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## Design & development of a prototype of the layman's air-cooler

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### Abstract

This paper deals with the design & development of a prototype of the layman's air-cooler. In summer seasons, we require cold water and cooled air because of scorching temperature. Modern appliances fulfilling these requirements need high power and are costly. So, we propose modified simple air cooler, which is portable and is low maintenance machine. Air cooler is one of the major consumers of electrical energy in many parts of the world today. Air cooler causes energy shortage for example in China. The demand can be expected to increase because of changing working times increased comfort expectations and global warming. Air conditioners are pretty expensive themselves and adding to them their power bills makes it out of reach for most common man. So opting for an air cooler is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners. The work presented here is the mini-project work of the second semester engineering students of electronics & communication engineering department of Dayananda Sagar College of Engg., Bangalore, Karnataka.

**Keywords :** Air, Cooler, Conditioning, Cost, Prototype, Refrigeration.

### 1. Introduction to the work

As with any problem, the first step to overcoming it is to understand the nature and scope of the problem and it is with that goal in mind we decided to develop Layman's air cooler. As in big cities, the problem is associated with the space and high installation cost of cooling appliances. Therefore, these appliances become unaffordable for middle class [15]. Also, maintenance cost of these appliances are quite high which makes them unsuitable most of the times. Due to its low maintenance cost it can be affordable to common people. Beginners can use this as a small project to boost their knowledge about DC motors. Most of the materials are taken from broken or discarded waste and reused and transformed into an amazing Home-made Air cooler. Air conditioners are pretty expensive themselves and adding to them their power bills makes it out of reach for most common man. So opting for an air cooler is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners [1].

### 2. Literature Survey

A number of literature survey had been carried out w.r.t. the work done in this paper. To name a few of them is presented here, which are the base papers. In the paper [1], according to the paper, "Design and Implementation of automatic air cooler" The proposed air cooler consists of a water tank, pumping motor and fan, which can also turn ON and OFF through bluetooth module. In this air cooler, silica gel is used instead of grass pad. Actually, in normal coolers, after sometime grass pad will become more unhygienic and there is another big problem that, when air passes through this grass

pad, there will be some water molecule, which will make our atmosphere sticky. Henceforth, by utilizing silica gel, water tank is not required and also silica gel absorbs moisture so that it will also reduce the weight of cooler and helps to maintain a hygienic environment. In the paper [2], the technology developed in the paper, “Development and analysis of compact cooling system” involves a commercially available thermoelectric system used for electronics cooling was also tested and compared with the vapor compression system. The results have shown that the micro compressor unit presented a coefficient of performance (COP) approximately two times larger than thermoelectric solution and higher cooling capacities were achieved under low ambient temperatures.

### 3. Problem statement

Air conditioners are pretty expensive themselves and adding to them their power bills make it out of reach for most common man. So, we have defined our problem statement as “LAYMAN’S AIR COOLER”. As it is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners [2]. In big cities, the problem is associated with the space and high installation cost of cooling appliances. Therefore, this appliance becomes unaffordable for middle class. Also, maintenance cost of this appliances is quite high which make them unsuitable most of the times, So opting for an homemade mini-air cooler is probably one solution [3].

### 4. Proposed methodologies adopted

The DC motor which is soldered by wires is attached to propeller. With the help of hot glue gun, it is attached to waste bottle. Then the 9V battery with connector is attached to bottle and switch is connected to the battery [11]. Small hole is made in the bottle to fill ice cubes in it and when switched on. The propeller with DC motor rotates and lowers the surrounding temperature [4].

### 5. Methodology

- The DC motor which is soldered by wires is attached to propeller [6].
- With the help of hot glue gun, it is attached to waste bottle [7].
- Then the 9V battery with connector is attached to bottle and switch is connected to the battery [8].
- Small hole is made in the bottle to fill ice cubes in it and when switched on [9].
- The propeller with DC motor rotates and lowers the surrounding temperature [10].

### 6. Scope of layman’s air-cooler

In big cities, the problem is associated with the space and high installation cost of cooling appliances. Therefore this appliances becomes unaffordable for middle class. Also, maintenance cost of this appliances are quite high which make them unsuitable most of the times, So opting for an homemade mini-air cooler is probably one solution [12].

### 7. Problem statement

Air conditioners are pretty expensive themselves and adding to them their power bills makes it out of reach for most common man. So, we have defined our problem statement as “Layman’s air cooler”. As it is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners [13].

### 8. Objective

The basic idea is quite simple. In the bottle ice cubes are kept when propeller which is fit inside is made to rotate, on evaporation it gives cooled air and thus room temperature drops making the ambience inside comfortable. The air cooler not only saves energy but also occupies lesser space [14].

## 9. Results and discussions

The results or the outcome of the mini-project work could be summarized as follows [5]:

- Air conditioners are pretty expensive themselves and adding to them their power bills makes it out of reach for most common man.
- So, opting for an air cooler is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners.



## 10. Conclusions

This paper deals with the design & development of a prototype of the layman's air-cooler. The work presented here is the mini-project work of the second semester engineering students of electronics & communication engineering department of Dayananda Sagar College of Engg., Bangalore, Karnataka. As there is natural evaporation of water, it is considered Eco-friendly and Green and doesn't affect on health of humans. It works in humid conditions however its efficiency gets affected as evaporation becomes slow during high humidity. Air conditioners are pretty expensive themselves and adding to them their power bills makes it out of reach for most common man. So, opting for an air cooler is probably one solution which not only is cheaper as an appliance, but also uses lower power than conventional air conditioners.

## References

- [1]. Ashish Samaddar, Manoj Kumar Singh, Manjinder Kumar, Samujjal Debnath, Krishan, "Design and implementation of moisture less automatic air cooler by using bluetooth module", 2021 5<sup>th</sup> International Conference on Intelligent Computing and Control Systems (ICICCS) May 26 2021.
- [2]. G.B. Reibero, "Development and analysis of compact cooling system", 13<sup>th</sup> Inter Society Conference on Thermal and Thermomechanical Phenomena in Electronic Systems, 5 July 2020.
- [3]. E. Frias-Martinez, G. Magoulas, S. Chen and R. Macredie, "Modeling human behavior in user-adaptive systems: Recent advances using soft computing techniques", *Expert Syst. Appl.*, vol. 29, no. 2, pp. 320-329, 2005.
- [4]. M. Perkowitz and O. Etzioni, "Adaptive web sites", *Common ACM*, vol. 43, no. 8, pp. 152-158, 2000.
- [5]. M. Spott and D. Nauck, "Towards the automation of intelligent data analysis", *Appl. Soft Compute.*, vol. 6, pp. 348-356, 2006.
- [6]. S. Gottwald, "Mathematical fuzzy logic as a tool for the treatment of vague information", *Inf. Sci.*, vol. 172, no. 1-2, pp. 41-71, 2005.
- [7]. H.J. Zimmermann, *Fuzzy Set and Its Applications*, Norwell, MA, Kluwer Academic Publishers, 1996.



- [8]. Y.Y. Chen and T.C. Tsao, "A Description of the Dynamic Behavior of Fuzzy Systems", IEEE Trans., vol. 19, pp. 745-755, 1989.
- [9]. M. Sugeno Tanaka, "Successive Identification of a Fuzzy Mode and its Application to Prediction of a Complex System", Fuzzy Sets Syst., vol. 42, pp. 315-334, 1991.
- [10]. M.Y. Hassan and F. Waleed Sharif, "Design of FPGA Based PID-like Fuzzy Controller for Industrial Applications", IAENG IJCS, vol. 34, no. 2, 2005.
- [11]. Shakowat Zaman Sarkar, "A proposed Air-conditioning system using Fuzzy Algorithm for Industrial Application", ICSE IEEE Proc., pp. 832-834, 2006.
- [12]. Shakowat Shabiul Islam, "Development of a Fuzzy Logic Controller Algorithm for Air-conditioning System", ICSE 2006 Proc 2006 IEEE.
- [13]. M. Saleem Khan and Khaled Benkrid, "Multi-Dimensional Supervisory Fuzzy Logic Control DEV Processing System for Industrial Applications", Lecture Notes in Engineering and Computer Science, vol. 2175, pp. 1208-1217.
- [14]. Ravish Kumar, "A review on solar air heater technology", IJMET, vol. 8, no. 7, pp. 1122-1131, July 2017.
- [15]. Praveen N., T.C. Manjunath, Pavithra G., Ravi Rayappa, Rajasekhar Koyyeda, Satvik M. Kusagur, "The Control Scheme of a Moving System Using Raspberry-pi with its Hardware Implementation", Journal of control system and control instrumentation, Vol. 6, No. 3, pp. 13-16, 2020.