Efficient Solar Power Network (ESPN)

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Group 10
Senior Design 1
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Project Narrative/Goals:

We have an interest in creating an environmentally friendly system that will save money on electricity and maximize the cost return on investment for solar panels. The goal of our project is to create a photovoltaic system with maximum power point tracking (MPPT). We hope to realize this through designing a low cost charge controller that will monitor current, voltage, and temperature, and will incorporate an LCD screen with several system status indicators. The overall system will consist of a solar panel, MPPT charge controller, battery, and an inverter to supply an AC signal for the end user.

Specifications:

Output should provide approximately 800-1000 watts to power a small appliance

Solar Panel

- Rated Power: 110 W
- Rated Voltage: 16.7 V
- Rated Current: 7.18 A
- V_{oc}: 21 V
- Isc: 8 A
- 57 x 25.5 in
- 26 lbs
- SunWize Single Crystalline Solar Cell Panels

Microcontroller

- AVR ATmega328

Display

- 2.8 in Color LCD

Battery

- 12V 120Ah Deep Cycle Lead Acid

Inverter

- 1,500 Watt Power Inverter
- 3 AC Outlets
- 5V USB Outlet

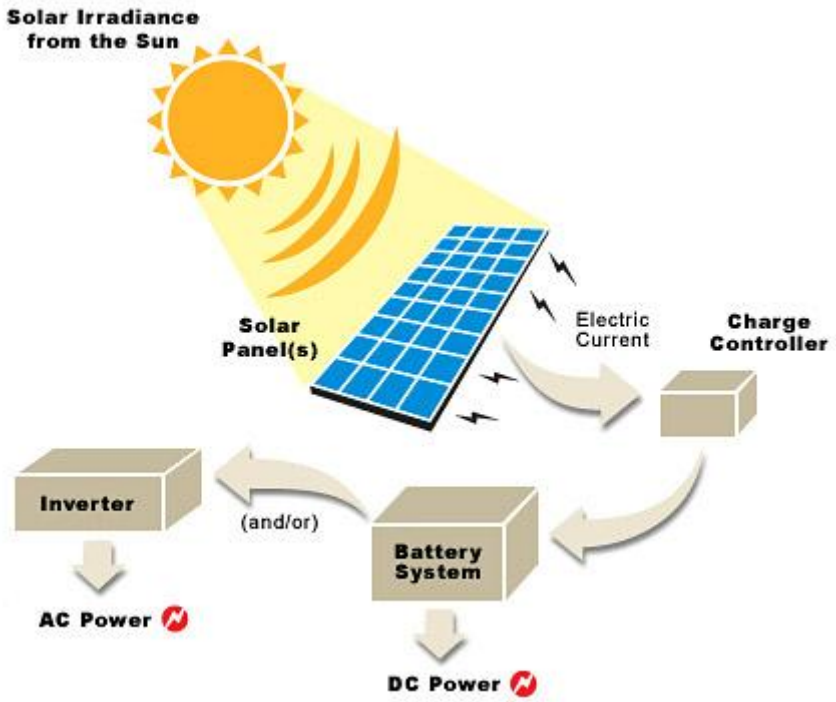
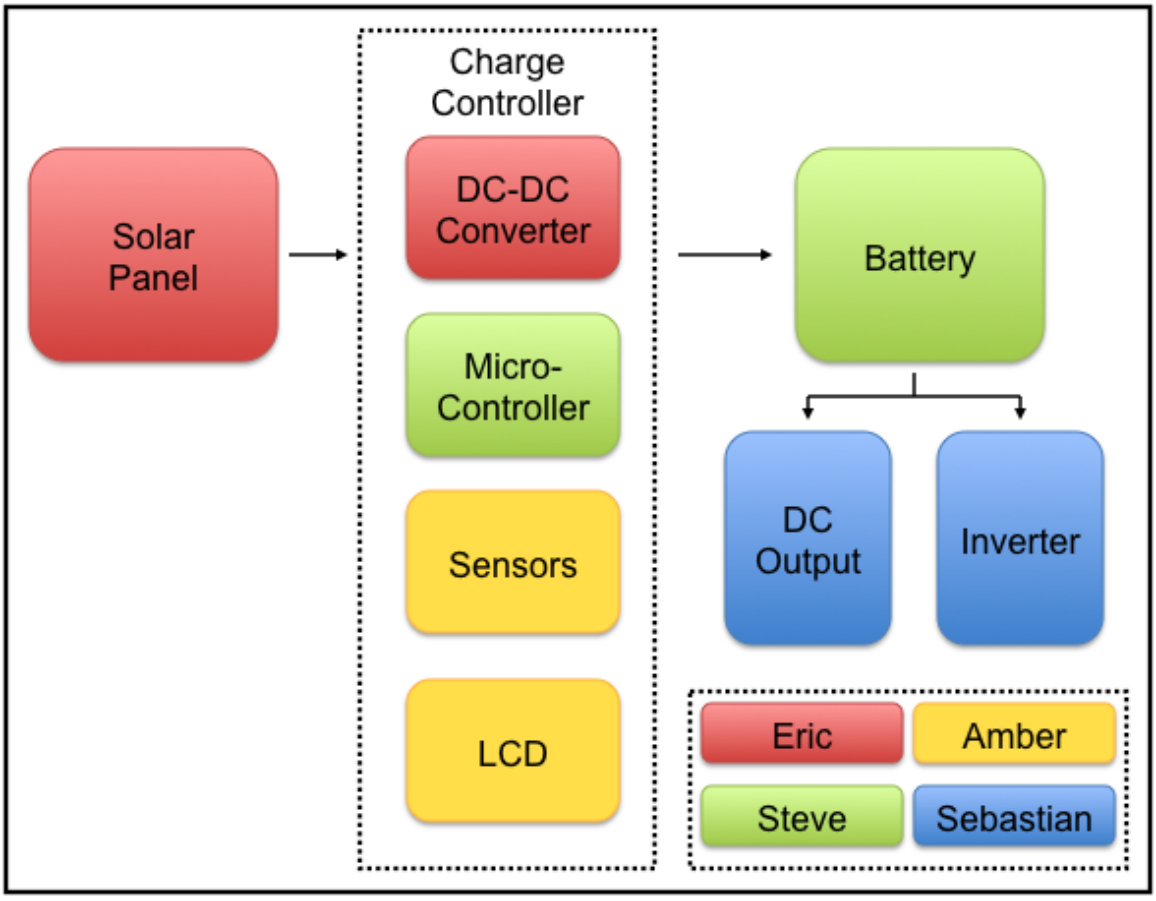


Image Source: http://www.alternative-energy-news.info/images/technical/solar-power.jpg



Parts Breakdown	Cost per part	Number of parts	Total Cost	Website
Solar Panels				
SunWize SW120, 120 Watts 12V Solar Panel	$382.89	2	$765.78	http://www.spheralsolar.com/products/SunWize--Solar-Panels-%28110-Watt%29.html
Charge Controller				
Printed Circuit Board (Student Special)	$33	1	33	http://www.4pcb.com/index.php?load=content&page_id=134
2.8" TFT Color LCD 240 x 320 pixel	$40	1	$40	http://adafruit.com/products/335
LM335 Precision Temperature Sensor	$0.81	5	$4.05	http://www.taydaelectronics.com/servlet/the-126/IC--dsh-40C-100C-335/Detail
Battery				
Trojan 12V 120Ah Deep Cycle Lead Acid	$190	2	$380	http://www.batteriesinaflash.com/deep-cycle-lead-acid/12v/trojan-30xhs-12v-130ah-group-30-flooded-deep-cycle-battery
Inverter/Outputs				
Scobra CPI 1575	$189.95	1	$189.95	https://www.cobra.com/detail/cpi-1575-1-500-watt-power-inverter.cfm
Heavy-Duty AC Power Inverter Cable Kit	$25.49	1	$25.49	http://www.amazon.com/Cobra-CPI-A4000BC-4-AWG-Heavy-Duty-Inverter/dp/B001550DVU/ref=pd_bxgy_e_img_b
Fuse Holder	$6.95	3	$20.85	http://www.amazon.com/Scosche-EWFH-Single-Fuse-Holder/dp/B000KIR8M0/ref=pd_bxgy_auto_img_b
150 Amp ANL Fuses	$7.06	3	$21.18	http://www.amazon.com/Raptor-RANL1502-Fuses-Gold-Plated/dp/B0002EXJIO/ref=pd_bxgy_e_img_c
AnyVolt Micro Buck-Boost Converter	$20	1	$20	http://www.dimensionengineering.com/AnyVoltMicro.htm
Microcontroller				
ATmega328 with Arduino Bootloader	$5.50	1	$5.50	http://www.sparkfun.com/products/10524
Arduino Uno SMD (ATmega328)	$30	1	$30	http://www.sparkfun.com/products/10356
Arduino Mega (ATmega2560)	$60	1	$60	http://www.sparkfun.com/products/9949
		Total:	**1595.8**	

Project Milestones/Projected Timeline

Senior Design 1	
27-Sep	Initial Project Report Due
30-Sep	Apply for Workforce Central Florida Funding
7-Oct	Meet with Dr. Richie
20-Oct	Meet with Mentor
27-Oct	Finalize Products to use
10-Nov	75% Done with Paper
18-Nov	Meet with Mentor
29-Nov	Final Paper is done

Senior Design 2	
20-Jan	All Parts Ordered
10-Feb	CDR
Feb-29	Order PCB
2-Mar	Meet with Mentor
5-10 -Mar	Spring Break (SCUBA Trip)
6-Apr	Done Building/Start Testing
27-Apr	Final Presentation