

# Cover Page

This report focuses on designing a simple and effective solar-powered phone charger that's easy to carry and can be used anywhere, especially when there's no access to a regular outlet. Phones are an important part of everyday life, but their batteries often run out when we're on the go, at school, traveling, or spending time outside. This project aims to solve that problem by creating a portable charger that runs completely on solar energy.

In this report, I explain the purpose behind the design, what materials and parts were used, and how the charger actually works. I also describe the key goals I focused on like making it lightweight, safe, and strong enough for outdoor use and how well the design meets those goals. There's also a section about how the charger will be tested to make sure it works well in real-life situations.

By the end of the report, readers will see how renewable energy can be used in everyday technology and how this small device could make a big difference for people who need a reliable way to keep their phones charged without depending on a wall outlet.

# Design of a Solar-Powered Portable Phone Charger for Everyday Use

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## Abstract

This report presents the design of a solar-powered portable phone charger intended for everyday use, particularly in situations where access to electrical outlets is limited. The objective is to develop a compact, sustainable device that can charge a phone using solar energy. The proposed design incorporates a small solar panel, rechargeable battery, charge controller module, and USB output, all housed in a portable case. Key design goals include portability, safety, durability, and the ability to provide at least one full phone charge. Initial evaluations suggest the charger is affordable and functional, though improvements are needed in charging efficiency under low sunlight and case durability. Future enhancements could include a larger solar panel, battery indicators, or wireless charging. This project demonstrates a practical application of renewable energy in personal electronics.

## Introduction

**Purpose:** There is limited access to phone charging and explain the goal of design a portable, solar-powered solution to address it

**Background:** Phones are essential, but battery life often ends during long days or outdoor activities.

**Problem Statement:** There is a need for a portable charger, sustainable charging solution, that doesn't rely on a power outlet or batteries.

**Objective:** Design a compact, solar-powered phone charger that can store energy and charge a phone through their charging ports.

## Design Requirements

**Portability:** Must fit in a backpack or pocket

Charging Capability: Must provide at least on full phone charge

Durability: Must withstand outdoor use

Sustainability: Powered only by solar energy

Safety: Prevent overheating or overcharging

## Design Description

Components: Small solar panel, rechargeable battery, charge controller module, USB output port, and an outside case

How it works: Sunlight charges the battery (solar panel), the charge controller manages energy flow and battery protection, and the user plugs in their phone with a cord to take the portable power.

## Design Evaluation

The solar-powered portable phone charger meets its main goal of providing a sustainable and portable way to charge devices without using traditional power sources. It is affordable, easy to carry, and uses a charge controller to keep the battery safe and efficient. However, there are some limitations. Charging can be slow, especially in low sunlight, and the device depends on good weather to work well. Some parts may also be fragile without a strong case. In the future, the design could be improved by adding a larger solar panel, a more durable casing, a battery indicator, or even wireless charging features to make it more user-friendly and reliable.

<b>Design Requirement</b>	<b>Target Goal</b>	<b>Actual Design Performance</b>
Portability	Fits in a small bag or pocket	Compact size: fits in a pocket and small bag
Charging capability	At least one full phone charge	Can fully charge a standard smartphone
Durability	Withstands outdoor use	Works well, but needs a stronger case
Sustainability	Powered only by solar energy	Fully solar powered with rechargeable battery

Safety	Prevent overheating and overcharging	Includes charge controller for safe battery management
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## Testing Plan

Test 1: Charging speed in full daylight vs partial daylight

Test 2: Battery capacity, can it fully charge a phone?

Test 3: Heat test, does the case stay cool in direct sun exposure

Test 4: Durability, how well does the case hold up?

## Conclusion

The solar-powered portable phone charger offers an effective and eco-friendly solution for charging mobile devices without relying on electrical outlets. Designed with affordability, portability, and sustainability the charger uses solar energy to store power in a rechargeable battery, making it ideal for students, travelers, and outdoor use. While the design has some limitations, such as slower charging in low sunlight and the need for a protective casing, it could successfully demonstrate the potential of small-scale renewable energy technology. With future improvements, this charger could become a reliable and convenient tool for everyday use.