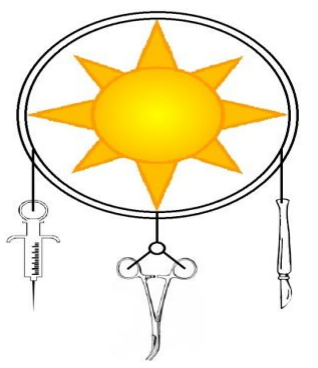


SOLARIZER

Michael Brandt, Michael Green, Shelby Pearce, Liana Soileau

Faculty Advisor: Dr. Mitra, Department of Biomedical Engineering, Florida Institute of Technology



Problem Statement

In developing countries and following natural disasters, there is a need for a portable solar powered autoclave to properly sterilize surgical equipment because there is often no access to electricity or natural gas. Without proper sterilization of surgical equipment, infectious diseases may spread throughout a population.

Product Benefits

- Self-powered with use of solar power
- Durable and portable components
- Straightforward and easy to operate after basic training
- Safety features to prevent injury to user and device

Design Overview

Part	Reason Chosen
All-American 1925X Sterilizer	Durable Aluminum, Machinable
2 x 1kWh Lithium Ion Chevy Volt Battery	Light Weight, Rechargeable, Large Capacity
120-Watt Powerenz Solar Panel	Light Weight, Foldable
Genasun MPPT Boost Charge Controller	Light Weight, Custom-made for Product
24 V 600 Watt DC Submersible Heating Element	Low Power Consumption, No Need for AC/DC Converter
DC/DC Step Down Converter	Ensures 600 Watts to Element at All Times

Safety Features

Safety Element	Protects Against
40 Amp Fuse	Overcurrent
Flyback Diode	Residual Current Backflow from Element
Genasun Charge Controller	Current Backflow, Battery Overcharge
Mineral Wool Wrap	Burns from Contact with Autoclave
Pressure Plug	Too Much Pressure in Vessel

Figure 1. Example of typical instruments placed in autoclaves worldwide

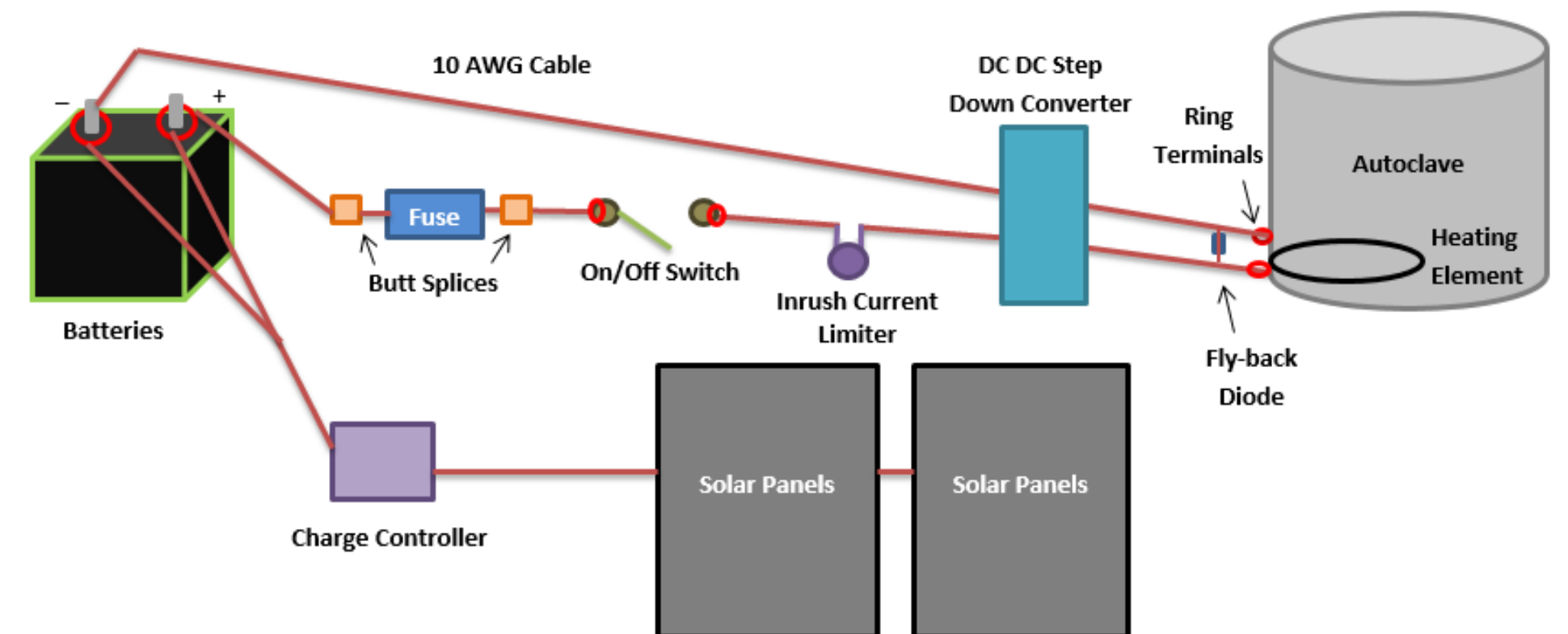


Figure 2. Final schematic of design layout

Calculations

Parameter	Result
Time to Reach 121° C	29.2 minutes
Total Sterilization Cycle Time	84.2 minutes
Battery Bank Capacity	1.83 sterilization cycles
Time to Charge Battery Bank	19.2 hours

Data and Analysis

In order to validate the autoclave, tests will be run to ensure that the device will reach the sterilization temperature of 121° Celcius for at least 35 minutes. In addition, the voltage loss in the batteries during the cycles will be tracked to create a graph of voltage loss vs. time. A graph of battery voltage vs. time while charging with the solar panel will also be created.

Future Improvements

- Use of bacteria spore strips for improved sterility testing
- Polymer insulator for improved durability over mineral wool
- Plug-in connections for easier assembly and convenience
- Additional solar panels for quicker charging times

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