signal processing (DSP) is the use of digital processing, such as by computers, to perform a wide variety of signal processing operations. digital signal processing can involve linear or non-linear operations.   Nonlinear signal processing is closely related to nonlinear system. It is interface with the digital inverter it generates the PWM signal using H bridge generate the signal. It is regulate the continuous signal to connect the refrigerator.
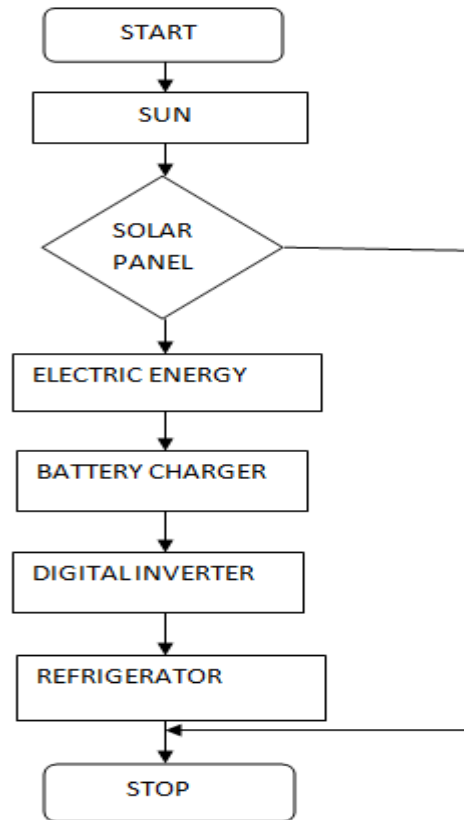
6. FLOW CHART

Fig 6.1 Flow chart of solar based refrigeration system

7. EXPERIMENTAL SETUP

```
D:\Documents and Settings\po\My Documents\inv\inv.c

MCUCR = 0x00;
GICR = 0x00;
TIMSK = 0x00; //timer interrupt sources
sei(); //re-enable interrupts
//all peripherals are now initialized
}

//===== FUNCTION FOR SOFTWARE DELAY OF 1 mSEC (appx.) =======

void delay_ms(int miliSec) //for 1 Mhz crystal
{
int i,j;

for(i=0;i<100;i++)
for(j=0;j<100;j++) ;
{
asm("nop");
asm("nop");
}
//******************** main ****************************
```

```
}
}

//******************** main ****************************

void main(void)
{
unsigned int counter;

init_devices();

while(1)
{
 OCR1B=OCR1A=0;
 _delay_ms(100);
 OCR1B=OCR1A=255;
 _delay_ms(100);
}
}
```

Thus the AVR coding is used to implementing the wave generation.

Fig7.1.digital inverter PWM signal generation

Fig7.2H bridge generate the signal

8. CONCLUSION

Thus the energy developed from the solar panel is capable of driving refrigeration. This can be

Implemented in village. Where there is no power supply. The maintenance cost of system is low.

9. FUTURE WORK

The refrigeration system can be designed with help of dish antenna. The refrigeration system developed can be made to work with different range of temperature. It is mainly used for vaccine storage. It is ecofriendly environment product which generates electrical natural.

REFERENCES

[1] Andrej kitanovski, Uros palaznik, Urban Tomc and Alojz Poredos , "Present and future caloric refrigeration and Heat pump tenchnologies", IEEE Transactions on International Journal of refrigeration, volume 4.0, issues 5, November 2015.

[2] Adolfo Ruelas, Nicolas Velazquez and Luis Gonzalez, "Design, Implementation and Evaluation of a Solar tracking System Based on a Video Processing Sensor", IEEE Transactions on International Journal of Advanced Research in Computer science and Software Engineering, volume 3, issue 10, October 2013.

[3] Bipin Krishna and Kaustav Sinha, "Tracking of sun for solar panels and real-time monitoring using LabVIEW", IEEE Transaction on Journal of Automation and control engineering, Vol.1.No.4, April 2013.

[4] C.R. Balamurugan, S.P.Natrajan, S.Shanma, R.Bensraj, "Embedded and Digital Controller Based MultiLevel Inverter", IEEE Transaction on International Journal of Hybrid Information Technology, Volume 8, Issue 3, October 2015.

[5] Dr.R.E. Critoph and Mr.K.Thompson, " Solar Energy for Cooling and Refrigeration", IEEE Transactions on International Journal of Advanced Research in Computer science and Software Engineering volume-6 issue 9, April 2013.

[6] M.T.A.Khanetal.,"Designand construction of an automatic solar tracking system", in Proc.6thInternationalConferenceonElectrical and Computer Engineering, 2010, pp. 326-329, November 2014.

[7] Nalin K. Mohanty, Ranganath Muthu, "Implementation of DSP Based Cost Effective Inverter Fed Induction Motor Drive with VisSim", IEEE Transactions on Journal of Electrical Engineering, Volume-63, issues 2, November 2012.

[8] Patil A.R, Atar K.D, Potdar A.A and Mudholkar R.R, "Embedded Fuzzy Module for Battery charger control", IEEE Transaction on International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume-7, Issue-8, Auguest 2013.