Abhinav Chinnusamy

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Education

Indian Institute of Technology — Dharwad, India
Bachelor of Technology - Electrical Engineering — *Aug 2020 – Apr 2024*

Coursework: Intro to Power Electronics, Electrical Machines and Power Electronics Lab, Design of Photovoltaics, Electronic Design Lab, Batteries for Electric Transportation, Introduction to Electric Vehicle Architecture.

Research Experience

Power and Energy Group, IIT Dharwad — Karnataka
Undergraduate Researcher — *Aug 2023 – Present*

- Designing a solid-state circuit breaker for Electric Vehicles and DC homes with a spec range of 800V and 70A using SiC Devices under Dr. Satish B Naik.
- The device uses an onboard microcontroller to detect short circuits and over currents and MOV protection to prevent voltage spikes during switch opening.
- Designed the schematic and a compact PCB with copper busbar for high current applications, considering the thermal and electrical constraints. The upcoming tasks will include fabricating the board and testing.
- Working under Dr. Abhijit Kshirsagar on Analysis of Interleaved Boost Converters and equal current sharing techniques.

Power and Energy Group, IIT Dharwad — Karnataka
Undergraduate Researcher — *Dec 2022 – Apr 2023*

- Worked under Dr. Abhijit Kshirsagar on "Half-Bridge Inverter using Infineon GaN devices".
- Created schematic designs from the ground up, made a small and efficient layout for the circuit board with separate power sources, and reflowed all the parts on the board in our facility.
- The gate driver on this board utilizes an RC circuit to produce a negative voltage during the turn-off period, ensuring compatibility with unipolar power supplies for gate-driving purposes.
- Conducted Double Pulse Test on this board and evaluated its performance and switching characteristics.

Projects

Grid Connected PV System(Ongoing)

- Working in a team of 13 members to design and fabricate a Grid-Connected Solar Inverter within a two-month timeline.
- My current focus is on developing the DC/DC converter for MPPT and working on its PCB design.

SmartMeter(AC/DC) | *Webpage*

- Designed current and voltage sensor boards with bi-directional sensing capabilities and seamlessly integrated them with an Atmega 2560 microcontroller, enabling versatile data acquisition and control.
- Developed a comprehensive data logging system utilizing an ESP-01 module to transmit data to ThingSpeak for real-time monitoring. Implemented a custom web interface for data visualization and incorporated fault protection mechanisms to ensure data integrity and system reliability.

High Bandwidth Current probe

- Designed and fabricated an 80MHz current probe on 4-Layer PCB with Ti's OPA855(QFN-2mm*2mm).
- Compatible with a Current Shunt Resistor and outfitted with SMA and MMCX connectors, ensuring rapid and secure connectivity and optimal signal integrity.
- Mainly for DPT Setups with GaN switches, where the demand for high bandwidth current probes is critical.

RP2040 dev-board | *GitHub*

- Designed and fabricated a development board using RP2040 in KiCad, demonstrating proficiency in electronic hardware design and hands-on manufacturing.
- Thoroughly documented the entire design and fabrication process, showcasing excellent attention to detail and the ability to communicate technical information effectively.

Awards & Achievements

INovEX Challenge by DHARTHI: Upon presenting our concept for developing an SOS Band to DHARTHI Foundation, we secured Rs. 50,000. As of now, the prototype has been constructed and is undergoing testing. (2023)

RT-Thread IoT Contest: Selected for final stage of the contest and received RISC-V hardware board(CH32V208) as a token of appreciation. (2023)

3rd Pos. in Electronics Design EXPO: Presented our EDL lab project, SmartMeter, in the Annual Electronics Design EXPO of IIT Dharwad and secured 3rd position with a cash prize. (2023)

3rd Pos. PCB Design Hackathon, IPTIF, IIT Palakkad: Designed a schematic and PCB of Boost converter for 250W PV applications. (10V-23V DC to 24V DC). (2022)

Mixed Signal Circuit Design and Simulation Marathon, FOSSEE: Simulated a buck converter circuit in eSim and got cash reward for the simulation. (2022)

Certificate of Completion, Circuit Building, ELAN&NVISION, IIT Hyderabad: Designed and simulated buck converter and inverter circuits with provided specifications. (2022)

Skills

Tools:	KiCad, Altium, Matlab, Simulink, LTSpice, PLECS, SIMetrix
Equipments:	Scopes, AFGs, Current Probes, Power Analyzers, LCR meters, SMD microscopes
Boards:	Arduino, Raspberry Pi, ESP
Soldering:	Hot Air, Reflow oven
Languages:	English, Tamil, Hindi (Elementary)

References

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Dr Satish Naik
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