ISAAC OZKAYNAK

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OBJECTIVE: *I would enjoy a professional opportunity in Power Electronics Engineering with responsibilities in the areas of research & development, product design & development, reliability engineering, project management, etc.*

SUMMARY: *Over twenty years of increasingly varied experience in all phases of electrical engineering:*

- *Complete design of Power Supplies, HF converters, HF inverters*
- *Power Electronics Product Design & Development*
- *Contract Engineering*
- *Project Coordination*
- *Product Feasibility & Marketing Analyses*
- *Military and Commercial*

Strong problem solvers with keen analytical and perceptual skills. Readily proceed with all phases of product design, development, and reliability from initial concept and/or technical specifications. Diligent, resourceful, and versatile; learn and adapt quickly. Cooperative with others in the pursuit of high standards of performance, efficiency and quality.

EDUCATION: **MSEE, Technical University of Istanbul – 1971, Member IEEE**

Citizen of Canada and Permanent Resident of the US.

EXPERIENCE:

CONTRACT ENGINEER - July 1989 to 02/20/2004

*Conducted feasibility studies and trade-off analyses for the **Nasa JIMO** (**J**upiter **I**nner **M**oons **O**rbiter) space craft ion plasma propulsion system power processing units (to 100KW), and developed **94% average efficiency Push-Pull Forward** and **Synchronous Rectifier Buck Converter with Ripple Steering** (Zero-Ripple) outputs, **CCIC (C**apacitor **C**urrent **I**njection **C**ontrol**)** and **Planar Integrated Magnetics** for the Zin Technologies, Brook Park, OH, for the Military/Aerospace/Defense/Space applications. Conducted steady state and dynamic modeling of **B**uilt **I**n **F**ilter **P**ush-**P**ull **F**orward Converter (Zero-Ripple and non-pulsating input current) with parasitics, which was not available at the time in the literature and still is not.*

*Converted an existing through hole **air borne-military power supply** product to an all SMT counterpart for **Abbott Technologies,** Inc. of Sun Valley, CA.*

Conducted the design of ***Dynamically Controlled Constant DC Current Source using Synchronous Buck Converter****, complete with* ***Canonical Modeling, for Laser Diode Drive*** *in Underwater-Deep Ocean Fiber-optic Communication Cable Systems for* ***Dorsal Networks****, Inc., Columbia, MD. The Converter included Zero-Ripple (Ripple Steering) Output Filter Inductor. Designed an* ***In-Line*** *Linear Shunt Regulator for* ***Single HV (10KV) Line (No return Cable)*** *as the Line Unit Primary Power Front End Supply, along with its Switching Alternative with* ***SEPIC Converter*** *for 150W, Underwater-Deep Ocean Fiber-optic Communication Cable System application for Dorsal Networks, Inc. Columbia, MD.*

Conducted ***Design Analysis and Dynamic Modeling of PFC*** *and HKPS Subunits of* ***Autronics MRM Power Supply*** *for Unit Failures in its application environments. Identified design dexterity problems and suggested solutions for design corrections.*

Conducted the redesign of AVU2 Power Supply System for ***cost effective compliance*** *to* ***Rockwell Collins, Inc. Specification for Next Gen. Audio Video Unit (AVU)*** *2, for* ***Autronics Corp****., Irwindale, CA.*

Conducted Design Analysis, ***Modeling*** *and cost effective modification/redesign of* ***Average Current Mode Controlled*** *AVU2 Airborne AC/DC Power Supply System of* ***Autronics Corp.****, Arcadia, CA.*

Conducted Design Analysis and ***Modeling of Average Current Mode Controlled*** *DC/DC Converter and PFC Unit for AOS-ED Airborne Power Supply System of* ***Autronics****, Arcadia, CA.*

Conducted design analyses and assessment for wider ambient temperature performance of the new Portable Heart Defibrillator for wider marketing campaign by the ***Medtronics Physio-Control,*** *Redmond, WA..*

Designed an Isolated Electronic Signal Attenuator with Low Pass Filters and ***"Inductance and Impedance Emulators"*** *for Cardiac Waveform Test System of* ***Medtronics Physio-Control****, emulating human body in the applications of Heart Defibrillators.*

Designed a Constant Voltage/Constant Current +3.3V DC/DC Converter for the Patient Parameters Board of Columbus Defibrillator Development Project. Received ***Corporate Award of Recognition*** *(11/14/00) from* ***Medtronics Physio-Control Corp****., Redmond, WA, for this development. Designed a Constant Current CIC Boost Converter for the NiMH Battery Charger of the Cruiser Defibrillator Development Project. Analyzed and Developed Canonical Models for the* ***SEPIC*** *and* ***INVERSE SEPIC (ZETA) DC/DC*** *Converters. Conducted FMECA Analysis on the Patient Parameters Board.*

Analyzed 6.25 KW DS10190 DC/DC Converter Unit for the International Space Station for Preliminary Reliability and MTBF (Mean Time Between Failures) Estimates for ***Ingenium Technologies****, Rockford, IL.*

Designed Power Factor Corrected, High Frequency and instant start Fluorescent Lamp Ballast for F30WT8 lamps for ***Osram-Sylvania****, Danvers, MA.. Ballast employs a novel single stage power processing and provide no filament power.*

Designed a 30W, High Efficiency, ***500 KHz Multi-output DC/DC Converter****, and* ***Controlled ON Time*** *250 KHz Power Factor Correction Unit (APM)* ***for In Flight Entertainment System Application*** *at* ***Primex Aerospace****, Cabin Electronics Division. Designed a Power Factor Corrected (Controlled ON Time), 300W, Multi Power Processor Supply, with* ***(n+1) Parallel Redundancy*** *for* ***Airborne Internet Server Application*** *on Passenger Airplanes.*

Designed an ***all SMT Power Conditioner Module****, which contains three inter linked power converters for Automotive Engine Control System by* ***Motorola-AIEG,*** *Chicago, IL..*

Analyzed selected Power Supplies used in ***Hughes Network Systems (HNS)*** *products for cost reduction, technology upgrade and control stability. Designed New* ***SSU Power Supply*** *for Universal Input and* ***Smart Battery Pack Interface****. Modified existing Sunrise Power supply for Latin American Power Sources.*

Developed a 400 KHz Forward Converter (500W), employing ***Integrated Magnetics for cost effective and high density integration*** *product applications.*

Developed an ***Expert System Mathcad Application*** *for designing a power converter from given specifications. It conducts magnetic design with core selections, modeling of skin, proximity and PWM harmonic effects on core losses, it conducts optimum feedback design with component selections, employing models of PWM Chips, it designs input filters complete with input filter effects on converter dynamics.*

Analyzed Zenith Laptop Computer power system & circuits for premature low battery warning problem. Trained by Univ. of Wisconsin, at Madison on ***Battery Technology for Product Design with emphasis on Li-Ion, Ni-MH, and Ni-Cd batteries*** *for portable computing applications. Proposed & designed an 800 KHz dual parallel power processor for AC Cube (AC/DC Converter) as technology upgrade for existing & future Zenith laptop computers.*

Proposed, designed & developed a UL458, FCC/15-Class A and USCG 33CFR ignition proof rated, 25A ***Lead Acid Marine Battery Charger****, using* ***Phase Shifted, Zero Voltage Switching Full Bridge (PS-ZVS-FB) with Current Doubler Integrated Magnetics****, for Heart Interface. Development included supervising sub-contracted PCB & Sheet Metal Design.*

Proposed, designed & developed, UL458, FCC/15-Class A & USCG 33CFR rated 30A Marine battery charger, using ***interleaved Forward converter with RCD clamp snubber and digital controls for automatic sequential multiple bank charging*** *for Raritan Engineering, Inc. Development included supervising sub-contracted PCB & Sheet Metal design.*

Designed & developed a 3.3 KW Power Factor Correction Unit, based on ***Zero- Voltage- Transition (ZVT) Boost Converter*** *and 3 KW (60V/50A)* DC/DC *downstream converter, based on PS-ZVS-FB and Current Doubler for Alpha Technologies, Inc. The project was cancelled before completion.*

*Designed TCP Power Supply System for **SPAS III Satellite**, which consists of two power processors for command & telemetry Interface, and a Battery Back-up system for MDTCP Terrain Cartridge Memory Modules for **F-16 & F-22 Fighter Planes** for the **Fairchild Space & Defense Corp**. (Germantown, MD). Proposed & developed a 200W PCU Breadboard (Based on **Parallel Loaded Resonant Converter**) and a 2 kW preliminary design (Based on **200 KHz CCM Flyback**) for **Arc-jet thrusters of Satellite Orbital Maintenance**.*

Directly involved in all stages of design & development of switch mode high frequency converters & inverters with applications in the marine, commercial and military aviation fields for Bruce Industries (Dayton, NV)...Heart Interface (Kent, WA)...Avtech Corp. (Seattle, WA)...and Eldec Corp. (Lynnwood, WA). Developments included:

Company	Development Description
Eldec Corp.	*Off-Line, double switch-forward conv., 150W, 5V/30A, Voltage Mode, 100KHz*
Eldec Corp.	*Off-Line, DCM - Flyback., 30W, ±15V/1A , CIC mode, 150KHz*
Eldec Corp.	*Off-Line, DCM - Flyback., 20W, ±20V/.5A , CIC mode, 150KHz*
Avtech Corp.	*Electronic Ballast, 28V DC to 400Hz AC, using DCM Flyback, CIC mode, 25KHz, 80W, Step Dimming*
Heart Intrfc.	*Pocket Inverter, 12V DC to 115V/60Hz AC, using 50KHz P-P (12V/160V) & LF PWM for RMS regulation.*
Heart Intrfc.	*Battery Charger, 12V/50A, 2 step & 3 state, Off-line, Full-Bridge, 50KHz, CIC Mode*
Bruce Ind.	*28VDC input, Electronic Ballast, HF-PLR, FM'ed full state feedback, 25KHz-150KHz., 4W-36W, Step dim*
Bruce Ind.	*Off-line (400Hz) Electronic Ballast, HF-PLR, FM'ed full state feedback, 50KHz-180KHz., 4W-72W, Step Dim..*
Bruce Ind.	*Off-Line (400Hz) Electronic Ballast, Differential CCM Flyback, Voltage Mode with SCM, 30KHz, 4W-80W,*
Bruce Ind.	*Off-Line (400Hz) Electronic Ballast, Differential CCM Flyback, CIC Mode, 30KHz, 4W-80W, Step Dim.*
Bruce Ind.	*Multi-AC-Spark, Electronic Ignition System, using 50Khz P-P, DC/DC Converter and resonant turn-off.*
Bruce Ind.	*DC/AC Sinusoidal PWM Inverter for Aircraft Cockpit Windshield Heater., 28V DC/115V, 40KHz, 1KVA*

SENIOR ENGINEER

March 1987 to March 1989

*At **LH Research** (Tustin, CA) and **Engineered Magnetics** (Hawthorne, CA) participated in product design proposals. For LH Research, designed an auto-strap add-on for TMA 40 series Switch Mode power supplies. For Engineered Magnetics, participated in various design proposals including 1.5KW Arc-Jet Thruster Power Control Unit.*

SENIOR SPECIALIST ENGINEER / STAFF ENGINEER

March 1984 to August 1986

*For **Litton Aero Products** (Moorpark, CA), assignments included IPPS Power Supply Tester, ARINC receiver-transmitter simulator and design analyses of cockpit illuminator power supplies for airplanes. For **XEROX Power Systems** (El Segundo, CA), designed an open frame Off-line,*

Single Switch CCM Forward Converter, 225W, 50KHz. and a fan cooled 1.6KW switch mode power supply system for large copiers (XEROX-1075). Supervised the packaging team for the aforementioned system.

PREVIOUS EXPERIENCE

1978 TO 1984

Provided expertise in power supply design at ***Clifford Industries*** *(Camarillo, CA)...****Versa-Power*** *(Hawthorne, CA)...****Aydin Energy Systems*** *(Palo-Alto, CA)...****Martin-Marietta Corp.*** *(Denver, CO)...****Bendix Aircraft Electric Power*** *(Eatontown, NJ)...and in reliability engineering at* ***Singer Sewing Machines*** *Elizabethtown, NJ) and* ***Litton Canada*** *(Mississauga, ONT). Prior to 1978, provided expertise in Nuclear Reliability and Accident/Risk Analyses for CANDU Nuclear Reactors in Canada.*

PROFESSIONAL ANALYSES, CAE, CAD & DTP QUALIFICATIONS:

ANALYSES

- *State-Space time averaged Modeling for PWM Converters*
- *Extended Describing Function Modeling for Resonant Converters*
- *Worst Case & Design*
- *Reliability & Modeling*
- *Failure Modes, Effects & Criticality Analyses*

CAE	MAGNETICS	CAPTURE	OFFICE	MATH
ICAPS/4[1]	**Transformer Design** [5]	OrCad SDT/386+	MS Office 97/2000	MathCad+ 6.0
ResoCad [2]	Inductor Design [5]	OrCad PCB/386+	MS Word 97/2000	Mathcad 7 Pro.
HB [2]	Magnetics Designer[8]	OrCad 7.20 / NT 4.0	MS Excel 97/2000	Mathcad 8 Pro.
Dyana [2]		OrCad 9.2 for W2K	MS PowerPoint 2K	Mathcad 2000 Pro.
Scamp [3]		OrCad-Cadence 14.0	MS Project 98	Mathcad 2001 Pro.
PSIM [9]		OrCad-Cadence 14.2		Mathcad 2001i Pro.
Power 4-5-6, Ver.8 [4]		ACAD LT 2.0		MapleV-Version 4[7]
Control Loop Analysis [5]		ACAD LT 2000		MapleV-Version 5
Program CC [6]		SmartSketch 4.0		MapleV-Version 7

NOTES:

1 – Electronic Circuit Simulation Software by IntuSoft, Inc.

2 – Design verification software by Design Automation, Inc. ResoCad & HB for resonant converters, Dyana for Converter Stability.

3 – Graphical Converter Synthesis and Stability Analysis by Caltech.

4 – Excel Spreadsheet Software by Ridley Engineering Co.

5 – Design & Verification Software by Analytic Artistry, Inc.

6 – Control System Analysis for Classic and Modern Control Systems, by Systems Technology, Inc.

7 – Software by Maplesoft, Inc.

8 - Magnetics Design Software by Intusoft, Inc.

9 - Behavioral Power Electronics Simulation with Mixed Signal, PowerSimTech, Andover, MA

PUBLICATIONS:

1- **"A Comparison of Relays & Solid State Devices in Nuclear Safety Systems"**, *IEEE Proc. of Reliability Engineering Conference, RELENG 76, pp.163-170, September 1976, Montreal, Quebec, Canada*

2- **"Electronic Regulator for Car Alternators Switches ON/OFF Rapidly to Maintain 14 V."**, *Electronic Design (US), Vol.25, No.15, p.100, July 19, 1977. The Most Valuable Design of The Issue Award which was announced in Vol.25, No.24 November 1977, p.166.*

3- **"A Voltage Regulator for Automobile Alternators"**, *Electronic Engineering, (UK) Vol.49, No.595, p.19, August 1977*

4- **"The Design of a Solid State Trip System for Nuclear Power Plants"**, *MicroElectronics & Reliability (UK), Vol.18, No.3, pp.243-249, 1978*

5- **"The Design of a Solid State Trip System for Nuclear Power Plants"**, *IEEE Transactions on Nuclear Science, Vol.NS-26, No.2, pp.2933-2936, April 1979, The paper was presented at IEEE Nuclear Science Symposium, Washington DC, October 20, 1978*

6- **"Electronic Regulator for Car Alternators"**, *400 Ideas For Design, Volume 4, pp.234-235, 1980, Hayden Book Co., Inc.*

7- **"A Dual Voltage Regulator for Diesel Engines & Recreational/Military Vehicles"**, *Electronic Engineering (UK), Vol.53, No.649, p.25, March 1981*

8- **"Electronic Ignition Keeps Spark Energy High During "Start", "Idle" & "Drive"**, *Electronic Design (US), Vol.29, No.8, pp.194-195, April 16, 1981*

9- **"Using High Frequency Digital Synthesis in Three-Phase Sinewave Inverter Design"**, *Proc. of POWERCON 9, Section F-3, July 1982, Washington DC.*

10- **"Pre-regulator for Linear Power Supplies"**, *Electronic Engineering (UK), Vol. 56, No.688, pp.30-33, April 1984.*

11- **"An Intelligent Inrush Current Eliminator"**, *Proc. of POWER ELECTRONICS DESIGN CONFERENCE, pp.154-163, October 1985, Anaheim, CA*

12- **"A Universal Synchronization System for Multiple Switch Mode Power Supplies"** *Proc. of The POWER ELECTRONICS CONFERENCE, pp.186-193, October 1986, San Hose, CA*

13- **"Introduction to Personal Computer Aided Power Supply Design"**, *Book, 1989, Tustin, CA*

14- **"Using Opto-Coupler or Current Mirror to Eliminate LC Output Filter Effects in Buck-Boost Topology",** *Proc. of the* ***POWER ELECTRONICS TECHNOLOGY 2002 CONFERENCE****, pp. 378-388, October 2002, Rosemont, IL. On screen viewable PDF copy is available at http://users.adelphia.net/~ozkaynak.*

15- **"Novel Approaches to Output Voltage Control for Static Power Inverters",** *Proc. of the* ***POWER ELECTRONICS TECHNOLOGY 2003 CONFERENCE,*** *pp. 450-460, Nov. 2-5, Long Beach, CA. On screen viewable PDF copy is available at http://users.adelphia.net/~ozkaynak.*

16 – **"Modeling and Control of Non-Isolated Synchronous Buck Converter "**, *Submitted for Seminar Publication in* ***POWER ELECTRONICS TECHNOLOGY 2004.*** *. On screen viewable PDF copy is available at http://users.adelphia.net/~ozkaynak.*

17 - **"Modeling and Control of Non-Isolated D^2 Converter"**, *Submitted for publication in* ***POWER ELECTRONICS TECHNOLOGY 2004****. On screen viewable PDF copy is available at http://users.adelphia.net/~ozkaynak.*