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IMPLEMENTATION OF SOLAR FRIDGE WITH FAST CHILLING APPLICATIONS WITH TEMPERATURE MONITORING USING LPC2148

B.SREEKAR[1], M.VEDACHARY[2]

[1] M.Tech, Dept of ECE, CMR College of Engineering & Technology, Hyderabad, AP-India,

[2] Assoc.Prof, Dept of ECE, CMR College of Engineering & Technology, Hyderabad, AP-India.

Abstract: This paper is designed for implementation of solar fridge with fast chilling applications with temperature monitoring. In this project we are using solar panels for charging a Lead Acid Battery (12V,1.2 Amp hrs), a pelteir thermoelectric device which when connected to battery generates cooling effect on one side and heat is dissipated on other side through heat sink, a cooling fan is used for dissipating the heat from the heat sink. A regulator 7803 is used to drive the internal cooling fan and LED. The temperature sensor LM35 senses the temperature and converts it into an electrical signal, which is applied to the ADC which is present in ARM7. The analog signal is converted into digital format by the analog-to-digital converter (ADC). The sensed values of the temperature are displayed on the 16x 2-line LCD. The main advantage of this project is the same unit 00 can be used as a fridge /oven. The Snap shorts modules under working conditions are included.

Key words: **Solar panel, ARM7 (LPC2148), Cooling Fan, Temperature Sensor (LM35).**

I.INTRODUCTION:

Solar energy systems have emerged as a viable source of renewable energy over the past two or three decades, and are now widely used for a variety of industrial and domestic applications. Such systems are based on a solar collector, designed to collect the 4sun's energy and to convert it into either electrical power or thermal energy.

In Today's world global warming is being increasing year by year. There are many reasons like pollution, deforestation, water contamination, etc...In coming years the major problem before us is depletion of ozone layer which is caused by the release of CFC's. Some of the equipments which cause this effect are refrigerators, AC 's. In this project we are mainly focusing on a solution to control this problem we have focused on refrigerators which releases CFC's. Here we are designing a mini solar based refrigerator which is cheaper as well as eco-friendly.

This project is designed with ARM7TDMI processor. Depending upon the temperature maintained inside the fridge its corresponding values will be read by the LPC2148 controller.

The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications

II.RELATED WORK

ARM7:-

The LPC2101/02/03 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation that combines the microcontroller with 8 kB, 16 kB, or 32 kB of embedded high speed flash memory. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical performance in interrupt service routines and DSP algorithms, this increases performance up to 30 % over the Thumb mode. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2101/02/03 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

A blend of serial communications interfaces, ranging from multiple UARTS, SPI, and SSP to two I2Cs, and on-chip SRAM of 2/4/8 kB make these devices very well suited for communication gateways and protocol converters. The superior performance also makes these devices suitable as math coprocessors. Various 32-bit and 16-bit timers, an improved 10-bit ADC, PWM features through output match on all timers, and 32 fast GPIO lines with up to 13 edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption.

The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as THUMB, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind THUMB is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM instruction set.
- A 16-bit THUMB instruction set.

Temperature Sensors

This device collects information about temperature from a source and converts into a form that is understandable by other device or person. The best illustration of a temperature sensor is mercury in glass thermometer. The mercury in the glass expands and contracts depending on the alterations in temperature. The outside temperature is the source element for the temperature measurement. The position of the mercury is observed by the viewer to measure the temperature. There are two basic types of temperature sensors.

· Contact Sensors – This type of sensor requires direct physical contact with the object or media that is being sensed. They supervise the temperature of solids, liquids and gases over a wide range of temperatures.

· Non contact Sensors – This type of sensor does not require any physical contact with the object or media that is being sensed. They supervise non-reflective solids and liquids but are not useful for gases due to natural transparency. These sensors use Plank's Law to measure temperature. This law deals with the heat radiated from the source of heat to measure the temperature.

SOLAR:-

Solar technology isn't new. Its history spans from the 7th Century B.C. to today. We started out concentrating the sun's heat with glass and mirrors to light fires. Today, we have everything from solar-powered buildings to solar powered vehicles. Here you can learn more about the milestones in the historical development of solar technology, century by century, and year by year. You can also glimpse the future

How Do Solar Panel Work?

A solar panel is a device that collects photons of sunlight, which are very small packets of electromagnetic radiation energy, and converts them into electrical current that can be used to power electrical loads. Using solar panels is a very practical way to produce electricity for many applications. The obvious would have to be off-grid living. Living off-grid means living in a location that is not serviced by the main electric utility grid. Remote homes and cabins benefit nicely from solar power systems. No longer is it necessary to pay huge fees for the installation of electric utility poles and cabling from the nearest main grid access point.

A solar electric system is potentially less expensive and can provide power for upwards of three decades if properly maintained. Besides the fact that solar panels make it possible to live off-grid, perhaps the greatest benefit that you would enjoy from the use of solar power is that it is both a clean and a renewable source of energy. With the advent of global climate change, it has become more important that we do whatever we can to reduce the pressure on our atmosphere from the emission of greenhouse gases. Solar panels have no moving parts and require little maintenance.

Solar panels are comprised of several individual solar cells which are themselves composed of layers of silicon, phosphorous (which provides the negative charge), and boron (which provides the positive charge). Solar panels absorb the photons and in doing so initiate an electric current. The resulting energy generated from photons striking the surface of the solar panel allows electrons to be knocked out of their atomic orbits and released into the electric field generated by the solar cells.

IV.SYSTEM IMPLIMENTATION:

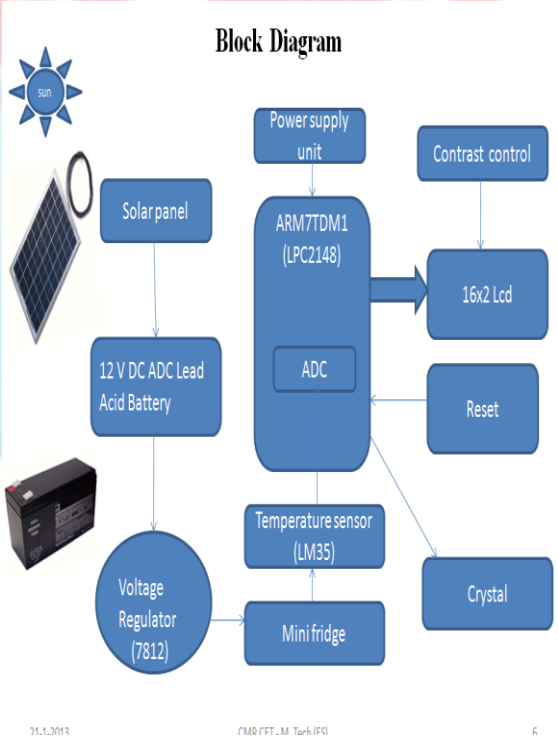


Fig: Block digram of system

In this paper we are using solar panels for charging a Lead Acid Battery (12V,1.2 Amp hrs), a pelteir thermoelectric device which when connected to battery generates cooling effect on one side and heat is dissipated on other side through heat sink, a cooling fan is used for dissipating the heat from the heat sink. A regulator 7803 is used to drive the internal cooling fan and LED.

The temperature sensor LM35 senses the temperature and converts it into an electrical signal, which is applied to the ADC which is present in ARM7. The analog signal is converted into digital format by the analog-to-digital converter (ADC). The sensed values of the temperature are displayed on the 16x 2-line LCD. The temperature range o f the sensor is 1 C to 255 C. The main advantage of this project is the same unit 00 can be used as a fridge /oven.

ALGORITHM:

STEP1: Start

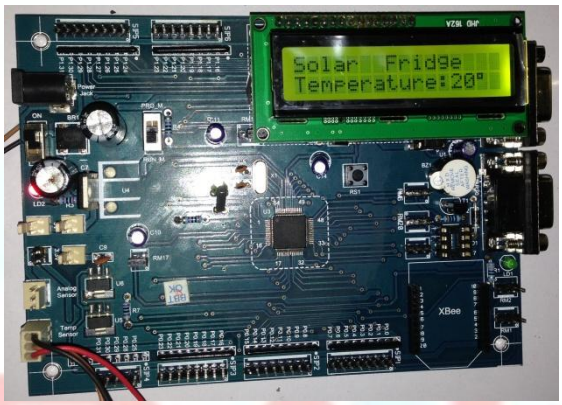
STEP2: Fixed the solar panel and connected to battery.

STEP3: Battery is connect to power supply and connected to fridge.

STEP4: Temperature sensor (LM35) connected into fridge and ARM7 board.

STEP5: To monitoring the temperature of fridge and displayed on the 16X2-line LCD.

STEP6: End of the process.



V. CONCLUSION:

This paper is implemented successfully with the help of basic requirements for fast chilling the solar fridge and also studied about ARM7,LM35, solar panel. ,pelteir plates.

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BIBLIOGRAPHY:

1. B.SREEKAR, received his B. Tech degree in Electronics & Communication Engineering from JNTU, Hyderabad, currently pursuing M. tech in Embedded systems from JNTU Hyderabad

2. M. Veda Chary , received his M. Tech degree in Electronics & **Communication** Engineering from JNTU, Hyderabad, currently working as an Associate Professor, ECE in CMR College of Engineering & Technology, Hyderabad.