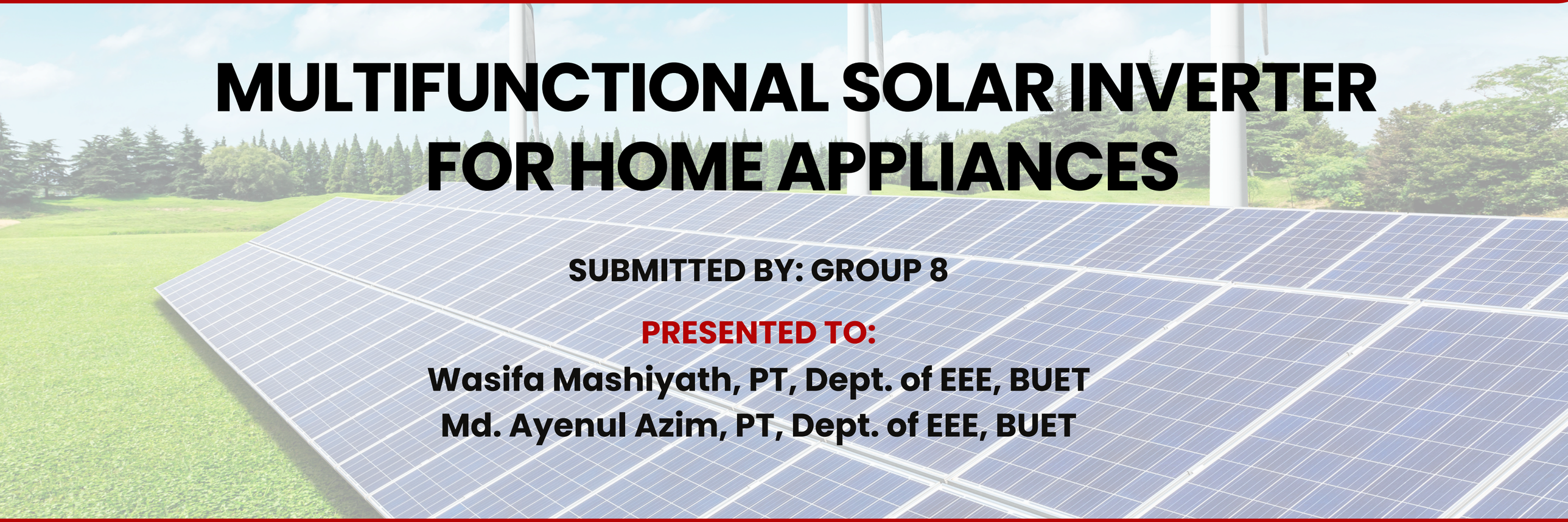
EEE 316 - Power Electronics Laboratory

Jan 2024 Level-3 Term-2 Section-B2

Final Project Demonstration



MULTIFUNCTIONAL SOLAR INVERTER FOR HOME APPLIANCES

SUBMITTED BY: GROUP 8

PRESENTED TO:

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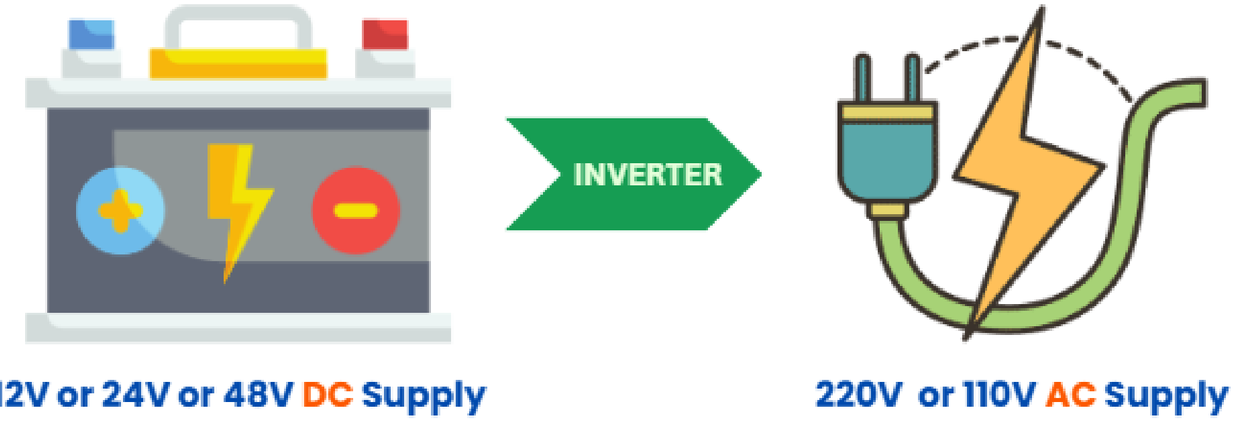
SUMMARY

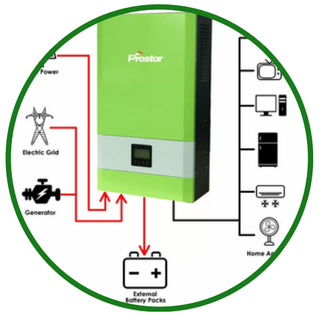
1. Solar energy is a sustainable, abundant, and cost-effective power source that reduces environmental impact and drives innovation in modern power systems, making it essential for a cleaner, more resilient energy future.
2. Solar panels will absorb solar energy it will charge the battery and run as a totally independent solar power system.
3. Solar inverter is a critical component in a solar energy system. It converts DC power output into AC current that can be fed into the grid and directly influences the efficiency and reliability of a solar energy system. The Inverter circuit converts DC to AC and applies to the 12*2/220V transformer to the load.
4. A solar charger circuit is used to charge a battery which would be fed into the inverter's source. •Boost converter is used to achieve higher voltage which can be used to drive load or ensure fixed voltage to the inverter circuit.



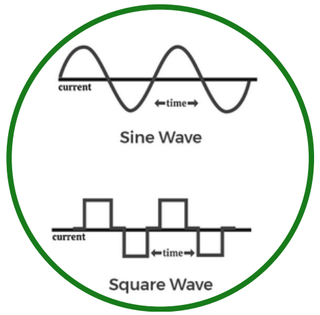
LITERATURE REVIEW

The quality of work in the inverter field has been widely studied, with various approaches applied in different regions.

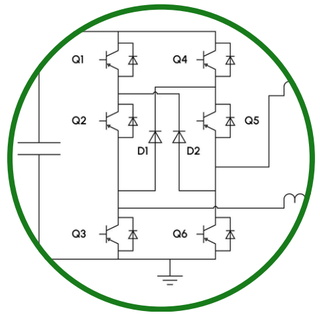
Hybrid inverter that also powers the utility grid



Inverter with MPPT controller

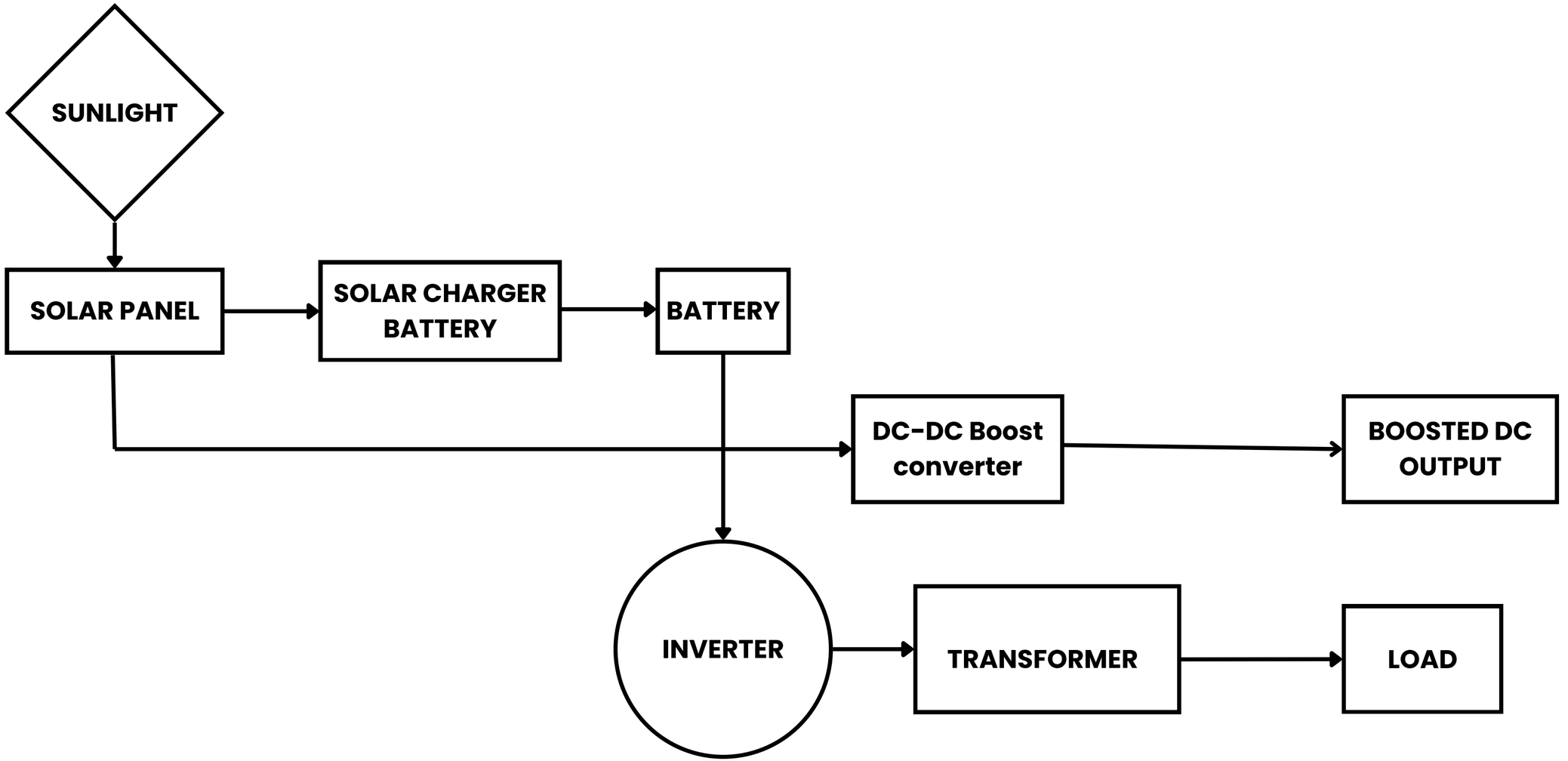


Square and Sine wave inverters

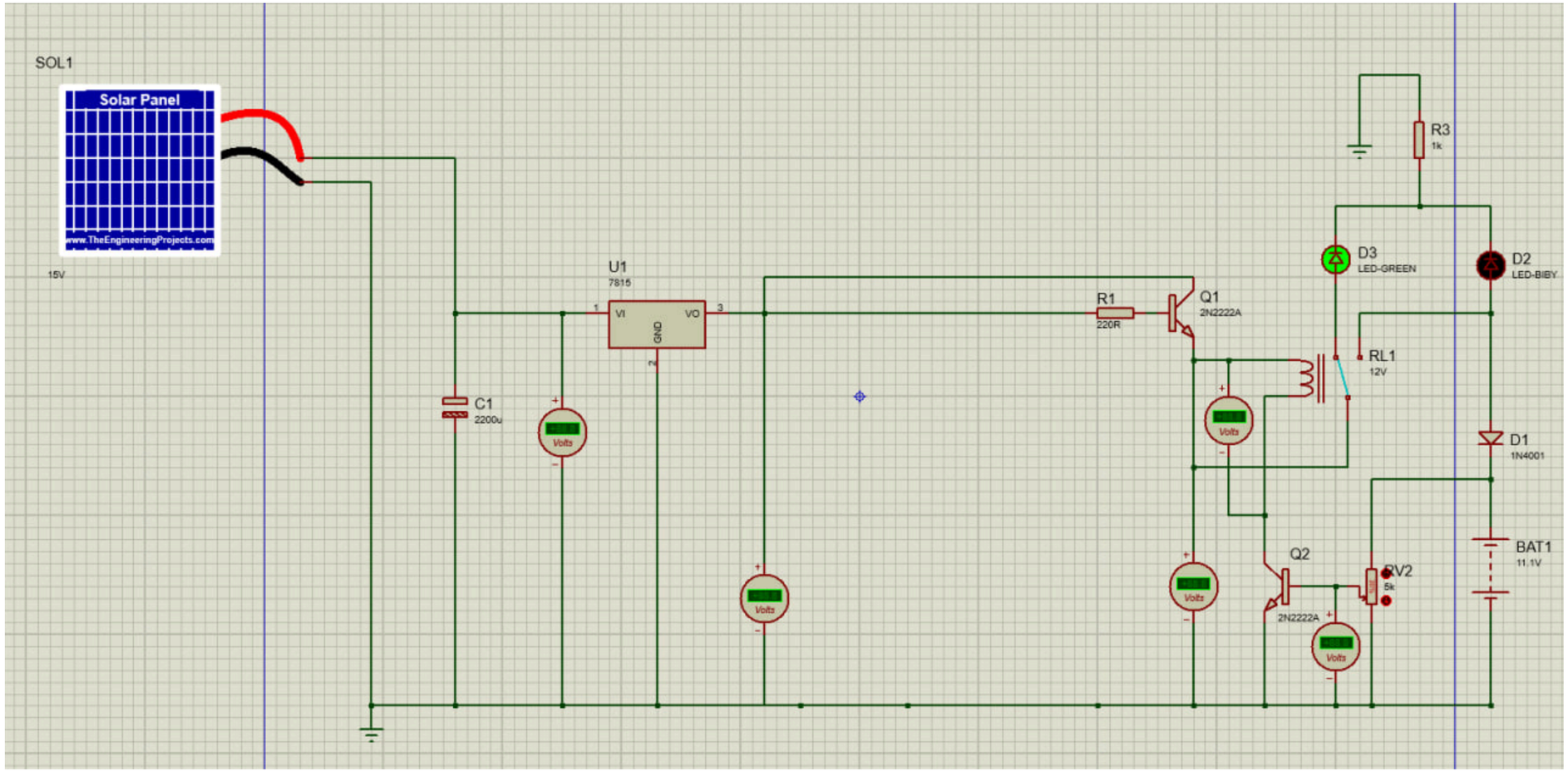


PWM Inverters

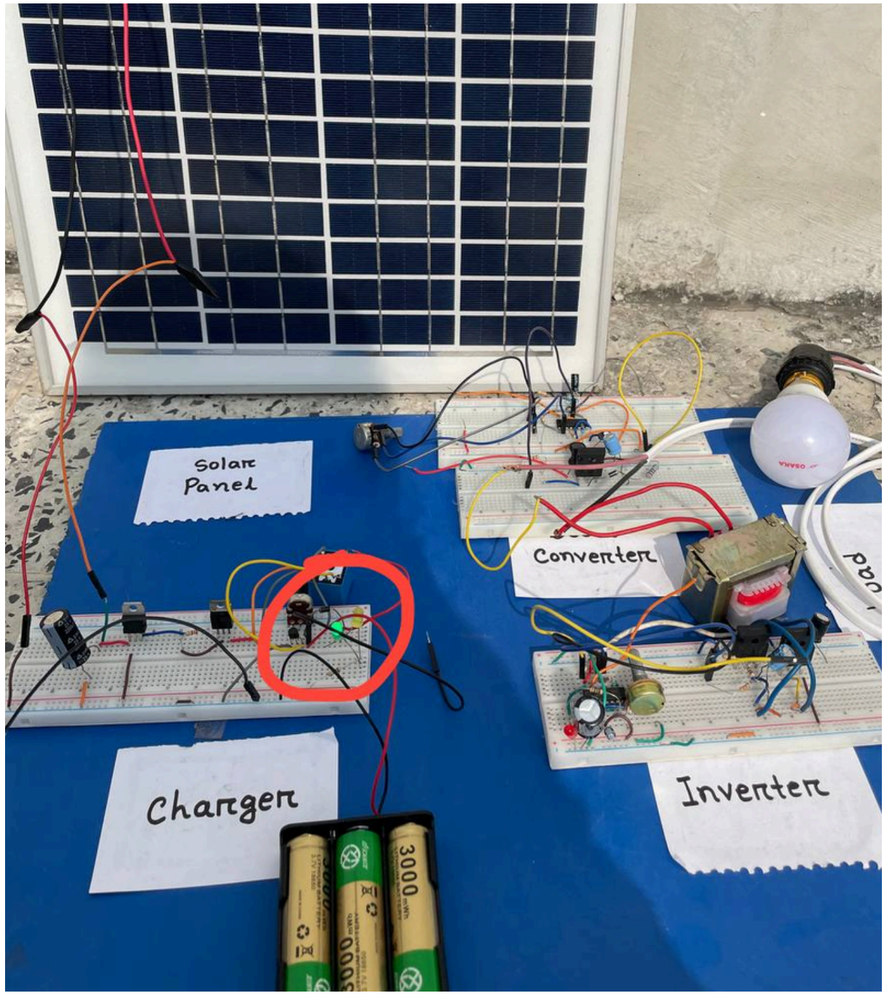
BLOCK DIAGRAM

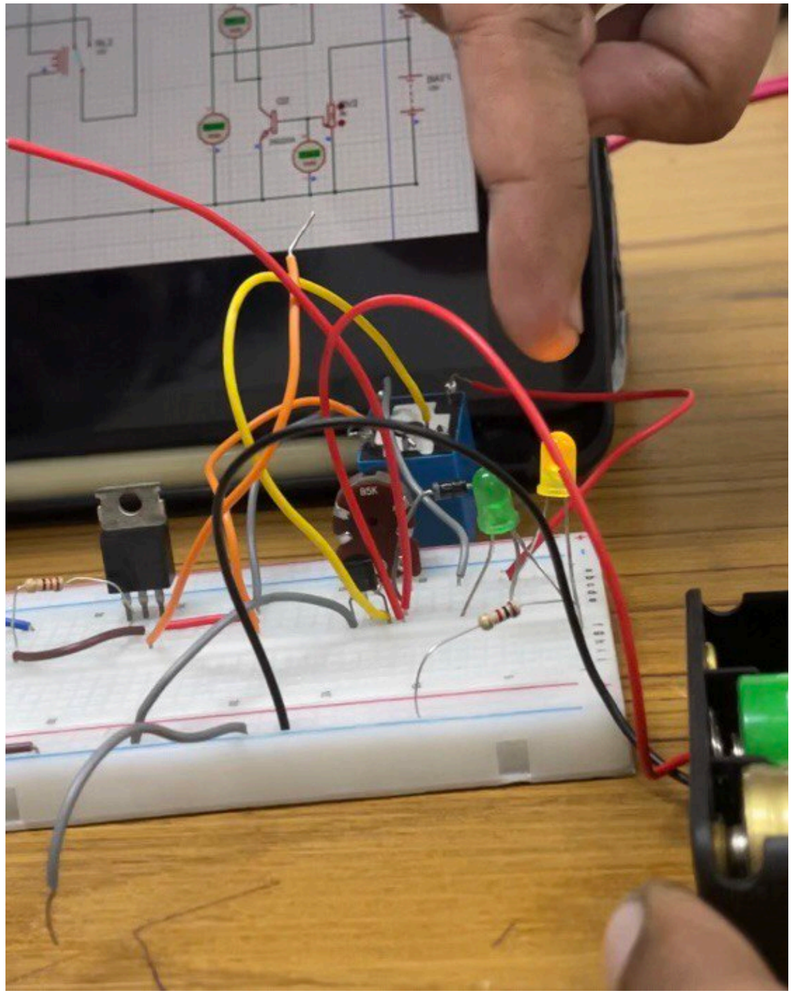


CHARGER CONTROLLER

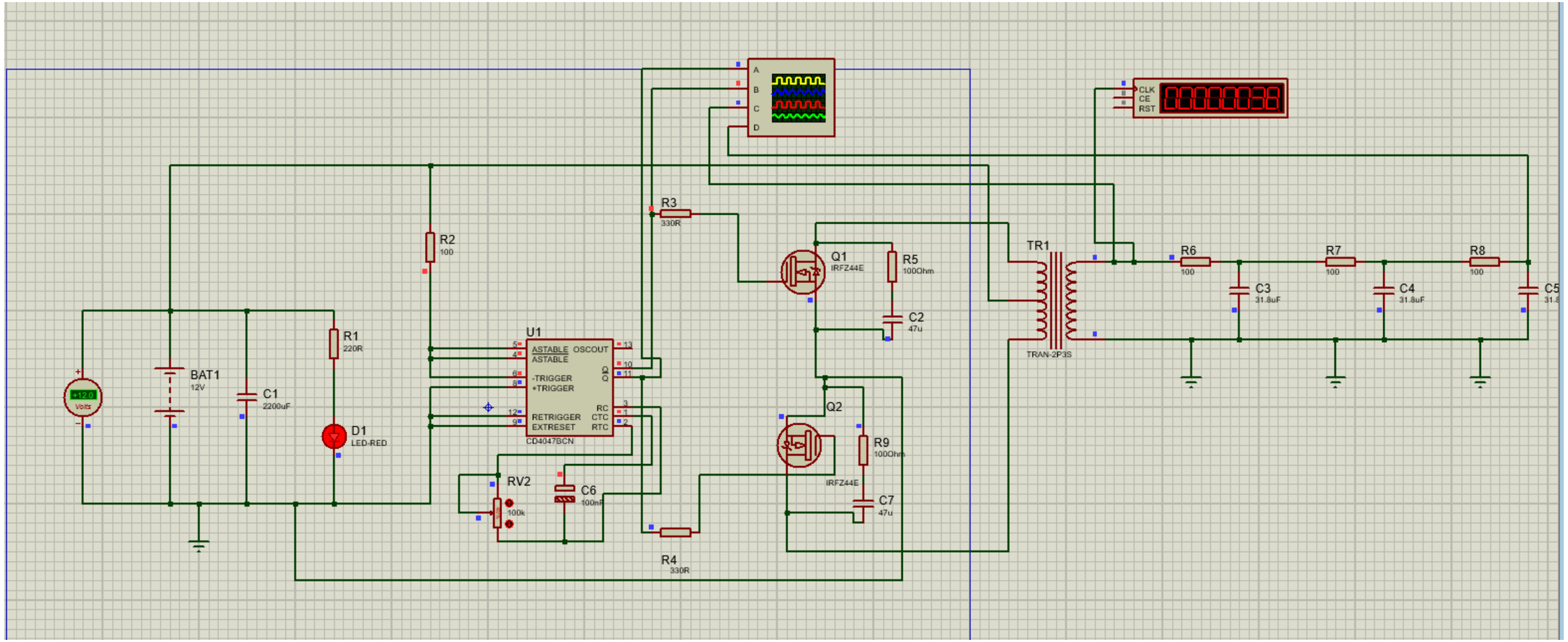


CHARGER CONTROLLER





DC TO AC INVERTER



DC TO AC INVERTER

Simulation OUTPUT

In lab,Vcc=10V

Frequency =48.8Hz

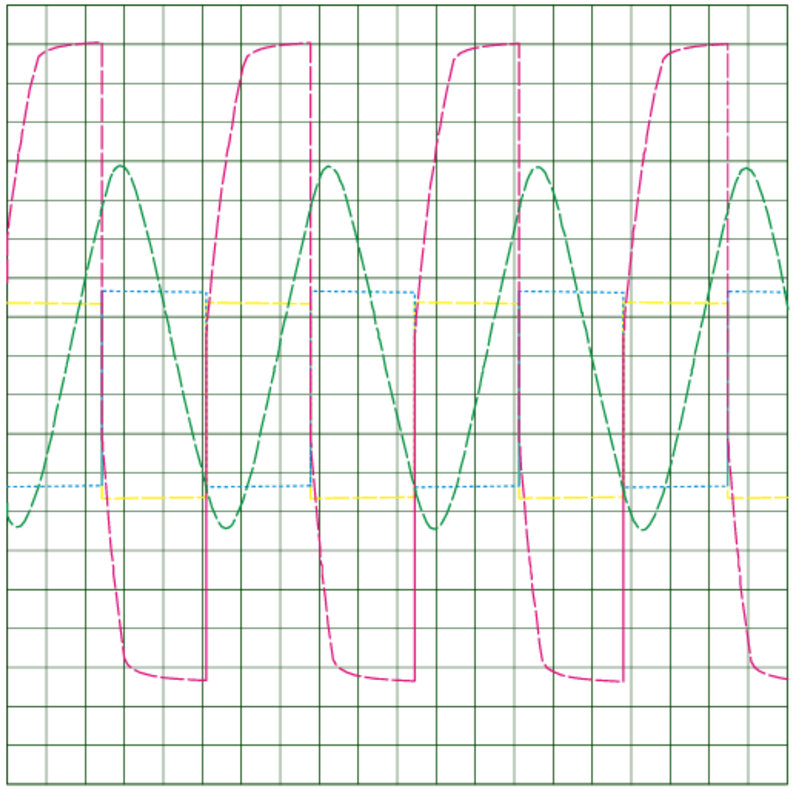
t=4.4RC

f= 1/(4.4RC)

C=100nF

R is calculated to be 45.454k ohm which is adjusted by 100k pot

Low pass RC filter was tried to get perfect sinusoidal waveshape but capacitor's rating didn't support >200V



	Channel A	Channel B	Channel C	Channel D
V/Div	1.00 V	1.00 V	20.00 V	10.00 V
Offset	0.00 V	0.00 V	0.00 V	0.00 V
Invert	Normal	Normal	Normal	Normal
Coupling	AC	AC	AC	AC

DC TO AC INVERTER

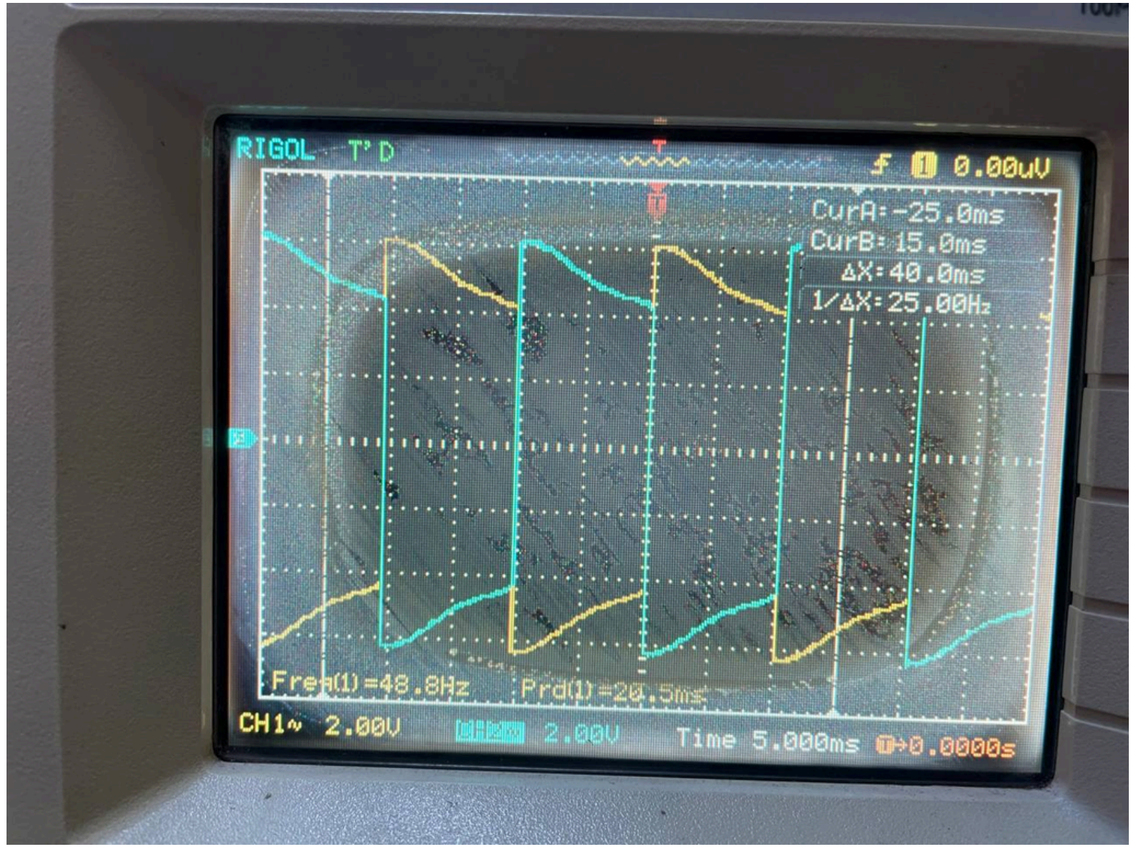


Fig: IC Inverted Pulse

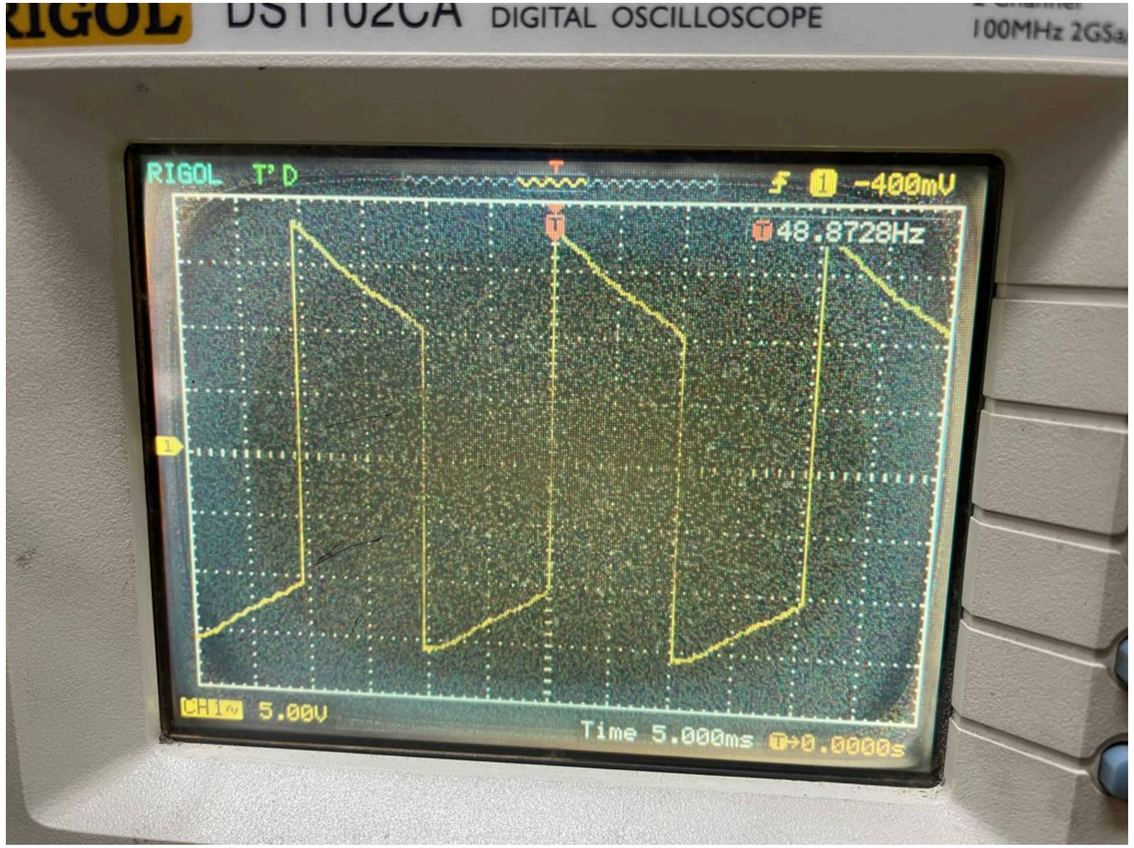
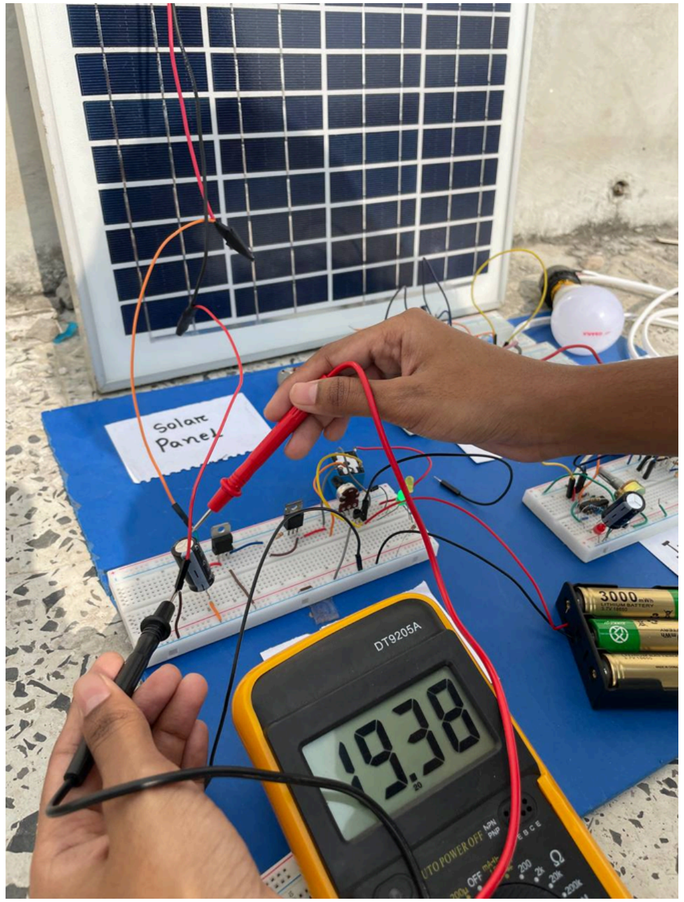
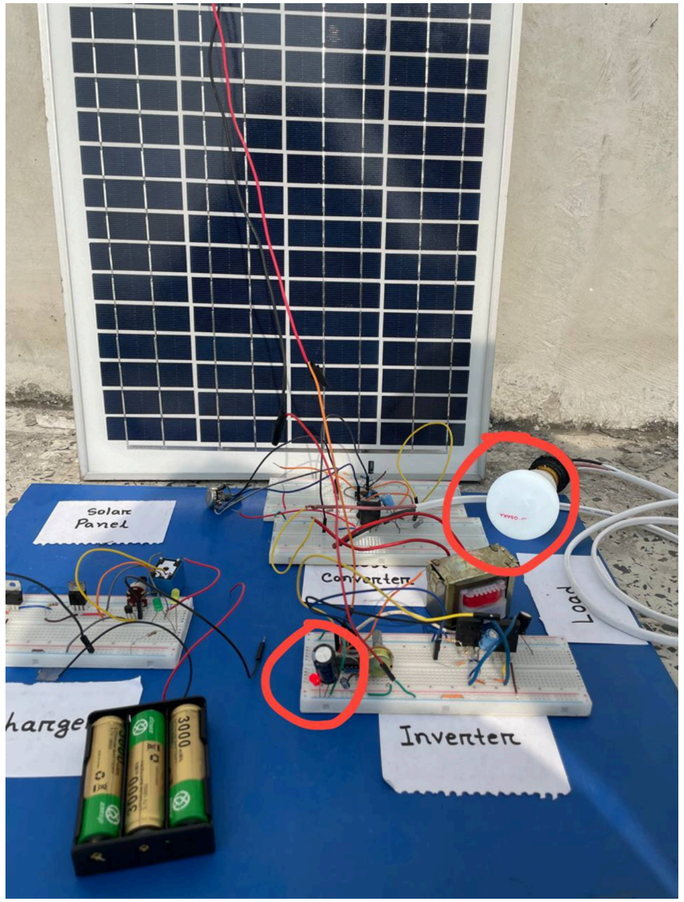
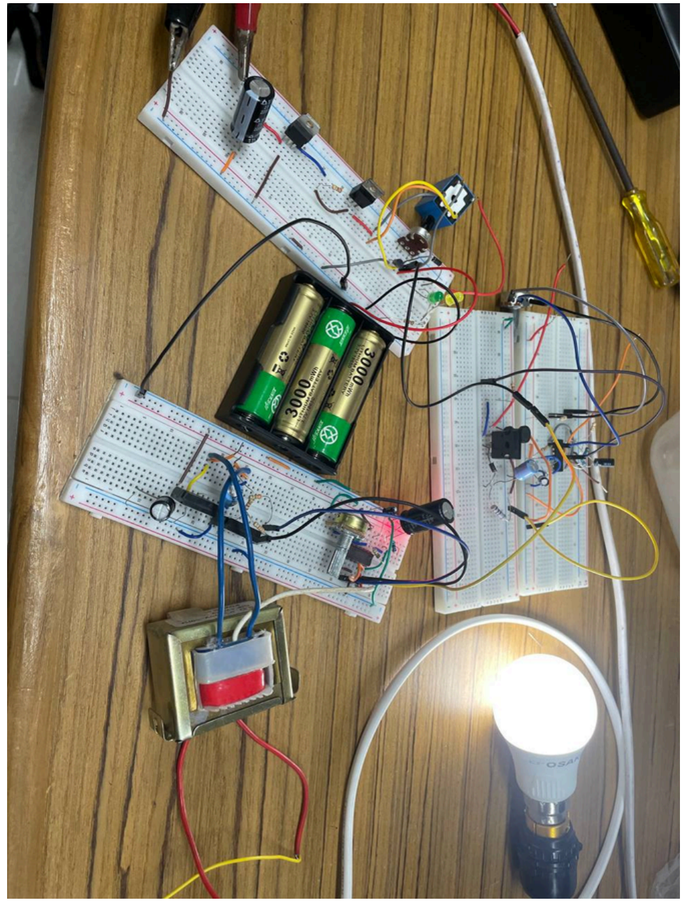


Fig: AC inverterd Output

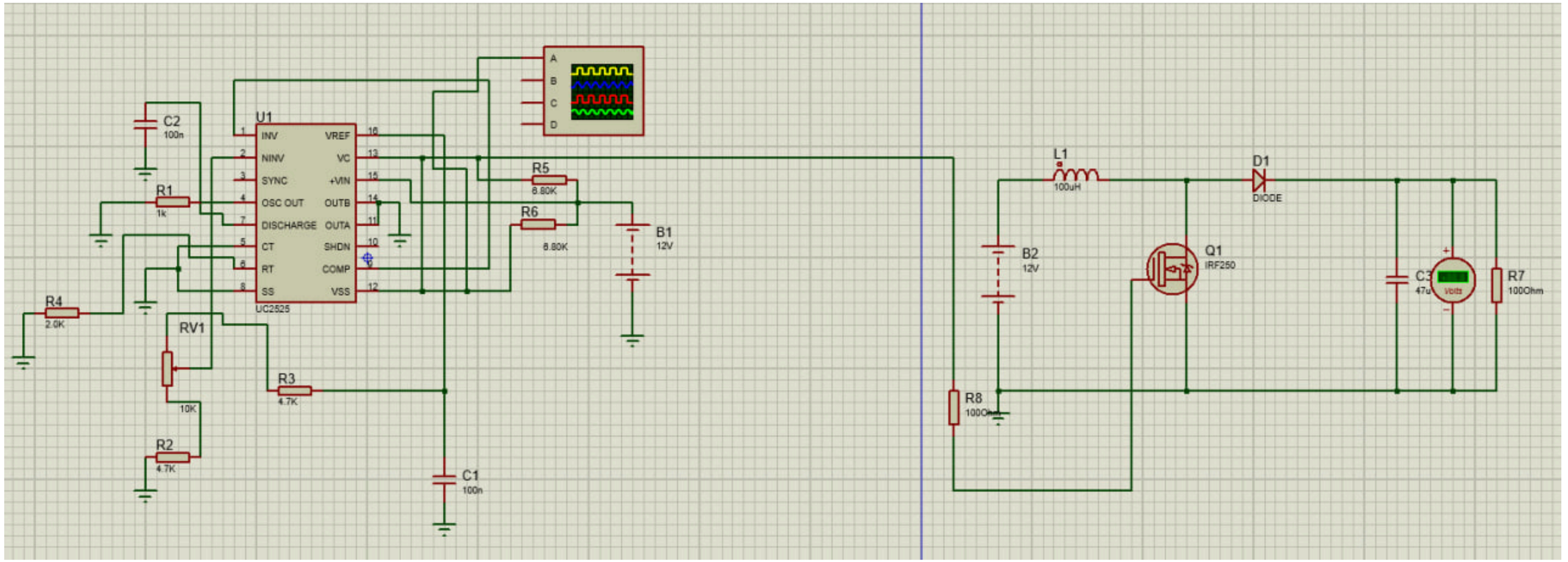
DC TO AC INVERTER



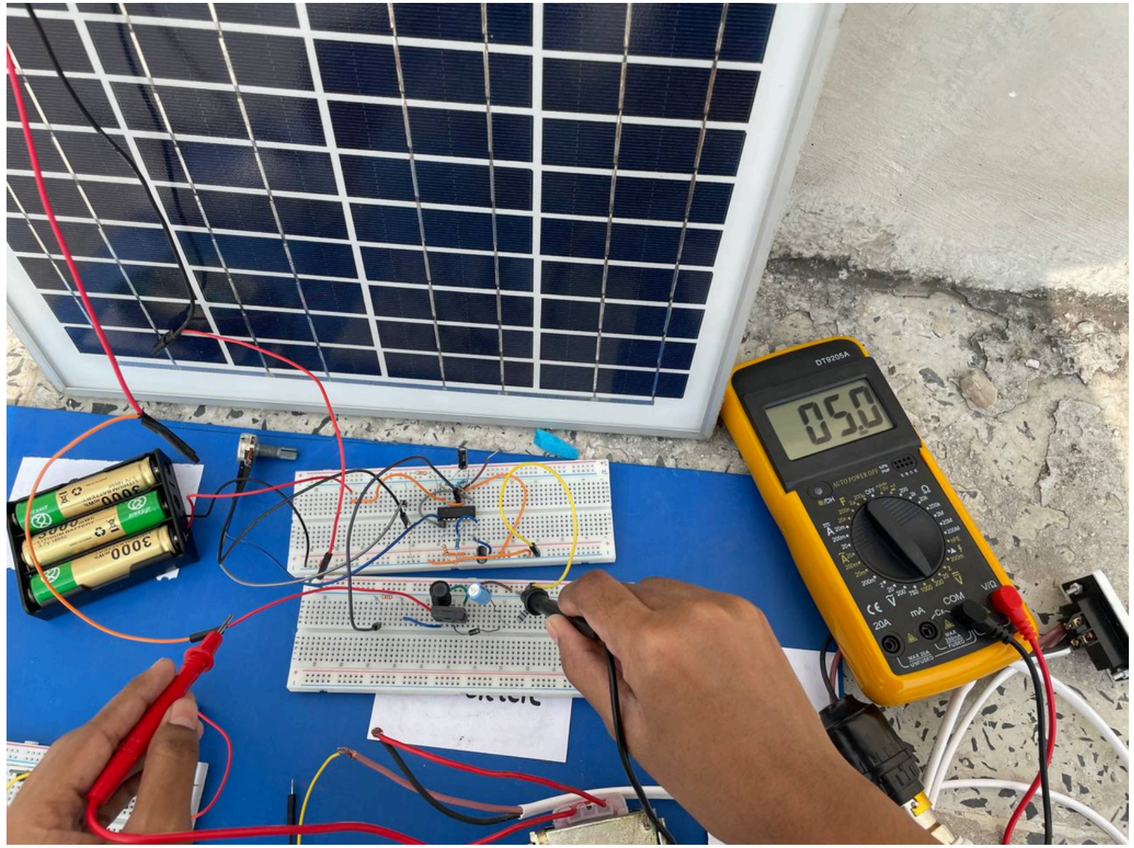


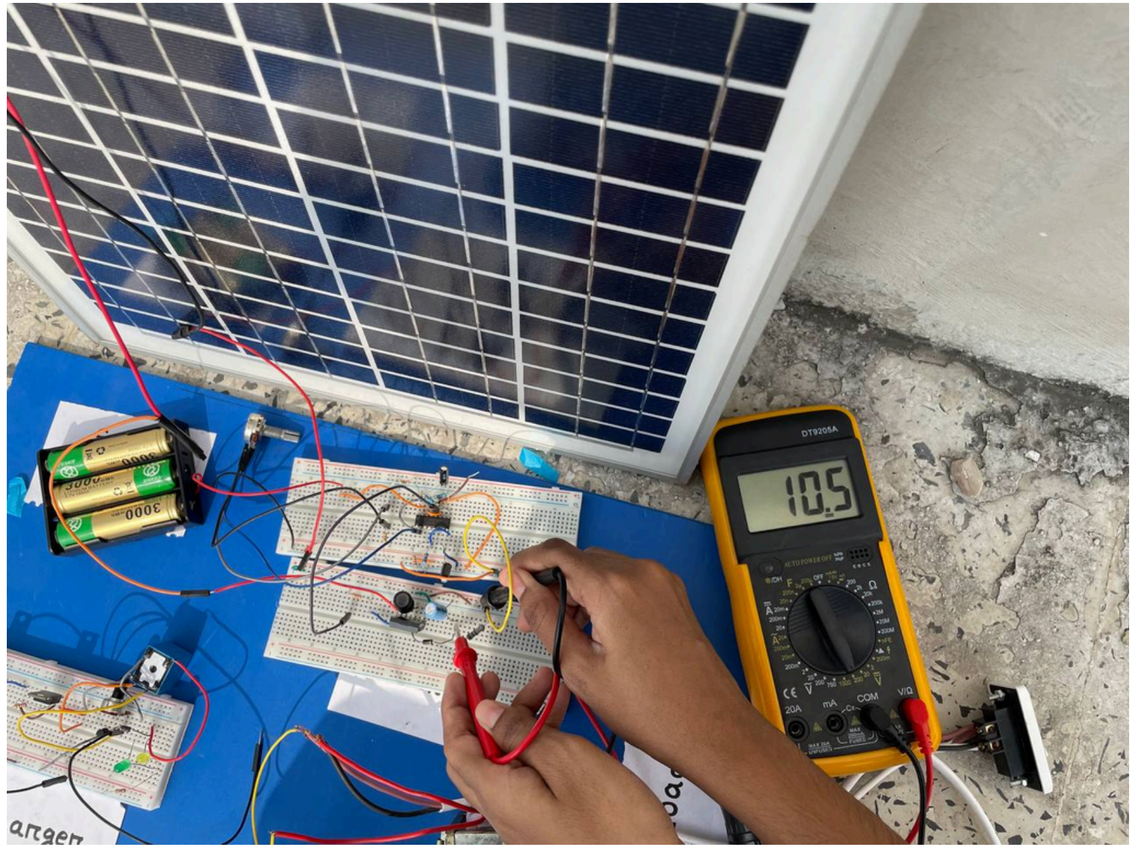


BOOST CONVERTER



BOOST CONVERTER





REAL LIFE APPLICATIONS

Considerations to public health and safety	When implementing a solar panel, it's important to consider factors such as structural integrity, ease of access, and electrical and fire safety.
Considerations to environment	We are planning for the recycling of solar panels at the end of their life. Additionally, our project does not release any harmful substances and uses clean, renewable energy.
Considerations to cultural and societal needs	This project is ideal for rural areas where power outages are common and frequent, and where the demand for electricity is low.

REAL LIFE APPLICATIONS

Assessment of Societal and Cultural Issues	The main goal of our project is to provide access to electricity and ensure the efficient use of resources for poor and underdeveloped communities.
Assessment of Health and Safety Issues	As solar power is renewable and environmentally friendly, the project has no negative impact on the environment.
Assessment of Legal Issues	It does not violate any legal regulations; in fact, it could help reduce power theft by providing access to electricity for all.

FUTURE WORK

1. Using an RC Filter would result in a perfect sinusoidal wave-like simulation result
2. Ensuring more accurate functionality of the boost converter circuit
3. Using high-rating wire for better tolerance
4. Integrating sophisticated control systems, such as microcontroller-based monitoring, to maximize performance and facilitate fault diagnosis.

WORK DISTRIBUTION

100 IDEA GENERATION AND SOLAR INVERTER CIRCUIT

109 DESIGN IMPLEMENTATION AND BATTERY CONTROLLER CIRCUIT

103 DESIGN IMPLEMENTATION AND BOOST CONVERTER CIRCUIT

110 HARDWARE SETUP,COMMUNICATION AND DEBUGGING

OBE OUTCOMES

- CO3: Review the scopes of improvement related to the power electronics field. PO(b)
- CO4: Design power electronic circuits with appropriate considerations to safety, cultural, societal, and environmental considerations. PO(c)
- CO5: Assess impact of power electronic equipment on Societal, Health, Safety, Legal and Cultural Issues. PO(f)
- CO6: Evaluate sustainability and impact of the power electronic equipment in the Societal and Environmental Contexts. PO(g)

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