

Report for E-design 344

by

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E-Design report # 2

September 2019

Declaration

By submitting this report electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

A hand-drawn stick figure with a circular head containing two small circles for eyes. The figure has a horizontal line for an arm pointing towards the word 'Egot', which is written in a stylized, handwritten font. The figure's legs are simple lines extending downwards and outwards.

Signature:

E. Stewdent

Date:

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List of Tables

Nomenclature

Constants

$$g = 9.81 \text{ m/s}^2$$

Variables

P Power [W]

Chapter 1

Signal conditioning system design

1.1 System overview

Here you insert a block diagram of your operational signal conditioning system. There is no need to specify the capacitor and resistor values here, but you want to capture the higher-level functional arrangement you have opted for. The diagram ties together the other chapters in this report and helps the reader understand how you have connected the different functional blocks together to produce the outputs. For example, a block could be “Differential amplifier” or “level shifting op-amps” or the like. Fig. 1.1 as an example that is completely irrelevant and just holds space.

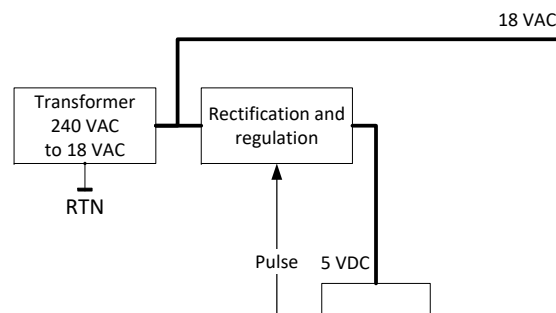


Figure 1.1: System diagram

Chapter 2

Voltage peak transducer

2.1 Theory and releated work

In this section, you put a very short summary of information you gatherered from literature (papers, web sites, datasheets) that you used to do the design. Be sure to include the references, which you can add in the `References.tex` file.

Some examples of how to cite (all in `References.bib`): It was stated by [1] that Subsequently, he changed his mind and said in [2] that While [3] claims it to be

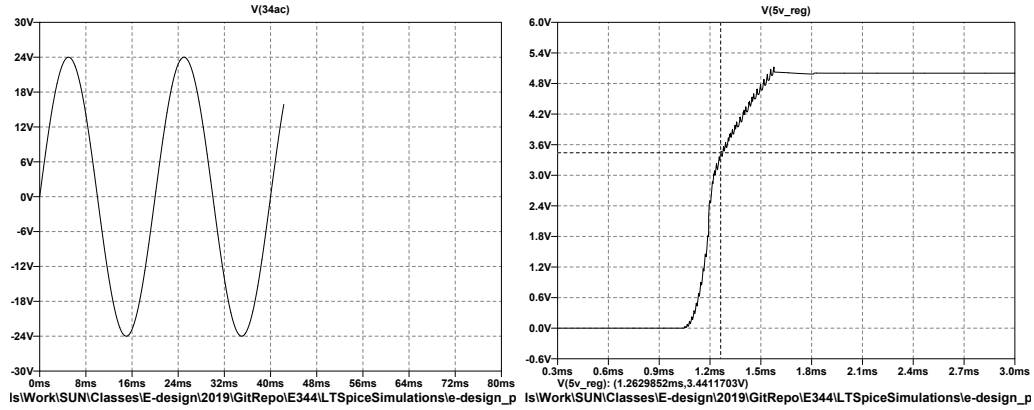
2.2 Design

In this section, you need to capture your design, which should include the following:

- Design rationale, i.e. what your thinking was behind the design
- Design calculations, for example to determine resistor values and capacitor values, or to check for allowed voltage and current ranges and levels.
- Circuit diagram.

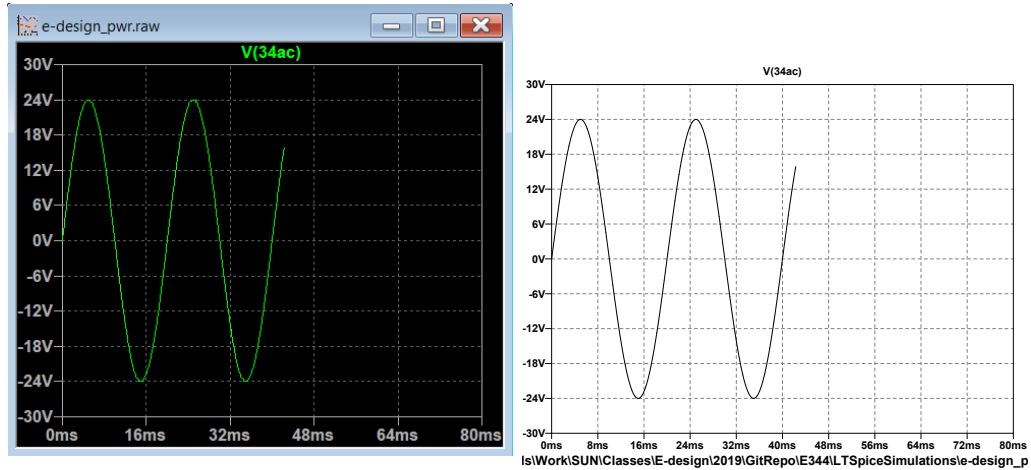
2.3 Simulation

In this section, you want to demonstrate, by means of simulation results, using the designed circuit, what your circuit is expected to behave. An example is the figure shown in Figure 2.1 or Subfigure 2.1a. Be absolutely sure that the text and information in your report are readable.



(a) 24 VAC supply voltage.

(b) Positive 5 V rise time.



(c) It is OK to use a screengrab if you are technologically challenged, my mum is too.

(d) Say something, I'm giving up on you.

Figure 2.1: Energy and temperature results of the different control strategies represented as distributions for all water heaters. (a) depicts electrical energy used per EWH per day, (b) depicts thermal energy drawn per EWH per day, (c) depicts outlet temperatures during usage events, (d) depicts thermal losses per EWH per day.

2.4 Measurements

In this section, you must present your measured results. You can use screengrabs or photos of the oscilloscope, or download the CSVs and plot them as PDFs using Matlab, Excel or similar.

Chapter 3

Current peak transducer

3.1 Theory and related work

3.2 Design

3.3 Simulation

3.4 Measurements

Chapter 4

Phase shift transducer

4.1 Theory and related work

4.2 Design

4.3 Simulation

4.4 Measurements

Chapter 5

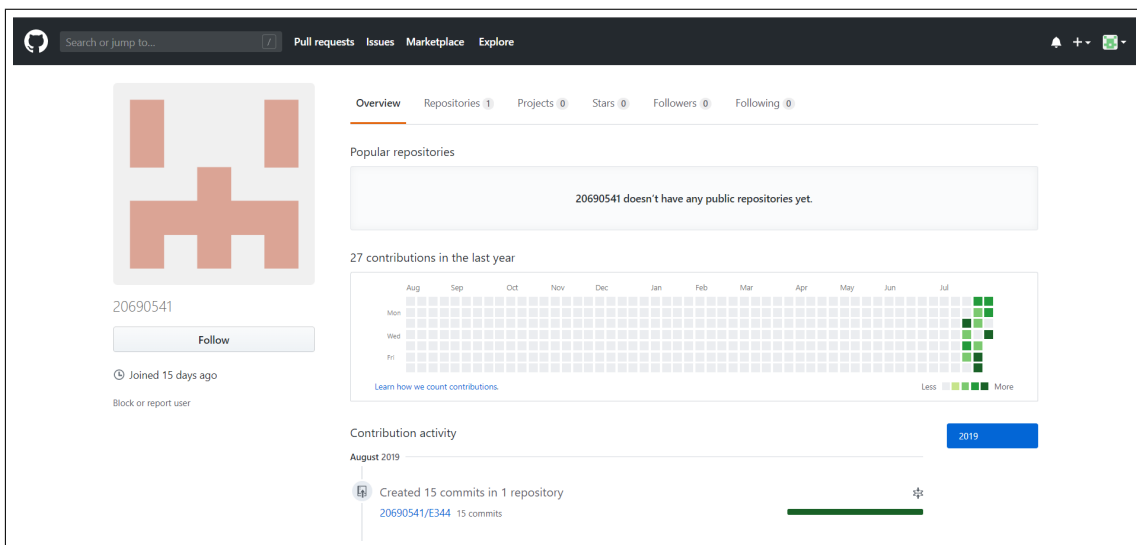
System tests

Here you include an image of your PCB (showing your barcoded ID) and any system-level tests you deem appropriate. For example, the total current drawn by the opamp circuitry.

References

- [1] Booysen, M.J., Andersen, S.J. and Zeeman, A.S.: Informal public transport in Sub-Saharan Africa as a vessel for novel Intelligent Transport Systems. In: *16th International IEEE Conference on Intelligent Transportation Systems (ITSC 2013)*, pp. 767–772. Oct 2013. ISSN 2153-0009.
- [2] Gerber, S., Rix, A.J. and Booysen, M.J.: Combining grid-tied PV and intelligent water heater control to reduce the energy costs at schools in South Africa. *Energy for Sustainable Development*, vol. 50, pp. 117 – 125, 2019. ISSN 0973-0826.
- [3] BBC: How to make opamps amp op. 2018.
Available at: www.electronics-tutorials.ws

Appendix A: GitHub Activity Heatmap



Appendix B: Stuff you want to include

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Appendix C: More stuff you want in

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