

# SUSTAINABLE CAPSTONE PROJECTS ( SCAP ) SPRING 2023-2024

## Sustainable tiny house design and construction(Electricity)

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### INTRODUCTION

Electricity is a fundamental form of energy that powers our modern world. This project aims to explore the concept of electricity - how it is generated, distributed, and utilized in our daily lives .

The primary focus of the project will be on examining the various sources of electricity, including traditional fossil fuels as well as renewable energy technologies such as solar, wind, and hydropower. We will investigate the advantages, challenges, and environmental impacts associated with each energy source . Additionally, the project will delve into the infrastructure and technologies involved in the transmission and distribution of electricity through the power grid.

This will include an analysis of energy efficiency, conservation, and the role of emerging smart grid technologies . By understanding the concept of electricity, the project participants will gain insights into the critical role of this form of energy in our society and the importance of developing sustainable and efficient solutions to meet our growing energy demands .

The ultimate goal of this project is to enhance our knowledge and awareness of electricity, and to explore ways in which we can contribute to a more sustainable energy future

### MATERIALS USED IN CONSTRUCTION

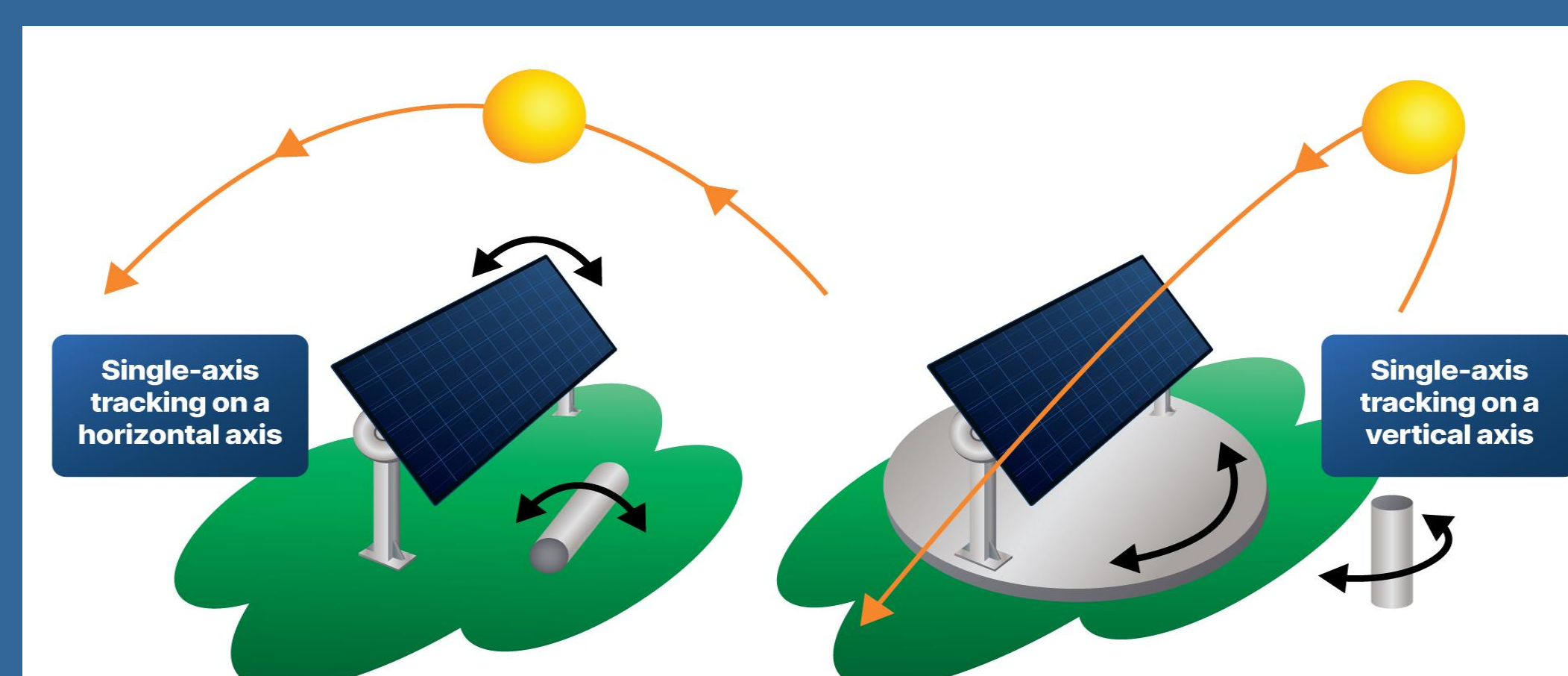
#### Re-Used/Recycled Materials:

- Power supply wires
- drying clothes rack
- LEDs
- resistors
- fans
- wood tiles
- screws
- fans control switches
- switches
- an unknown type of electric joint connector

#### Other Materials:

- solar panel
- controller of the solar panel
- battery 12v 7.2Ah

#### Future design of the solar panel stand



### FINAL PRODUCT

There are two parts to distributing the electricity using the solar panel, first, it's adjusting the solar panel to the right angle to get maximum efficiency. Next is powering the house using the controller in an ordered manner.

The system has a wire distributor that connects every electric part to the load on the connector.

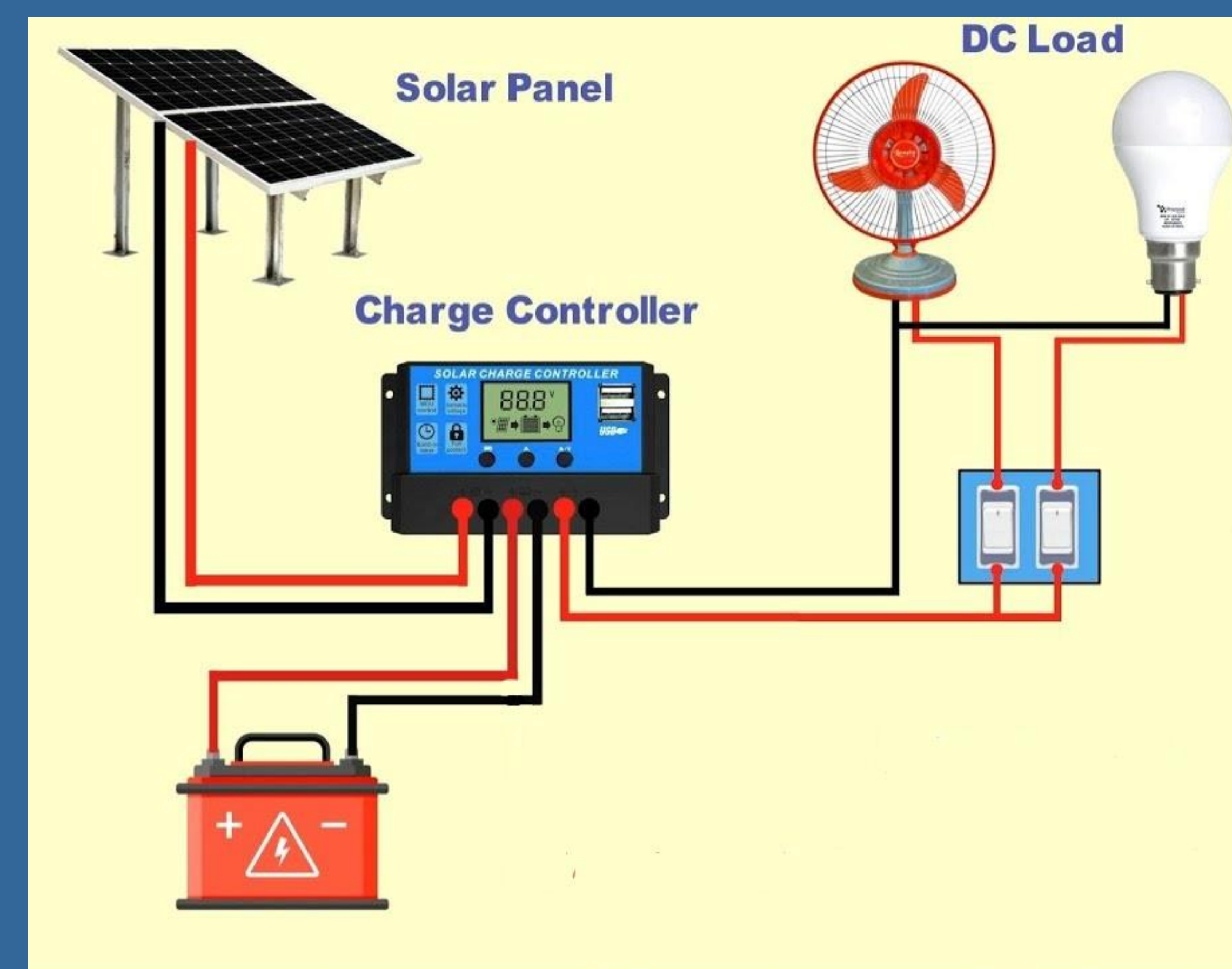
The light is made of a simple circuit, using only LEDs and resistors, and controlled by a switch to power off and on. The fans are separated in two pairs or sets, one as an intake and the other as an outtake, the system allows you to switch them on separately or in pairs if needed.

### RESULTS AND DISCUSSION

The system has a huge space for improvement. The solar panel stand can be developed so it can adjust its angel to 270, also adding a rotating base to add more axis to the stand. You can go further and add motors and automate them to track the Sunlight. The system currently can only power DC devices, so adding an inverter, which allow you to power AC devices, is a jump for the system.

A controller is also a great addition to the house, for example, you can install a mechanism that detects whether someone got in the house which by default powers on the system automatically, A thermistor can added, which can measure temperature, so it can control the fans and the heating system ....etc. as it was mentioned before, the system has a huge space of improvement

The diagram of the current system



### CONCLUSIONS

In this project, we embarked on an exploration of electricity—a fundamental form of energy that powers our modern world. Our journey took us through various facets of this dynamic field, from its generation to distribution and utilization. Here are the key findings and insights we've gained:

#### • Diverse Energy Sources:

We delved into the rich tapestry of energy sources, ranging from traditional fossil fuels to renewable technologies like solar, wind, and hydropower. Each source has its advantages and challenges, and understanding these nuances is crucial for informed decision-making.

#### • The Role of Electricity in Society:

By comprehending the concept of electricity, we gained insights into its critical role in our daily lives. From powering homes and industries to fueling technological advancements, electricity is the lifeblood of our interconnected world.

#### • Challenges and Opportunities:

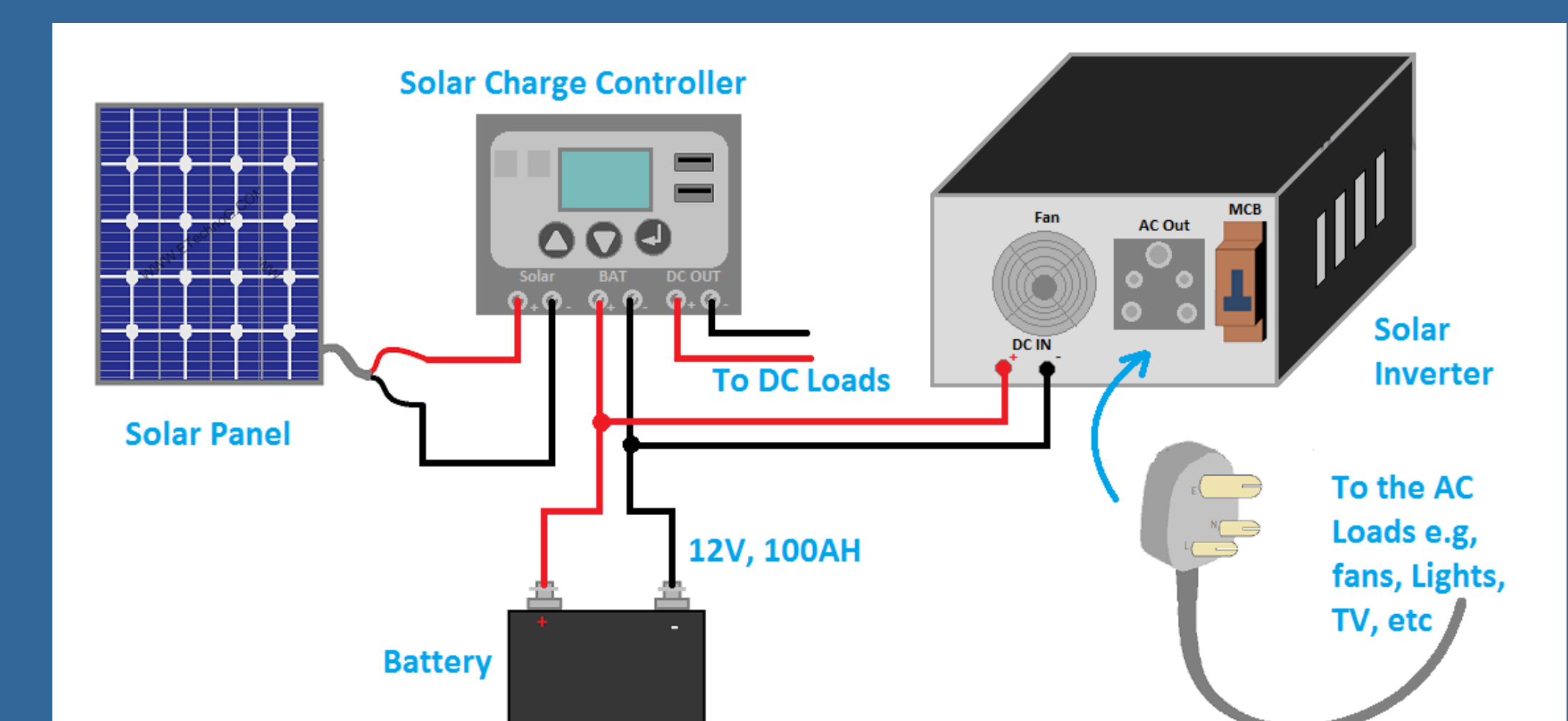
Our project encountered challenges, such as optimizing solar panel angles for maximum efficiency and addressing the limitations of DC-only devices. However, these hurdles also present exciting opportunities for improvement.

#### • Future Enhancements:

The solar panel stand can evolve further—adjusting angles dynamically and even tracking sunlight using automated motors. Adding an inverter would expand the system's capabilities to power AC devices. Additionally, a smart controller could enhance efficiency by responding to occupancy or temperature changes.

In joining the SCAP program and working on this project, we've deepened our understanding of electricity and its significance. Our commitment to sustainable energy solutions remains unwavering, and we look forward to contributing to a brighter, more efficient future.

Remember, innovation thrives in the gaps where improvement awaits. Let's continue refining our system, exploring novel ideas, and embracing the boundless potential of electricity.



Future diagram