# Portable Power Generator

Project

Power has become essential to every aspect of life. Sometimes the comfort of power being is not easily accessible. A portable power generation system can resolve the accessibility issue. This was our teams design challenge.

Objectives:
- Power system can take input from two energy sources
- Power system will have both AC and DC power outputs
- Test power conversion circuits and confirm outputs

System Diagram
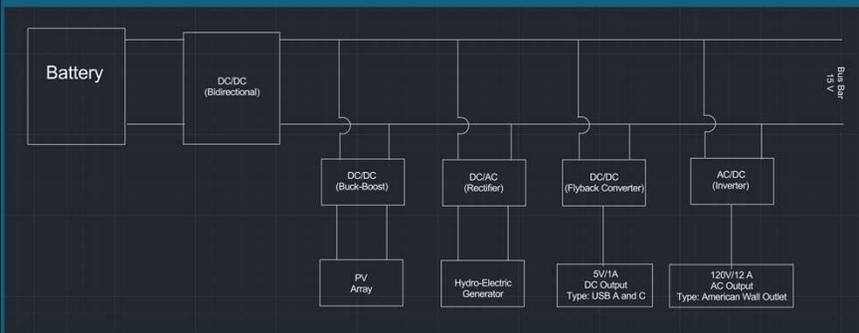
Methods

Input Power Sources

Solar Panels. The system uses monocrystalline solar panels designed to produce 12V DC and 9.6W of power.

Hydro-Electric Turbine. The hydro turbine outputs 24VAC at peak speed and generates 10W of power.

Battery Management

Battery. The system uses a lithium iron phosphate battery supplying 12.8V at 100Ah.

Battery Charge Monitoring. A microcontroller monitors battery voltage and controls an LED display to show charge status.

Battery Charge/Discharge Control. A bidirectional buck-boost converter manages battery charge and discharge control.

Methods Power Converters

Input

Bidirectional Buck-Boost Converter. The converter controls battery charge/discharge, maintaining 15V/100A output and protecting charging at 12.8V/50A max by monitoring voltage and current.

DC/DC Buck-Boost Converter. The buck-boost converter regulates solar input, ensuring a steady 15V output despite sunlight variation.

Output

DC/DC Flyback Converter. The Flyback converter steps down bus voltage to 5V for USB output, maintaining low current to protect devices.

AC/DC Inverter. The inverter converts bus voltage to 120V AC at up to 10A, enabling use of small AC devices.

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