



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.379**



9940 572 462



6381 907 438



ijircce@gmail.com



www.ijircce.com

# Solar Power Battery Charger

**Hardik Pandey, Shrey Gupta, Vivek Bapna, Vatsal Balsara, Vaishali Rane,  
Mrs. Poonam Vengurlekar**

Dept. of Computer Engineering, Thakur College of Engineering and Technology, Mumbai, India

**ABSTRACT:** Solar power battery chargers have become increasingly popular in recent years due to their eco-friendliness and versatility. They are ideal for outdoor enthusiasts and those who live in areas with limited access to electricity. The use of solar power to charge batteries eliminates the need for traditional electricity sources, which reduces greenhouse gas emissions and saves money on energy costs. The key component of a solar power battery charger is the solar panel, which is responsible for capturing and converting solar energy into electrical energy. Most solar power battery chargers use photovoltaic (PV) cells to accomplish this. PV cells are made up of multiple layers of semiconducting materials, which generate electricity when exposed to sunlight. In addition to the solar panel, a solar power battery charger may also include a charge controller, which regulates the flow of electricity from the solar panel to the battery. This ensures that the battery is not overcharged or undercharged, which can damage the battery and reduce its lifespan. Some solar power battery chargers also come with built-in LED lights or other features, making them even more versatile and convenient. Solar power battery chargers are available in a variety of sizes and capacities, making it easy to find one that meets your specific needs. They are also relatively affordable, with prices ranging from a few dollars for small, portable models to several hundred dollars for larger, more powerful chargers. In summary, solar power battery chargers are an eco-friendly and cost-effective way to charge batteries using the power of the sun. They are versatile, convenient, and easy to use, making them ideal for a wide range of applications. Whether you're camping in the wilderness or simply looking to reduce your carbon footprint, a solar power battery charger is a great investment.

## I. INTRODUCTION

In recent years, there has been an increasing interest in the use of renewable energy sources, such as solar power, to mitigate the negative impact of climate change. Solar power battery chargers are one such innovation that has gained popularity due to their eco-friendliness, portability, and cost-effectiveness. The need for portable and reliable power sources has always been a challenge, especially for those who work or travel in remote areas without access to electricity. The use of solar power battery chargers eliminates the need for traditional electrical sources, which often contribute to greenhouse gas emissions and environmental degradation. Instead, solar power battery chargers harness the power of the sun to charge rechargeable batteries, making them an ideal solution for powering electronic devices and small appliances. In this presentation, we will explore the mechanics behind solar power battery chargers, including the role of solar panels and charge controllers in converting sunlight into electrical energy. We will also discuss the various types of solar power battery chargers available in the market, their sizes and capacities, and the range of applications for which they are suitable. Furthermore, we will delve into the advantages of using solar power battery chargers, including their cost-effectiveness, versatility, and environmental sustainability.

## II. OVERVIEW

Solar power battery chargers have been around for several decades, with the first commercial models appearing in the 1970s. However, it was not until the 21st century that they gained popularity due to advancements in solar panel technology and increased awareness of the need for sustainable energy sources. The first solar power battery chargers were primarily designed for military and space applications, where access to electricity was limited. These early models were large and expensive, making them impractical for personal use.

However, as the technology improved, solar power battery chargers became smaller, more efficient, and more affordable, making them accessible to a wider audience.

Today, solar power battery chargers are commonly used for charging mobile phones, laptops, and other portable electronic devices, as well as for powering small appliances and equipment. They are popular among hikers, campers, and other outdoor enthusiasts who need a reliable source of power in remote areas. They are also used in developing countries to provide electricity to rural communities that lack access to traditional power sources.

The advantages of solar power battery chargers include their portability, convenience, and eco-friendliness. They do not require an external power source to operate, reducing energy costs and carbon emissions. They are also easy to use, with most models simply requiring exposure to sunlight to charge the battery.

Despite their many benefits, solar power battery chargers are not without their limitations. They require adequate sunlight to charge the battery, which can be a challenge in areas with limited sunlight or during cloudy weather. They are also less efficient than traditional electrical sources, which can affect the charging time and overall performance.

In conclusion, solar power battery chargers have come a long way since their inception in the 1970s. They are now widely used and appreciated for their portability, convenience, and environmental sustainability. As solar panel technology continues to advance, it is likely that solar power battery chargers will become even more efficient and affordable, making them an even more attractive alternative to traditional electrical sources.

### III. PURPOSE

The purpose of a solar power battery charger is to convert the energy from sunlight into electrical energy, which can then be used to charge rechargeable batteries. Solar power battery chargers are typically used to charge mobile phones, laptops, and other portable electronic devices, as well as to power small appliances and equipment. The main advantage of solar power battery chargers is that they do not require an external power source to operate. Instead, they rely on the power of the sun to charge the battery, making them a cost-effective and eco-friendly alternative to traditional electrical sources. They are also portable and easy to use, making them ideal for those who work or travel in remote areas without access to electricity.

Solar power battery chargers typically consist of a solar panel, a charge controller, and a battery. The solar panel converts the energy from sunlight into electrical energy, which is then stored in the battery. The charge controller regulates the flow of energy to the battery to prevent overcharging and damage to the battery.

In summary, the purpose of a solar power battery charger is to provide a portable, cost-effective, and eco-friendly source of power for charging rechargeable batteries. By harnessing the power of the sun, solar power battery chargers offer a sustainable alternative to traditional electrical sources and are an important technology for those who work or travel in remote areas without access to electricity.

### IV. SIGNIFICANCE

1. **Sustainability:** Solar power battery chargers are powered by the sun, a renewable energy source that produces no harmful emissions. This makes solar power battery chargers a sustainable and eco-friendly alternative to traditional electrical sources, which rely on fossil fuels and contribute to carbon emissions and environmental degradation.
2. **Cost-effectiveness:** Solar power battery chargers eliminate the need for traditional electrical sources, which can be costly and unreliable, especially in remote areas. By harnessing the power of the sun, solar power battery chargers offer a cost-effective solution for charging rechargeable batteries, without the need for external power sources or electricity bills.
3. **Portability:** Solar power battery chargers are typically small, lightweight, and portable, making them ideal for those who work or travel in remote areas without access to electricity. They can be easily carried and used anywhere, providing a reliable source of power for charging portable electronic devices and small appliances.
4. **Versatility:** Solar power battery chargers are available in a variety of sizes and capacities, making them suitable for a range of applications. They can be used to charge small batteries for portable electronic devices or larger batteries for powering appliances and equipment.
5. **Accessibility:** Solar power battery chargers are particularly useful in developing countries, where access to traditional electrical sources is limited. They can provide a reliable source of power for charging mobile phones, lighting, and other essential equipment, improving the quality of life for those in rural communities.

### V. OBJECTIVE

- To provide a sustainable and eco-friendly source of power for charging rechargeable batteries.
- To reduce dependence on traditional electrical sources, which can be costly and unreliable.
- To provide a portable and reliable source of power for charging portable electronic devices and small appliances.
- To improve access to electricity in remote areas, particularly in developing countries where access to traditional electrical sources is limited.
- To reduce carbon emissions and contribute to a more sustainable future.



- To provide a cost-effective solution for charging rechargeable batteries without the need for external power sources or electricity bills.
- To offer a versatile technology that can be used to charge small batteries for portable electronic devices or larger batteries for powering appliances and equipment.
- To contribute to a more sustainable and environmentally friendly future by using a renewable energy source.

## VI. COMPONENTS USED

- -3W 9V solar panels
- 22 gauge stranded wire
- 5V DC/DC buck converter
- E6000 craft glue (a hot glue gun is pictured, but this is what I ended up using)
- Reusable grocery bag
- Heat shrink tubing (optional)
- 1/4" eyelets (optional)

## VII. STEPS FOR MAKING SOLAR POWER BATTERY CHARGER.

### Step 1: Prepare the Fabric

- ▶ For this design, I upcycled an old reusable grocery bag to cut a strip of fabric to which I attached the panels. It protects them and allows them to fold up for easy storage.
- ▶ Place the panels, eyelets (if using), and DC/DC buck converter on the reusable grocery bag in your desired layout.
- ▶ **Tip:** I recommend giving yourself 1" or more of space between your solar panels so they can fold easily. I also gave myself more length than necessary so I could fold the fabric over the buck converter, as you'll see in Step 6.
- ▶ Cut the fabric to your desired dimensions with scissors. (Mine ended up being about 14" long by 8.25" wide.)

### Step 2: Wire the Solar Panels in parallel:-

Cut a length of wire to connect the panels' positive terminals. Give yourself some slack in the wire so it isn't pulled taut when the panels are folded.

- ▶ **Note:** Because my panels have two pairs of terminals on back, before wiring I used a multimeter to check their voltages. It turned out the terminals that output 9 volts are the two "top" terminals — not the terminals with the "+" and "-" signs. Strange.
- ▶ Strip and solder the wire from positive terminal to positive terminal. (I decided to orient my panels in opposite directions to lessen the stress on the wire when the panels are folded.)
- ▶ Cut a length of wire to connect the panels' negative terminals. Once again, give yourself some slack.

### Step 3: Solder the Leads to the Panels:-

- ▶ Cut a length of wire for the panels' positive lead. It will connect one of the panels' positive terminal to the buck converter's positive terminal. Make sure it can reach where you want to place the converter. Don't forget some slack!
- ▶ Strip and solder the positive lead to one of the panels' positive terminal.

### Step 4: Solder the Buck Converter to the Leads:-

- ▶ Locate the positive and negative terminals on the buck converter.
- ▶ Solder the positive lead to the converter's positive terminal and the negative lead to its negative terminal. Now you should have a working solar charger!
- ▶ Time to check that it's working.
- ▶ First, make sure the buck converter is connected properly and working by shining some light on the panels. Its LED should light up.
- ▶ The LED is on. Looks like it's working.
- ▶ Next, test your charger by placing it outside in direct sunlight and plugging in your phone or USB device. Your device should start charging.
- ▶ It's outputting 460 mA (about 0.5 A) at 5V. That's about 2.5W, or half the rate of a standard 5W phone charger. (During real-world use it regularly got up to 3W.)

- ▶ According to our solar charging calculator, it will take about 5.7 peak sun hours to fully charge my iPhone XR.
- ▶ Definitely not the fastest solar charger, but it'll top off my battery in a pinch

#### Step 5: Glue the Charger to the Fabric:-

- ▶ Grab your glue and the strip of fabric you cut back in Step 1. Glue the panels and buck converter to the fabric in your desired layout.
- ▶ Wait for the glue to set. Once it has, touch up any spots you missed, if needed.

#### Step 6: Install the Eyelets (Optional)

- ▶ Because I'll be using my charger while hiking and biking, I wanted to install eyelets so I can strap it to my backpack and bike. If you don't need to attach your charger to anything, you can skip this step.
- ▶ First, let's install the two eyelets at the "bottom" — the side opposite the buck converter.
- ▶ Cut a circle in the fabric using the eyelet as a guide. Feed the eyelet bottom through the hole.

#### Step 7: Test Your DIY Solar Charger

- ▶ Now that you've made your own solar-powered charger, it's time to charge something with it!
- ▶ Place it outside in direct sunlight. Plug in your phone or other USB device. Then sit back and relax as you take advantage of all that free solar energy. When you're done charging, fold the charger shut for easy storage.
- ▶ This charger doesn't have a built-in battery. Adding a battery makes a homemade solar phone charger more complex.
- ▶ You can easily pair your charger with your battery pack of choice (I use the Anker PowerCore 10000). Charge your battery pack during the day, then use it to charge your phone or USB device at night.

### VIII. BENEFITS/ADVANTAGES

Solar power battery chargers offer several benefits and advantages over traditional battery chargers that rely on grid electricity or disposable batteries. Here are some of the main advantages:

1. **Cost savings:** One of the most significant advantages of solar power battery chargers is that they can save you money over time. Since solar power is free and abundant, you won't have to pay for electricity from the grid to charge your batteries. This can add up to significant savings, especially if you use your battery charger frequently.
2. **Portability:** Solar power battery chargers are typically lightweight and portable, making them ideal for outdoor use, camping, hiking, or other off-grid activities. You can easily pack them in your backpack and use them to charge your devices while on the go.
3. **Environmentally friendly:** Solar power is a clean and renewable source of energy, which means that using a solar power battery charger is much more environmentally friendly than using traditional battery chargers that rely on non-renewable sources of energy.
4. **Reliable:** Solar power battery chargers are generally very reliable, as long as they receive enough sunlight. You won't have to worry about power outages or electricity interruptions, which can be a problem with traditional chargers.
5. **Easy to use:** Solar power battery chargers are typically very easy to use. Most models come with simple instructions, and all you have to do is plug in your device and place the charger in direct sunlight.
6. **Long-lasting:** Solar power battery chargers can last for many years with proper maintenance, and they don't require any expensive replacement parts or frequent repairs.
7. **Overall,** solar power battery chargers are a great investment for anyone who wants to save money, be environmentally friendly, and have a reliable and portable source of power for their devices.

### REFERENCES

#### Hardware references:

1. Arlo Ultra & Pro 3 Solar Panel Charger - This is a solar power battery charger designed specifically for Arlo security cameras. It is weather-resistant and can be used to charge the batteries for the Arlo Ultra and Pro 3 cameras.
2. Anker PowerPort Solar Charger - This is a solar power battery charger that can be used to charge a variety of devices, including smartphones, tablets, and cameras. It has two USB ports and can charge up to two devices at once.



3. RAVPower Solar Charger - This is another solar power battery charger that can be used to charge a variety of devices. It has three USB ports and can charge up to three devices at once. It is also waterproof and dustproof, making it ideal for outdoor use.
4. Goal Zero Nomad 7 Plus Solar Panel Charger - This is a compact and portable solar power battery charger that can be used to charge USB and 12V devices. It has a built-in LED light and can be used to charge a variety of devices, including smartphones, cameras, and portable power banks.
5. Nekteck Solar Charger - This is a high-capacity solar power battery charger that can be used to charge multiple devices at once. It has four USB ports and can charge up to four devices at once. It is also waterproof and dustproof, making it ideal for outdoor use.





**INNO**  **SPACE**  
SJIF Scientific Journal Impact Factor  
**Impact Factor: 8.379**



**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
**INDIA**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 **9940 572 462**  **6381 907 438**  **ijircce@gmail.com**



[www.ijircce.com](http://www.ijircce.com)

Scan to save the contact details