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Radio Frequency Based Automatic Efficient Cooler, AC And Blower Control System

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Abstract: As we all know that employment is decreasing as compared to the population and we are no longer able to satisfy the actual basic needs, inflation is increasing and seeing the hot and humid weather and temperature rise and fall due to global warming ac, cooler , blower are the basic needs but we know the electricity rates are way too high for these expectations to turn into realitynow we have this challenge to see all these problems and we came up with a prioritizing output as a prototype as stated in the topic which can meet with our satisfaction of cost and even have lower power consumption.

With each forth coming day the world is stepping into the systems in which everything is going to be automatic, hence in this project we have built a temperature based automatic radiofrequency based cooler and blower with the help of Peltier plate can be used as any mode We have used a LM35 sensor, senses the surrounding temperature and microcontroller acts as the brain of the control systems as based on the programming set, relay module trips the generating signal and dc motor takes supply from a step-down transformer and the fan status is shown on the LCD panel.

Key Words: LM35, Microcontroller, relay module, DC Motor, LCD Panel.

I INTRODUCTION

Today's era is all about dealing and working with an unpredictable environment in which at every second, the technologies are changing drastically and miraculously. Everything is getting more sophisticated and challenging. Thus, demand for cutting-edge technologies and smart systems is rising.

In the creation of smart systems, microcontrollers are crucial. In this project Arduino uno is used to form the processing and controlling part. It uses LM35 (Temperature Sensor) for temperature sensing. The particular temperature at which the user want fan to be ON. The fan will turn on if the current temperature is higher than or equal to the given temperature value; else, it will remain off. The temperature and the fan status are being displayed on the liquid crystal display. Therefore, microcontroller-based temperature control is crucial since it serves as the standard for autonomous temperature detection and monitoring.

We have used Peltier plate (TEC12706), at which heat sink, exhaust is mounted, the Peltier plate is connected with other supply of 12 volt given externally and DC motor is connected with the step-down

transformer when fan status is on relay module trips signal and dc motor starts rotating.The heat sink side at which exhaust is connected is used as blower while the cold side is used ascooler, ac

With the help of radiofrequency based remote control module any of 3 functions can be used automatically.

This research article shows how control theory is applied to hardware-based temperature management, including circuit design, implementation, and presentation on an Arduino Uno board. The output is shown on an LCD display. The application, which was created for the ARDUINO UNO board, makes it easier to input temperature measurements for the fan and automatically turn on and off the fan based on changing temperature values.

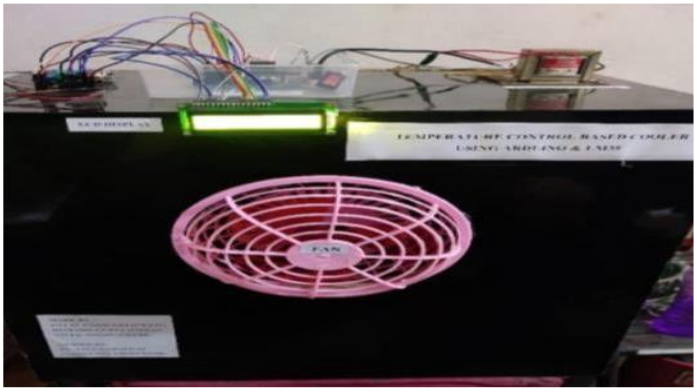


Fig1: Showing Hardware of Circuit

II WORKING METHODOLOGY

GRAPHICAL REPRESENTATION

The data displays the proportion of households, broken down by country, that had air conditioning in 2016. According to the table below, the percentage of households with air conditioning (AC) globally in 2016 is as follows:

Characteristics	**Penetration Rate**
Japan / united states.	91 %
Korea.	86 %
Saudi Arabia/ China.	63-60 %
Mexico.	16 %
Brazil.	16 %
Indonesia.	9 %
India.	5 %

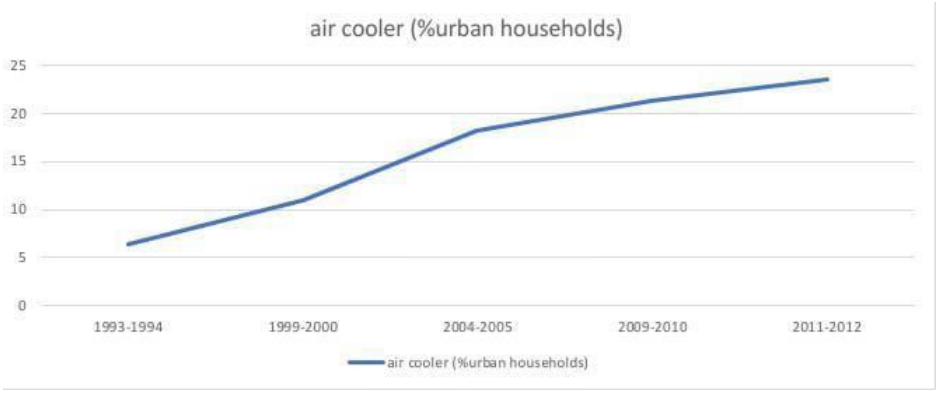


Fig2. Percentage increase in urban families' use of air conditioners and coolers

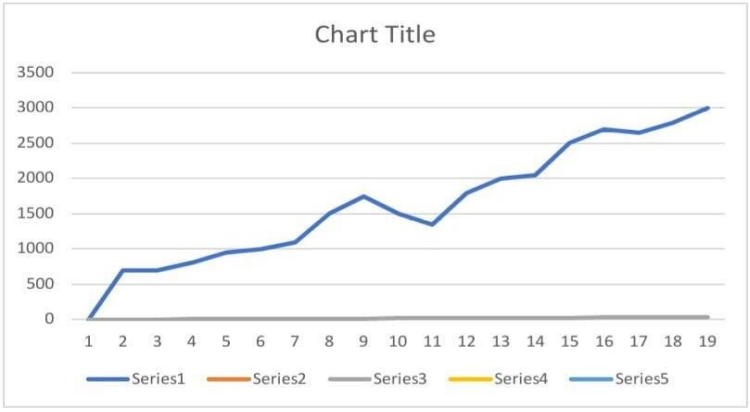


Fig3. Heat and Power Curve /Average Period of The Year

Market size of heater in India in 2019

Characteristics	**Market size in billion (INR)**
Gas heaters	2.75
Electric instant heater	5.3
Solar heaters	6.5
Electric storage heater	10.7
total	25.25

Calculation of Electricity Usage of Air Conditioner/Heater

Energy consumption= appliance wattage (KW/W)/*No of hours usage

Suppose 300W air conditioner for 4 hours per day, then Electricity consumption =1200WH/1.2KWH per day. As a general rule of thumb, for AC power consumption calculation you should take, 1ton of cooling =1000 watts and1.5 ton of cooling = 1500watts

Power consumption calculated as

- ✓ Rated power of your appliance(watt)
- ✓ Daily operational hours (hours)
- ✓ Electricity tariff (any currency)
- ✓ Daily units consumed by the appliance (KWh)
- ✓ Monthly units consumed by the appliance
- ✓ Monthly electricity bill because of this appliance (your currency)

By using this convention, the calculation can be made.

Drawbacks in Conventional Systems

- ✓ Higher power consumption
- ✓ Higher bills, power consumption of I ton ac is 589.99kwh.
- ✓ Ac produces CFC which is not good for environment
- ✓ Unexpected changes in humidity and temperature causes headache, itching of skin
- ✓ No space for fresh air when blowers are working, reduce oxygen levels and humidity.
- ✓ Leads to noise pollution.

Advantages In Tech Based AC, Cooler And Blower

- ✓ Exhibit very high reliability.
- ✓ Have more precise control over the temperature.
- ✓ This makes unit maintenance free.
- ✓ Thermoelectric module is small and light weight.
- ✓ Lower levels of vibrations and noise.

III INDIVIDUAL CIRCUIT PICTURES AND COMPONENT

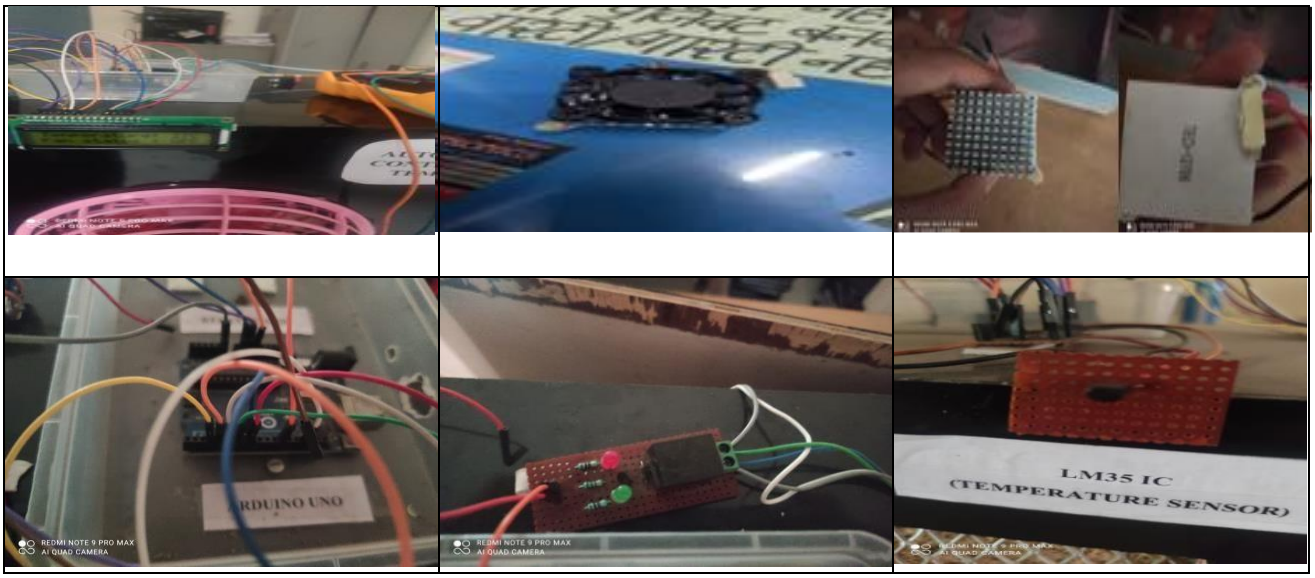
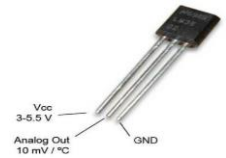


Fig4: Showing Photographs of different Sub circuits

Sr.No	COMPONENT	FEATURES	IMAGE
1	ARDUINO (AT mega328)	Operating voltage =5v Input voltage =7 -12v DC current/inputpin=20mA Clock speed=16MHz Length,width,weight=68.6mm,53.4mm,25gm	
2	TEMPERATURE SENSOR (LM35)	Linear +10.0mV/Degree Celsius Operates from 4 to 30 volts Less than 60microamp current drain Suitable for remote application	
3	LIQUID CRYSTAL DISPLAY (16X2)	Brightness or luminance Response rate high Adjustability to suitable Contrast ratio typically 400:1	
4	PELTIER PLATE (TEC1-12706)	Operating voltage = 12v Maximum voltage Umax (V) =15.4V Maximum current Imax =6 amp Maximum power =92watt Power cord 200mm	

IV BLOCK DIAGRAM

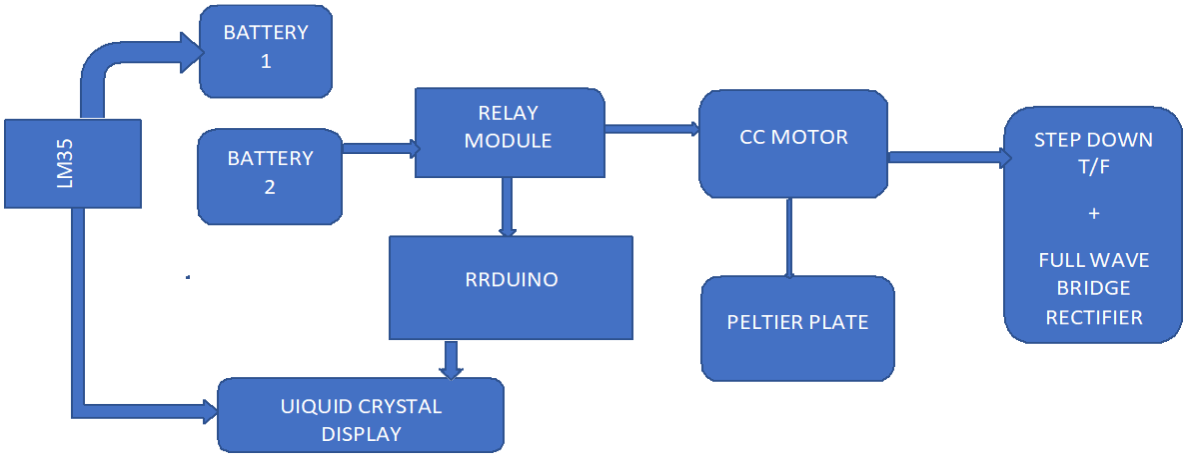


Fig5: Showing Block Diagram of System

V RESULTS

Temperature Sensor (LM35)	Environmental Temperature	Fan status (ON/OFF)
25- degrees	30 degrees	OFF
28- degrees	30 degrees	OFF
28 -degrees	34 degrees	ON

Initially set 25 degrees centigrade as the value, and therefore at 28 fans should be running, but seeing the environmental condition the fan starts operating at a temperature above 30 degrees.

VI CONCLUSION AND FUTURE SCOPE

The targets of designing a method of automatic temperature controlled is successfully achieved. Arduino based hardware along with the LM35 temperature sensor has been realized in hardware. The display shows the sensed temperature of the environment and corresponding fan status of cooler. It is due to the sense temperature that LED to the turning on and OFF, of the fan when it is crossing the set value.

In the future, simulating this system there are the several improvements that can be made in order toupgrade the features such as:

- ✓ Using a wireless technology for sensor to interface and microcontroller, monitor and control the temperature through internet.
- ✓ When temperature exceeds the limit, a call will be dialed to the given number by an

automatic dialed system.

- ✓ This temperature-controlled fan with some modification can further be used in other heater circuits to maintain the constant temperature of device.
- ✓ With this circuit, alarm circuit can add and used effectively in large equipment's where therisk of being overheating and explosion are the serious problems in various industries

REFERENCES

1. Mathur ML and Jain BP, "Performance of a portable cooler: desert cooler", Journal of Institute of Engineers (India), 241-245 (1979).
2. Mathur ML and Jain BP, "Experimental study of performance of portable air washer type air cooler", Journal of Institute of Engineers (India), 38-40 (1982).
3. Singh SP, Sawhney RL, Bansal NK, Sodha MS, "Sizing of an evaporative cooler for thermal comfort inside a room", Housiong Science, 141-148 (1987).
4. Singh SP, Sawhney RL, Bansal NK, Sodha MS, "Optimization of an evaporative cooler for space cooling", Housing Science, 225-231 (1987)'
5. Dowdy JR and Karabash NS, "Experimental determination of heat and mass transfer coefficients in rigid impregnated cellulose evaporative media", ASHRAE Transactions, 382-395 (1987).
6. Sodha MS, Singh SP, Sawhney RL, "Evaluation of design patterns for direct evaporative coolers", Building and Environment,278-291 (1995).
7. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-I: Optimization of the COP" (1997).
8. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-II: Thermal performance of a non-conditioned building coupled with an IEC" (1997).
9. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-III: Optimization of the cooling potential of a room-coupled IEC" (1998).
10. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-IV: Effect of recirculation on cooling of a room coupled to an IEC" (1997).
11. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-V: Relative thermal performance of buildings coupled to direct and indirect evaporative cooler" (1997).
12. Singh SP, Tulsidasani TR, Swahney RL, Sodha MS, "Recent research on IEC Part-VI: Evolution of design pattern for IEC" (1999).
13. Alonso JS, Martinez FR, Gomez EV, Plasencia MA, "Simulation model of an IEC", Energy and Buildings, (1998).

14. Camargo JR and Ebinuma CD, “A mathematical model for direct and indirect evaporative cooling AC systems”, Thermal Engineering and Sciences, Caxambu, Brazil, (2002).

15. Riangvilaikul B and Kumar S, “An experimental study of a novel dew point evaporative cooling system”, Energy Build, 637-644 (2010).