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Design of Low Cost Refrigeration System using Peltier

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Abstract: *The continuous development of science and technology has led to innovative refrigeration methods that are energy-efficient, compact, and environmentally friendly. This project focuses on the design and development of a low-cost refrigeration system using the Peltier effect. Unlike conventional vapor compression systems, the proposed system employs a thermoelectric module (Peltier module), eliminating the need for compressors and harmful refrigerants.*

When electric current passes through the thermoelectric module, a temperature difference is created, producing a hot side and a cold side. This principle is utilized to achieve the required cooling effect. The system is designed to be lightweight, portable, and suitable for applications where conventional refrigeration is impractical. The entire setup is fabricated and experimentally analyzed to evaluate its cooling performance, efficiency, and cost-effectiveness.

The results indicate that the developed refrigeration system is capable of maintaining a stable temperature suitable for preserving medicines and food items, particularly during travel and in remote or emergency conditions. Due to its low cost, portability, and eco-friendly operation, the proposed system presents a viable alternative to traditional refrigeration systems for small-scale cooling applications..

Keywords*:* Thermoelectric module (TEM), Peltier Effect, thermal energy, compressor, semiconductor etc

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