

Portable refrigeration system powered by solar energy

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Elevator Pitch

Imagine a lightweight, solar-powered refrigerator that keeps your essentials cool anywhere, anytime, without harmful refrigerants or noisy compressors. Our innovative design uses thermoelectric Peltier technology to deliver eco-friendly, portable cooling for outdoor adventures, medical needs, and off-grid living. Compact, durable, and sustainable—**this is the future of cooling.**

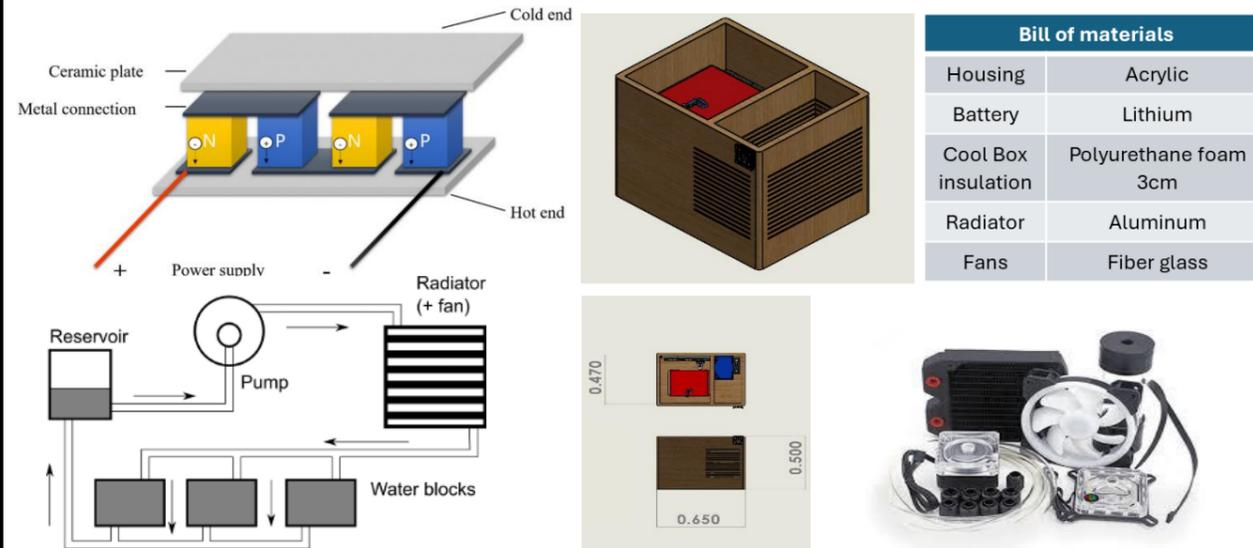
Problem Statement

There is a need for a compact, durable, and eco-friendly cooling solution for off-grid use, as traditional systems are bulky, rely on harmful refrigerants, and require conventional power sources. This project addresses this by developing a solar-powered portable refrigerator using thermoelectric Peltier technology for reliable and efficient cooling in diverse applications.

Objective of the Project

To design and develop a portable, solar-powered refrigerator using thermoelectric Peltier technology, providing an eco-friendly, energy-efficient, and reliable cooling solution. The project aims to address the needs of off-grid applications, such as outdoor activities, medical storage, and sustainable living, by delivering a compact, durable, and user-friendly system that combines innovative engineering with environmental responsibility.

Prototype



Bill of materials	
Housing	Acrylic
Battery	Lithium
Cool Box insulation	Polyurethane foam 3cm
Radiator	Aluminum
Fans	Fiber glass

Specifications

Power Supply:

- Battery capacity: 100Ah / runtime of at least 5 hours.
- Solar panel: 120W, selected for efficiency and space constraints.

Energy Efficiency:

- Maximum power consumption: 165W.

Durability and Reliability:

- Shock-proof and water-resistant design
- Minimal maintenance due to the absence of moving parts in the cooling system.

Eco-Friendliness:

- Reducing environmental impact.
- Designed to integrate with renewable energy sources.

Portability:

- Lightweight and easy to carry.

Constraints

Cooling Performance:

- Temperature range: 10°C to 12°C.

Size and Weight:

- Total weight: Approximately 15kg for portability.
- Compact design suitable for off-grid and outdoor use.

Usability:

- User-friendly interface and controls.
- Includes a detailed user manual for ease of operation.

Cost:

Optimized for cost-effectiveness while ensuring high-quality materials and components.

Conclusion

This project created a portable, solar-powered refrigerator using thermoelectric Peltier technology, providing an eco-friendly and efficient cooling solution for off-grid use. The system combines reliable performance, low maintenance, and quiet operation, powered by a battery and a solar panel. It showcases the potential of thermoelectric cooling in industry and renewable energy applications.