

Title: Design of Solar Stirling-VCR Hybrid Air Conditioner System (OLP 2603)

Abstract:

The Solar Stirling air conditioner is an innovative system that uses a solar collector to harness solar energy, which powers a gamma Stirling engine which further mechanically coupled to a vapor compression cycle. Unlike conventional cooling systems that depend heavily on electricity and consume significant energy, this approach provides a sustainable and efficient alternative. The design incorporates novel configurations. In this system a non-pressurized gamma Stirling engine is used which used air as working medium, the majority of heat rejection is due to the expansion in the cooling cylinder and radial fins on cylinders will be designed for optimum heat rejection. ensuring energy efficiency of Stirling cycle. The technology once proven can be hybridized with a variety of existing solutions (with evaporative cooler/ existing ac units). Its adaptability across different applications and climatic conditions makes it a versatile solution for residential, commercial and small-scale applications. The uniqueness of this project lies in its potential to deliver both energy and cost savings while directly addressing the urgent global demand for sustainable and eco-conscious cooling technologies

Objectives:

- To design and develop a 200 W functional solar Stirling air conditioner system for space cooling.
- Advance the technology of Solar Stirling Air Conditioner from current TRL-2 to TRL-4
- To study and evaluate the performance of model building with the proposed hybrid solar Stirling-VCR cooling system through mathematical modelling and simulation in a model building under Indian climatic conditions.

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