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Linear Power-supply Design

Electronic-Design 344

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# Declaration of Own Work

This is my own work. I hereby sign that I have not plagiarised.

………………..…………………

Date:

# Abstract

# List of Abbreviations

# Introduction

# System Design

This will include the design, analysis, measurements and comparations of theory and results.

## Transformers

## Rectifiers & Capacitor Banks

## Zener Constant-Voltage Reference

## Pass Output Stage

## Voltage Regulator

## Current limiter

## Arduino Interface

### Inputs (PWM RC filters)

### Outputs

# Circuit Integration (Analogue)

## Final System Measurements

## Interpretation of Results

# Software Design

## Purpose & Requirement

## Software Literature

## Software Extras

### Control System

*I added a control system. Alas, it was not yet merged with the final version at the time of the demo. However, it can still be discussed, here.*

The idea was to learn the plant transfer function characteristics of the power supply, without knowing the gain of the voltage regulator or transconductance of the current regulator.

It could be described as a PI control system.

Using a known load is preferable, as one can set appropriate step inputs to learn the system.

Lets assume the case where a 10 ohm calibration load is used.

It gave a step input of a supposed 1000mV, and current greater than 1A. This could be adjusted by the user. Then it would take the average of a number of voltage measurements.

I also gave the user the option of setting the number of samples before adjusting the output. Samples were sent every 200ms, therefore a good number of samples to test it would be about 5 samples, which means one sees a change every second. It had a slight bit of overshoot as it learned, but it would reach a steady state after about 2-3 seconds.

Upon reaching a steady state within 10% for at least 3 samples, it lowered the current to a specified value, and increased the voltage. For example, voltage now becomes 10V and current becomes 100mA. It learns what the transconductance is.

Upon learning the characteristic plant transfer function of the power supply, it made the voltage gain and transconductance less susceptible to supposed changes in future. This allowed for a smoother steady state, and less overshoot.

# PCB

# Photo of Circuit

# Circuit Diagram