



Faculty of engineering

# Solar Power Bank

Physics applications project

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## Section: 6

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## Task Sheet

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## Motivation

Our objective is not only to provide an alternative power source for electronics in a situation where normal electric power supply is unreachable, but to also ensure that the backup source is environmentally friendly.

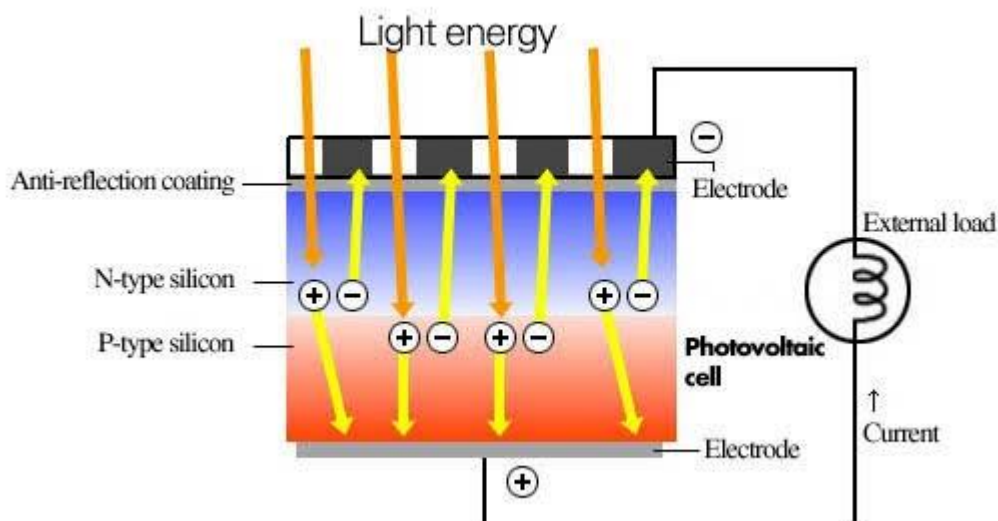
Hence, the introduction of “Power Banks”, solar-powered ones specifically, as they provide a clean, eco-friendly source of energy and less wastes along with a pure DC current good for the battery life. Solar power banks can be either stationary or portable, with the latter being the focus of our project, since portable banks eliminate the problem of unavailability of outlets and allow the user to move around while charging their phone with an unlimited power supply.

Anyone can benefit from solar power banks, from students using their phones for studying to construction engineers, travelers and hikers spending their whole day outdoors. (1)

## Background

A solar power bank is an energy-storing device that collects and stores the energy of the sun and uses that energy to power and charge electronic gadgets. It contains a **Solar panel** placed on the surface of the bank body to be in direct contact with sunlight. A solar panel is created by combining photovoltaic cells made out of a semiconducting material (silicone being the most commonly used. When the sun shines over the cells, an electric field is created, thus converting sunlight hitting it into electricity. Power produced would then be transmitted to the bank's **rechargeable battery** through a **step-up booster USB**. Both The battery and step-up booster are Lithium Ion (Li-ion) (They could be Lithium Polymer (LiPo), but Li-ion ones are cheaper). When an electronic device is then connected to one of the USB ports present on the **power bank board**, power then flows from the battery to the device. In other words, the device is being charged. (2) (3)

**A photovoltaic cell generates electricity when irradiated by sunlight.**



## Key features

There are some features to be considered when using a solar power bank:

1. **Efficiency:** The more efficient the photovoltaic solar panel, the more energy output it will have per amount of light energy hitting the cell. Most solar panels provide an energy efficiency rating between 11 and 15 percent, which is the percentage of solar energy that is being converted into useable electricity. Solar power efficiency depends on a variety of factors including insolation, temperature, shading and orientation, and advances in technology will inevitably increase efficiency. (4)
2. **Charging Duration:** In general, it takes about 25-30 hours in ideal conditions to fully charge the power bank via solar energy and with a full charge, it can charge most cell phones about 12 or more times. However, there are different factors that determine the charging duration of a solar power bank, of which are: The capacity of the solar power bank, weather conditions and the brand or model being used. (5)
3. **Charging Capacity:** Most portable solar power banks can't be used for high-power and output less power than stationary ones, which is understandable because its portability is a good enough compensation and the user would still adequately charge one or more of the devices full. (2)

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## References

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