

Ozgur GULSUNA

Undergraduate Student | METU EEE

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Middle East Technical University, Ankara/Turkey

Interests Aerospace Systems, High Reliability, Data Driven Design, 3D Manufacturing & Prototyping.

Research Integrated Motor Drive, PCB Design, High Frequency & Power Dense Applications.

EDUCATION



2018 - Middle East Technical University | 4th Year
B.S., Electrical and Electronics Engineering. CGPA : 2.94
Minor in Mechatronics. CGPA : 3.08

2013 - 2017 Adana Final High School
Graduated with 3rd rank.

SKILLS

Language	Turkish	Native				
	English	Advanced (C1)				
Software	CCS C	★★★★☆	HTML/CSS	★★★★☆	MATLAB	★★★★☆
	KiCad	★★★★☆	Altium	★★★★☆	LTSpice	★★★★☆
	Autodesk Fusion 360	★★★★☆	Siemens NX	★★★★☆	CAM/Mach3	★★★★☆
	Rhino/Grasshopper	★★★★☆	Autodesk Maya	★★★★☆	Blender	★★★★☆
Other	Linux/Manjaro, L ^A T _E X, Adobe (Photoshop, Illustrator, After Effects), OpenOffice (Word, Excel), 3D Printing, Laser Cutting, CNC Milling, Turning.					


EXPERIENCES

2019 -	 METU Power Lab Undergraduate Student Researcher Power Lab is a research group in the Department of Electrical and Electronics Engineering in METU. A place where motivated graduate and undergraduate students work in power systems, power electronics, and electric machines. <ul style="list-style-type: none">> Design of a PCB Motor with Integrated Driver.> 5 kW DC Motor Driver design and implementation. <div>Magnetic Design Thermal Design PCB design I²C SPI</div>
2018 - 2019	 METU Robotics Society Clean Energy Team (METU-CET) A Team of fresh students who are eager to develop an electric vehicle with high performance in power and efficiency. <ul style="list-style-type: none">> Electronics Team Member, In charge of motor driving systems.<ul style="list-style-type: none">Project : Isolated DC-DC converter design for in-vehicle power distribution.Project : Brushless DC (BLDC) Motor driver design and implementation.> Participated in Shell Eco-marathon Europe 2019 (London).> Participated in TUBITAK Efficiency Challenge 2019 (Istanbul). <div>Proteus Matlab/Simulink CCS C CAN bus</div>

PROJECTS AND PUBLICATIONS

DESIGN OF A TEMPERATURE CONDITIONING SYSTEM USING MODIFIED ANALOG PID CONTROLLER

PROJECT | 2022

 github.com/ozgurgulsuna/EE313-TermProject

Designing a responsive and accurate temperature controller is challenging due to the complexity of thermal systems and the asymmetry between the heating and cooling operations. This project focuses on the design, simulation and prototyping of an autonomous temperature conditioning system using a modified PID method.

Analog Electronics Asymmetric PID Controller KiCad Term Project Thermal Modeling

DESIGN OF AN INTEGRATED PCB MOTOR

PROJECT | 2021

 ozgurgulsuna.com/pcbmotor.pdf

Abstract—This document presents an integrated printed circuit board (PCB) motor design that is specifically optimized for compactness and power dense applications. Featuring Gallium Nitride switches and high switching frequencies to overcome the high current ripple which is a result of using PC board windings.

GaN High-Frequency PCB Motor Altium Integrated Drive C++ TMSF28375

FEASIBILITY OF QUASI-SQUARE-WAVE ZERO-VOLTAGE-SWITCHING BI-DIRECTIONAL DC/DC CONVERTERS WITH GAN HEMTs

PUBLICATION | 2021

mdpi.com/1996-1073/14/10/2867

Abstract—The proposed converter applies a high-switching frequency at high output power to maximize the power density at the cost of high current ripple with high frequency of operation which requires a design strategy for the passive components.

Gallium nitride Power density Interleaving High-frequency Reliability

DC MOTOR DRIVER EXPERIMENTAL SETUP

PROJECT | 2020

ozgurgulsuna.com/dcdriver.png

Designed as a laboratory equipment, this driver controls DC motors with a generator as an input source. It has a maximum voltage of 250 volts and current of 30 amperes at the peak power of 5kW. An integrated AVR microcontroller is used to establish the serial communication. Onboard isolated DC-DC converter powers its control stage. Its protective features consist of under-voltage, over-current, short circuit, over-temperature protection, and many more.

PCB Design (KiCad) LTSpice Mechanical and Thermal Design AVR C++

6 WATT FLYBACK DC-DC CONVERTER

PROJECT | 2019

ozgurgulsuna.com/flybackconverter.png

This low power bias supply is designed to provide power to a DC Motor driver's controller and gate drivers. It has primary and secondary side 12V outputs so that only a single supply can be utilized in isolated energy conversion systems. Quasi-Resonant (QR) flyback topology is used to increase efficiency.

PCB Design (KiCad) LTSpice Transformer Design QR (Quasi Resonant)

BRUSHLESS DC MOTOR CONTROLLER

PROJECT | 2019

ozgurgulsuna.com/rivdriver.png

A custom-designed motor driver for our battery-electric vehicle "R-IV", which participated in the Shell Eco-marathon. This controller has an input voltage level up to 72V, and its nominal input is 50.4 V. The maximum current rating is 20 A. Controller and power stages of the driver are optoisolated. The onboard current sensor is used for closed-loop control. Mechanical construction consists of an aluminum case, and bolts are used as cable connectors.

Power & Control Stage Design Proteus AVR C++ CAN-Bus PID

POLARGRAPH

EXHIBITION | 2017 & 2019

ozgurgulsuna.com/polargraph [Presented at TIW! 2017](#), [METU 2019](#)

Polargraph, a drawing-bot which draws over any surface using pen-like utensils. It has its uniqueness in the way that it generates drawings. Couple of exhibition and numerous drawings.

Processing(Java) C++ Inkscape Raspberry Pi

TOPOLOGY OPTIMIZATION

PROJECT | 2018

ozgurgulsuna.com/pdf/topology-opt.pdf

Finite element analysis approach to design visually appealing and practical things. Scope of this project was to design a table mount.

Fusion 360 Simplify3D