PROJECT ORGANISATION AND REPORT:

Session 2

Group 5:

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1. Introduction

Depletion of fossil fuels represent a threat to the rising demand for electricity, thus sustainable and efficient methods need to be developed. Solar power rises as one alternative due to its practical advantages such that solar panels virtually need no maintenance and they are eco-friendly. Nevertheless, solar panels only allow collecting DC power directly. The goal of this project is to harvest AC power from solar panel and feed it into the power grid so it can act as storage in case of over and under generation of energy. In order to efficiently achieve this, three main steps are going to be carried out, these create such a load to achieve maximum power transfer from the solar panel, convert DC into AC power and finally adjust the voltage and phase it to that of the grid. This raises the following questions: How to develop a load that continuously adapts itself to the internal resistance of the solar panel to achieve maximum power transfer?. What are the processes involved in a power inverter and which aspects should be taken into account so as to obtain the maximum efficiency possible? Lastly, in order to adapt the phase of the obtained voltage to the grid, which method is more efficient and how to adapt it to the response of the power inverter?. This report will cover these questions in detail in the analysis starting with the load design followed by power inverter and its efficiency, then the process to adapt the phase to the grid will be described. Next, the results of the project will be shown and a discussion in which things that went wrong and right will be summarized and commented. Lastly, a brief conclusion will be presented [1].

1.Analysis

1.1Maximum Power Point Tracking (MPPT)

Description of the importance of this process in the project.

1.1.1 Introduction.

This section will cover an explanation of how this technique works to extract the maximum power available under certain conditions.

1.1.2 Methodology and Analysis

This section will be based on the application of the MPPT process in order to get the maximum power available, therefore is necessary to choose a load which has to be adapted to the changing in the internal resistance of the solar panel. Also, this section will contain structured graphs in which it will be possible to compare different approaches of the mentioned process.

1.2 Power Inverter

Why this circuit is needed for the project will be motivated.

1.2.1 Introduction

This subsection will look at the general function of a power inverter and what is the main processes involved to achieve it. What is the utility of this for the purpose of the project?

1.2.2 Methodology and analysis

In general, this subsection will focus on how to build a power inverter, namely which components are the ones to be used and why. Some topology may be involved so as to choose the right component values.

1.3 Phasing to the grid

How to adapt the power inverter response in the most efficient way?

1.3.1 Introduction

A brief review of the concept grid will be discussed.

Why small-scale electricity generation technology is not compatible with currently grid infrastructures will be mentioned. This,, in particular, will enhance the importance of phase signal processing during the feed of voltages into transmission lines.

1.3.2 Methodology and analysis

Generally, this section will take a look at how to manipulate electric signals. The focus for this part will consist of phasing voltages.

2.Design

This section will describe in detail how each part of the final circuit was built, all experiments made to prove the functionality of the circuit will also be covered in this section. Moreover, block diagrams and schematics will be shown and explained. All this will be covered in the following order.

2.1 Maximum Power Point Tracking (MPPT)

2.2 Power Inverter

2.3Adapt to grid

3. Results

This section will show all the data from testing the functionality of the circuit. The aspects that are going to be examined in the circuit are the following.

3.1 Maximum Power Point Tracking (MPPT).

This result is going to show the efficiency of the circuit.

3.2 Power Inverter.

This point will prove if the circuit is able to successfully transforms the DC current produced by the solar panel into AC current.

3.3Adapt to a grid.

Check the capability of the circuit to adapt the frequency of the AC current, to make it compatible with the current flowing in a grid.

4. Discussion

In this section will interpret the results of the project. It will be explained how it can be improved to obtain better results. If the project has problems and does not reach its objective, it will be shown about what were the errors in the project, and it will be given to know what could be the possible solutions to obtain the desired result. In other words, the meaning of the discussion is to demonstrate what result shows and why does it work in that way. In addition, it will be announced importance of the experiment and benefits of it.

5. Conclusion

For the final part, it will be explained the goal of the project as well as a general summary of the results and implications of the project. Additionally, the performance of the three parts will be described: MPPT, inversion to Ac and adaptation to the grid.

5.1. General summary.

In this subsection, a brief description of the overall performance of the power inverter will be given.

5.2. MPPT

This subsection will explain what was the load chosen to get the maximum power point tracking and how this affected the outcomes.

5.3. Inversion to Ac

The last design of the inverter and why this was selected as well as the consequences of choosing it will be described in this subsection.

5.4. Adaptation to the grid

This part will describe how the phase of the grid was sensed and which method was used to inject power in the grid. Additionally, it will be described how efficient this method was.

6. Bibliography

[1] Spreeuwers, L. (2018). *DESIGN OF A GRID-TIED INVERTER FOR SOLAR POWER.* Obtained from https://canvas.utwente.nl/courses/2011/pages/project-ec-manual?module_item_id=44785