

Flexible Inverter

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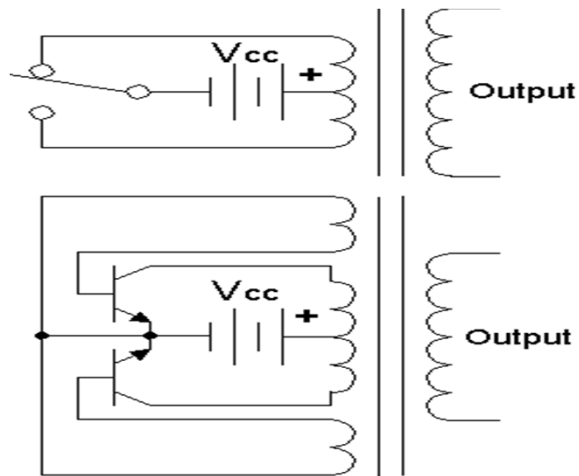
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Background

- What is an Inverter?
- What is meant by a flexible Inverter?



Background

Why flexible inverters are beneficial?

1. Cost efficient

2. Good for the environment in 2 ways:

a. Clean solar energy- More investment

b. The disposal rate will decrease

Problem Formulation

Customer needs

Affordable

expandable inverter



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Problem Formulation

Existing problem

Expensive

Very few options

Less focus on mass consumer



Problem Formulation

Our approach benefits

Offers expansion

Cost effective

Mass consumers focus

Simpler solution



Current Status of the Art

What do Flexible Inverters look like in the Market (Up to date Status)?

- Pros?
- Con?



Current Status of the Art

What are purpose of these Changes?

- Pros?
- Cons?

Would it help the market(Cost Effect)?

yes?
No?

Cost Benefit Analysis

Our Flexible Inverters

VS

Central/Commercial Flex. Inverters

Benefit Analysis

Benefits of our design over our competitors

1. Individual Optimization
 - a. Optimization for each solar panel
 - i. Shading,dirt,snow wouldn't bring entire down
2. Maximum Power Point Tracking (MPPT)
 - a. Easier to find MPPT

Benefit Analysis

- 3. Easily Expandable
 - a. No need for restringing or expensive parts

- 3. No Single Point of Failure
 - a. if one solar panel or inverter fails
 - i. The system is not affected

Benefit Analysis

5. Improved Safety

- a. No need for high voltage DC wiring
- b. Safe for both solar installer and owner

6. Silent

- a. significant less heat generation
- b. no need for active cooling

Cost Analysis

Two important factors

- ❖ Lifetime cost(\$)
- ❖ Lifetime energy production(KWh)

Cost Analysis

Lifetime cost

Our Flexible Inverters Vs. Competitors

Our inverters installation simple less time
consuming

Hence 15% installation cut

Cost Analysis

Inverter	Power (Watts)	Input Voltage	Output Voltage	Type	Average Price
Our Flex Inverter	3000	12 VDC	120 VAC	Pure sine wave	\$1,392
Competitors' Inverter	3000	12 VDC	120 VAC	Pure sine wave	\$2,223.20

Solution Approaches

Reasons for not picking this solution:

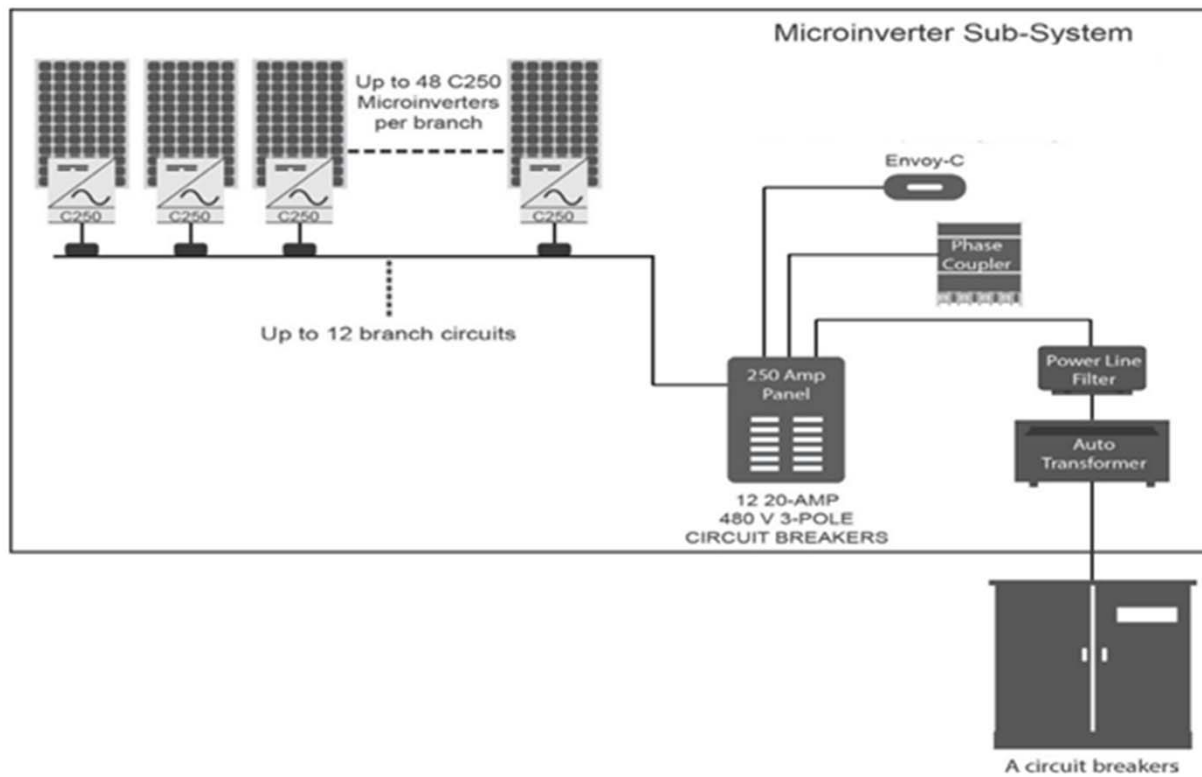
- Very complicated circuit

- Lack of resources

- Expensive

- Difficult to implement for the customer

Solution Approaches



Solution Approaches

Reasons for choosing this design:

- More convenient for the consumer

- Easier to implement

- Cost-Effective

Implementation Plan

Our implementation plan is as follows:

Order components (micro-inverter, mini-panels, etc.)

Build a prototype

Use the meters to test for current, voltage, and power

Implementation Plan

Once we make enough progress, we plan on being able to use our model to be able to power everyday items.



Progress Made This Semester

Design

- a. Flexible inverter unit
- b. Micro-inverters connected in series

Option B was chosen.

Progress Made This Semester

Project Planner (Fall 2015)

Activity

Percent complete

Formulate Problem statement.....	100%
Research Possible solutions.....	100%
Conceptual Design.....	100%
Alternate Conceptual Design.....	100%

Progress Made This Semester

Project Planner (Spring 2016)

Activity

Build Prototype

Test Prototype

Prepare for ECE day

Costs and Resources

1. Microinverters- 142.99\$

2. Solar panels - 199\$

For the resources Mr. Blue will be providing that

Conclusion

- We began this semester by brainstorming.
- The first thing we did collectively was to decide what the consumers wanted or demanded for their solar panel inverters.
- Then we did our first conceptual design focusing mainly on the idea that we wanted our inverter to be eco- friendly , inexpensive and proficient in power expansion.
- The second conceptual design we focused solely on the power expansion aspect of the inverter. How could we as team expand the power lifespan of a solar panel inverter.
- Through research of each member of the group , our solution was to designing and building an inexpensive expandable inverter which allowed for easy power expansion.

The End

Questions/Comments