**Controlled Cooling System for any Electrical or Electronic Devices**

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**Abstract**

In any electronic or electrical device overheating is the major problem that we encounter in our day-to-day life. Through this possible way, we can reduce the phenomena of overheating in these kind of device, by cooling that up to an appreciable level.

**Keywords**

Heat Sink, Microcontroller, Arduino, Coolant

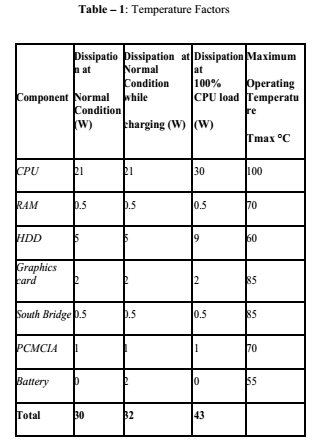
**Introduction**

In today’s scenario, we generally use any electronic or electrical device for a very long duration of time; due to this the problem of overheating of that device occurs, which eventually reduces the performance of that device.

Now, through this approach of ours, we have tried to encounter that problem in a very controlled manner, i.e. the temperature of that device will not fall rapidly (just to avoid any kind of fluctuation in that device).

**Need and Importance**

Unlike the fans or heat emitting surface we use in nowadays device, this kind of device will be used in those electronic devices which are used in countries(India, Japan, Africa) having room temperature above 30oC.This device will definitely increase battery life and will also maintain durability of the electronic or electrical device. Also it will not cool down quickly, so as to make the device worn off due to fluctuation in temperature, that’s where controlled cooling comes in. Also we can see as in Table -1 the heat dissipation at 100% CPU load and how it might first affect the battery then rest other components of laptop or personal computer. This list only tells about the effect of heat on laptop and computer. We can imagine how heating might effect other electronic devices.



**Current Market Scenario**

As in current market scenario laptops, mobiles, refrigerators and many other devices are been manufactured in Korea or Taiwan and assembled in China with standard consumer production for European or American countries. These same devices are also imported to other countries without keeping in mind the various geographical landmarks of that country. So there are no coolants or fans made to take out more heat problems of these devices.

**Existing Technologies**

Waste heat from operation is difficult to remove in the compact internal space of a laptop. Early laptops used heat sinks placed directly on the components to be cooled, but when these hot components are deep inside the device, a large space-wasting air duct is needed to exhaust the heat. Modern laptops instead rely on heat pipes to rapidly move waste heat towards the edges of the device, to allow for a much smaller and compact fan and heat sink cooling system. Waste heat is usually exhausted away from the device operator, towards the rear or sides of the device. Multiple air intake paths are used since some intakes can be blocked, such as when the device is placed on a soft conforming surface like a chair cushion. It is believed that some designs with metal cases, like Apple's aluminum MacBook Pro and MacBook Air, also employ the case of the machine as a heat sink, allowing it to supplement cooling by dissipating heat out of the device core. Secondary device temperature monitoring may reduce performance or trigger an emergency shutdown if it is unable to dissipate heat, such as if the laptop were to be left running and placed inside a carrying case. Such a condition has the potential to melt plastics or ignite a fire.

**Our Proposed Approach**

Our approach to solve this problem will be the same way in which manufactures tries to cool down the device, instead we will just cool down the heat sink from where the manufacturer tries to dissipate the heat. This method will generally help out solve manufacturer’s problem and will increase the life of device.

**Gadgets Required**

* 600 Electronic speed controller
* 600 Restless motor
* A Li-Po battery
* Li-Po charger
* PGS sheet(Heat Sink)
* Adrino Board
* LM-35 Microcontroller
* Coolant Strip
* Wires and Key
* DS18B20 chip(One wire temperature sensor)

**Block Diagram and Technical Description**

* As shown in diagram, when heat sink absorbs all the heat of electronic device, then temperature sensor(DS18B20) records temperature. If temperature goes above optimum level then LM-35 microcontroller switches the key on, and motor starts working.
* As motor starts, the hot air from heat sink strikes coolant and hence cool down.
* Also LM-35 microcontroller gives instructions to electronic speed controller to control the speed of motor, hence giving speed controlled cooling to electronic device.

**Benefits**

To start with it has many benefits over the simple heat pipe sink and exit fan option. In our current system the air, devices vent out might get blocked or restrained due to certain reasons or the fan may not be able to vent out the heat of heat engine at a fast rate, so our system might break down due to intolerable heating or might just freeze and shutdown. In that case our setup will be able to cool that device controllably, so that device does not break down due to heat and also fluctuation in temperature. Also this approach can solve many of the heat problems of devices which demands to be run continuously for hours and also have use much use of its internal components.

**Recommendations**

The proposed controlled cooling system for any electrical or electronic device is not only useful in cooling down the system in controlled manner but also it is user friendly. The main problem with air fan is that over time dust and other particles clog the vents, fan and exhaust port or radiator of the system thus restricting air flow and cooling. In this system the user will only have to change the coolant of the system after some time and then it will start working normally. So basically, no big maintenance cost for it.

**Limitations and Constraints**

Well for starters, the limitation for this device to use it that it is not so compact for use in mobile or smaller devices right now. Also it needs to be weightless for electronic device so that there is factor of weight for consumers to risk buying the device.

**Future Scope**

As future rolls on, we need better devices and equipments for stability, performance and high durability. So we can introduce new methods to make so compact and weightless that we can use it in mobile back cover, phablets and many other smaller electronic or electrical devices.

**Conclusion**

The heat management of a device also shows that the performance for high-powered chip cooling application can be easily integrated into the compact enclosures of modern devices.

Finally, in conclusion this cooling solution is better in heat dissipation and cooling the system when compared to the existing active cooling solutions. It also has additional advantages such as the noise-free operation, lower energy consumption and higher reliability.

**Novelty in our Paper**

In this paper, we have not only presented the new  
method to cool down an electronic or electrical device but have also defined set of rules in which the control cooling takes place.

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**References**

**Author’s Technical Profile**

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**Mr. Rohit Rastogi** received his B.E. degree in Computer Science and Engineering from C.C.S.Univ. Meerut in 2003, the M.E. degree in Computer Science from NITTTR-Chandigarh (National Institute of Technical Teachers Training and Research-affiliated to MHRD, Govt. of India), Punjab Univ. Chandigarh in 2010.

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Worked as the reviewer for the SPICES-2015 at NIT Kerala, Kojhicode for international conf. of Signal Processing and Communication…Currently working as the reviewer in the technical reviewer committee for the **INDIA-2015** is Second **IN**ternational Conference on Information System **D**esign and **I**ntelligent **A**pplications organized by Faculty of Engineering, Technology and Management, University of Kalyani, Kalyani-741235, West Bengal, India.

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He has mentored around 20 Live Projects in Digital Logic Design at Graduation level like Automatic street Light Controller, Darkness detector, Visitor counter and Car Parking system etc.

He is CSI-student Coordinator of ABES-EC CSI student Chapter and life member of ISTE.

He keeps himself engaged in various competitive events, activities, webinars, seminars, workshops, projects and various other teaching Learning forums.

He has been awarded in different categories by ABES-EC, Gzb. College management for improved teaching, significant contribution, human value promotions and long service etc.

He has authored/co-authored, participated and presented research papers in various Science and Management areas in around 40 International Journals and International conferences including prestigious IEEE and Springer and 10 national conferences including SRM Univ., Amity Univ. and Bharti Vidgyapeetha etc. He has guided five ME students in their thesis work and students of UG and PG in around 100 research papers. He has developed many commercial applications and projects and supervised around 30 B.E. students at graduation level projects.

His research interests include Data ware Housing and Data Mining, Design Analysis of Algorithm, Theory of Computation & Formal Languages and Data Bases. At present, He is engaged in Clustering of Mixed Variety of Data and Attributes with real life application applied by Genetic Algorithm, Pattern Recognition and Artificial Intelligence.

Also, He is preparing some interesting algorithms on Swarm Intelligence approaches like PSO, ACO and BCO etc.