



A literature review on Improvement of Weather prediction by using Machine learning

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ABSTRACT:

COMPACT MULTIDIRECTIONAL (360°) AIR COOLER is innovative project. The concept and idea are developed in mind for cooling Air cooling is a method of dissipating heat. It works by expanding the surface area or increasing the flow of air over the object to be cooled, or both. An example of the former is to add cooling fins to the surface of the object, either by making them integral or by attaching them tightly to the object's surface (to ensure efficient heat transfer). In the case of the latter, it is done by using a fan blowing air into or onto the object one wants to cool. The addition of fins to a heat sink increases its total surface area, resulting in greater cooling effectiveness. There are two types of cooling pads that can use for air cooling: one is the honeycomb design and another one is excelsior.

In all cases, the air has to be cooler than the object or surface from which it is expected to remove heat. This is due to the second law of thermodynamics, which states that heat will only move spontaneously from a hot reservoir (the heat sink) to a cold reservoir (the air).

Introduction:

An air cooler serves to cool down the hot air in a room. Air cooler cools the atmospheric air in a room by adding water to the air. The water is added in the form of minute droplets. The air cooler has a fan installed in it that pulls the warm air from outside through a water wetted filter medium. The water in the cooler is evaporated by the warm air drawn by the fan. The evaporated water releases in the room. The temperature of the room comes down because the warm air is drawn by the fan of the air cooler.

An air cooler is not the same as an air conditioner. The air cooler does not use compressor and refrigerant gas. We can say that though the air cooler is not as effective as air conditioner, it is not harmful for the environment and is cost effective. The air coolers cool the atmospheric air mostly by the process of evaporation of water.

The temperature of the room falls owing to several reasons such as:-

1. Relative Humidity Level
2. Air temperature
3. The size of the room
4. The amount of cross ventilation

An air cooler is any device for cooling the air inside a building, room, or vehicle. Air coolers are used in thermally insulated casings to form refrigerators and are also used in buildings to cool rooms. In buildings they are only required when the building itself is not constructed so that it is able to dissipate enough heat. Methods to construct buildings in such a fashion that additional air coolers are not required are e.g. Earth sheltering or specific building designs.

Background

India's energy demands are expected to be more than double by 2030, and there is a pressing need to develop ways to conserve energy for future generations. Thus energy consumption can be reduced drastically by using energy efficient appliances. In India, the Union ministry of power's research pointed out that about 20-25% of the total electricity utilized in government buildings in India is wasted due to unproductive design, resulting in an annual energy related financial loss of about Rs 1.5 billion. Conventional heating ventilation and air conditioning systems (HVAC) consume approximately 50% of the building energy. This type of air conditioning is therefore neither eco- friendly nor sustainable. Selection of proper air conditioning system for buildings can not only help the country save electrical energy but also reduce green house emissions.

Problem identification

The increasing use of air cooler had led to considerable activity in methods for better performance and reduction in power consumption and particle levels emitted in the exhaust. The required levels are difficult to achieve through cooler design alone even with high grade fan. But, blending different additives into air cooler is still today the best way to have results in matter of pollution. One group of air cooler additives is oxygenated compounds. The main reason of using oxygen to produce a cleaner air is used few decades ago. The reduction of heat generation by the addition of water compounds in the air cooler.

The producing of electricity is ultimately responsible for hot and humid conditions, i.e. global warming. As in below shown chart it is clear that major quantity of electricity is produced by coal (fossil fuel).

Fossil fuels also contain radioactive materials, mainly uranium and thorium, which are released into the atmosphere.

Electricity generation produces nitrogen oxides and Sulphur dioxide emissions, which contribute to smog and acid rain, emit carbon dioxide, which may contribute to climate change.

Aim and Objective

- To make aware of non-conventional energy sources to reduce environmental pollutions.
- This product preferably suitable for villages, because they face lot of power cut problems in summer (around 12 to 14 hrs. in day). And for offices and schools which runs in day to which save energy.
- As air-conditioning and refrigeration consumes more power and mainly cost of refrigerating and air conditioning products are very high. So would like develop product which runs by solar energy and provide cooling effect for house hold food items at lower cost.
- It provide more cooling area compare conventional air cooler.
- It provide air cooling in all direction.
- In this evaporative cooler air and water is used. It is most environmental friendly and effective cooling system.

Literature Review

2.1 Sunil J. Kavle1, Vivek M. Shahane, Nivrutti Satpute, Vitthal N. Garje, Manufacturing of 360 degree Rotation Air Cooler, Mar-2018, From this research paper it is evident that for drip type 360 EVAPORATIVE cooling the performance characteristics cooling the performance characteristics can be related to the variables like and thickness and the atmospheric conditions such as humidity control and comfort. It is also possible to determine the parameters but location and one need to optimize the design parameters for corresponding outdoor conditions.

The result also indicates that a considerable saving in power consumed is possible and at the same time the cooling effectiveness can be enhanced. The procedure detailed in the present study can be used to advantage in designing 360 EVAPORATIVE air cooler of larger capacity to economically cool bigger endusers, because the various parameters can be changed with ease, the approach can be employed to analyze any piece of equipment and improve its performance.

2.2 Harsha G. Nathjogi , Tushar A. Koli, Vijay H. Patil, A Review on Auto Tracking Solar Operated Air Cooler with Cooling Cabin, January-2019, So as comparing the cost of this product with the existing products in the market is, solar product appeals better and affordable by common people. This solar product will perfectly suits for villages, schools and offices and thus prevention from the power cut problems. It will comprise of many attractive features such as usage of solar energy, cooler and cooling cabin at lower cost. This method is eco-friendly and natural, electricity savers. Durability of our product is more thus minimizing the cost. No electricity will spent so this product saves the energy and saves environment from getting polluted.

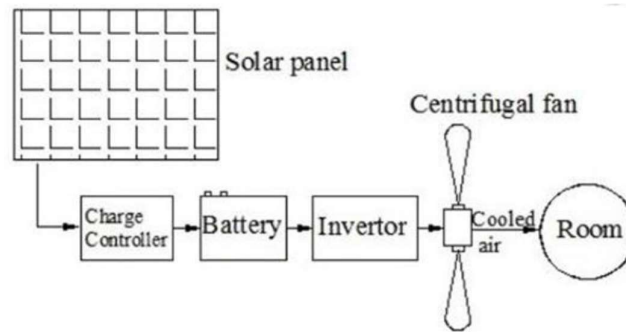


Fig. 2.1 Process of cool air generation by centrifugal fan

2.3 Chaudhari Aniket, Patel Upesh, Patel Bhavik, Gamit Nihal, Prof. Dr. Kamlesh Chaudhari, DESIGN AND FABRICATION OF 360 DEGREE AIR COOLER, August 2021, This paper is based on innovation to conventional coolers. In conventional or normal cooler we get one directional air flow only. This cooler is designed in such a way that the people sitting in any area in the room will get equivalent cooler air. The cubical cooling chamber consists of four cooling pads. The exhaust fan mounted above the chamber, below which the heating oil is mounted. Thus this cooler can be used as a heater in winter season and air cooler in a summer season.

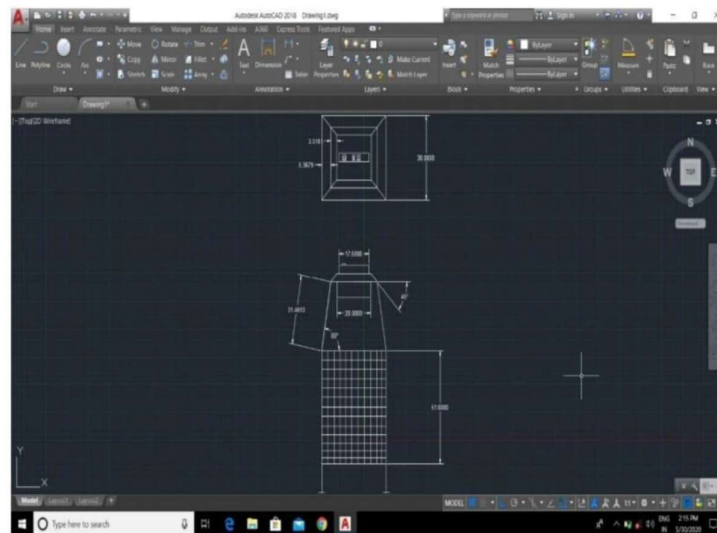


Fig. 2.2 AutoCAD design of 360 degree air cooler

2.4 Akhilesh Yadav, Rajatkumar Bachchan, Sankesh Toraskar, Dattaprasad Tendolkar, Prof. Ramankumar, Design and Fabrication of 360 cooler cum Heater, May 2018, The EVAPORATIVE cooling is one of the earliest methods employed by men for conditioning their houses. Only in recent years, it has been put on sound footing thermodynamically. It is a process of adiabatic saturation of air when a spray of water is made to 360 EVAPORATIVE into it without transfer of heat from or to the surroundings. The initial investment cost of such a system is low & the operation is simple & cheap. These cooling systems are economical in terms of energy usage. During the energy crisis from last two decades, 360 EVAPORATIVE cooler uses were promoted as to control household utility bills. This project can be used in room as well as in open areas such dabas, hotels, restaurant etc. This project is cheap compared to coolers available in market. If little advancement in is done in such cooler, then it can be operated on solar energy .Hence the problem of electricity crisis can be reduced more.



Fig. 2.3 Design and Fabrication of 360 cooler cum Heater

2.5 Prof. Nilesh Ambaji Jadhav, DESIGN OF 360° AIR COOLER AND HEATER, January 2019, Through above research paper and model it is good to conclude that 360° cooler and heater can cool air up to 10° to 12° due to evaporation of water while at the same time if heating coil is used it can increase the temperature of the air by 5° to 8°. And this system cost much low as compared to regular air conditioner. It also has a advantage of saving the natural recourses as it works on natural phenomenon and it is pollution free.

In this project 360° air cooler cum heater will be design, developed and fabricate to low operational and overall cost. And as cooler can only be used in summer seasons and during winter and monsoon it is kept ideal as we now that during winter ambient air is already cold and during monsoon even if its ambient air temperature is high but it also has high relative humidity hence using 360° cooler in such conditions are non-effective, hence there is need to find a convenient method for even heating the air so that the utilization of it must be maximum and even it will be favorable for human in cold conditions. 360° Directions will allow to sit people anywhere.

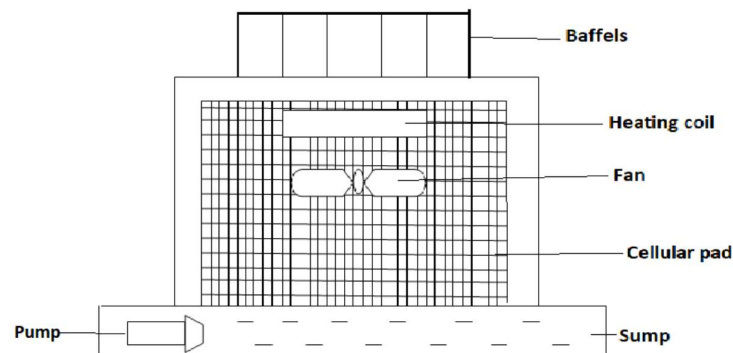


Fig. 2.4 Design of 360° air cooler and heater

Proposed Project Plan

3.1 Methodology

3.1.1 Problem: - The producing of electricity is ultimately responsible for hot and humid conditions, i.e. global warming. As in below shown chart it is clear that major quantity of electricity is produced by coal (fossil fuel).

3.1.2 Collecting research paper:-Collecting research paper from the internet on the pre concept of compact multidirectional (360°) air cooler. Collect research paper on study of design and fabrication of 360 degree air cooler.

3.1.3 Project proposal:-Making a project proposal for the selection of project and experiencing our ideas with project in charge. Getting suggestions and implementing that suggestion and submitting the project proposal to the project in charge.

3.1.4 Selecting area of work:-After project finalization we have to decide area of work for making a model with respect to the residence of group members as the suitable area of work.

3.1.5 Finding resources:-Resources should be found for making a model which is required to make a desired model.

3.1.6 Collecting different components: - After fabrication and purchase of all the components all the components should be collected from various locations at the workplace.

3.1.7 Assembly:-Assemble all the components of compact multidirectional (360°) air cooler as according to design setup.

3.1.8 Trial on project:-Take a trial on project and find out some parameters.

3.2 Component

3.2.1 Fan: It is an apparatus with rotating blade that creates a current of air for cooling which suck the atmospheric air through cooling pad and drawn to room which is to be cooled. Fan is driven by the motor



Fig 3.2.1 Fan

3.2.2 Motor: It is an electrochemical device that converts electrical energy into mechanical energy. The motor is work on the principle of Faradays law of electromagnetic it state that. When a current carrying conductor is placed in a magnetic field such that the direction of current is perpendicular to the magnetic field it experiences a force. But if a conductor is moving inside a magnetic field or magnetic field is changing around a fixed conductor, electric current which is generated will interact with an electric circuit to produce an electromotive force (EMF). It is the Faraday's law of induction is a basic law of electromagnetism that predicts how a magnetic field fundamental operating principle of transformers, inductors.

3.2.3 Induction motor: The motor used in this project is induction motor, An induction motor is an asynchronous AC motor where power is transferred to the rotor by electromagnetic induction, much like transformer action. An induction motor resembles a rotating transformer, because the stator (stationary part) is essentially the primary side of the transformer and the rotor (rotating part) is the secondary side. Polyphase induction motors are widely used in industry. Induction motors may be further divided into squirrel-cage motors and wound-rotor motors. Squirrel-cage motors have a heavy winding made up of solid bars, usually aluminum or copper, joined by rings at the ends of the rotor. When one considers only the bars and rings as a whole, they are much like an animal's rotating exercise cage, hence the name.



Fig. 3.2.2 Induction Motor

3.2.4 Capacitor: A capacitor (originally known as condenser) is a passive two terminal electrical component used to store energy in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors separated by a dielectric (insulator), for example, one common construction consists of metal foils separated by a thin layer of insulating film. Capacitors are widely used as parts of electrical circuits in many common electrical devices.



Fig. 3.2.3 Capacitor

3.2.5. Signal processing: The energy stored in a capacitor can be used to represent information, either in binary form, as in DRAMS, or in analogue form, as in analog sampled filters and CCDs. Capacitors can be used in analog circuits as components of integrators or more complex filters and in negative feedback loop stabilization. Signal processing circuits also use capacitors to integrate a current signal.

3.2.6 Pump: It is a mechanical device using suction or pressure to rise or move liquid to inflatable objects.

3.2.7 Submersible pump: A submersible pump (or electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged. This type of pump is that it prevents pump cavitations, a problem associated with a high elevation opposed to jet pumps having to pull fluids. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersible pumps are made, as their name implies, to be submerged within a tank, well, or other container for immersion. The motors of submersible pumps are commonly made of stainless steel. They have the advantage of being essentially self-priming. Common types of pumps to make them suitable for contact with the substance they are pumping. They have the advantage of being essentially self-priming. Common types of pumps to make them suitable for contact with the substance they are pumping. They have the advantage of being essentially self-priming.



Fig. 3.2.4 Submersible pump

3.2.8. Water storage tank: Cylindrical tank storage of the water capacity is the 40 to 50 liter.

3.2.9. Valve: A valve is a device that regulates, directs or controls the flow of a fluid (gases, liquids, fluidized solids, or slurries) by opening, closing, or partially obstructing various passageways. Valves are technically fittings, but are usually discussed as a separate category. In an open valve, fluid flows in a direction from higher pressure to lower pressure.



Fig 3.2.5. Valve

3.3 Block Diagram



Fig. 3.3 Block Diagram

3.4 Construction:

Compact multidirectional 360 degree air cooler consist of fan, motor, capacitor, signal processing, submersible pump, water storage tank and valve. The motor used in this project is induction motor; an induction motor is an asynchronous AC motor where power is transferred to the rotor by electromagnetic induction, much like transformer action. Capacitors are widely used as parts of electrical circuits in many common electrical devices. A submersible pump (or electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. Cylindrical tank storage of the water capacity is the 40 to 50 liter. A valve is a device that regulates, directs or controls the flow of a fluid (gases, liquids, fluidized solids, or slurries) by opening, closing, or partially obstructing various passageways.

3.5 Working

First start the pump which sucks water from bottom tank which was already filled with water. Water goes on stationery pad which are placed on backside of two side door, through delivery pipe. After that, the exhaust fan starts & sucks the atmospheric air, which is passed through wet pad. In this process cooling is achieved by direct contact of water particles & moving air stream. In complete contact process the air would become saturated at WBT of entering air. In other words sensible heat of air is carried by water in the form of latent heat, when it is brought intimate contact with water. After some time air may be sufficiently cooled by 360 evaporative processes, which results in considerable increase of humidity. For better effect add ice cube or chilled water in bottom tank. The result also indicates that a considerable saving in power consumed is possible and at the same time the cooling effectiveness can be enhanced. The approach can be employed to analyze any piece of equipment and improve its performance.

COST ESTIMATION

Sr. no.	Component	Price
1	Fan Blade	250/-
2	Wood Grass	180/-
3	Air cooler grill	1000/-
4	Water pump	350/-
5	Water pipe	200/-
6	Wire	150/-
7	Switches	70/-
8	Supply indicator	45/-
9	Regulator	85/-
10	Cooler body	1200/-
11	Other	1500/-
	Total	5030/-

APPLICATION

- To reduce the consumption of energy a 360° air cooler and heater need to be used. One more reason for the use of 360° air cooler and heater is reduction in global warming as the conventional air conditioning system gives out Chloro-Flouro Carbon resulting in depletion of Ozone layer due to global warming.
- 360° air cooler is a device used to cool or the air according to the requirement of the user.
- Considering 360° air cooler is used in dry climates. Air conditioning in today's world has a vital importance. Considering human comfort it is necessary to study and do researches on the topic of 360° air cooler cum heater, in order to make it more economical and efficient. The air may be sufficiently cooled by 360° evaporative process to results a considerable degree of summer comfort in climates of high dry bulb temperatures associated with low relative humidity. The minimum outdoor temperature required for successful 360° evaporative cooling is above 32°c
- These cooling systems are economical in terms of energy usage. During the energy crunches of the last two decades, 360° compact multidirectional air cooler use was promoted as one means to control household utility bills.

RESULT AND DISCUSSION:

The result indicates that a considerable saving in power consumed is possible and at the same time the cooling effectiveness can be enhanced. The procedure detailed in the present study can be used to advantage in designing 360 EVAPORATIVE air cooler of larger capacity to economically cool bigger endusers, because the various parameters can be changed with ease the approach can be employed to analyze any piece of equipment and improve its performance.

- It provide more cooling area compare conventional air cooler.
- It provides air cooling in all direction.

In this evaporative cooler air and water is used. It is most environmental friendly and effective cooling system.

CONCLUSION:

It is good to conclude that 360° compact multidirectional air cooler can cool air up to 10° to 12° due to evaporation of water. And this system cost much low as compared to regular air conditioner. It also has a advantage of saving the natural resources as it works on natural phenomenon and it is pollution free.

- 360 DEGREE cooling is Environmentally Friendly.
- Air cooler has Economic Advantages.
- No Special Modifications Necessary.
- 360 degree cooler can be made at Industry.
- Air cooler can be made from Industrial Products.
- Energy Efficient.

FUTURE SCOPE

In future we can establish 360 DEGREE air cooler station so that we will independent on Air conditioner. Simultaneously we have to design vehicle cooler which run by less power. We have to provide Heater coil, Advance exhaust fan and Exhaust Gas Recirculation for better performance and lower emission of Cooler.

In this way we can achieve goal of green revolution and sustainable development in science and technology.

If dehumidifier is added at the inlet of cooler will increase its efficiency. And it will also enable to use this cooler in condition when relative humidity of air is high.

The cooling range of cooler can be varied by changing the fluid but it can also result in increasing the cost of cooler. And even increasing the no of pads through which air will pass further cooled air can be obtained.

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5. Chaudhari Aniket, Patel Upesh, Patel Bhavik, Gamit Nihal, Prof. Dr. Kamlesh Chaudhari, DESIGN AND FABRICATION OF 360 DEGREE AIR COOLER, August 2021, p 1-3.