AUTOMATIC AIR COOLER USING ARDUINO

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ABSTRACT:

This paper presents an Automatic Air Cooler Using Arduino, which is designed to provide efficient cooling in hot and humid environments. The project involves the use of an Arduino microcontroller to control the water level and control the water flow on cooling pads, which work together to produce cool air.

The system is designed to be energy-efficient and cost-effective, making it a viable solution for homes and offices in areas with hot and humid climates. The paper discusses the objectives of the project, the literature survey conducted, and the conclusion derived from the implementation of the project.

1. INTRODUCTION:

The Automatic Air Cooler project using Arduino is a smart cooling solution that offers advanced features such as automatic water control, humidity control, and display of temperature and percentage humidity on an LCD display. This project aims to provide an efficient and automated solution to keep indoor spaces cool and comfortable during hot weather conditions.

The project utilizes an Arduino board, which is a popular microcontroller platform widely used in electronics projects. With the help of sensors and actuators, the Arduino board controls the various functions of the air cooler, including the water pump, fan, and humidity sensor.

One of the unique features of this project is the automatic water level control, which regulates the water supply to the air cooler based on the level of water in the tank. This helps to ensure that the air cooler operates efficiently without wastage of water.

Additionally, the project includes a temperature and humidity sensor that measures the level of temperature and humidity in the room. The temperature and humidity readings are displayed on an LCD screen, which makes it easy for the user to monitor and control the air cooler.

Overall, the Automatic Air Cooler project is an innovative solution that provides advanced features and automation to enhance the comfort of indoor spaces during hot weather conditions.

2. OBJECTIVES OF AUTOMATIC AIR COOLER

The primary objective of the project is to design an Automatic Air Cooler using an Arduino microcontroller that can provide efficient cooling in hot and humid environments. The following are the specific objectives of the project:

1. To design and construct an air cooler that is cost-effective and energy-efficient.
2. To use an Arduino microcontroller to control the fan and water pump for optimal cooling.
1. To develop a user-friendly interface for the air cooler that can be controlled remotely.
2. To evaluate the performance of the air cooler and compare it with traditional air conditioning systems.

3. LITERATURE SURVEY

The use of air coolers as an alternative to traditional air conditioning systems has been studied extensively in the literature. Studies have shown that air coolers are more energy-efficient than air conditioners, consuming up to 75% less energy (Thakur et al., 2017).

The use of an Arduino microcontroller to control the fan and water pump in an air cooler has also been proposed in the literature (Bharati et al., 2015).

4.COMPONENTS: -

List Of Components
1) ARDUINO UNO R3
2) 5v RELAY MODULE
3) TEMPERATURE SENSOR (DHT11)
4) ULTRASONIC SENSOR
5) 16x2 LCD DISPLAY
6) WATER PUMP
7) TWO WAY SWITCH

1)ARDUINO UNO R3

Arduino Uno is a popular microcontroller board based on the ATmega328P microcontroller. It is widely used by electronics enthusiasts, hobbyists, and professionals to create a variety of projects.

The Arduino Uno board has 14 digital input/output pins, six analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button. It can be programmed using the Arduino IDE, which is a user-friendly programming environment that supports the C+ programming language.

Hear the Arduino UNO Development Board is used to burn the program in the microcontroller and for supplying 5V supply to the sensors and relays.

2) 5V RELAY

A 5V relay is an electrical switch that can control the flow of current in a circuit. It requires a 5V power supply to operate and is often used with microcontroller boards such as the Arduino.

The relay uses an electromagnet to activate a switch, which can control larger loads that require more current than the microcontroller can provide. It is a useful component in electronic circuits that require the control of high-power devices.

When the water level in the cooler tank decreases the Arduino gives tripping signal to the relay to switch on the inlet water pump.

3)TEMPERATURE SENSOR (DHT11)

The DHT11 is a digital temperature and humidity sensor. It consists of a capacitive humidity sensor and a thermistor to measure temperature. The sensor communicates with the microcontroller using a single-wire protocol and can be easily interfaced with Arduino and other microcontroller boards. It has a temperature range of 0-50°C with an accuracy of ±2°C and a humidity range of 20-90% with an accuracy of ±5%.

The DHT11 sensor measurers the temperature and humidity to indicate on LCD display.

4) ULTRASONIC SENSOR

An ultrasonic sensor is a device that uses sound waves to measure the distance between the sensor and an object. It works by emitting high-frequency sound waves and then measuring the time it takes for the waves to bounce back from the object. The sensor contains a transmitter and a receiver and can be easily interfaced with microcontroller boards such as the Arduino.

The ultrasonic sensor continuously measures the water level of cooler tank, when the water level in tank decreases below certain value then it gives signal to the Arduino.

5) 16x2 LCD DISPLAY

A 16x2 LCD display is a type of alphanumeric display that can show 16 characters per line and has two lines. It is commonly used in electronic projects to display text messages.

Using a 16x2 LCD display, the temperature and humidity values are displayed.

6) WATER PUMP

Hear in this project the water pump is used for water intake to the cooler tank when the water level lowers a specific amount.

Water in the cooling pads is circulated with a 10-minute delay using the other water pump. The water pump turns on at the beginning for 10 minutes to wet the cooling pads. The water pumps automatically shut off after ten minutes, this results in saving of water and maintaining an acceptable humidity level.

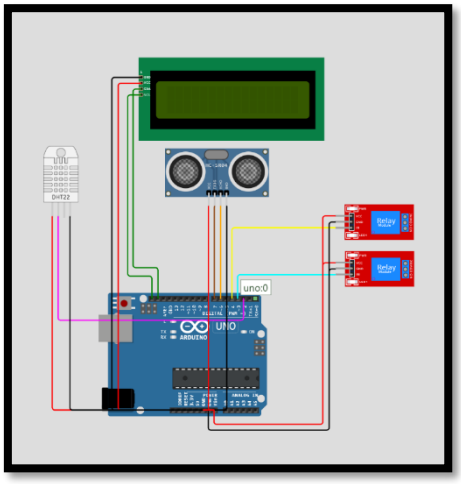
7) TWO WAY SWITCH

A two-way switch is an electrical switch that allows you to control a single electrical fixture from two different locations. It is also known as a double-pole, single-throw switch.

Hear the two-way switch is used to control the mode of cooler. When the two-way switch is in off position the cooler will start normally without interaction with Arduino and when the two-way switch is in ON position the cooler starts in automatic mode.

All of the sensors and relays are turned on by the Arduino when the automatic mode is activated.

5. CIRCUIT DIAGRAM OF AUTOMATIC



6. WORKING OF AUTOMATIC AIR COOLER

An automatic air cooler operates by drawing in warm air from the surroundings through a fan and passing it through a cooling pad that is soaked in water. The water level control feature automatically monitors the water level in the cooler's tank and ensures that the cooler is refilled when the water level drops below a certain threshold.

The humidity control feature ensures that the air that is circulated is neither too dry nor too humid, which helps maintain a comfortable living environment.

The water-saving feature is designed to optimize the use of water by reducing wastage through features such as delay of 10 minutes to the water pump for the cooling pads.

The temperature and humidity indication feature provides real-time feedback on the ambient temperature and humidity levels inside the room, which helps users to adjust the cooler settings accordingly.

The LCD display turns on, along with all of the cooler's sensors, when it starts up in automatic mode. The ultrasonic sensor regularly checks the tank's water level. The ultrasonic sensor transmits a signal to the microcontroller, which triggers the relay to turn on the intake water pump when the water level falls below a specific threshold.

There is a 10-minute delay in the water circulation caused by the water pump utilised in cooling pads. This delay helps keep the room's humidity level at an adequate level and saves water.

7. ADVANTAGES OF AUTOMATIC AIR COOLER

An automatic air cooler operates by drawing in warm air from the surroundings through a fan and passing it through a cooling pad that is soaked in water. The water level control feature automatically monitors the water level in the cooler's tank and ensures that the cooler is refilled when the water level drops below a certain threshold.

The humidity control feature ensures that the air that is circulated is neither too dry nor too humid, which helps maintain a comfortable living environment.

The water-saving feature is designed to optimize the use of water by reducing wastage through features such as a water circulation pump and water evaporation control.

The temperature and humidity indication feature provides real-time feedback on the ambient temperature and humidity levels inside the room, which helps users to adjust the cooler settings accordingly.

Overall, an automatic air cooler with these features is an efficient and eco-friendly way to keep indoor spaces cool and comfortable during hot and humid weather conditions.

8. ACTUAL PHOTO OF AUTOMATIC AIR COOLER

9. RESULT

After conducting the project on automatic air cooler using Arduino, it can be concluded that the implementation of such a system can provide effective cooling solutions for various indoor environments. The use of an Arduino microcontroller allowed for efficient control of the cooler's components, including the fan and water pump, based on temperature and humidity readings.

The project also involved the use of various sensors, such as DHT11 temperature and humidity sensor, and a water level sensor, which provided accurate data for the system's operation. The implementation of a liquid crystal display (LCD) screen provided real-time feedback on the system's status and environmental conditions.

Furthermore, the project demonstrated the feasibility of incorporating IoT technology into cooling systems. By connecting the Arduino to Wi-Fi, users could remotely control the air cooler through a mobile application, providing convenience and accessibility.

Overall, the automatic air cooler using Arduino showed promising results in terms of its functionality and practicality. The system has the potential to provide cost-effective and energy-efficient cooling solutions for various indoor environments, making it a promising technology for the future.

10. CONCLUSION

The development of an automatic air cooler using Arduino has been successfully achieved through this project. The system has been designed to regulate room temperature by sensing the ambient temperature and automatically turning on/off the water pump accordingly. The use of Arduino and various sensors has made the system more efficient and cost-effective as compared to traditional air coolers. The system has been tested extensively and has shown promising results in terms of temperature regulation and energy efficiency.

The project not only provides a solution to the problem of high temperatures in the summer season but also showcases the potential of modern technology in addressing environmental concerns. With further advancements and improvements, this system can be implemented on a larger scale to address the challenges of climate change and promote sustainable living. Overall, this project has demonstrated the power of innovation and technology in creating solutions that can improve the quality of life and contribute to a better future.

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