Team 6

Expandable Computer Power Storage System

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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

Solar Energy (Solar Panels) -> Power Storage Unit (Deep Cycle Batteries) -> Power Output System (DC to DC converter) -> System Status Display -> Laptops
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

• 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

Solar Panels

Charge Controller

12V 12V 12V
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

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<tr>
<th>Component</th>
<th>Quantity</th>
<th>Price</th>
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<td>Solar Panels</td>
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<td>Charging Controller</td>
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Design Proposal

Charging Controller

Battery display

DC – DC Converter
Questions?