JOEL JEBUS
CSE DEPARTMENT
2023103061
Tel 7708780398
joeljebusmn@gmail.com

GREEN CONDITIONER

FY 2024

An abstract of the updated project idea with enclosed updated budget and team members list

TABLE OF CONTENTS

Contents

ABSTRACT

This project focuses on the development of an innovative **ohmic contact-based room cooler and heater**, designed to regulate room temperature through a compact and efficient heat exchange system. The system utilizes the **ohmic contact principle**, wherein cells containing heat-absorbing and heat-emitting terminals are integrated into a single **minimal ceiling-mounted unit**. This makes the system adaptable for use in spaces with limited ceiling areas while ensuring effective temperature regulation. The setup also includes a **specialized air supply system** that constantly circulates room air towards the cooling terminal, significantly improving heat absorption and overall system efficiency.

The methodology involves using a number of cells with **ohmic contact terminals** made of advanced materials like **semiconductors** and **thermal fillers**, which are capable of either absorbing or emitting heat based on the seasonal requirements. During summer, the heat-absorbing terminal extracts heat from the room and dissipates it, while in winter or rainy seasons, the heat-emitting terminal can warm up the room by reversing the heat flow. The **air circulation system** plays a key role in directing room air to the cooling terminal, enhancing the rate of heat exchange and ensuring uniform temperature control. This design works efficiently within a

ABSTRACT

restricted ceiling area, making it ideal for smaller spaces or rooms where full ceiling coverage is not feasible. Here the hot enters through the upper fan duct and is cooled by the semiconductor stuff and is ejected down the room through the lower fan duct system.

To achieve this, the project incorporates a **minimalistic design** that optimizes the use of space and reduces installation complexity. The system relies on **fans or air ducts** to move the warm room air across the heat-absorbing membrane, ensuring consistent air movement and effective temperature management. The **smart material selection** ensures efficient thermal conduction while minimizing energy consumption, making it a highly sustainable solution.

Environmental Significance:

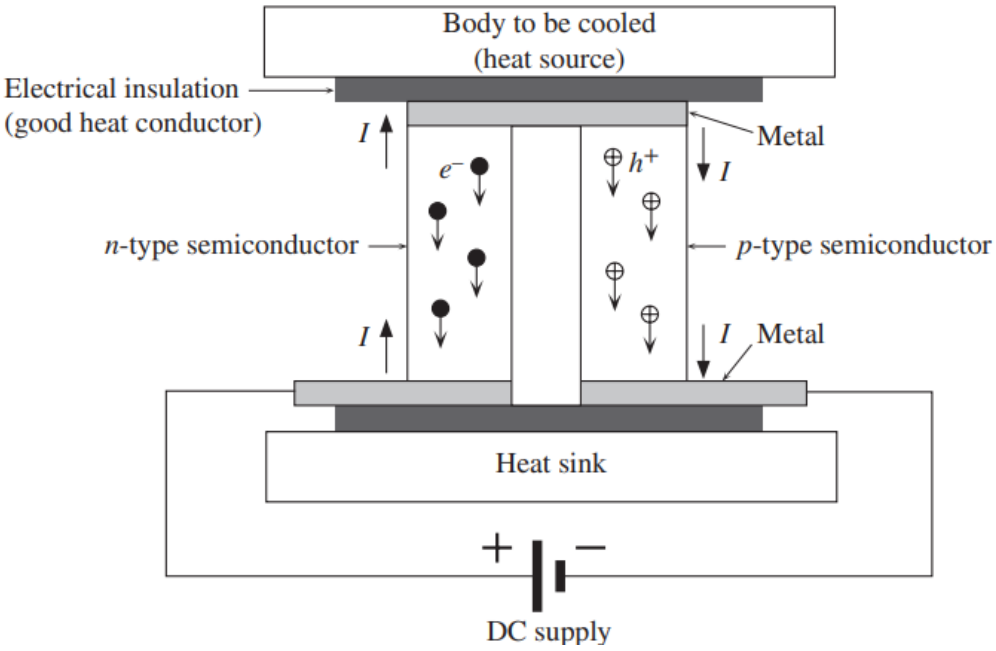
The system has significant environmental advantages, as it promotes **energy efficiency** and minimizes reliance on traditional, energy-intensive HVAC systems. By employing **thermal conduction** instead of high-powered compressors or refrigerants, the system drastically reduces **power consumption**. This energy-efficient operation leads to **lower electricity costs** and reduces the system's **carbon footprint**. Furthermore, the compact nature of the system means fewer

ABSTRACT

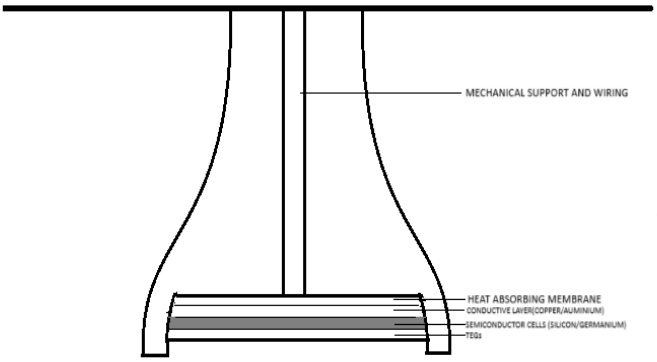
materials are required, making it both **economically and environmentally sustainable**.

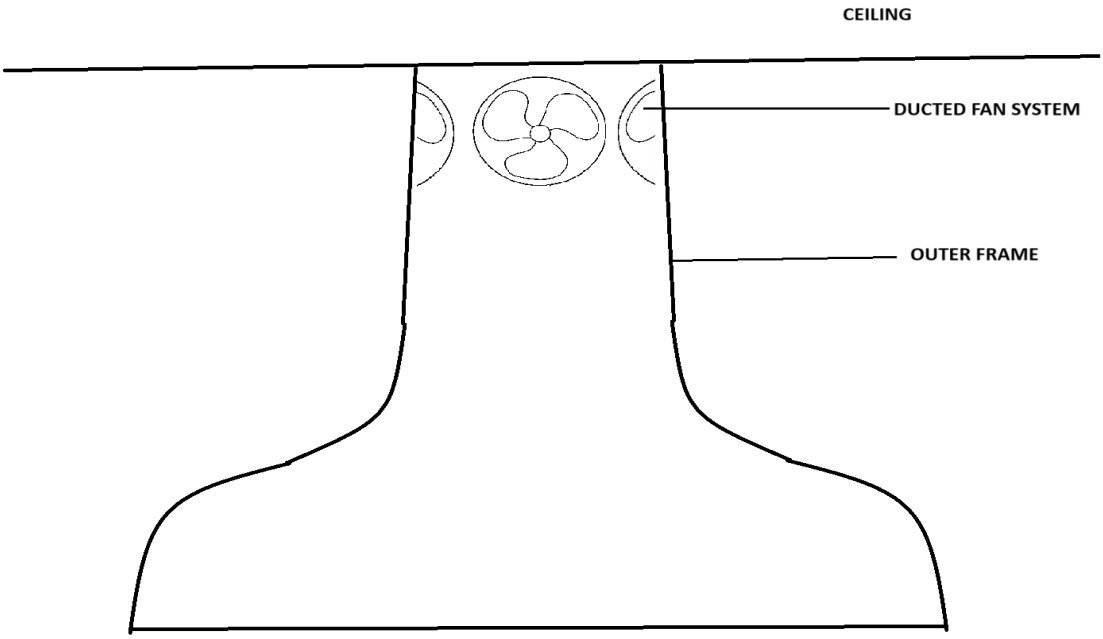
Overall, this project aims to deliver a highly effective cooling and heating solution that fits within limited space constraints while also being **environmentally responsible**. By focusing on **minimal space usage**, **smart material integration**, and a **constant air supply**, the system stands as a **sustainable and innovative alternative** to conventional room cooling and heating technologies.

A SINGLE CELL OF THE OHMIC JUNCTION



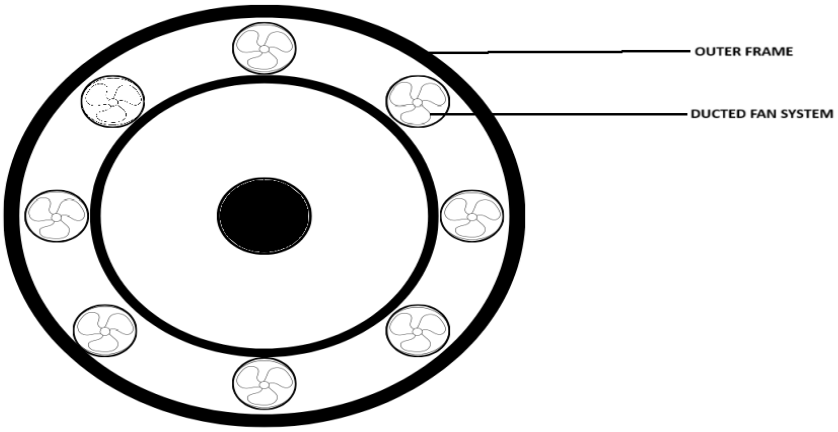
ABSTRACT


MECHANICAL SUPPORT AND WIRING
HEAT ABSORBING MEMBRANE
CONDUCTIVE LAYER(COPPER/AUMINIUM)
SEMICONDUCTOR CELLS (SILICON/GERMANIUM)
TEGs


CEILING
DUCTED FAN SYSTEM
OUTER FRAME

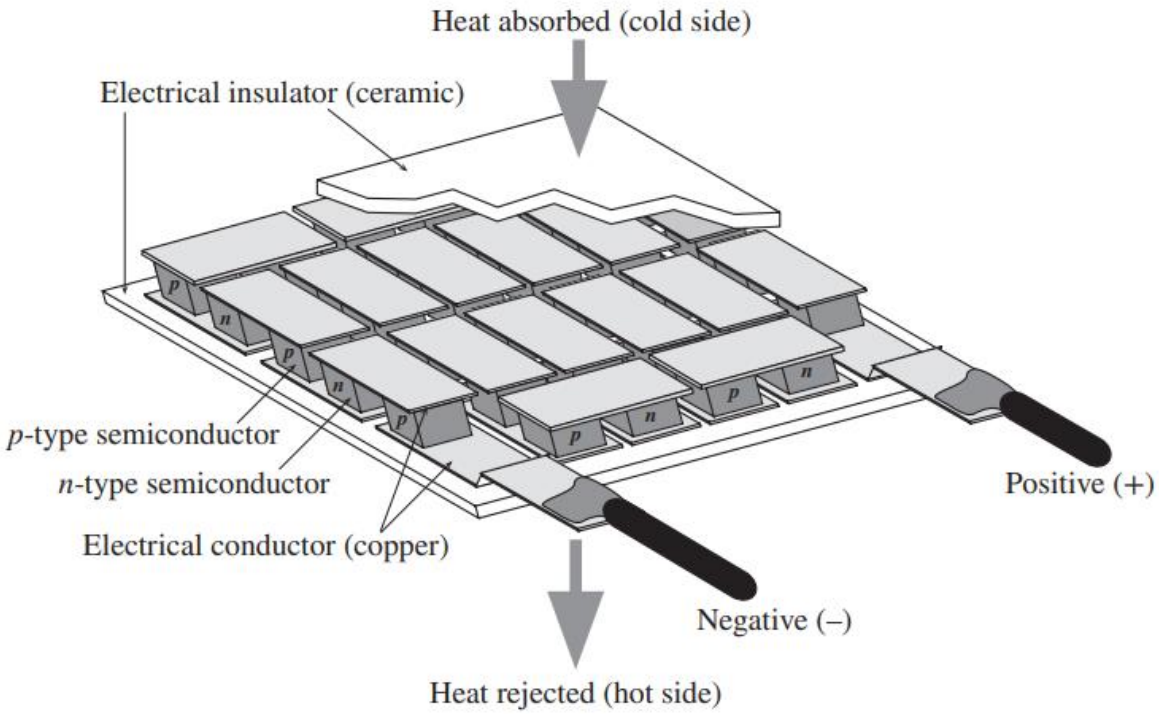
ABSTRACT

BOTTOM VIEW



Diameter : circle of 2 meter diameter

INTEGRATED COMBINATION OF CELLS



ESTIMATED BUDGET :

MATERIAL	BUDGET
SEMICONDUTORS	45000
PCM/GRAPHENE	10000
TEGS	4000
COPPER/ALUMINIUM	8000
FANS/MOTORS	2000
MISCELLANEOUS	4000
TOTAL	73000

MEMBERS REQUIRED:

1. Mechanical Engineer

- **Responsibilities**: Designs the structural framework, including heat sinks, air circulation units, and the ceiling-mounted apparatus.
- **Skills Required**: Expertise in mechanical design, thermal management, CAD software, heat transfer principles, material properties.

2. Electrical Engineer

- **Responsibilities**: Manages electrical design, ohmic contacts, power supply management, and control circuits.
- **Skills Required**: Electronic circuits, ohmic contact principles, thermoelectric generation, PCB design, power electronics, control systems.

3. Material Scientist or Chemist

- **Responsibilities**: Advises on material selection, including semiconductors, PCMs, and heat-absorbing membranes.
- **Skills Required**: In-depth understanding of phase change materials (PCM), thermal conductivity, advanced ceramics, semiconductors.

4. Software Engineer

- **Responsibilities**: Develops the control system, including temperature monitoring and automation.
- **Skills Required**: Microcontroller programming, IoT systems, sensor integration, control algorithms, automation systems.

ABSTRACT

5. HVAC Technician

- **Responsibilities**: Assists with the installation and maintenance of air circulation systems.
- **Skills Required**: Expertise in airflow management, ventilation systems, HVAC installation, and maintenance.

6. ECE Technician (Electronics and Communication Engineering)

- **Responsibilities**: Provides hands-on assistance with the installation and testing of electronic circuits and communication systems.
- **Skills Required**: Experience in **circuit testing**, **soldering**, and **component assembly**. Familiarity with **signal processing** and **communication systems** for controlling and monitoring the system's performance.

7. Designer

- **Responsibilities**: Focuses on the aesthetic and ergonomic design of the system, ensuring it integrates seamlessly into the room's architecture while maintaining functionality.
- **Skills Required**: Proficiency in **industrial design**, **3D modeling** (e.g., using software like Blender, AutoCAD), and an understanding of **aesthetic design principles**. Experience in **user-centered design** and **space optimization** for minimal ceiling area installations.