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RESEARCH PAPER PRESENTATION

by **TESA-SPCE Students at NCRAC-2024, IIT MADRAS**

Name of the Conference: **8th NATIONAL and 2nd INTERNATIONAL**

CONFERENCE on REFRIGERATION and AIRCONDITIONING

Organized by: IIT MADRAS; Date: 13-15 March 2024

**Supported by: IIT Bombay, IIT Tiruapti, IIT Jammu, NIT Rourkela, Anna University and
ASHARAE Chennai Chapter,**

Title of Paper: **Design, Manufacturing and Testing of a Portable Cooling
Jacket (Paper ID: 701)**

Authors: **Madan Narayanan, Shashank Phulmali, Hatim Lakdawala, Suparno Ghosh and
Prof. Parag K. Muley, Mechanical Engineering Department, SPCE.**

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Design, Manufacturing and Testing of a Portable Cooling Jacket

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Abstract

In regions with tropical climate such as India, combating heat has been major challenge, especially for personalized cooling. Advancements in air conditioning technology has led to development of sophisticated systems. However, the cost and environmental impact of these conventional systems has always been a matter of concern. The stationary conventional air conditioning units are not always applicable for individuals in transit, particularly in hot climatic conditions. This necessitates personalized cooling wearables that can provide cooling and comfort for individuals during transit or in high-temperature work conditions such as furnaces, firefighting and mining etc. The present work involves design, fabrication and testing of an innovative and cost-effective wearable jacket based on Peltier Cooling. A prototype is developed for portable cooling jacket of spandex cloth using thin copper wire strand sewed to it and a TEC12706 Peltier module with aluminum heatsink. The optimal prototype is designed with a water-cooling system using a pump and 3-D printed nozzles for the Peltier unit. Experimental tests conducted for performance evaluation of the Peltier cooling jacket resulted in producing and maintaining a consistent temperature of the jacket in the range 16-18°C, with total power consumption of 30 W. The cost of production of present prototype is estimated to be approximately Rs. 3000. Thus, the prototype of portable cooling jacket developed in the present research is a cost effective, energy efficient and environmental conscious for personalized cooling in both daily life and specific occupational conditions.

Keywords: Personalized cooling unit, Peltier cooling, Prototyping, 3-D Printing, Thermal comfort, Thermal design.