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Self Tuning Buck Converter

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March 16, 2021

Submitted in partial fulfilment of the requirements for
Honours of Electronic and Computer System Engineering.

Abstract

This document gives some ideas about how to write a project proposal, and provides a template for a proposal. You should discuss your proposal with your supervisor.

1. Introduction

Switch Mode Power Supplies

Switch mode power supplies convert a DC input voltage to another DC output voltage. They are commonly used in a wide variety of consumer and professional appliances such as laptops and chargers due to their high efficiency compared to other DC-to-DC converters. This project will

The step-down switch mode power supply also known as a buck converter, is a common DC-to-DC power converter that steps down an input voltage to a desired output efficiently. Currently the design of these converters for specific applications requires a specifically designed output filter, designed around the switching speed of the converter. This filter will smooth the converter output voltage and maintain the inductor current ripple at the designed values. However this design process is not always applicable, if the specified components for the filter are not available there can be lead times, cost implications and delays.

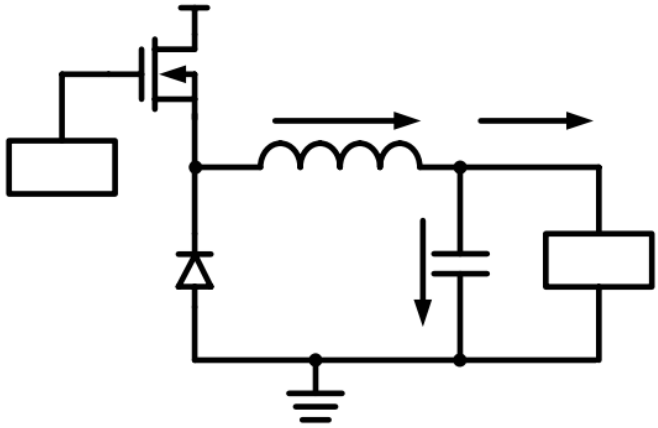

Figure 1: Asynchronous buck converter topology [1]

This project aims to remove the need for designing the output stage of the buck converter. Using a control system, the switching frequency and duty cycle of the converter can be modulated to meet a selected inductor ripple, while maintaining a selected output voltage. This project will focus on the design and implementation this control system on a basic asynchronous buck converter.

2. The Problem

In this section you should give a brief description of the problem itself. You want to briefly explain the problem, why it is important to solve the problem and define your project aims. After reading this section, the reader should understand why it is a problem, believe that it is important to solve and have a clear idea of the aims of your project.

When describing the aims of the project, you should avoid vague, unmeasurable words like ‘analyse’, ‘investigate’, ‘describe’, and use specific, measurable words like ‘implement’, ‘demonstrate’, ‘show’, ‘prove’.

For example:

Good The aim of this project is to implement and evaluate a management system for network switches;

is much better than:

Bad The aim of this project is to investigate management systems for network switches.

In the second case there is no idea of how much work is involved, and you will never know whether you have finished. You and your supervisor (and the markers of your project) may have very different ideas about what such an 'investigation' involves. Of course, it is possible that the task you set yourself is not achievable, but if you are clear from the outset this is less likely, and will more easily be corrected.

3. Proposed Solution

In this section you will explain how solve the problem, that is, how you intend to carry the project out. At this early stage you need to be both clear about what you are going to do and flexible enough to adapt to changing circumstances. Making an early plan will not prevent you from running into trouble, but it will help you identify possible problems early. For example, if you intended to run an experiment in HCI, you might realise early on that there would be problems gathering sufficient data to get reliable results, and that you should re-design your experiment.

Part of the planning process involves producing a timetable for when the work is actually going to be done.

Each part of the project should produce some output. For example you might plan on spending two weeks on background reading: the output of this will be a bibliography, and a possibly a literature survey for your report. Indeed, if you take the advice given above about having specific, measurable goals, you should describe this part of your project as:

Good Produce bibliography (est: 2 weeks)

rather than

Bad Background reading (est: 2 weeks)

Note that the methodology you outline here is dependent upon the type of project and engineering area. You must talk to your supervisor about this.

4. Evaluating your Solution

In this section you will explain how you will evaluate your solution once you have built it. The method of evaluation will be domain specific. Your supervisor should provide guidance as to what is an appropriate form of evaluation. For example, user testing for a HCI project or performance measurement for a Network Engineering project.

5. Resource Requirements

In this section you will detail any resource requirements such as hardware, software or access to subjects.

Bibliography

[1] A. Jain, "Synchronous vs. Aynchronous Buck Regulators," tech. rep., Semtech Corporation, Camarillo, CA.