



PROPOSAL of DESIGN PROJECT

Spring 2019

Project Name	Fully Digital Adjustable Power Supply
Project Team Members (Name – No)	Alişan Aygar – 05140000567 Elif Ege Diken – 05160000053 Emir Kaan Yerli – 05150000734 Fehmi Demirel – 05140000533

Project Delivery Date
10.03.2019

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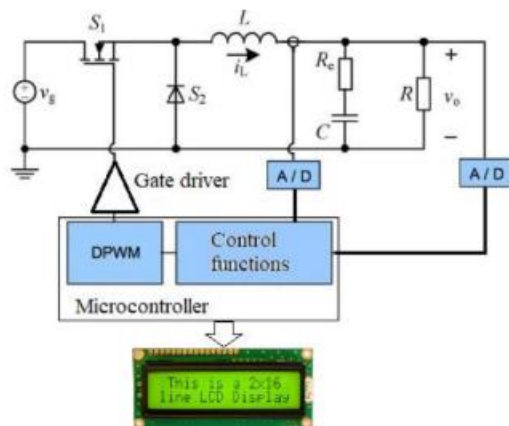
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1. Brief Information of Project

The main goal of our team in this project is to design and prepare the proper fully digital adjustable 0-15V/ 2A DC power supply. Our proposal is composing the most optimized project work for this design project by functioning as an efficient team. We will design, simulate, engineer and test a power electronics converter in the form of a fully digital adjustable 0-15V/ 2A DC with LCD displayed power supply that is based on a switching converter topology(buck, boost, buck-boost etc.) and is controlled by a microcontroller (PIC, AVR, ARM etc.) such can be adjusted wirelessly.

2. Design Requirements

1. The whole system's power supply requirements including the microcontroller (3.3V DC) and the general supply requirements (+15V, -15V, +5V etc.) should be energized from a single 18V(5%) DC voltage source.
2. The final product of the power supply should be based on a switching converter topology (Buck, Boost, Buck-Boost etc.). The linear power supply topologies (such as pass transistor, LM317 etc.) are not allowed in this project.
3. All the power supply functions must be controlled by a single microcontroller (AVRxx, PICxx, dsPICxx, STM32xx, TMSxx or similar development card) which must also be powered from the 18V DC source.



4. The microcontroller should have an LCD display to indicate the updated output voltage, the output current and the output power in every 0.25 second.
5. The output voltage and output current should be adjustable by the user using push buttons (or similar, maximum of 3 buttons) on the board.
6. If possible, the output voltage and the output current can also be adjusted wirelessly by an Android device.
7. The output voltage of the power supply must be adjustable in the range of 0-15V(maximum) by the user.
8. The output voltage ripple must be lower than % 1.5.
9. The load regulation should be 2% or better.

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10. The output current limit for the power supply must be adjustable in the range of 0.5-2A(maximum) by the user. If the load current exceeds the current limit, the power supply must shut down immediately and stay in that state until the load is disconnected.

11. The output power limit for the power supply must be adjustable in the range of 5-30W(maximum) by the user. If load power exceeds the power limit, the power supply must shut down immediately and stay in that state until the load is disconnected.

12. During the no-load condition, the power supply input power should be lower than 2W.

3. Project Team Members and Tasks

Our project team consists of 4 members: Alisan Aygar(3), Elif Ege Diken(3), Emir Kaan Yerli(4) and Fehmi Demirel(4). We have shared the project tasks according to our interests. Thus we will be able to work effectively.

Project Team Members (Name)	Project Team Members (No)	Tasks of Members
Alişan Aygar	05140000567	Microcontroller Design
Elif Ege Diken	05160000053	Circuit Design + PCB Design
Emir Kaan Yerli	05150000734	Circuit Design + Android Communication
Fehmi Demirel	05140000533	Converter Design

4. Work Plan

- 1) Doing individual research about the shared tasks.
- 2) Collecting data and organizing the process.
- 3) Designing the power circuit and planning the digital circuit's inputs and outputs.
- 4) Deciding the required electronic materials and choosing the most suitable ones.
- 5) Simulating the circuit in the computer environment.
- 6) Composing the microcontroller's programs to control the circuit fully digital.
- 7) Designing wireless control processes.

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- 8) Simulating the whole circuit diagrams in the computer environment.
- 9) Designing and making the printed circuit board for the power supply.
- 10) Combining the whole system together.
- 11) Testing the system and measuring the results in the laboratory environment.
- 12) Correcting the mistakes if any, and optimizing the whole circuit.
- 13) Preparing the final project report and completing the processes.

5. Time Schedule

Steps	Procedure	Dates
General project meeting	Meeting project team members for planning the project	08.03.2019
Simulation	Making a simulation for design the project	14.03.2019
Getting project materials	Specifying and getting the project materials	16.03.2019
Converter design	Designing a buck-boost converter	25.03.2019
Microcontroller design	Designing a ARM based microcontroller	31.03.2019
Android communication and PCB design	Using the App Inventor for Android comm. and designing PCB for testing the project	10.04.2019
Testing the project	Testing the project based on project procedure	25.04.2019
Preparing the project report	Preparing the project report based on project procedure	27.04.2019