

Team 6

Expandable Computer Power Storage System

Team Members:

I-Ting Wang
Alan Everdeen
Siyang Liang
Danny MacBeth



MSU: Resource Center for Persons with Disabilities



Overview

- Background
- Project Specifications
- Design Solution
- Budget
- Project Management Plan
- Summary
- Questions



Background

- Existing book program within RCPD
- Sponsor's Involvement with Asian Aid
- State of existing power grid in Bobbili



Project Specifications

- Acceptable battery life
- Battery life display
- Expandability
- Components should be easily obtainable in India
- System independence
- User safety



Design Goal

- Provide a stable power storage system to provide energy to the laptops in India
- The design should power a computer lab of ten laptops for five hours
- The system should be expandable to meet different energy needs in the future

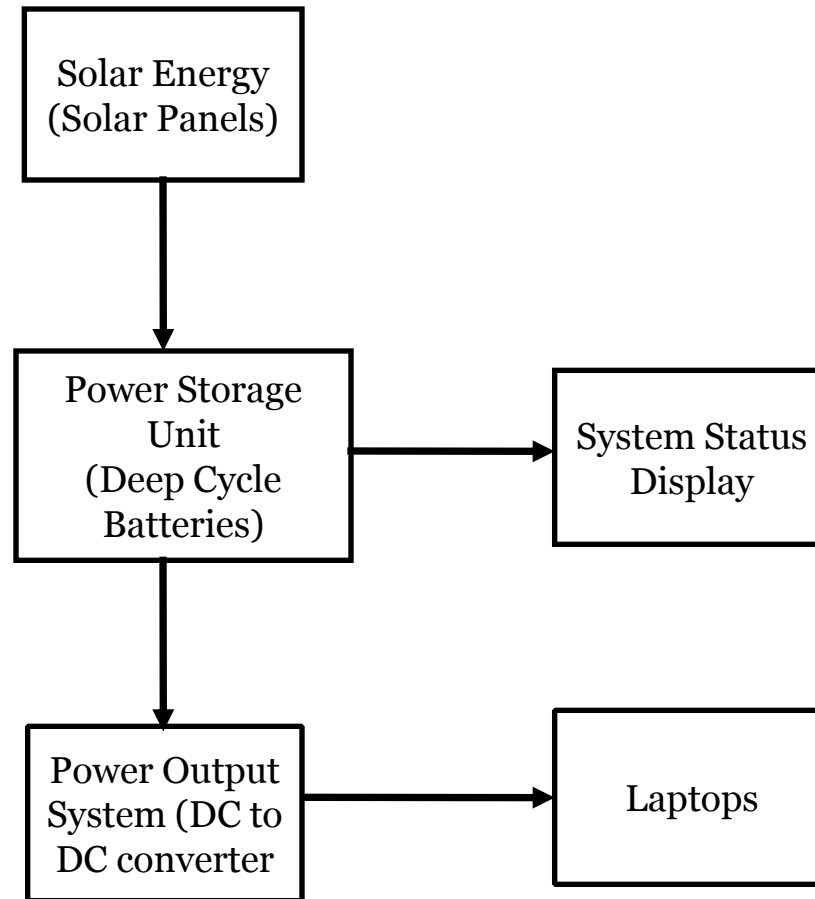


System Components

- Solar panels that provide free electrical energy
- Solar energy storage unit
- Customized DC to DC converter from the power supply to the laptops
- System monitor and information display controlled by a microcontroller



Block Diagram & Design Concept



Charging Circuit Design



- Two 120 Watt 12 Volt solar panels connected in parallel
- Maximum Power Voltage 17V
- Maximum Power Current 7A
- Solar panels are not a stable voltage source



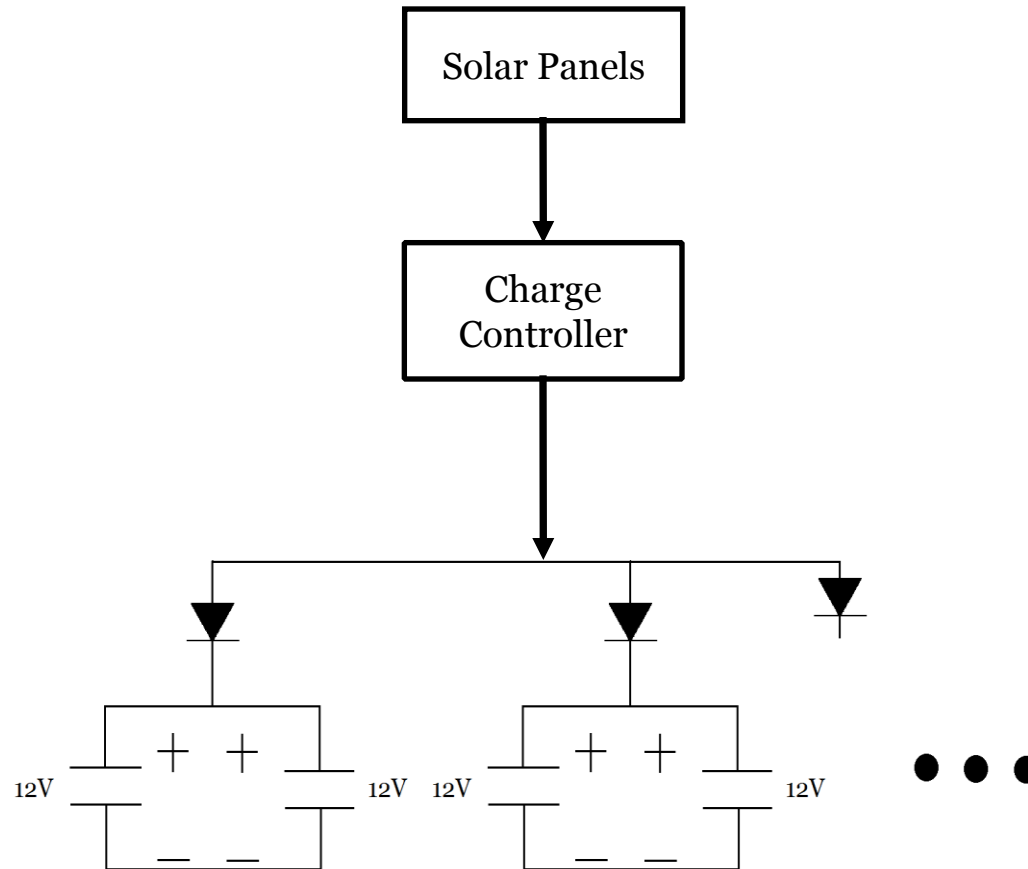
- MPPT(maximum power point tracking) charge controller for 12V batteries
- Sunforce 60032 30 Amp Digital Charge Controller
- Provide charging information and battery status
- Prevent overcharging the batteries



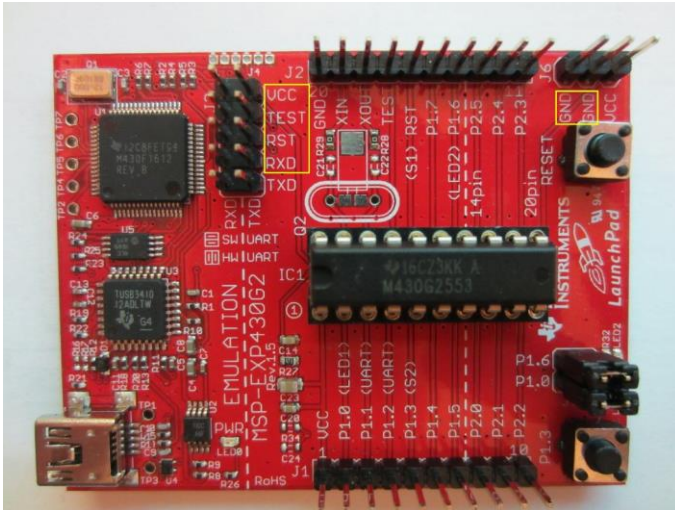
- Deep cycle batteries are rated up to 255 Ah
- $\text{Time} = A * h$
- Deep cycle batteries are designed to be charged and discharged frequently
- The standard “deep” cycle is typically 100%-20%
- Lifetimes can last up to 8 years with proper maintenance



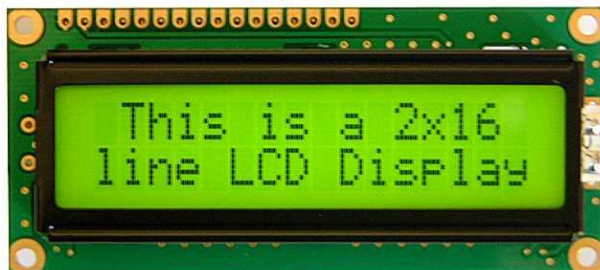
Design Diagram



Battery Monitor



- MSP430 Launchpad Microcontroller
- 16x2 character LCD display for output



Laptop Choice

- Needed to be low-power
- The sponsor is purchasing all laptops for the lab, so it also needed to be inexpensive
- Also needed to be available in India



Dell Inspiron 15

- Intel i3-3227u processor
17W TDP
- 40 Whr battery
- 1.9 Ghz
- 6 GB RAM
- Max draw is 5A at 19V



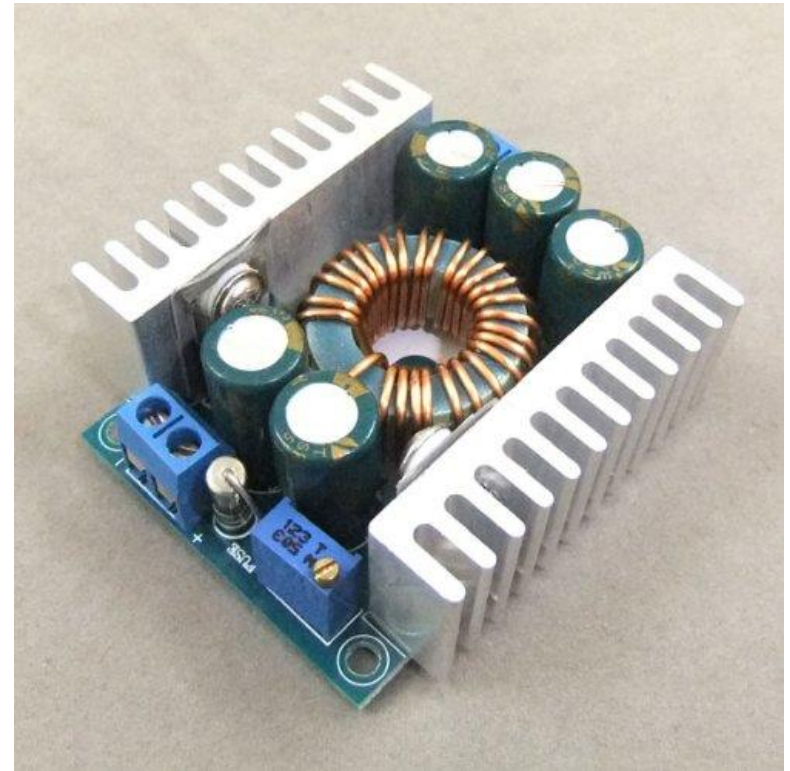
Boost Converters

Input Voltage: DC 11~35V

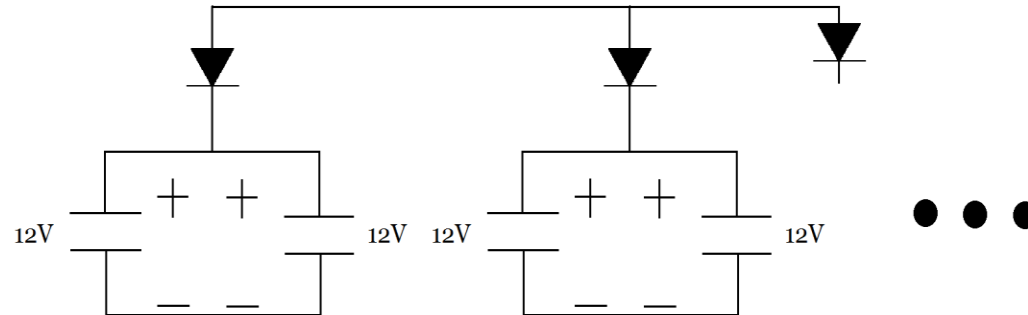
Output Voltage: DC 11~35V

Output Current: 5A(Max),
100W

Operating temperature:
-40° c to +85° c



Benefits of Parallel Connections



- Higher Amperage
- Easily Expandable
- Compatible with Solar Charging Controller

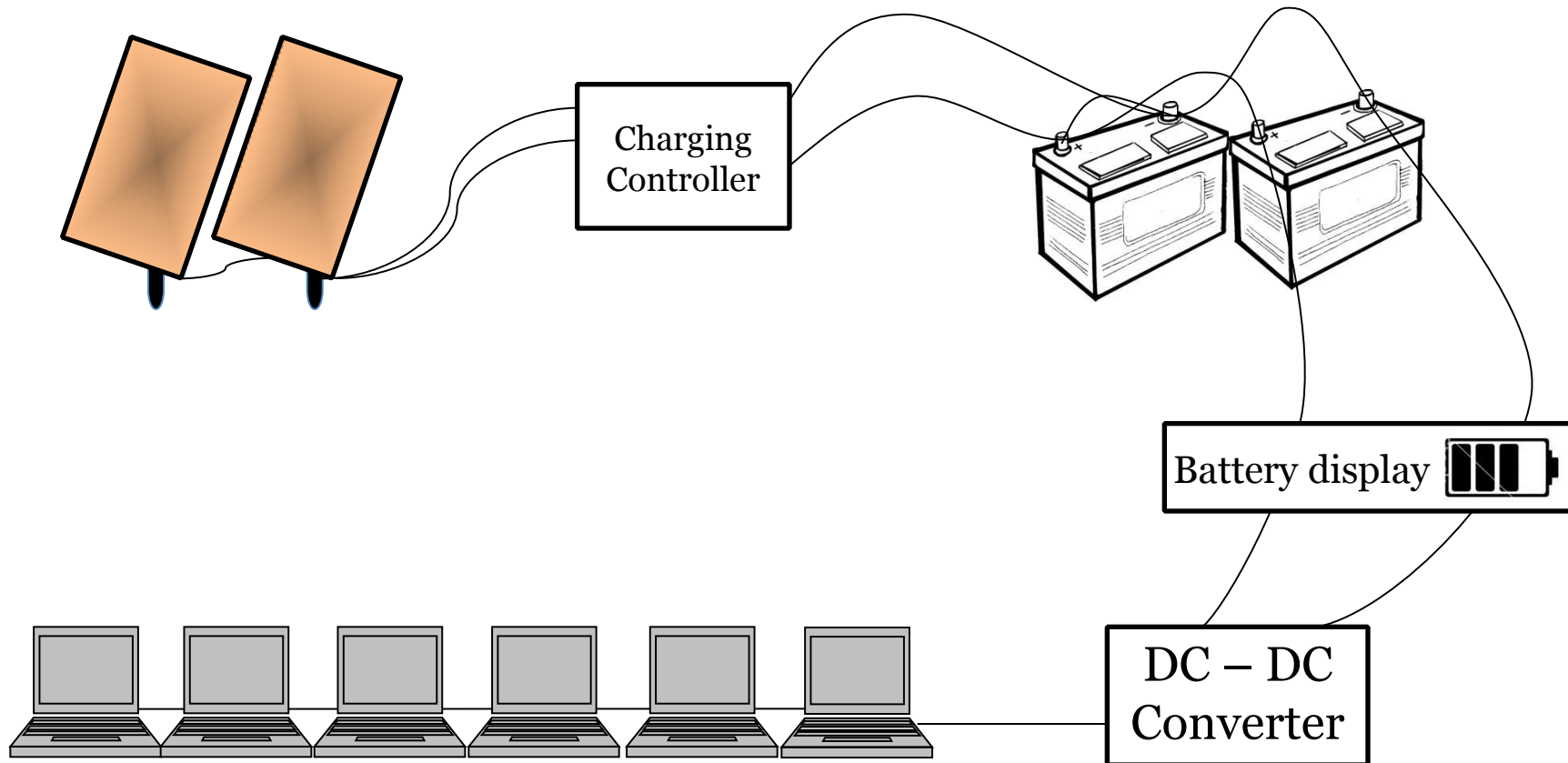


Budget

Component	Quantity	Price
Solar Panels	2	\$300 + Shipping
Charging Controller	1	\$86 + Shipping
Microcontroller + LCD Screen	1	\$25 + Shipping
DC to DC Boost Converter	4	\$44 + Shipping
Misc. Integration Components		\$50
Deep Cycle Batteries	2	\$200
		Total Price \$



Design Proposal



Questions?

