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DEHUMIDIFIER USING THERMOELECTRIC PELTIER MODULE

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Abstract – Thermoelectricpeltier module cooling technologies have proven themselves as reliable alternatives for laboratorial applications and small home appliances. Its range of applications is growing, fomented by lower prices of technology and development of small house products as cooking machines and small refrigerator. They consist of an assembly of Peltier modules and heat sinks, which in the scope of this work, are air cooled. The objective of this thesis is to develop a compact thermoelectric cooling assembly for a kitchen countertop home appliance – a sous vide cooking machine – falling under the scope of new product development. The appliance design process, must take in consideration the volume available and user experience related constraints. In this work, a brief review of existent technologies and market assessment, precedes the problem formulation, mechanical design and mathematical prediction model of the refrigeration process. The Peltier modules thermal behavior is estimated and the thermoelectric assembly is characterized. The heat sinks chosen are then described. Numerical simulation of the heat sinks, submitted to different conditions and turbulence models, simulated on ANSYS ICEPAK, are presented. The Spalart-Allmaras, the ERNG Model and the ERTE Model are the turbulence models considered. To conclude, a heat sink geometry, especially design for the appliance is suggested, and the main conclusions and some recommendations for future works are presented. From these, it is noted that the vertical and horizontal flow heatsinks assessed are predicted to have similar performance. For noise reduction and better efficiency, the horizontal flow is the best configuration. Extruded heat sink can achieve similar performance to bonded fins heat sinks, but with a significant mass increase. The estimated costs justify the study of liquid cooling solutions.

Key Words: Peltier, heat sink, thermoelectric, design, cooling,Arduino Uno.

1.INTRODUCTION

Humidity is blamed for harmful things of all kinds. In this study it aims at creating an automatic controller for humidifier and dehumidifier. It helps to regulate and monitor the level of humidity to minimize the room humidity and to make the user comfortable. The study uses a humidity sensor to measure the room's humidity and provide the device with two choices to automatically humidify or dehumidify the air.

This helps minimize odors that can surround mold and mildew to rid your house of the "musty" or "rotting" smell, it also decrease dust and the risk of forming molds on your clothing, furniture and other linens, and eventually reduces inflammation of your skin and respiratory system, making it easier to breathe and feel comfortable at home. Controller used in this study is Arduino Uno. An input supply to the Arduino Uno is then connected to its pin by a humidity sensor, and the LCD will display the humidity value. A relay that was used to power humidifier and dehumidifier operations. The study was done after the testing procedure shows the result of different longer-term data when the dehumidifier and humidifier turns on and turn off if it's become normal, depending on the size of room and weather temperature.

2. Literature Survey

The studies concerned set out in this section present the definition that relates to the Arduino powered Automatic Room Humidifier and Dehumidifier.

A research in Soil Moisture, Temperature and Humidity Calculation Using Arduino said that this project was built to designed smart farming methods for Indian farmers to track critical crop growth factors accurately. The system tests three of the most important and significant plant production parameters, namely soil moisture, temperature, and humidity.

The Arduino Uno microcontroller. The FC28 hygrometer and DHT11 sensors are used, respectively, to measure soil humidity and

temperature. In other words, soil humidity and relative humidity. The microcontroller of Arduino Uno.

The FC28 hygrometer and the DHT11 sensors are being used to calculate soil moisture and temperature respectively. The data is read by the sensor and then sent to the microcontroller board. The board then processes, maps and displays data by code on the LCD panel.

L.Barik., The computer employs Arduino Uno with Raspberry Pi, sensor package HTU 211D, and Wi-Fi module ESP8266. The experimental data show the ambient live environment temperature and humidity of any plant using Raspberry Pi with Arduino Uno, and the soil moisture. This research incorporates the environmental observance results, such as humidity and temperature measurements using sensors. The information collected could be used to generate habits such as distantly dominant cooling devices, heating devices or long-term statics that will help track the same.

Another study by Bhadani P., used the Arduino controller system to calculate the devices temperature and humidity, pressure, and size. The system involves the height measurement tool and a measurement or control instrument. For this work they suggested an Arduino Uno with Raspberry Pi data processing unit.

Late people are increasingly relying on embedded systems to control and monitor ecosystem-influencing factors for rising human effort and participation. Temperature and humidity are important to natural observation and understanding. IoT takes form here by dramatically enhancing the mechanism's efficiency and systematically reducing human participation, and therefore overall spending.

The proposed prototype consists of a temperature and humidity detection DHT11 module, an Arduino microcontroller, a mist generator and a ventilator for cooling. DHT11 sensor was extensively used in temperature and humidity control system design.

The comfortable room was built by monitoring room condition temperature (on a scale of 18 – 34 0C) and humidity (on a scale of 40 percent -70 percent). Room temperature and humidity were regulated using four variables such lamp, water vapor supply pump, air circulation fan and exhaust air cleaner. Hardware (moisture sensor, microcontroller, pump, lamp and fan) and (software IDE) were used to build the system.

Arduino refers to an electronic board which is open source and is programmed using the software. It makes the electronic design more available for anyone interested in creating it with suitable environments.

3. Problem definition:

Nowadays, there are lacks of awareness to the significant of humidity in our life. Suitable humidity level is needed to stabilize our environment and the world ecosystem including to ourselves.

The relative humidity in the air should be monitor in order to maintain an ideal environment. The common problem result by humidity such as dampness, dryness and condensation in surroundings cause discomfort and various problem to public, Too high or too low humidity level condition can affect the quality of wood furniture which needs an extra care of dry condition all the time.

For certain industry such as chickens eggs hatching or even the incubation of immature new born chicks also needs a controlled humidity condition. In order to ensure energy efficient and optimized results, proper controlled system need to be designed. Development in sensor design lead sensor as main component to read some.

4. CONCLUSIONS

The design is more convenient for water collection. The design is so simple such that the device can be carried to anywhere .The equipment is very helpful for explorers, mountaineers, fishermen etc. The concept of this system can also be used as a better alternative in refrigeration against conventional systems. At the current climatic conditions as global warming increases and the water resources over the world diminishes, so this equipment is extremely helpful to mankind.

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