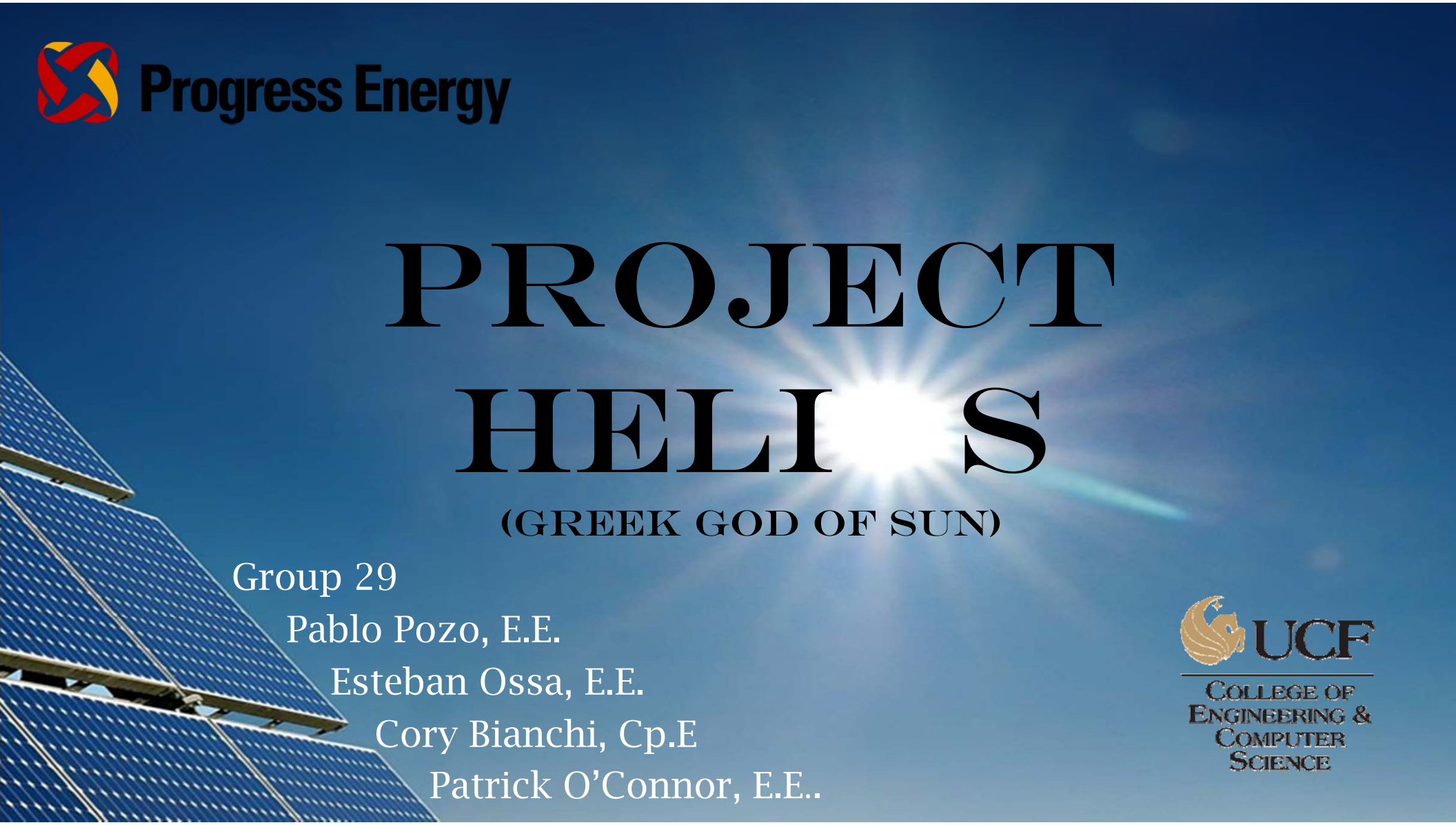

Progress Energy
PROJECT
HELI S
(GREEK GOD OF SUN)
Group 29
Pablo Pozo, E.E.
Esteban Ossa, E.E.
Cory Bianchi, Cp.E
Patrick O'Connor, E.E..
UCF
College of Engineering & Computer Science

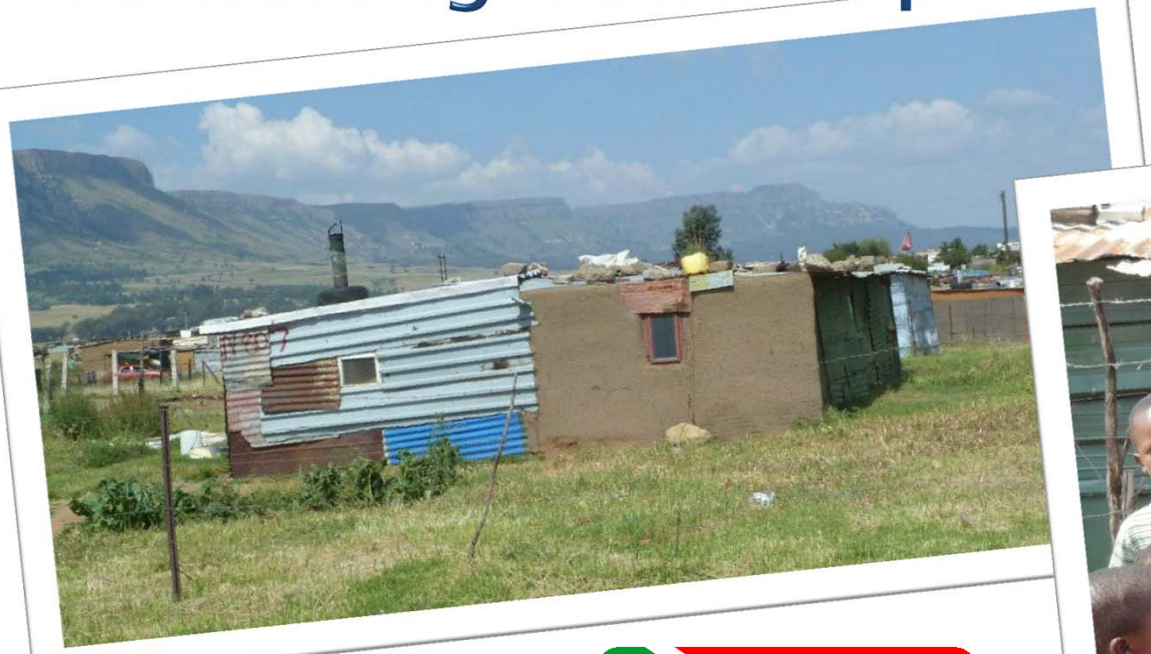
Speaker: Cory Bianchi

Motivation

- To acquire international engineering experience
- To design a solar power system
- To experience new cultures and explore new international horizons
- To promote the use of new, clean, and sustainable energy sources for humanitarian efforts

Speaker: Cory Bianchi

Pomolong Township



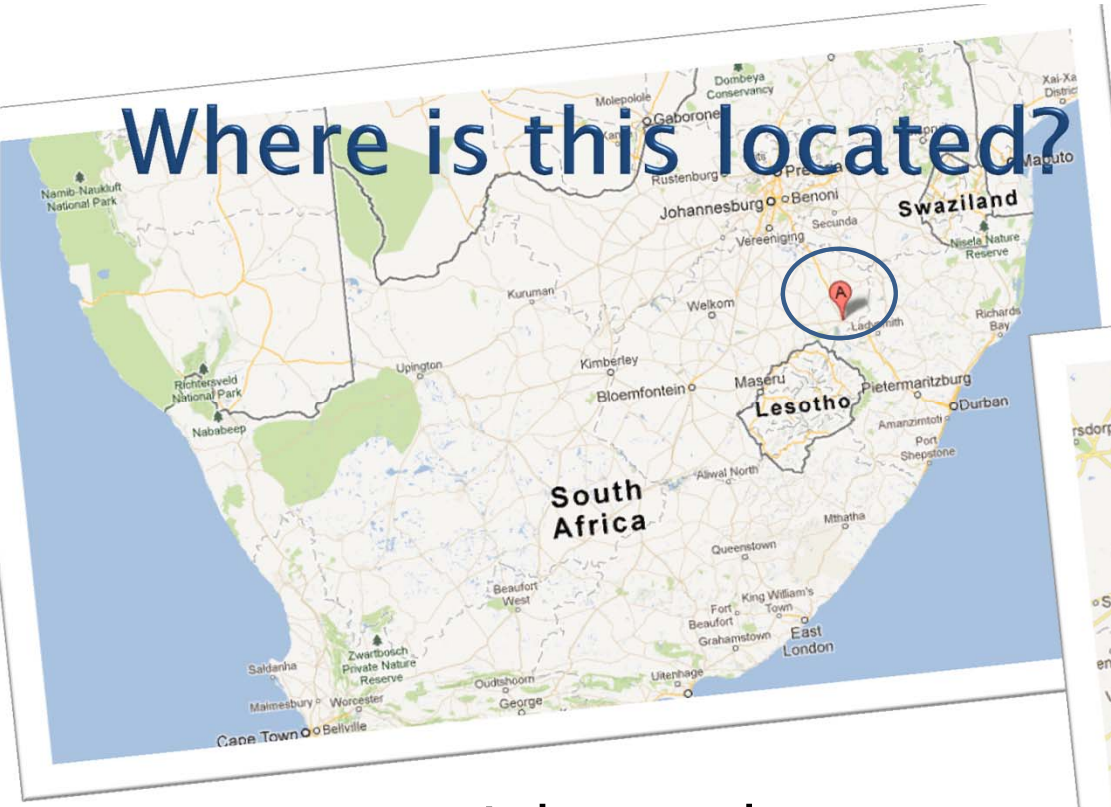
Speaker: Cory Bianchi

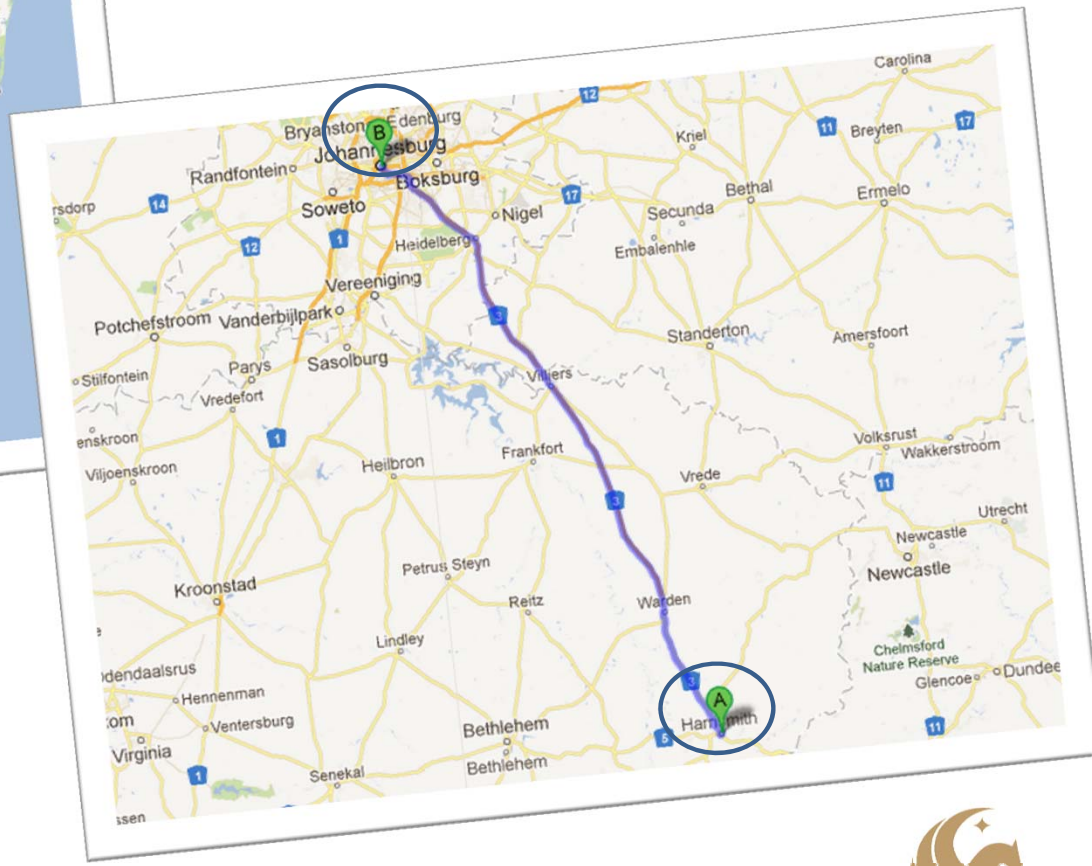
South Africa Demographics

- Rural population: 38% (2010)
- Population: 48,600,000
- Internet users: 4.4 million (2009)
- Life Expectancy: 50 years
- Unemployment rate age 15-24: 48.2% (2009)
- Literacy: 86.4% (4 out of 5)
- Population Growth Rate: -0.412%
- Poverty Rate: 50% (2000)
- HIV/AIDS: 17.8% (2009) (1 out of 5)

Where is this located?

Speaker: Cory Bianchi





- Johannesburg to Harrismith
  - Approx. 2.5 hrs
  - Approx.150 miles

Speaker: Cory Bianchi

Goals & Objectives

- To generate, store, and distribute power
- Self-sustaining reliable system
- To improve the quality of life of the Pomolong Township
- To deliver AC power

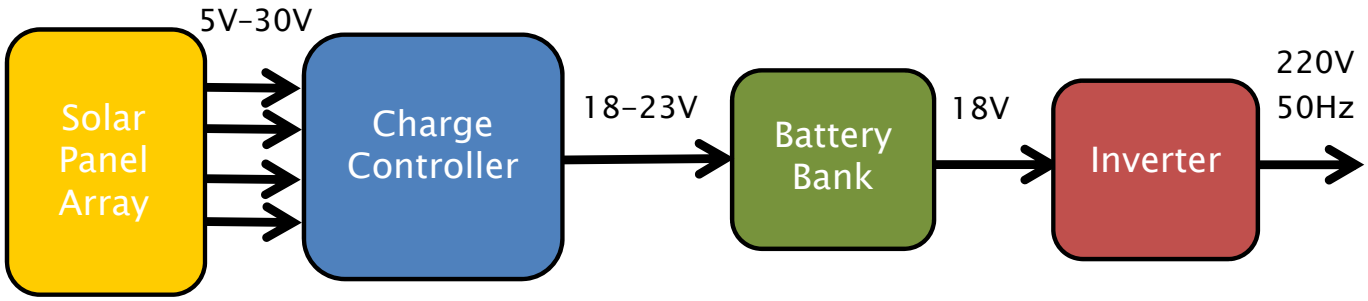
Speaker: Patrick O'Connor

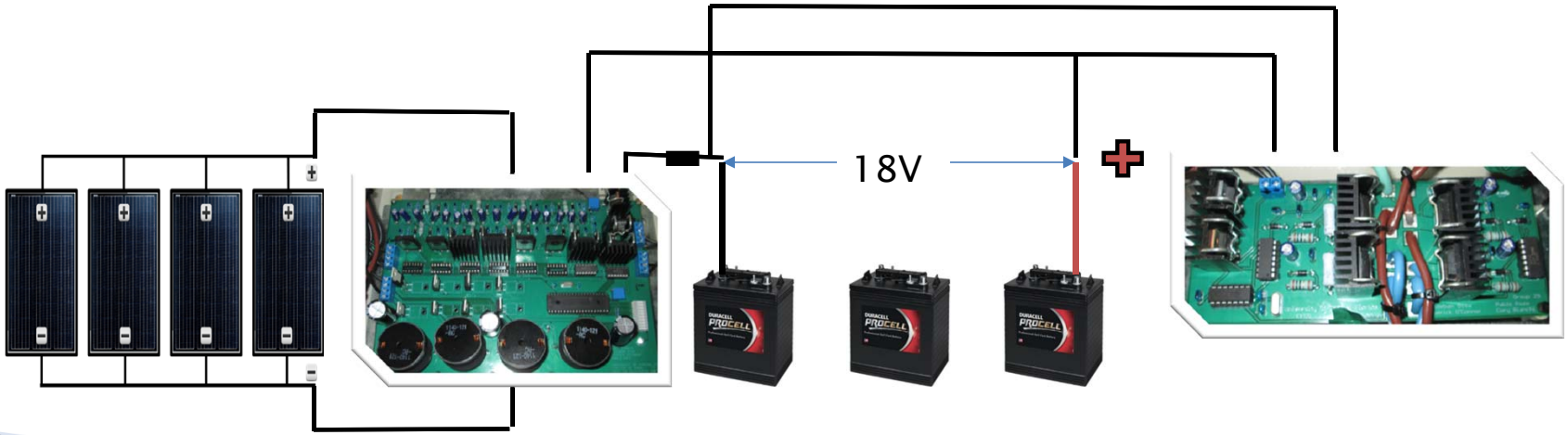
System Specifications and Requirements

- Produce 1000W
- Input up to 30V and up to 32A
- Output 220V at 50Hz
- 7.5 hours at 10A without charging
- Work at temperatures from 0 – 125°F

Speaker: Patrick O'Connor

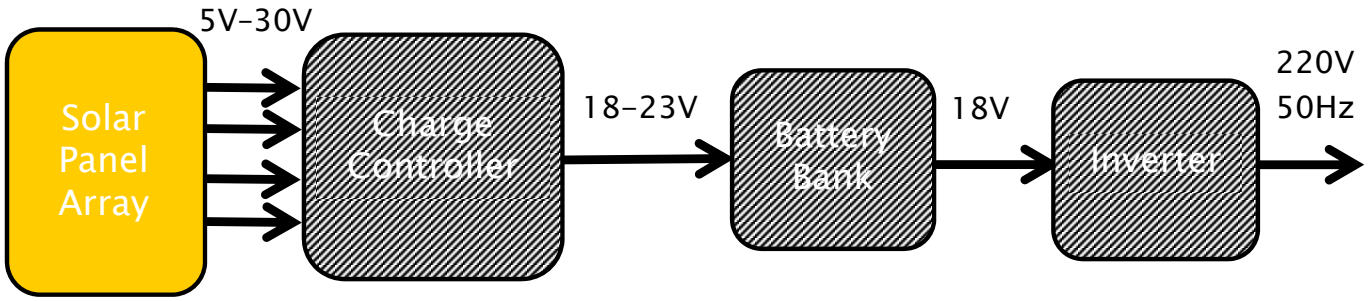
General Block Diagram

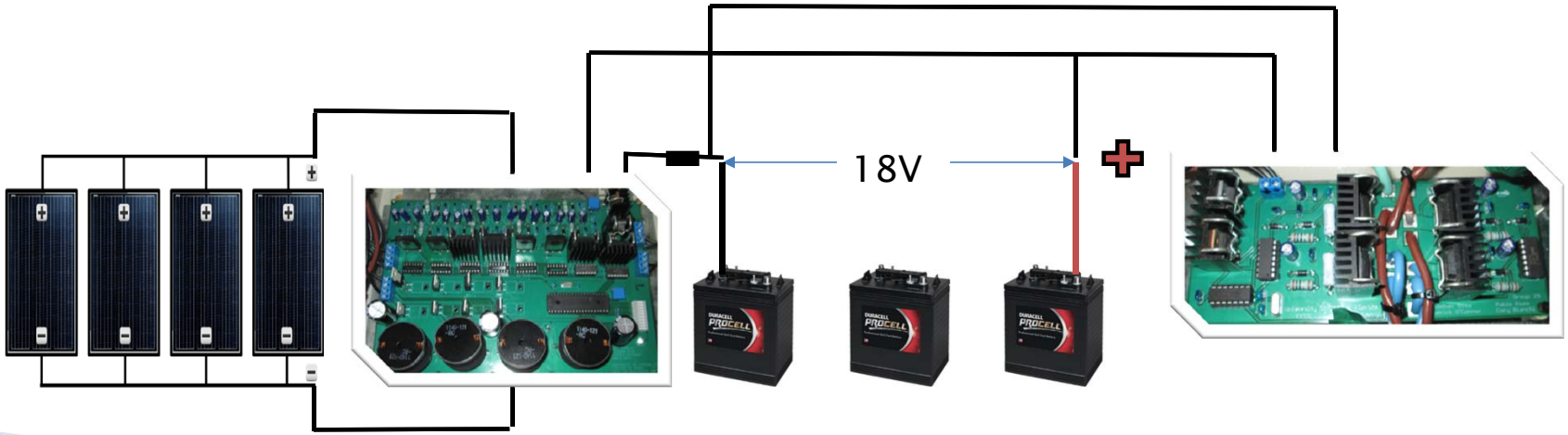




Speaker: Patrick O'Connor

General Block Diagram

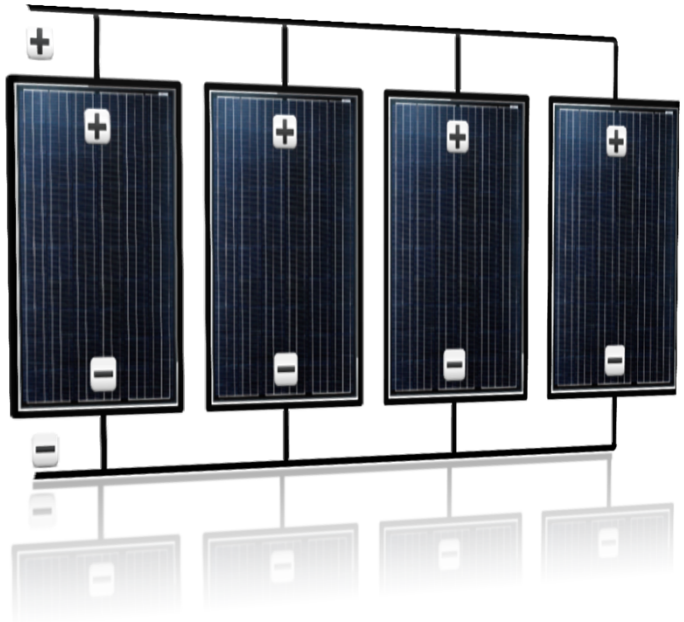




Speaker: Patrick O'Connor

Solar Panel

- 4 Solar Panels in parallel



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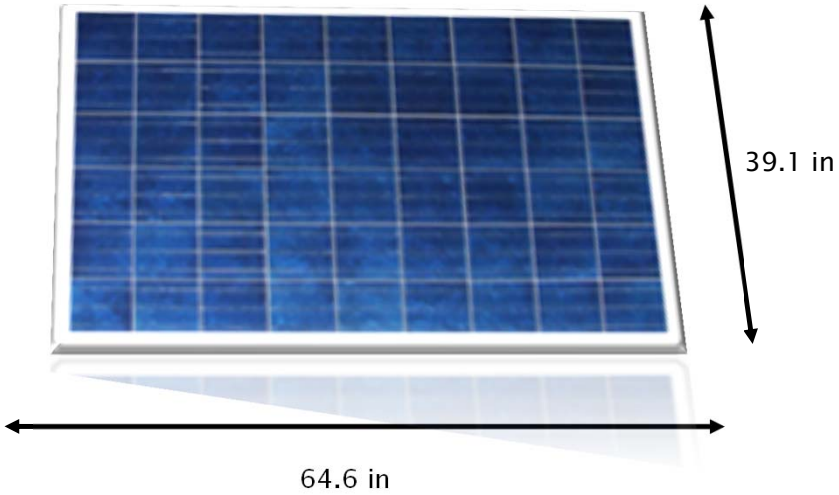
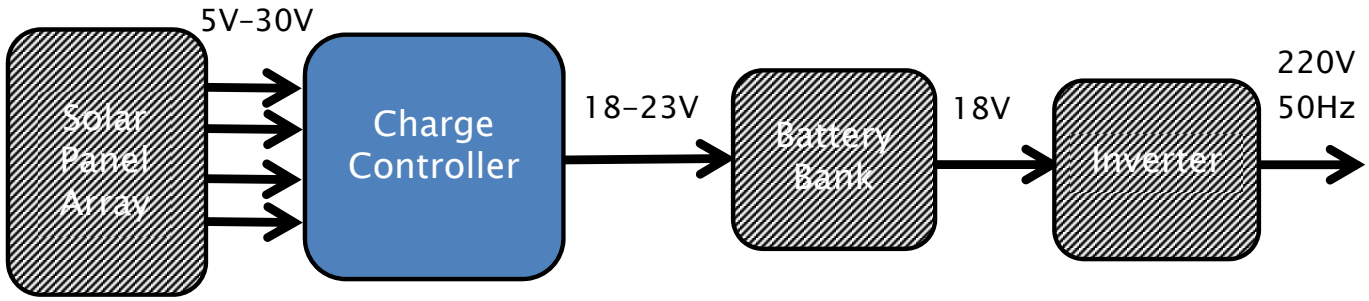
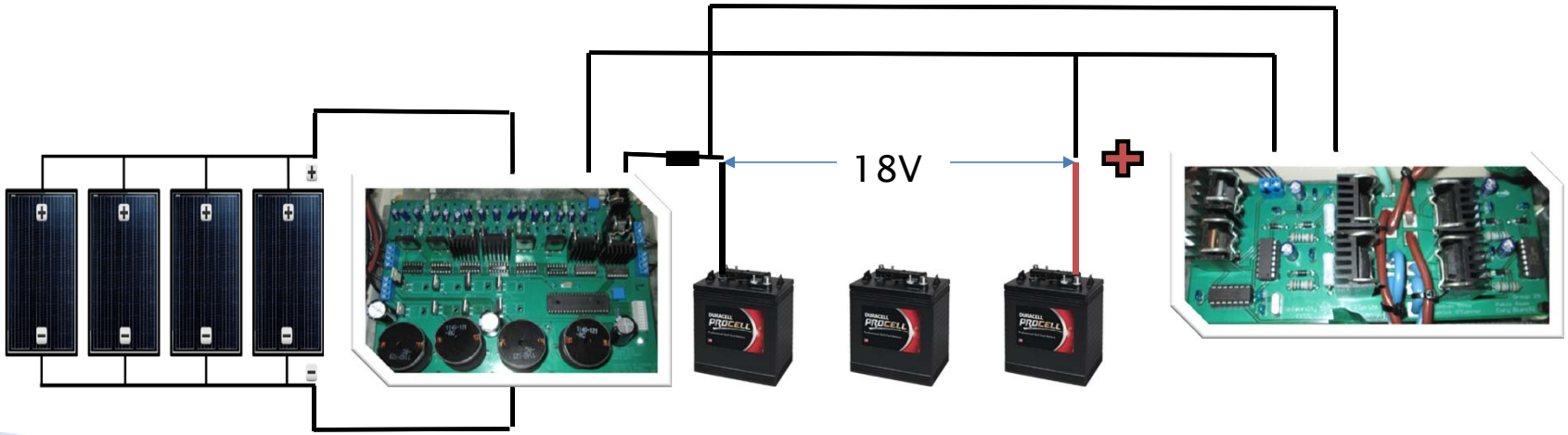


Speaker: Patrick O'Connor

General Block Diagram

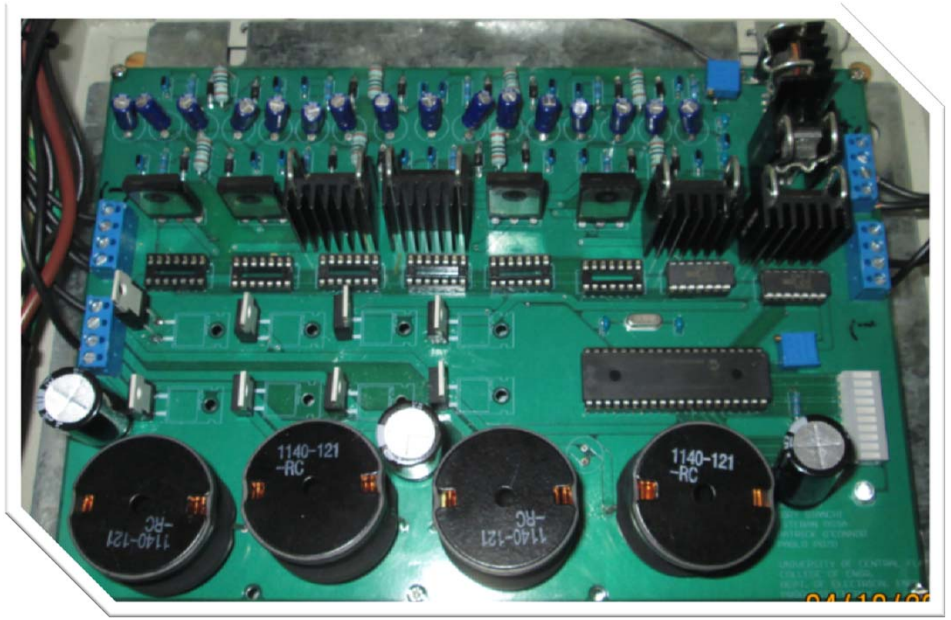




Speaker: Patrick O'Connor

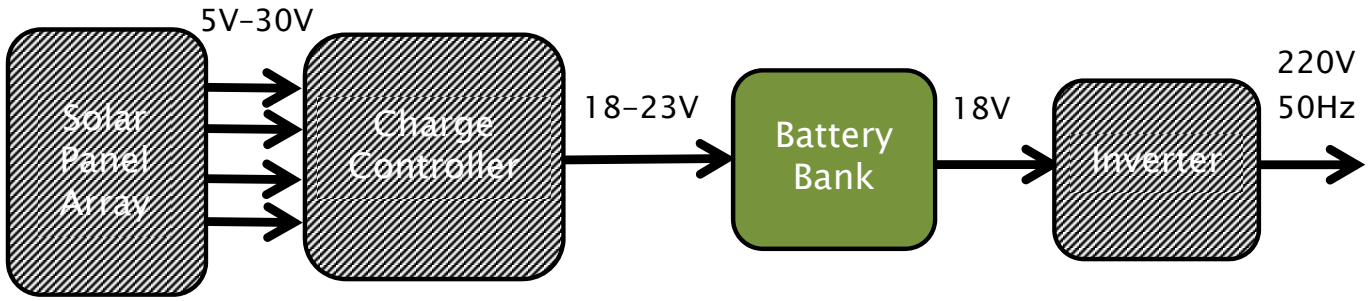
Charge Controller

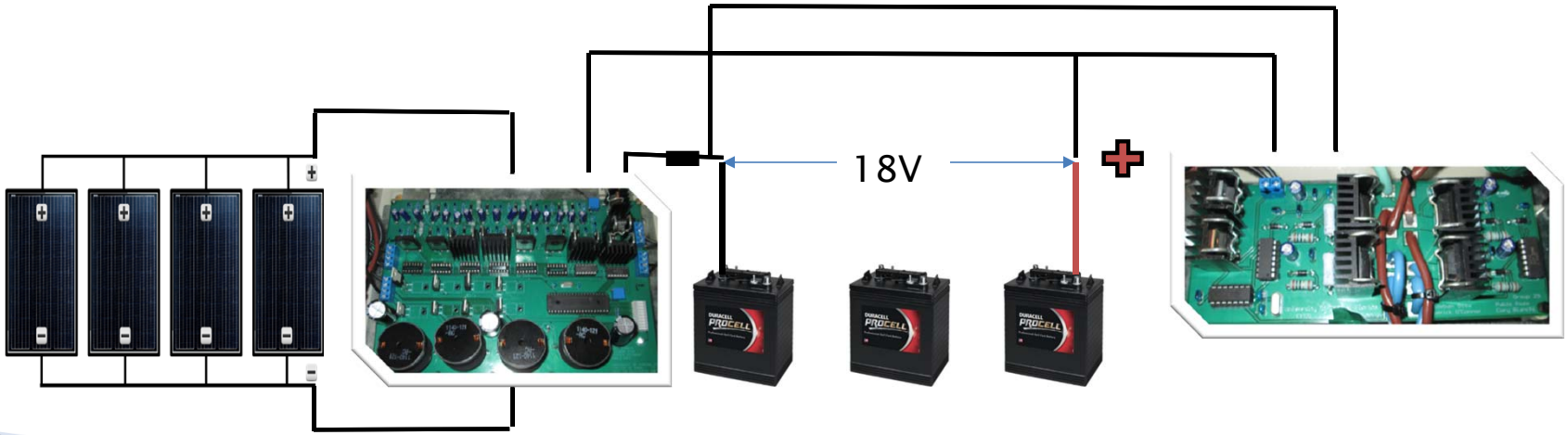
- Specifications & Requirements
  - 5-30V input
  - Max 32A input
  - Constant output 20V
- Functionality
  - Manages the power from the solar panel, and stores energy to the battery bank



Speaker: Esteban Ossa

General Block Diagram





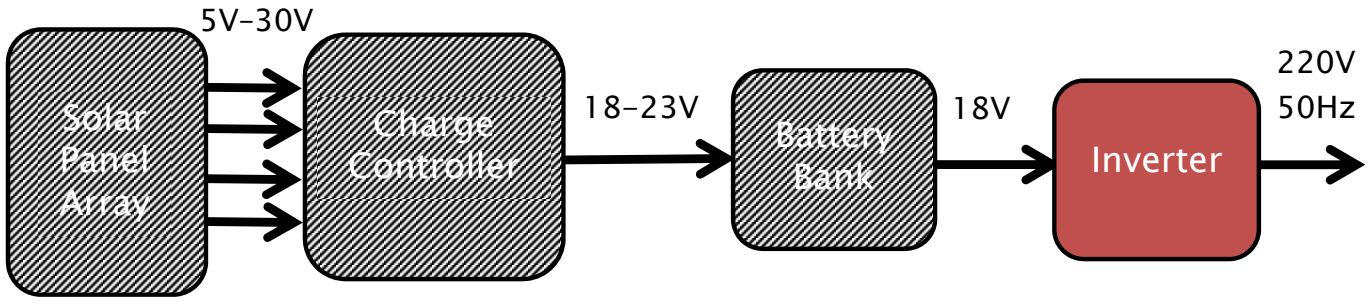
Speaker: Esteban Ossa

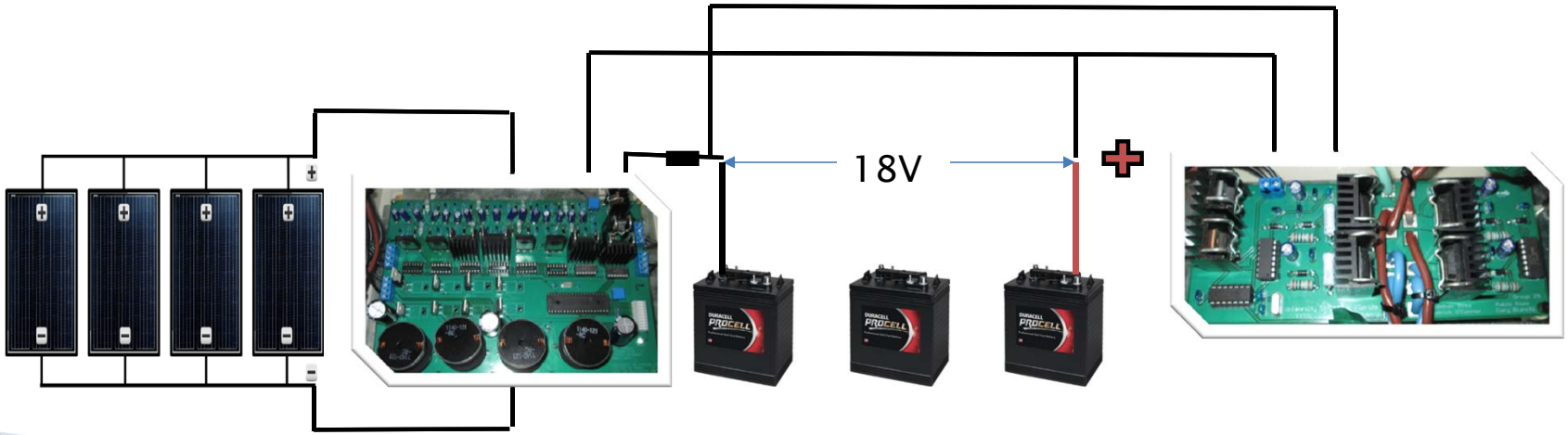
Battery Bank

- Specifications
  - Three 6V batteries to be able to store 1000W
  - Lead Acid and Deep Cycle batteries
- Functionality
  - Storages DC energy produced by the panels for later use

Speaker: Esteban Ossa

General Block Diagram

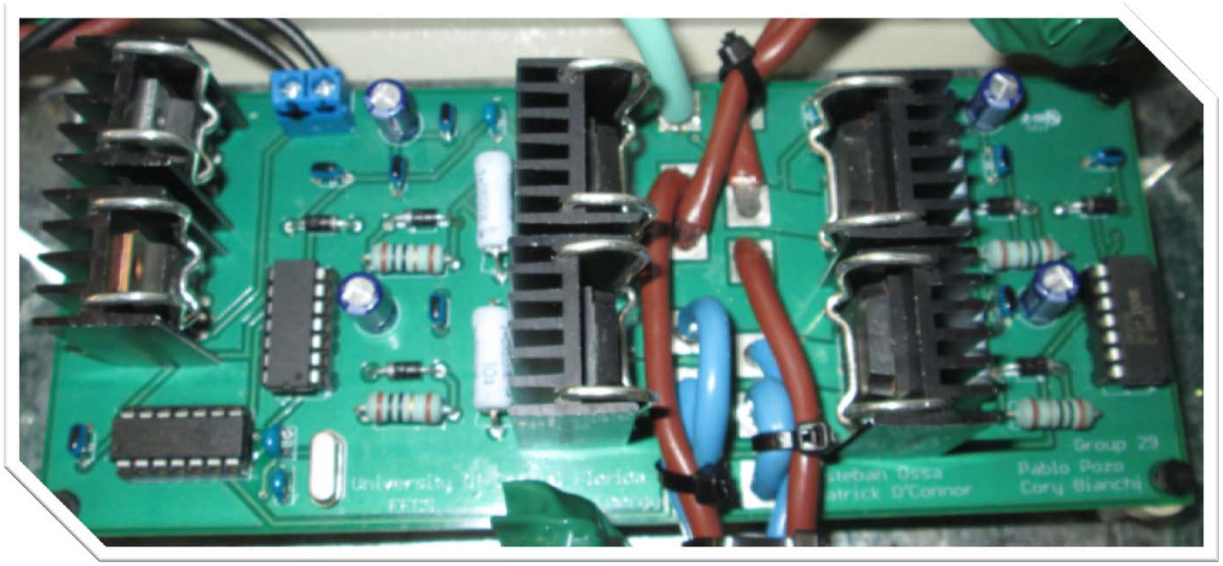




Speaker: Esteban Ossa

Inverter

- Specification & Requirements
  - Input voltage 18VDC
  - Pure sine wave output
  - Output 220VAC at 50Hz
  - Deliver 1000W
- Functionality
  - Converts DC power (stored) to AC power (usable) for distribution



Speaker: Esteban Ossa

Challenges

- Technical
  - Driving the gate of the DC-DC converter
  - Creating a high power LC filter
  - Installing system abroad
- Administrative
  - Getting funding to travel to South Africa
  - Collaboration with the other groups and the Honors College

Speaker: Esteban Ossa

Inverter Efficiency

- Voltage Input: 18.36V
- Current Input: 6.5A
- Power Input: 119.34W

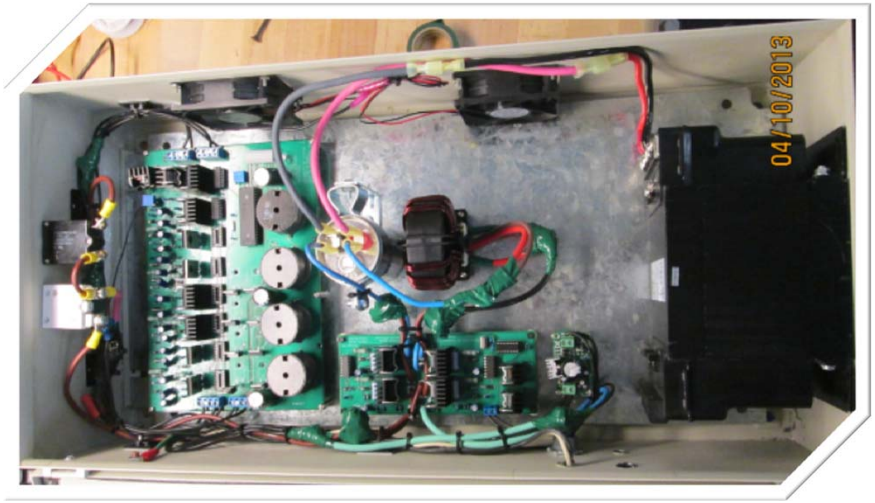
- Voltage Output: 223.2V
- Current Output: 0.406A
- Power Output: 90.62W

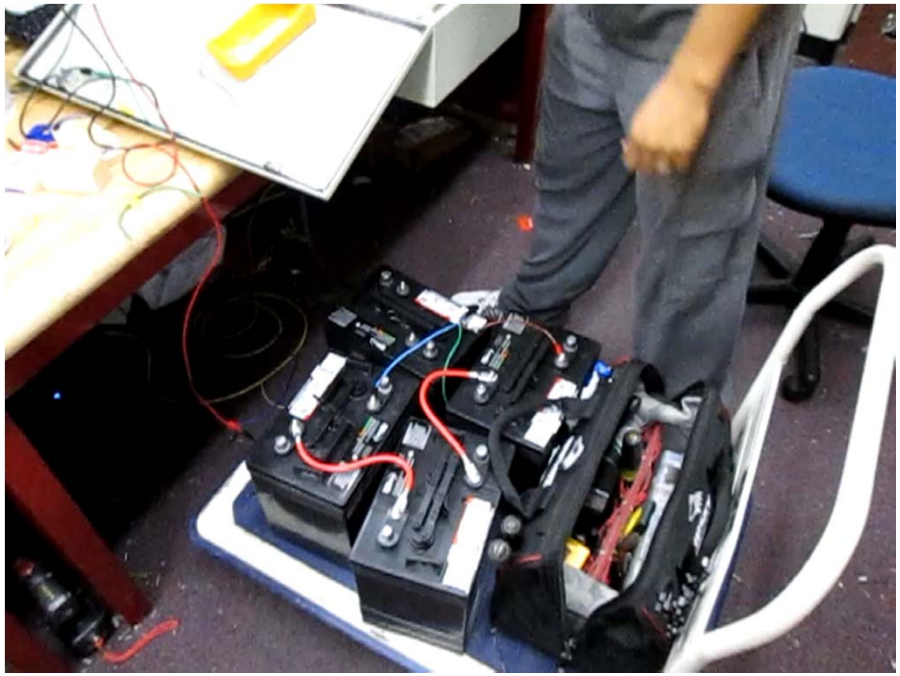
- **76% Efficiency** (efficiency range of 50% to 97%)

Speaker: Esteban Ossa

Testing & Results

- System Efficiency
  - The System Efficiency is 76%
- Battery Life
  - The Battery life time is 7.5 hours





Speaker: Pablo Pozo

Community Impact & Applications

- Extension of night time activities
  - Movies
  - Music
- Communication expansion
  - Television
  - Radio
- Education
  - Internet Access

Speaker: Pablo Pozo

Scaling and Uses

- Case 1
  - 1 Projector, 1 computer, 1light bulb for a period of 2.5 hours
- Case 2
  - 5 Cellphone chargers, 2 computers, 1 light bulb for a period of 2.5 hours

Speaker: Pablo Pozo

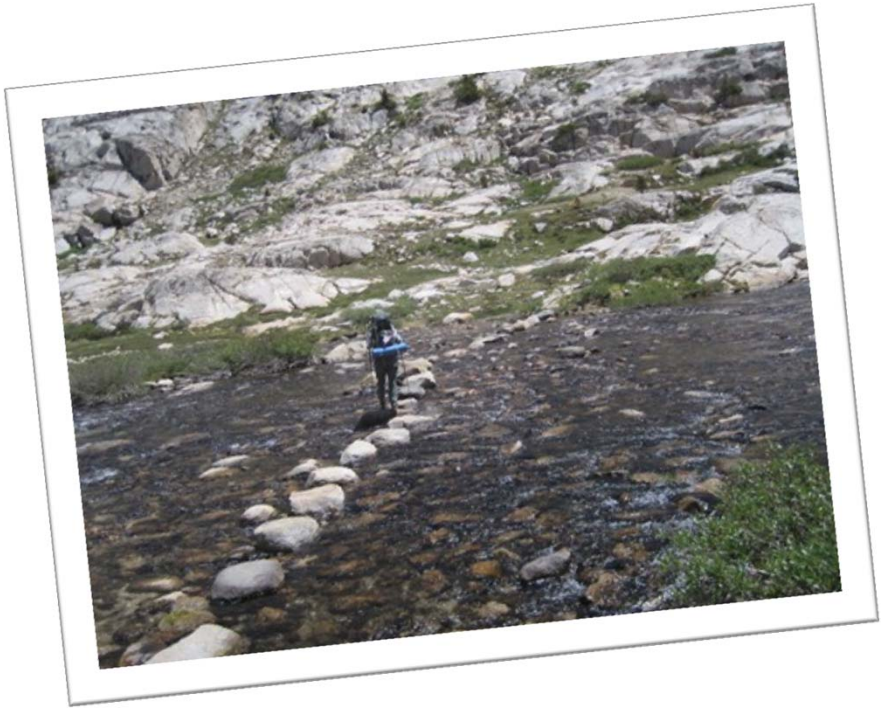
Cost Breakdown

ITEM	COST
SOLAR PANELS	$733.20
CHARGE CONTROLLER	$200.00
BATTERIES	$370.59
INVERTER	$860.00
MISCELLANEOUS	$356.71
TOTAL COST	$2,536.71

Speaker: Pablo Pozo

Stepping Stone

- This project will potentially open the doors for continuity on new projects dedicated to humanitarian work in South Africa or other parts of the world.



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Special Thanks:

- Dr. Richie
- CECS & EECS
- Mike Tullbane
- Honors College