Introduction of Power Electronics (PE) Laboratory

Room: 8019-1 (Electrical Engineering Building)

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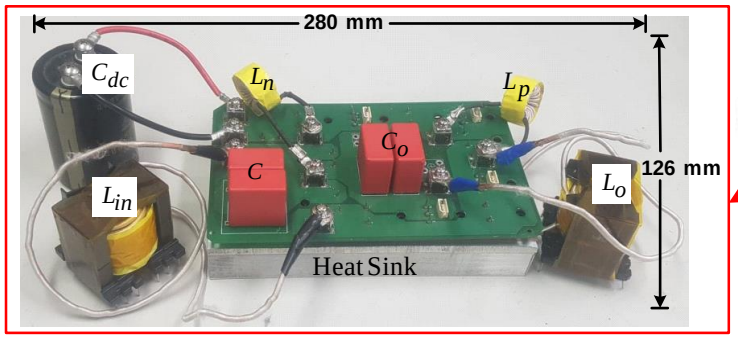
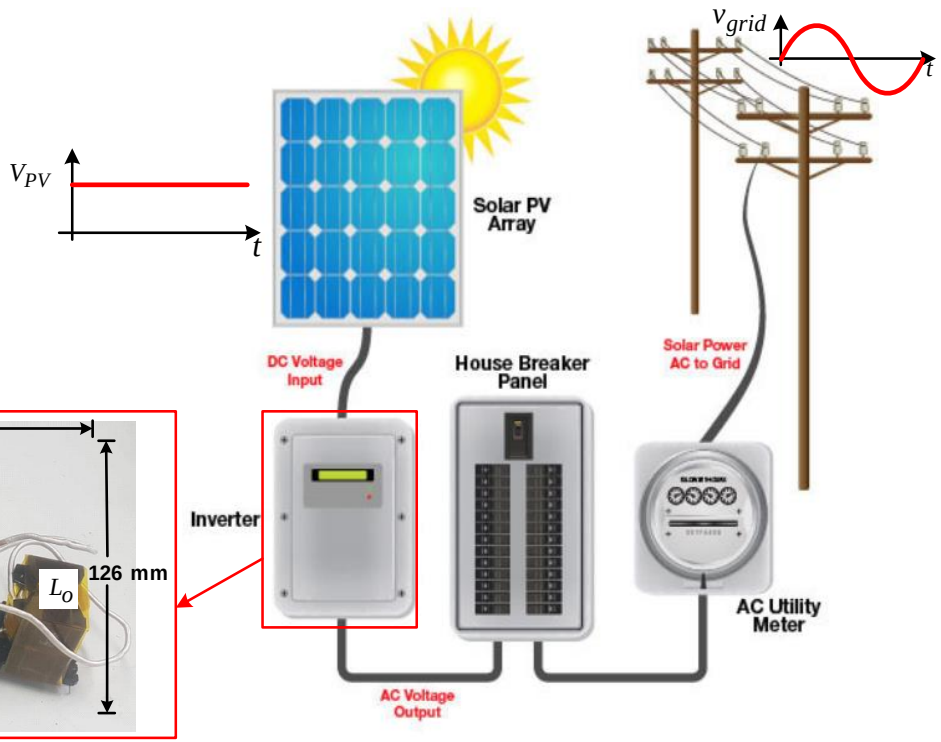
December 11, 2024

I. Development of Single-Phase Buck-Boost PV Inverters

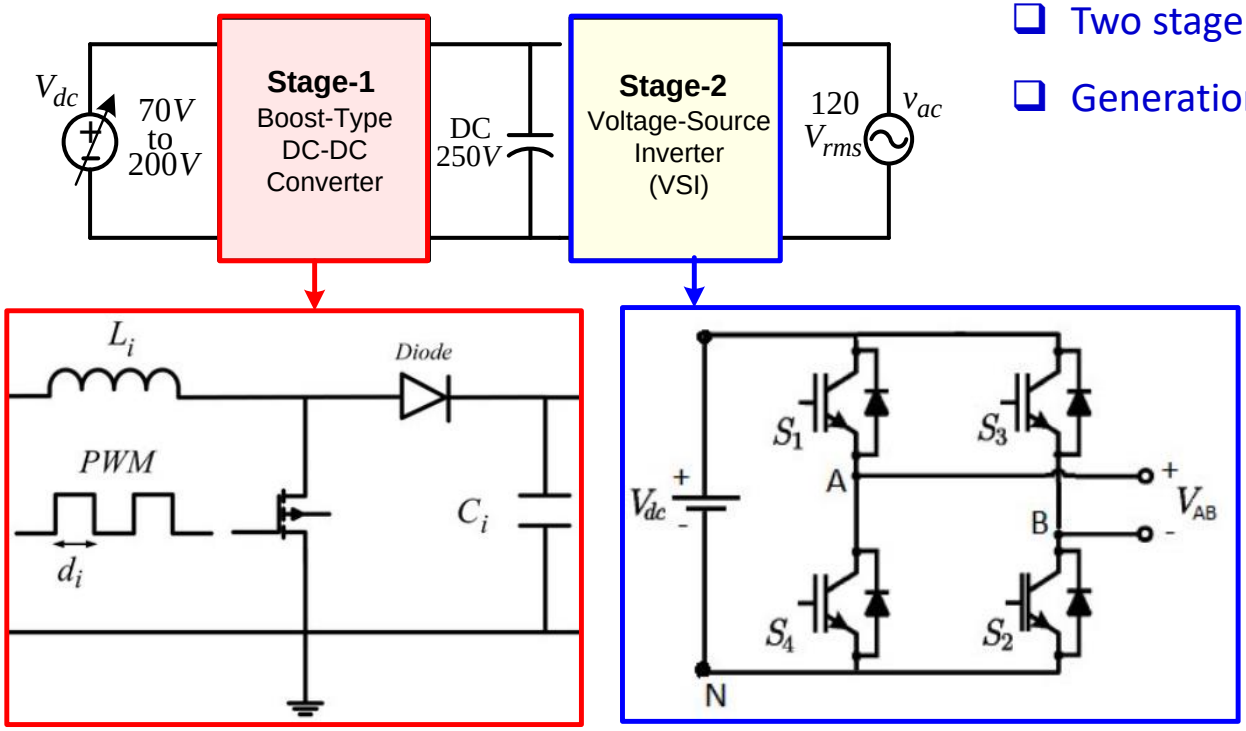




Limitations of the Conventional Voltage Source Inverter for PV Applications

- A buck-boost inverter system is required for PV applications

Conventional two-stage buck-boost inverter

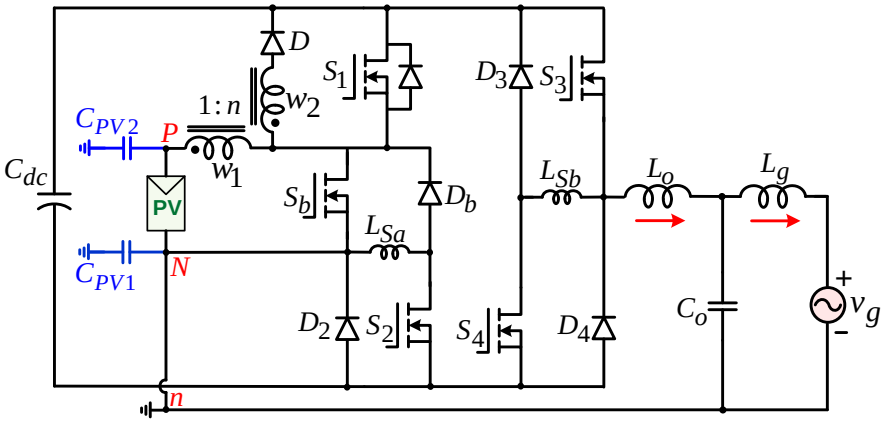


Drawbacks

- Two stage power conversion (dc-dc-ac)
- Generation of PV to grid leakage current

Proposed Single-Stage Buck-Boost Inverter

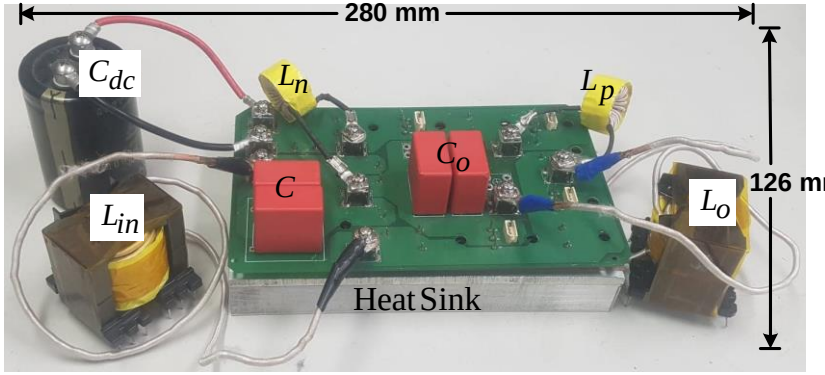
Proposed buck-boost inverter



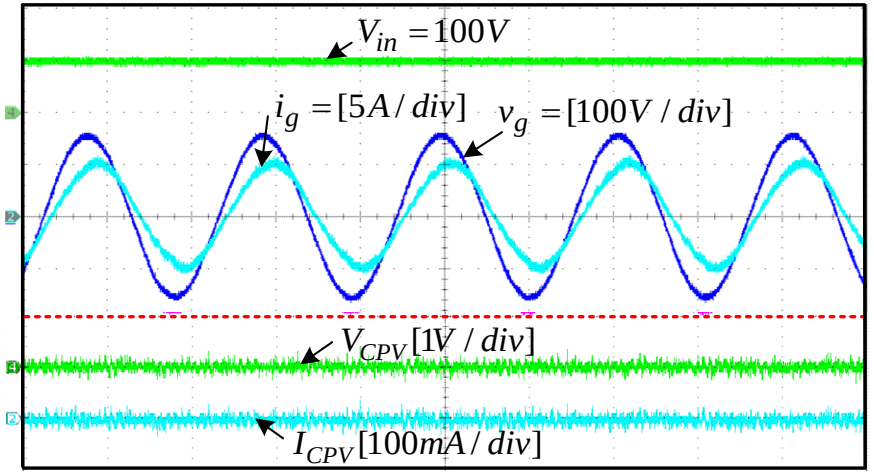
Features

- Single-stage buck-boost voltage inversion
- Common-ground point between PV panel and Grid
- Elimination of PV leakage current

Hardware prototype



Experimental waveforms

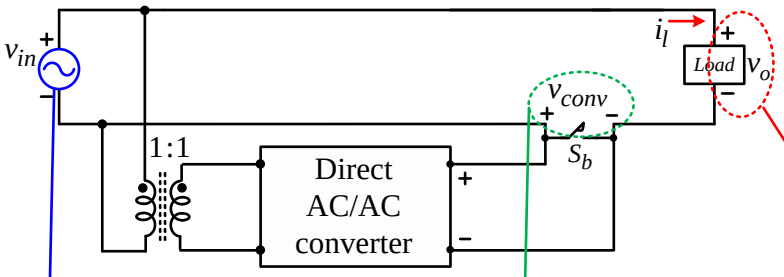


II. Development of AC-AC Converters for Grid Voltage Regulation

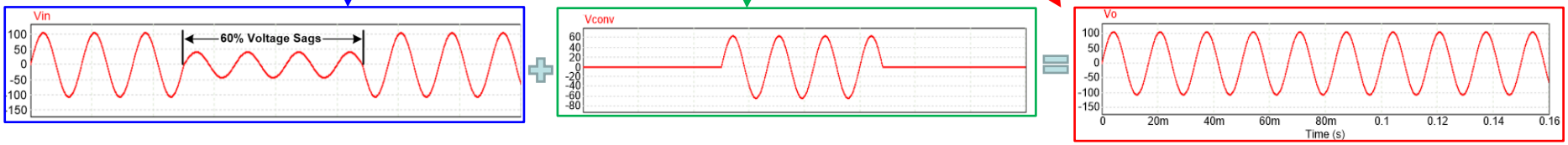
Direct AC-AC Converter Based Dynamic Voltage Restorer (DVR)

- Stabilize the grid voltage through series voltage injection

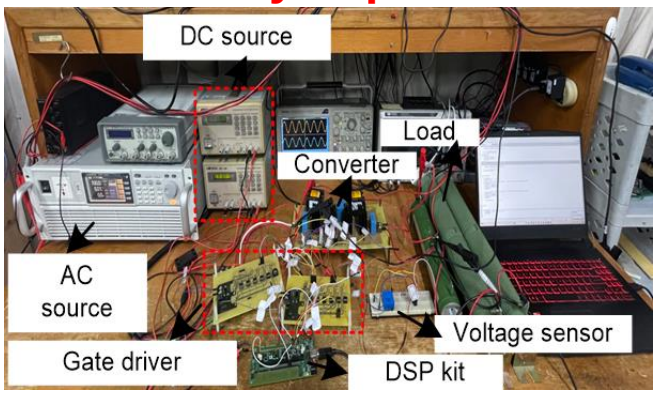
➢ **Direct AC/AC converter based DVR**



$$v_o = v_{in} + v_{com}$$



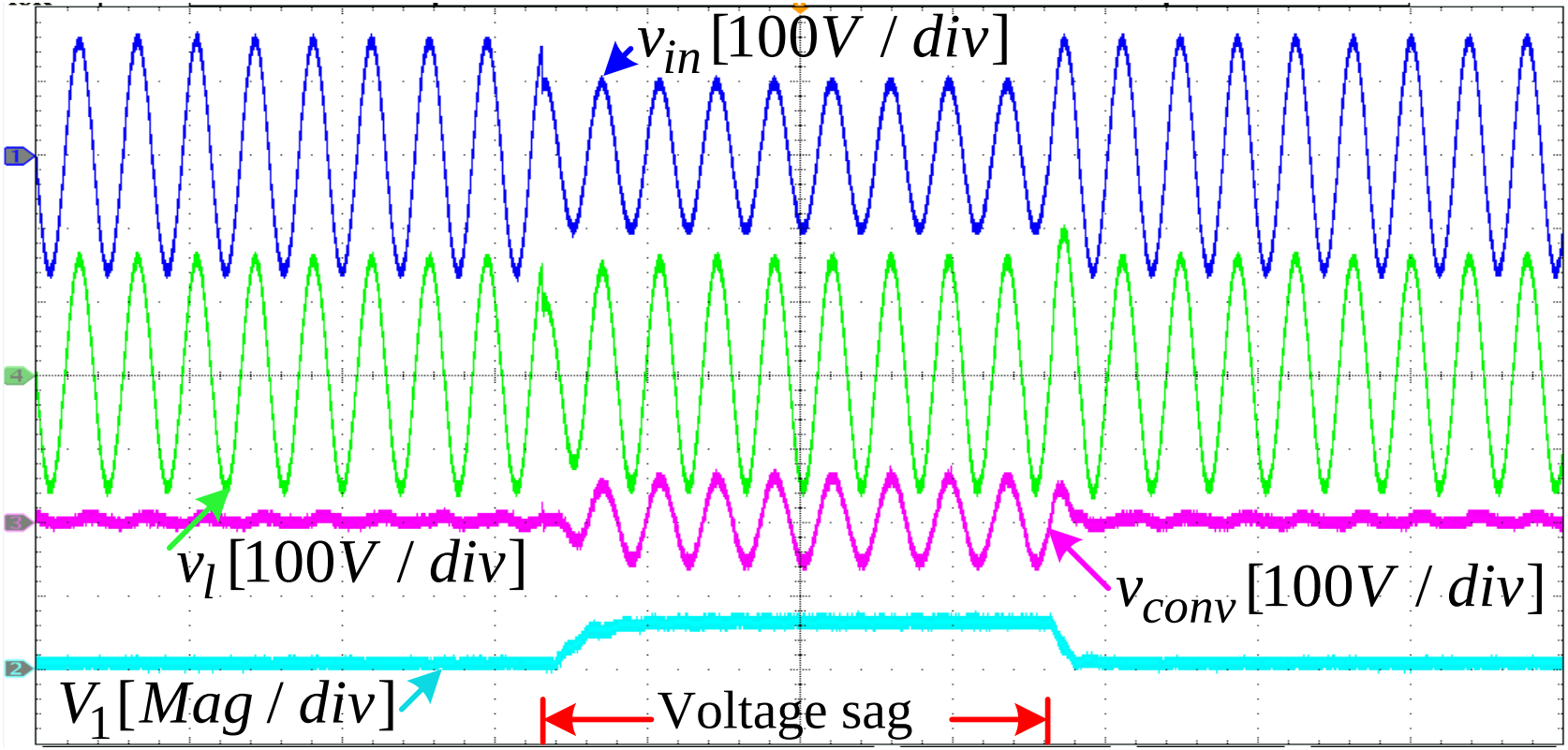
➢ **Laboratory implementation**



- **Key features**
  - ➢ Single-stage power conversion
  - ➢ No external dc-source

Experimental Results for Voltage Sag

- **Voltage sag- depth of 36%**
  - v_{in} drops from 110 V_{rms} to 70 V_{rms}
  - v_o is regulated to 110 V_{rms}



Thank you for your attention !