# DESIGN AND FABRICATION OF SOLAR RECHARGABLE MULTIPURPOSE ELECTRIC CART FOR SMALL SCALE VEGETABLE VENDER

***Project Reference No.:*** *47S_BE_3747*

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**Keywords:**

Peltier kit, Solar Panel, Batteries, Controller, Multipurpose.

## Introduction

The solar-operated cycle cart for small-scale vegetable vendors represents a transformative solution to the pervasive problem of post-harvest losses in horticulture. With acapacity of up to 200 KG and the ability to extend the storage life of produce by 10 to 20 days,depending on the crop, this innovation directly tackles the root causes of waste in the agricultural supply chain. What sets this cart apart is its efficiency with minimal resource inputs. Requiring only a liter of water per day and a modest 20 watts of electricity, the system operates seamlessly whether connected to the grid or functioning off-grid. This not only reduces operational costs but makes it accessible to a wide range of farmers and traders, including those in remote areas. The self-adaptable and sustainable design of the cart is noteworthy. Eliminating the need for cooling and chemical interventions, not only minimizes environmental impact but also ensures that the stored fruits and vegetables retain their natural freshness without compromising nutritional value. This not only addresses the economic dimension of post-harvest losses but also aligns with green and eco-friendly principles.

The high perishability of horticultural produce often results in a significant percentagenot reaching the market, contributing to inflated prices. By directly intervening in the post- harvest phase, this solution empowers individual farmers, cooperatives, and traders to reduce waste, enhance product availability, and ultimately stabilize market

prices. In doing so, it not only addresses economic concerns but contributes to sustainable agricultural practices, presenting a comprehensive and impactful solution to the challenges of the perishability of horticultural commodities. categorized by their generation, intelligence, structural, capabilities,application, and operational capabilities.

## Objectives And Scope

- The main objectives of the present project work
    1. Design and fabrication of solar-operated electric cart for small-scale vegetable vendors by Design construction of self-adaptable.
    2. To fabrication of electric cart.
    3. To design of refrigeration box and compare it with and without vegetables.
    4. Incorporating energy-efficient technologies to maximize the utilization of solar powerand minimize energy wastage.
    5. Ensuring that the designed system is cost-effective and accessible for small-scale vegetable vendors, aligning with their budget constraints and operational needs.
    6. Consideration of the environmental impact of utilizing clean and renewable energy sources.
    7. The usage of Solar is an alternative the fuel.

## Methodology

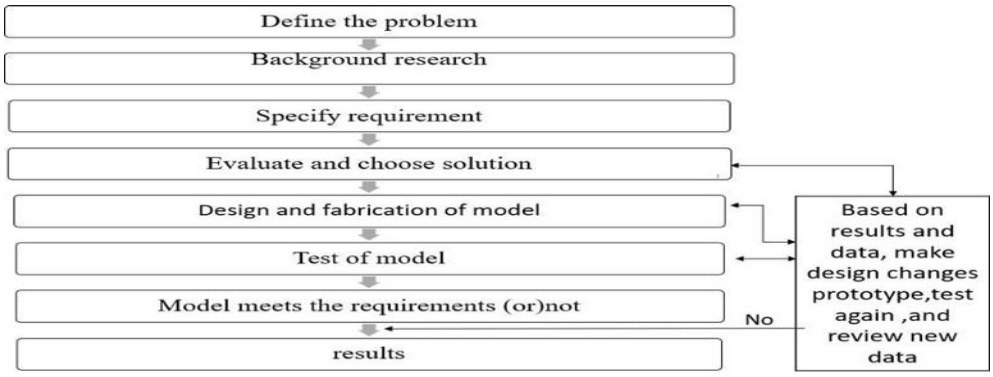


Fig 1: Methodology of design and fabrication of the project

- The ethylene oxidizing, and near-sterile microclimate is insulated in the chamber.

- The controlled microclimate created inside the insulated chamber inhibit pathogen growth, delays browning as well as ripening and regulate activity of antioxidant enzyme.

- It also oxidizes ethylene into hydrogen, carbon di-oxide, water vapour and other small molecules which further creates a controlled atmosphere that enables the storage of fruits and vegetables for anywhere up to 20 days.

**Components Required:**

- Circular tube bar for chassis
- Ball bearing for all 3 wheels
- Solar panels of specification 10Watt/12V higher efficiency Poly crystalline cell
- 1 Hub motors of specification 250Watt and 48V supply.
- Hub motor control with throttle and break.
- Lead acid Battery- 4 batteries of specification 12V, 7 amps each.
- 2 Shock absorber.
- 4 Peltier module for cooling.
- Thermocol box with aluminium silver bubble sheet outside plastic
- Solar charge control.
- AC to DC convertor.
- Thermocouple

**Components description:**

- **Mild steel** is an iron alloy with carbon as its main alloying element. It is one of the most widely used forms of steel and can be applied to a range of general-purpose applications. Mild steel owes its popularity to its

adequate strength at low cost, in addition to its excellent machinability and weldability.

- The **Aluminum Silver Bubble Sheet** with a weight of 210 GSM is a lightweight material commonly used for insulation and packaging due to its reflective properties and cushioning provided by the bubble layer.
- The **Peltier effect** is the reverse phenomenon of the Seebeck effect; the electrical current flowing through the junction connecting two materials will emit or absorb heat per unit time at the junction to balance the difference in the chemical potential of the two materials.
- When electricity is passed through the module, electrons move in one element and positive holes move in the other element, this is called the "Peltier effect." This allows one side of the substrate to absorb heat and the other to radiate heat, so the hot and cold sides to be switched depending on the current direction.

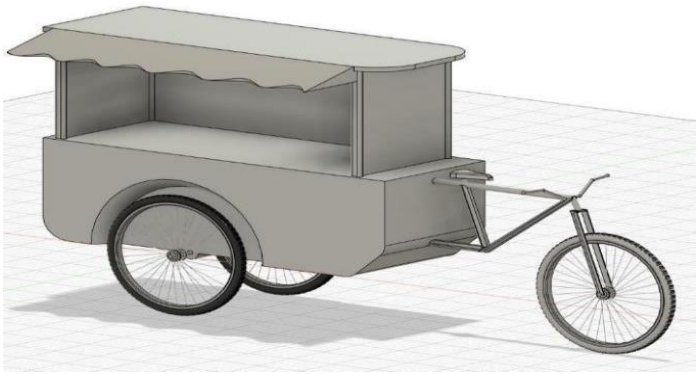

Fig 2: 3D model

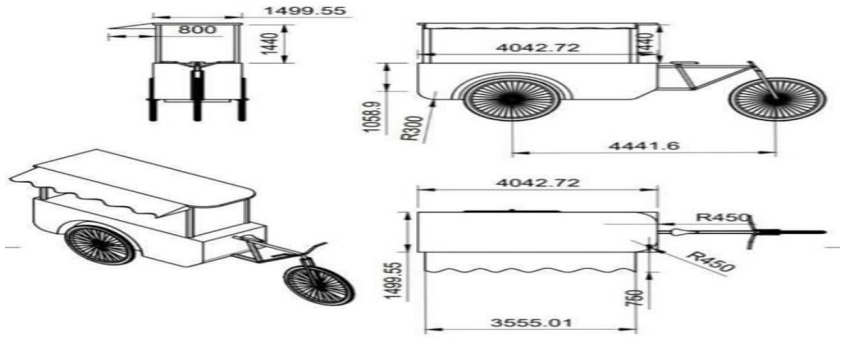


Fig 3: Line diagram of the model showing major dimensions

Fig 4. Final Fabricated Mode

## Results And Conclusion

### Tested Results of Refrigeration Box When Empty

Table 1: Table showing values of Temperature V/S Time in Hours for Empty Container

| Sl no | Time in minute | Temperature in celsius |
|---|---|---|
| 1 | 0 | 38 |
| 2 | 30 | 34 |
| 3 | 60 | 30 |
| 4 | 90 | 26 |
| 5 | 120 | 21 |
| 6 | 150 | 18 |

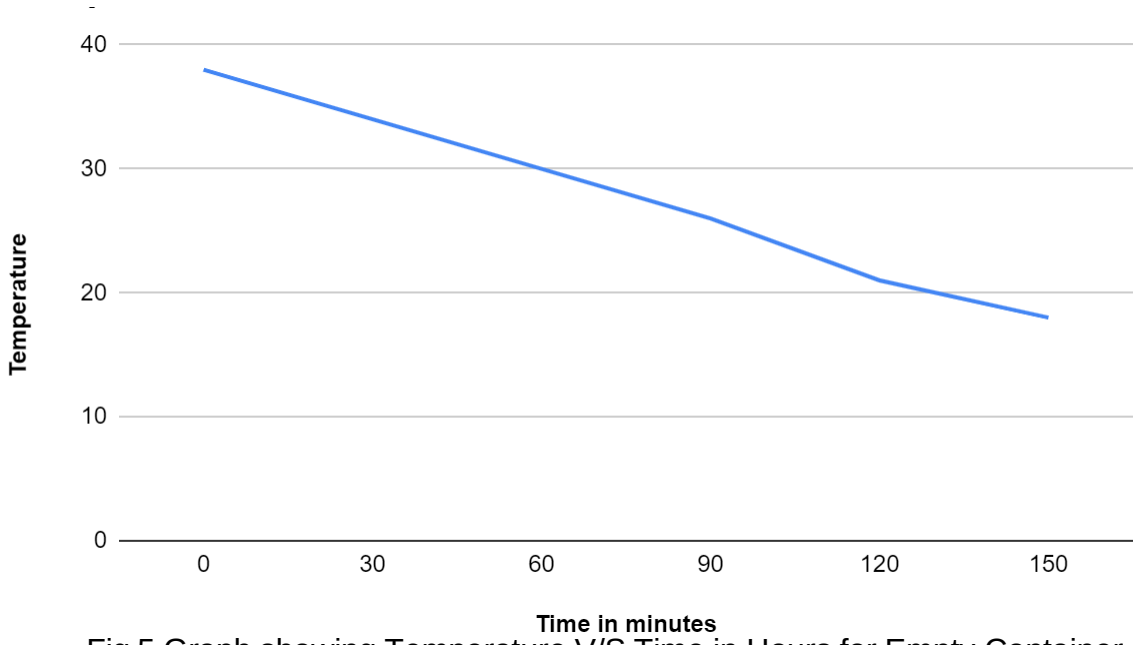


Fig 5 Graph showing Temperature V/S Time in Hours for Empty Container

## TESTED RESULTS OF REFRIGERATION BOX WHEN FILLED

Table 11.1: Table showing values of Temperature V/S Time in Hours for filled Container

| Sl no | Time in minute | Temperature in celsius |
|---|---|---|
| 1 | 0 | 38 |
| 2 | 30 | 36 |
| 3 | 60 | 34 |
| 4 | 90 | 30 |
| 5 | 120 | 26 |
| 6 | 150 | 22 |

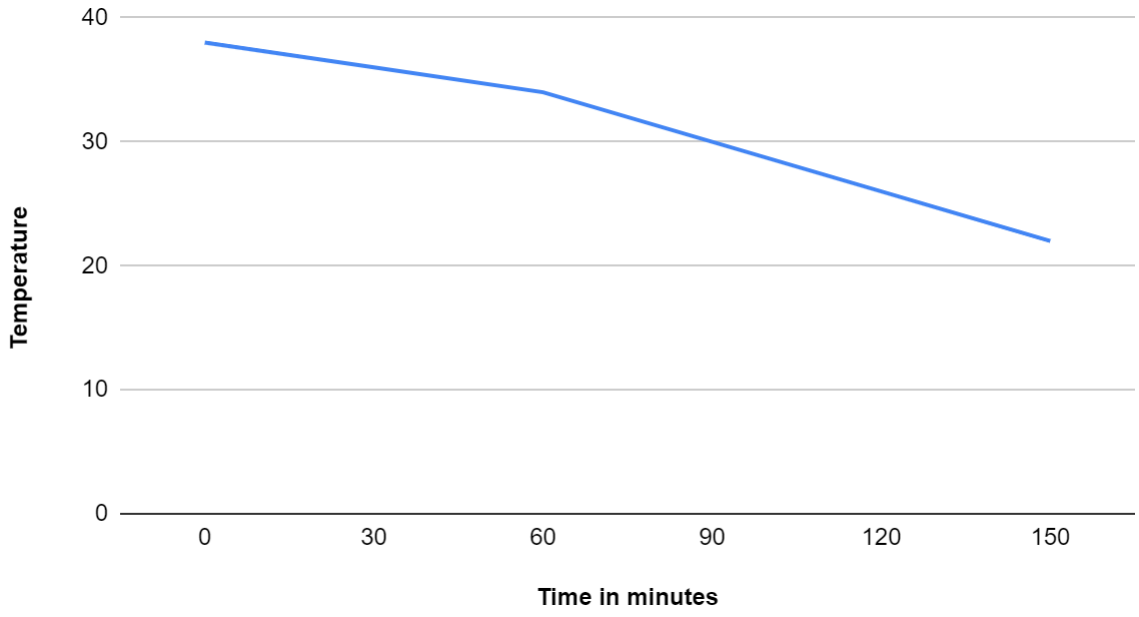


Fig 6. Graph showing Temperature V/S Time in Hours for filled Container

- In the filled container considering room temperature as 38 degrees Celsius temperaturegradually decreases as time increases
- In a empty and filled container after 30 minutes temperature is reduced to 36 degreesCelsius
- In empty and filled container after 150 min temperature is reduced to 18 and 22 degrees Celsius respectively

**Scope For Future Work**

- So, our main goal is to 50% increase in the income of small & marginalfarmers
- Try to Reduction in waste by more than 30%
- It is Health benefits-kills deadly pathogens and makes food safe.
- It Reduces Energy consumption by more than 80%.
- This project Avoid Up To 1276.8 Kg $Co_2$ Emissions Per Year-Equivalent to Cultivating-60 Trees!!!