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Automatic Temperature Controller with Cooling System

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Abstract

This project focuses on the design and implementation of an automatic temperature controller integrated with a cooling system. The system is designed to maintain a predefined temperature range within a specified environment, providing efficient cooling when necessary. The automatic temperature controller utilizes sensors to continuously monitor the ambient temperature and compare it with the setpoint temperature. Based on this comparison, the controller activates the cooling system to regulate the temperature within the desired range. The cooling system employs a combination of methods such as air cooling, liquid cooling, or thermoelectric cooling, depending on the application requirements.

Introduction

The concept of this paper is to create an automatic temperature control system to control the temperature of a system. This circuit maintains the temperature of the system in a particular range. Automatic control plays an ever-increasing role in human way of life. The problem of the precise control of temperature of liquid flowing through a tank containing heater is one which is important and familiar in the process-control industry. In rainy season, the most common problem is drying the clothes. Due to humidity, it takes a long time for drying. During winter season, room temperature must be maintained in order to ensure the human convenience. This project mainly includes the temperature control of heater, temperature control of surrounding in winter, voltage control i.e. it works as stabilizer & also as dryer in rainy seasons. It consists of Temperature sensing unit, LCD module, switching device, driver, a fan and heater.

Descriptions*:*

This project Temperature Based Fan Speed Control s can be done by using Arduino board with some electronics materials. The Arduino UNO board is very popular among all electronic circuits; thus we employed Arduino UNO board for the operation of the fan speed control. In the proposed system itself said that it is designed to detect the temperature of the room and send that information to the Arduino UNO board. Then the Arduino UNO board carries out the contrast of current temperature and set temperature based on the inbuilt program of the Arduino that feed through us. The output obtained from the operation is given through the o/p port of an Arduino UNO board to the LCD display that connected with the board.

Literature Review

The Home is usually the most inhabited place in any society. he need to keep the home environment thermally conducive should be of paramount concern in any society that wants to maintain happy and healthy citizens. Areas in the home that are usually occupied by people, such as the living room and bedrooms need to be maintained within habitable temperature ranges. The human body has a set-point temperature of about 37°C. Extremely higher or lower temperatures can result in damage to some body organs or tissues and eventual death. These issues become more pertinent in areas of the home that are occupied by infants. Adults could possibly find their way around "thermal discomforts", but infants may not. Other areas of the home that are used as storage areas for perishable food items also need to be thermally regulated in order to prevent accelerated decay of such items.

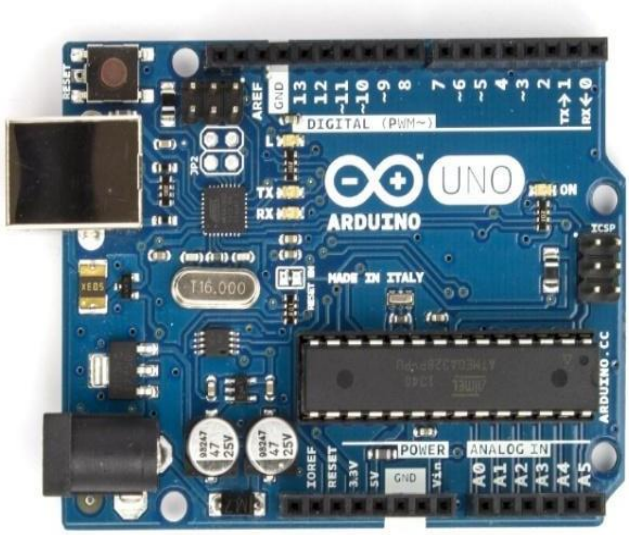
Components used:

The components used are

1. Arduino UNO
2. Temperature Sensor
3. Fan
4. LCD Display
5. Motor Drive
6. Voltage Regulator
7. Lithium Battery
8. Solar Panel
9. Solar Charger Controller

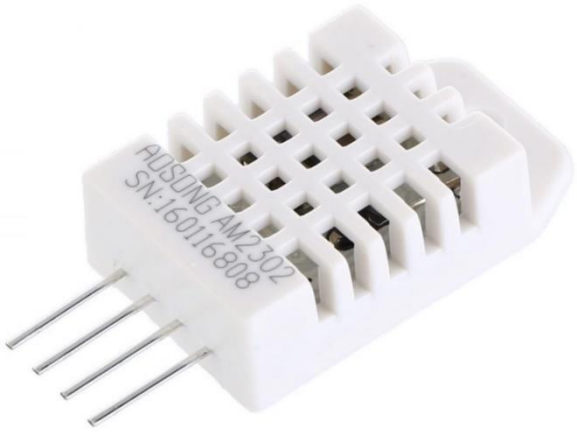
Arduino UNO:

Arduino UNO is a development board which contains microcontroller in the board itself. It is an open-source software. In the electronics platform, arduinois easy to use hardware and software. The Arduino boards can read inputs so that they can understand and give as some of the outcomes like light on a sensor, a finger on a button, activating a motor, turning on an LED, publishing something manually in online etc,. that are all given as output to us. The most of the applications on everyday life, ardunio is a par



DHT22 Temperature and Humidity sensor

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor with a calibrated digital signal output. It uses exclusive digital-signal-acquisition technique and temperature & humidity sensing technology; it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.



Fan 12v 2Pin

The 12V 2-pin fan represents a ubiquitous component in electronic systems, renowned for its simplicity, efficiency, and versatility. Operating on a 12-volt power supply, this fan typically features two pins for connection: one for power (12V) and the other for ground. Its design, characterized by its compact size and lightweight construction, makes it an ideal choice for various cooling applications in electronics, computers, automotive systems, and more.

Liquid Crystal Display (LCD):

LCDs are commonly used for visual output in Arduino projects. They come in various sizes, from small character displays to larger graphical displays. They are often used to show sensor readings, messages, or menu options. Character LCDs are simple displays that can show text and limited symbols. They consist of a grid of characters arranged in rows and columns. Character LCDs commonly come in formats like 16x2 or 20x4, indicating the number of characters per row and the number of rows. Graphical LCDs can display both text and graphics. They offer more flexibility in displaying information compared to character LCDs.

Motor Drive L293D:

This L298N motor driver module is a high-power motor driver module for driving dc and stepper motors. this module consists of an L298N motor driver ic and a 78m05 5V regulator. L298N module can control up to 4 DC motors, or 2 DC motors with directional and speed control.

Voltage Regulator:

This DC-DC 12V to 3.3V 5V 12V Power Module Multi Output Voltage Conversion is also known as **Buck Converter** or also as Step-Down Voltage Converter. The module is capable of altering the output of the power source/supply before supplying it to the load so as to deliver the specified power to your load.

12V Lithium Battery

The 12V lithium battery stands as a pinnacle of portable power technology, offering a compact and efficient energy storage solution for a wide range of applications. Leveraging the high energy density and lightweight characteristics of lithium-ion chemistry, these batteries have become indispensable in powering various devices, from electronics and automotive systems to renewable energy installations and portable appliances.

Solar Panel

The solar panel stands as an emblem of sustainable energy generation, harnessing the power of sunlight to produce electricity. Comprising interconnected photovoltaic cells, these panels convert solar energy into usable electrical energy through the photovoltaic effect. This process involves the absorption of photons by semiconductor materials within the cells, generating an electric current and voltage differential across the panel.

Solar Charger Controller

A solar charger controller serves as the vital intermediary between solar panels and batteries, regulating the flow of electricity to ensure optimal charging and protection. Functioning as the brain of off-grid solar systems, these controllers manage the charging process, prevent overcharging or deep discharging, and maximize the lifespan of batteries.

Conclusion

An automated room temperature controller system was designed successfully. The system used Atmega 328 on Arduino microcontroller for the control unit and DHT11 as the temperature sensor. The Fan was turned ON and heater turned OFF when the room temperature was higher than the reference temperature and the heater was turned ON and Fan turned OFF when the DHT11 reading was below the threshold or reference value. The system is helpful for people who are disabled and can be used in the industry or any environment whose temperature is supposed to be maintained.

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