

# Reza Rezaii

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## Education:

- **Doctor of Philosophy (PhD):** Electrical Engineering (Power electronics), University of Central Florida, Orlando, U.S.A, 2021-up to now.  
**Reward:** Fellowship for spring and summer of 2021  
Advisor: professor Issa Batarseh
- **Master of Science:** Electrical Engineering (Power), Tarbiat Modares University, Tehran, Iran, 2013-2015.  
**Overall GPA:** 4.0/4.0 (or:17.43/20)  
**Thesis Title:** " Implementation and Building a Switched Capacitor Boosting-Balancing Converter to Eliminate Partial Shading Effect ", Advisor: Dr. Ali Yazdian.
- **Bachelor of Science:** Electrical Engineering (Power), Hadaf Institute of Higher Education, Sari, Mazandaran, Iran, 2010-2012.  
**Overall GPA:** 4.0/4.0 (or:18.65/20) – Top Student  
**Thesis title:** " Technical and economic study of Gas Insolated Transmission Line in power system", Advisor: Dr. Reza Ebrahimi.
- **Associate of Science:** Electrotechnic, Technical and Vocational College of Enghelab Eslami, Tehran, Iran, 2008-2010.  
**Overall GPA:** 4.0/4.0 (or:17.82/20) – Top Student

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## Publications:

1. **Rezaii, R., Nilian, M., Safayatullah, M., Ghosh, S., & Batarseh, I.** (2021, October). “**A Bidirectional DC-DC Converter with High Conversion Ratios for the Electrical Vehicle Application**”. In IECON 2021–47th Annual Conference of the IEEE Industrial Electronics Society (pp. 1-6). IEEE.
2. Ghosh, S., Alhatlani, A., **Rezaii, R., & Batarseh, I.** (2021, October). “**Control of Grid-tied Dual-PV LLC Converter using Adaptive Neuro Fuzzy Interface System (ANFIS)**”. In IECON 2021–47th Annual Conference of the IEEE Industrial Electronics Society (pp. 1-6). IEEE.
3. **Rezaii, R., Khalili, R., Batarseh, I., & Enyioha, C.** (2021, October). “**Linear Active Disturbance Rejection Control Design for Single-Phase UPS Inverters**”. In IECON 2021–47th Annual Conference of the IEEE Industrial Electronics Society (pp. 1-6). IEEE.
4. Safayatullah, M., **Rezaii, R., Elrais, M. T., & Batarseh, I.** (2021, October). “**Review of Control Methods in Grid-Connected PV and Energy Storage System**”. In 2021 IEEE Energy Conversion Congress and Exposition (ECCE) (pp. 951-958). IEEE.
5. Alaql, F., **Rezaii, R., Gullu, S., Elrais, M. T., & Batarseh, I.** (2021, October). “**A Switchable Rectifier-based LLC Resonant Converter for Photovoltaic Applications**”. In 2021 IEEE Energy Conversion Congress and Exposition (ECCE) (pp. 2093-2098). IEEE.
6. Ghosh, S., **Rezaii, R., Alhatlani, A., Batarseh, I.** (2020, October). “**Analysis and Control of Grid-**

- Tied Quad-PV LLC Converter with MPPT**". 2020 IEEE Energy Conversion Congress and Exposition (ECCE). IEEE, 2020.
7. **Rezaii, R.**, Ameri, M. H., Varjani, A. Y., & Beiranvand, R. (2018, February). **"Overcoming partial shading issue of PV modules by using a resonant switched capacitor converter"**. In Power Electronics, Drives Systems and Technologies Conference (PEDSTC), 2018 9th Annual (pp. 38-43). IEEE.
  8. Esmaili, A. A., **Rezaii, R.**, Khodashenas, J. G. (2018, March). **"Implement of A High Current Three Phase Double Star Rectifier"**. In International Congress on Science and Engineering, 2018 International Congress, Hamburg-Germany (Verification Code: PE-BBBG)
  9. Mousavi, S., **Rezaii, R.**, Beiranvand, R., & Varjani, A. Y. (2016, February). **"A high step-up switched-capacitor converter with zero current switching technique for using in solar system applications"**. In Power Electronics and Drive Systems Technologies Conference (PEDSTC), 2016 7th (pp. 308-313). IEEE.
  10. **Rezaii, R.**, Abolhasani, M. A., Varjani, A. Y., & Beiranvand, R. (2016, February). **"Analysis of the boost converter under the DCM condition to reduce the MIC volume to mitigate partial shading effects in PV arrays"**. In Power Electronics and Drive Systems Technologies Conference (PEDSTC), 2016 7th (pp. 349-355). IEEE.
  11. Abolhasani, M. A., **Rezaii, R.**, Beiranvand, R., & Varjani, A. Y. (2016, February). **"A comparison between buck and boost topologies as module integrated converters to mitigate partial shading effects on PV arrays"**. In Power Electronics and Drive Systems Technologies Conference (PEDSTC), 2016 7th (pp. 367-372). IEEE.
  12. Goodarzi, S., Beiranvand, R., **Rezaii, R.**, Abolhasani, M. A., & Mohamadian, M. (2016, February). **"Design and implementing of a novel resonant switched-capacitor converter for improving balancing speed of lithium-ion battery cells"**. In Power Electronics and Drive Systems Technologies Conference (PEDSTC), 2016 7th (pp. 204-210). IEEE.
  13. **Rezaii, R.**, Abolhasani, M. A., Varjani, A. Y., & Beiranvand, R. (2015, November). **"New strategy of grid connected photovoltaic system using module integrated converters with B4 inverter to overcome partial shading effect"**. In Power System Conference (PSC), 2015 30th International (pp. 163-168). IEEE.

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## Honors and Awards:

- Fellowship award for spring and summer of 2021 from university of central Florida
- Straight admission to M.S. Level by the excellence of the educational records.
- Ranked 1<sup>st</sup> among all 50 students of Bachelor of Science in Electrical Engineering (Power), Hadaf Institute of Higher Education, Sari, Mazandaran, Iran, 2012.
- Ranked 1<sup>st</sup> among all 32 students of Associate of Science in Electrotechnic, Technical and Vocational College of Enghelab Eslami, Tehran, Iran, 2010.
- Elected as a member of Iran's National Elites Foundation, 2016.

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## Patents:

- Balancing-boosting Switched-capacitor converter for mitigating partial shading effects in Photovoltaic arrays, Patented in the Scientific and Industrial Research Organization of Iran, **Tehran, Iran** (Issued: Apr.11, 2016; Patent issuer and number: Ir., H03B;F16B)
- Step-up Resonant Switched-Capacitor Converter with Dual-phase structure, Patented in the Scientific and Industrial Research Organization of Iran, **Tehran, Iran** (Issued: Apr.27, 2016; Patent issuer and number: Ir., H04B;H03B)

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## Projects:

### 1. **Design, simulation of a hybrid inverter:**

Design, analysis, simulation, and control a 2kW hybrid inverter for residential application. Hybrid inverters refer to the three-port converters that have PV, Battery, and AC ports. (using Matlab/Simulink for simulation) (2021)

### 2. **Design, simulation and Implementation of a high-gain hybrid bidirectional DC-DC converter as an interface between supercapacitor and dc bus in EV application:**

Design, analysis, simulation, control, and implementation of a 400W hybrid bidirectional converter with high gain for charging and discharging supercapacitor, as the second energy storage, in EV system. (using Matlab/Simulink for simulation, Altium PCB design for designing PCB, and STM32F407VG microcontroller for the control) (2021)

### 3. **Design, control, and implementation a four-port LLC converter for PV application:**

Design, control, and implementation of a 500 W four-port resonant LLC converter which can track maximum power point of four PV panels separately. (using Matlab/Simulink for simulation, Altium PCB design for designing PCB, and STM32F407VG microcontroller for the control) (2021)

### 4. **Design and simulation of a Grid connected PV system with a four-input LLC converter: (NSF project)**

Design, analysis, simulation, and control of a 1.5 kW resonant LLC converter which can track maximum power point of four PV panels simultaneously. In addition, a single-phase space vector controller is designed for grid connection section. (using PLECS for simulation) (2020)

### 5. **Design, simulation and Implementation of a hybrid bidirectional DC-DC converter for an electrical vehicle battery charger:**

Design, analysis, simulation, control and implementation of a 1kW hybrid bidirectional converter which is combine of inductor and capacitor base converter. The converter has a very high gain which is necessary for electrical vehicle application. (using Matlab/Simulink for simulation) (2020)

### 6. **Design and Implementation of a medical defibrillation:**

Design, analysis and implementation of combination of a Flyback converter and H-bridge converter which is used in medical defibrillation. In other words, Flyback converter is used to charge a large capacitor and H-bridge converter deliver the energy to patients. (2020)

### 7. **Design and simulation of a Dual LLC converter for PV system:**

Design, analysis, simulation, and control of a 1.5 kW resonant LLC converter which can track maximum power point of two PV panels simultaneously. (using PLECS for simulation) (2019)

### 8. **Design and simulation of a Power Factor Correction (PFC) for battery charger system:**

Design, analysis, simulation, and control of a boost PFC which is used in battery charger system. (using Matlab/Simulink for simulation) (2019)

### 9. **Design and simulation of an online Uninterruptible Power Source (UPS):**

Design, analysis, simulation, and control of a UPS which can be used in home application. (using Matlab/Simulink for simulation) (2019)

**10. Implementation of a set of high power three phase double star rectifier (including a 6-Phase Transformer, a double star rectifier with interphase connection, and Control electrical enclosure):**

Design, analysis, simulation, control, and implementation of a 6 kA, 180 kW high power three phase double star rectifier. (using Matlab/Simulink for simulation, Altium PCB design for designing PCB) (2017)

**11. Implementation of a high power three phase double star rectifier:**

Design, analysis, simulation, control, and implementation of a 6 kA, 240 kW high power three phase double star rectifier. (using Matlab/Simulink for simulation, Altium PCB design for designing PCB) (2018)

**12. Implementation of a high voltage Zero-Current Switching Switched-Capacitor DC/DC Converter:**

Design, analysis, simulation, control, and implementation of a 1.5 kV step-up resonant switched capacitor converter (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120) (2018)

**13. Implementation of a Single Phase Uninterruptible Power Source (UPS) with Peak to Peak Controller:**

Design, analysis, simulation, control, and implementation of a 240 W single phase UPS for linear and non-linear load with peak to peak control (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120, using HCPL7840 as voltage measurement) (2014)

**14. Implementation of a Cascaded H-bridge multilevel inverter (CHB):**

Design, simulation, control, and experimental implementation of a 3-Level CHB (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120) (2015)

**15. Implementation of a Boost converter for Maximum Power Point Tracking (MPPT) of in photovoltaic system:**

Design, simulation, control, and experimental implementation of 53W DC/DC converter for MPPT with Hill Climbing method (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120, using HCPL7840 as voltage measurement, and LTS25NP as current measurement, M55 PV module) (2015)

**16. Implementation of a new switched capacitor converter to reduce partial shading in photovoltaic system:**

Design, analysis, simulation, and experimental implementation of a resonant switched capacitor converter to prevent from damage of photovoltaic panels. (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120) (2015)

**17. Implementation of a B4 inverter for grid connection in a photovoltaic system:**

Design, analysis, simulation, and experimental implementation of a B4 inverter with 2 legs in 3-phase grid connection (using ARM-STM32F407 as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120) (2014)

**18. Implementation of a 2-Level system (including a step-up converter and an inverter used in photovoltaic system):**

Design, analysis, simulation, and experimental implementation of a PV inverter with switched-capacitor converters used as the interface of the PV panel and the inverter (using ARM-STM32F407

as the controller, Matlab/Simulink for simulation, Altium PCB design for designing PCB, designing gate driver circuit using HCPL3120) (2015)

**19. Lithium-Ion Battery Cell Equalizers:**

A new design, analysis, and simulation for increasing balancing speed of a switched-capacitor battery equalizer (using Matlab/Simulink for simulation) (2015)

**20. DC motor control system:**

Design and simulation of DC motor controller with Four-Quadrant DC/DC converter and using PI controller (using Matlab/Simulink for simulation) (2014)

**21. AC motor control system:**

Design and simulation of three-Phase induction motor controller by three-phase inverter and using two control methods: 1.Vector control method, 2. Direct torque control (DTC) method (using Matlab/Simulink for simulation) (2014)

**22. Voltage control of a 3-phase voltage source inverter:**

Design, simulation, and control of 3-phase inverter by using new space vector method (using Matlab/Simulink for simulation) (2014)

**23. Current control of a 3-phase voltage source inverter:**

Design, simulation, and control of 3-phase inverter by using two control methods: 1.hysteresis loop control, 2.PR control (using Matlab/Simulink for simulation) (2014)

**24. Flexible Alternating Current Transmission Systems (FACTS) project:**

Study of mathematical model and control of Static Var Compensator (SVC) in power system (2013)

**25. General Theory of Electrical Machines project:**

Study and simulation of fault on power system and its effect on induction motors which are working in this system. (using Matlab/Simulink for simulation) (2013)

**26. Implementation of electrical enclosure:**

Design and implementation of some control electrical enclosures which are using in industrial places (2015- 2018)

**27. Implementation of a line tracking robot:**

Design and implementation of a line tracking robot as my high school project (using AVR- ATMEGA32 as the controller, using CNY70 sensor) (2007)

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## Selected Graduate Course:

- Power Electronics
- Electrical Drives
- Advanced Motion Control systems
- Switched Mode Power Supplies
- Resonant Converters
- Flexible Alternating Current Transmission Systems (FACTS)
- General Theory of Electrical Machines
- Modern Control
- Linear Systems

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## Skills:

- **Technical Software:**

MATLAB\Simulink, PLECS, PSCAD, PSPICE, Proteus, Altium Designer (Design of Printed Circuit Boards), Keil  $\mu$  Vision, CodeVision, Bascom, Code Composer Studio, DIGSILENT.

- **Microcontroller and Microprocessor Programming**

ARM (STM32F407VG, LPC21XX, LPC17XX), AVR microcontrollers (ATMEGA series), PIC microcontroller (16F877)

- **Programming Language:**

Matlab, C programming, C++, and Basic.

- **General Software:**

Microsoft Office (Word, Excel, PowerPoint, Visio), Math Type, Mathcad, and InDesign.

- **Relative Skills:**

PCB Design and Test, Design and Implementation of Magnetic Components, Analog Circuit Design, Soldering and Simulation, Welding and turning.