

A Novel Air Cooling Device with 360-Degree Coverage for Domestic Environments

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Abstract: *Inefficient electricity usage in government buildings in India results in a 20 to 25 percent energy loss annually, translating to a financial burden of approximately Rs 1.5 billion. Heating, ventilation as well as air conditioning (HVAC) systems constitute nearly half of total building energy consumption. With India's energy demand projected to more than double by 2030, advancing energy-efficient cooling solutions is critical for sustainable development and environmental preservation.*

This study introduces a novel air cooling device engineered for domestic environments, featuring 360-degree airflow coverage to optimize spatial cooling efficiency. Departing from conventional vapor compression and absorption refrigeration methods, the proposed system utilizes evaporative cooling principles. Leveraging the high enthalpy of vaporization of water, the device induces cooling by evaporating water to reduce ambient air temperature with significantly lower electrical energy consumption.

The innovative design ensures uniform air distribution throughout the living space, enhancing thermal comfort by increasing humidity levels in arid conditions while reducing energy use. This approach presents a promising alternative to traditional air conditioning, contributing to reduced greenhouse gas emissions and supporting India's energy conservation goals. The device's scalability and low environmental impact highlight its potential as a sustainable cooling technology for widespread domestic adoption.

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