AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

(Project Report)

Course No :EEE 4228

Course Title :Power Electronics Lab

Submitted BY,

Group (3)

ID:190205080 -Tanjil Alom Khan

ID:190205088 -MD Khorsheduzzaman Sizan

ID:190205097 -Soumo Paul

ID:190205104 -Afsar Ul Haque

ID:180205007 -Raihan Uddin Ahmed

Project Title: Designing a variable voltage buck boost ac inverter

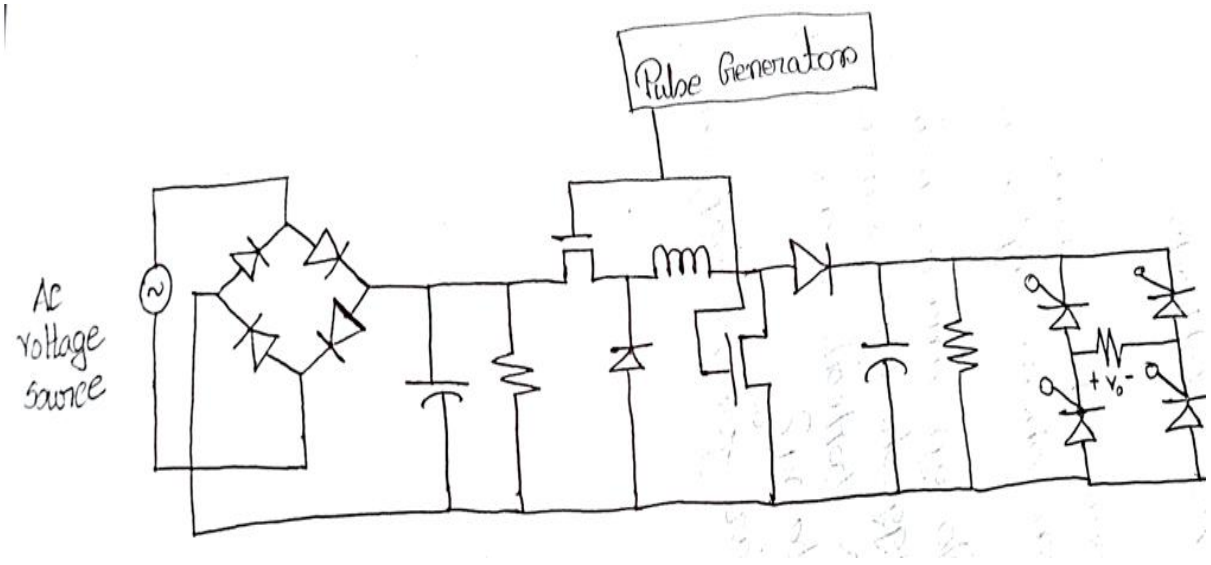
Objectives:

- Applying PWM signals for buck-boost converters.
- To transform voltage using power circuits.
- Achieving various voltage levels in a single circuit.
- Achieving high efficiency in the conversion process to minimize energy losses.

Components:

1. Mosfet IRF54ON
2. Diodes
3. Arduino Uno
4. Capacitor 1000uF,47Uf.
5. Breadboard
6. Potentiometer
7. Wires for Connection

Circuit Diagram:



Hardware Setup:

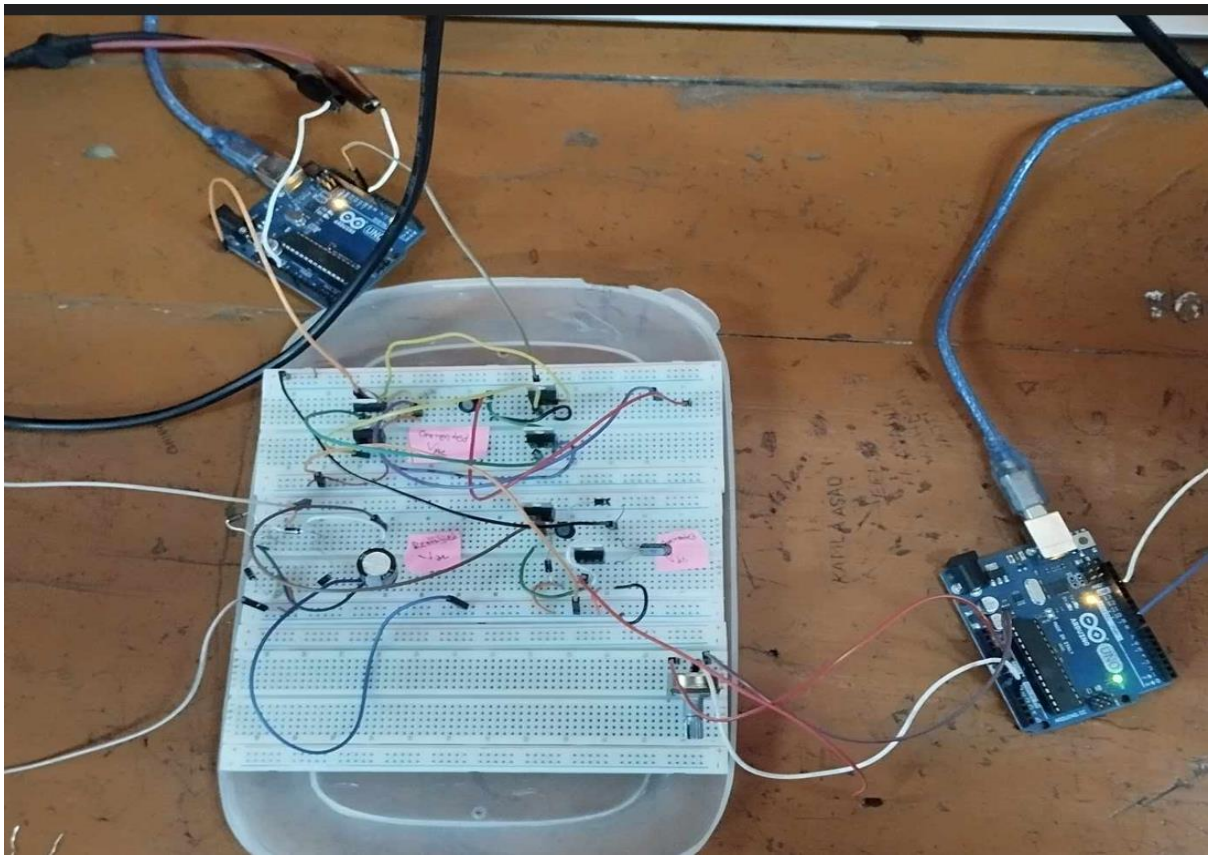


Fig 1: Hardware Setup

Simulation Circuit & Waveshapes:

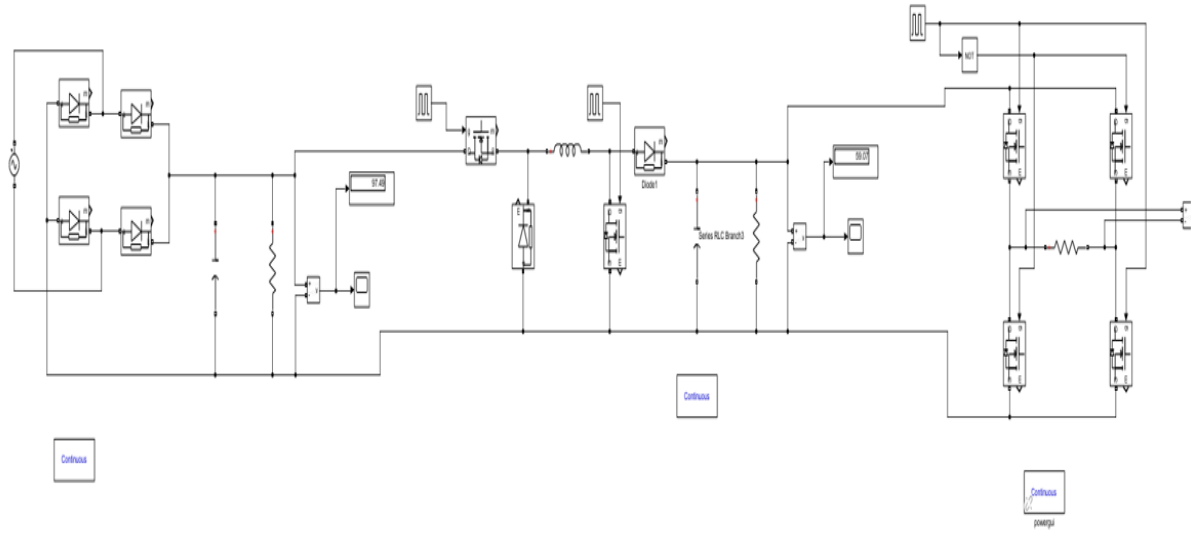
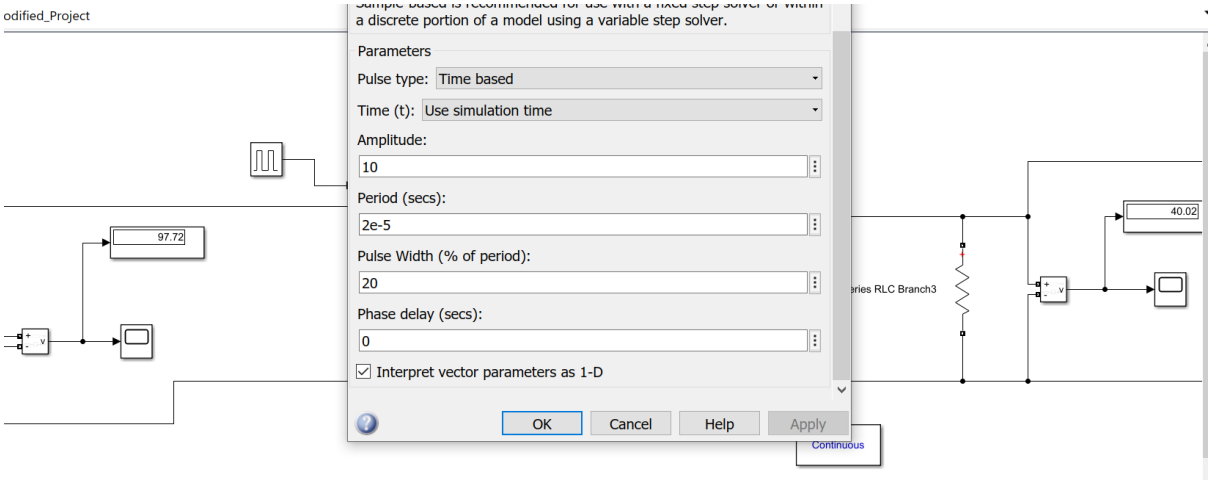
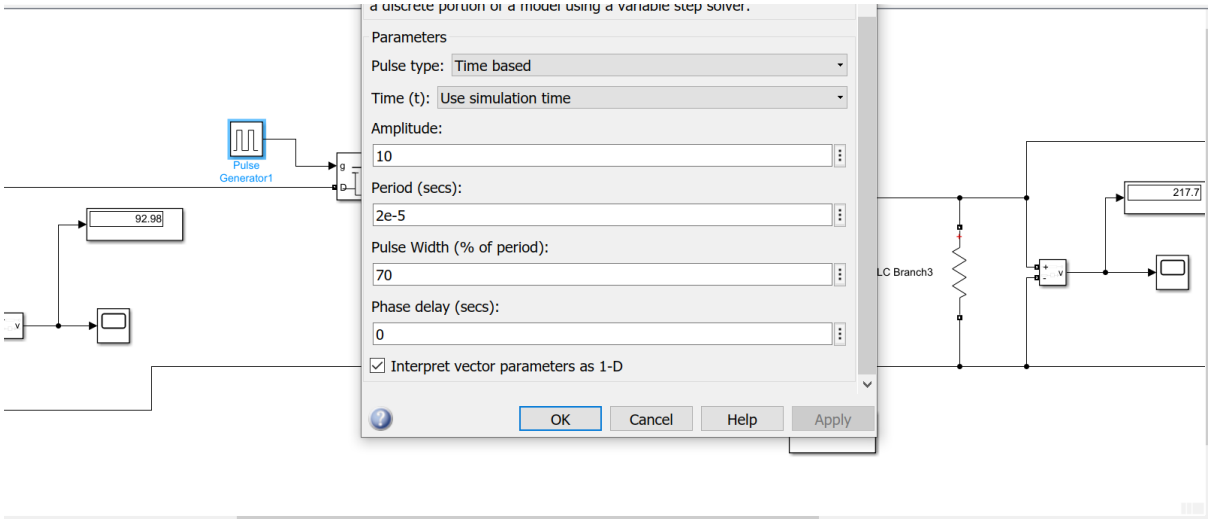


Fig 2: Simulation Circuit

Pulse width is 20%. So, it will work as a Buck Converter. [D=0.2]



Pulse width is 70%. So, it will work as a Boost Converter. [D=0.7]



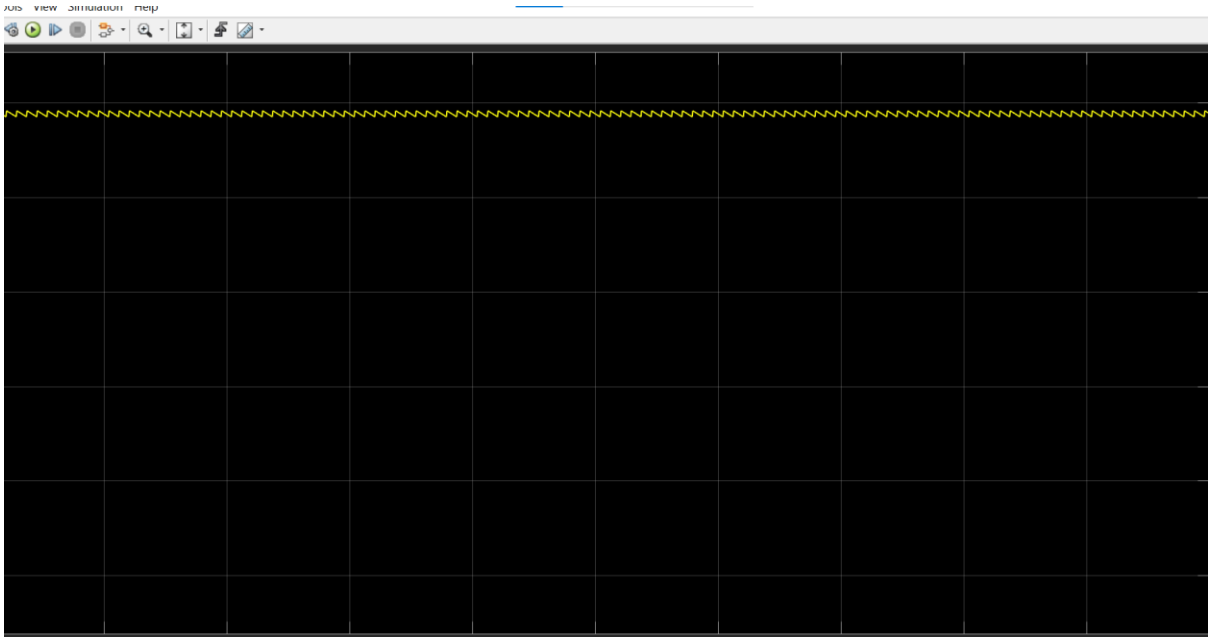


Fig 3: DC rectified output

SPWM signals for MOSFETS are generated by the below arrangements.

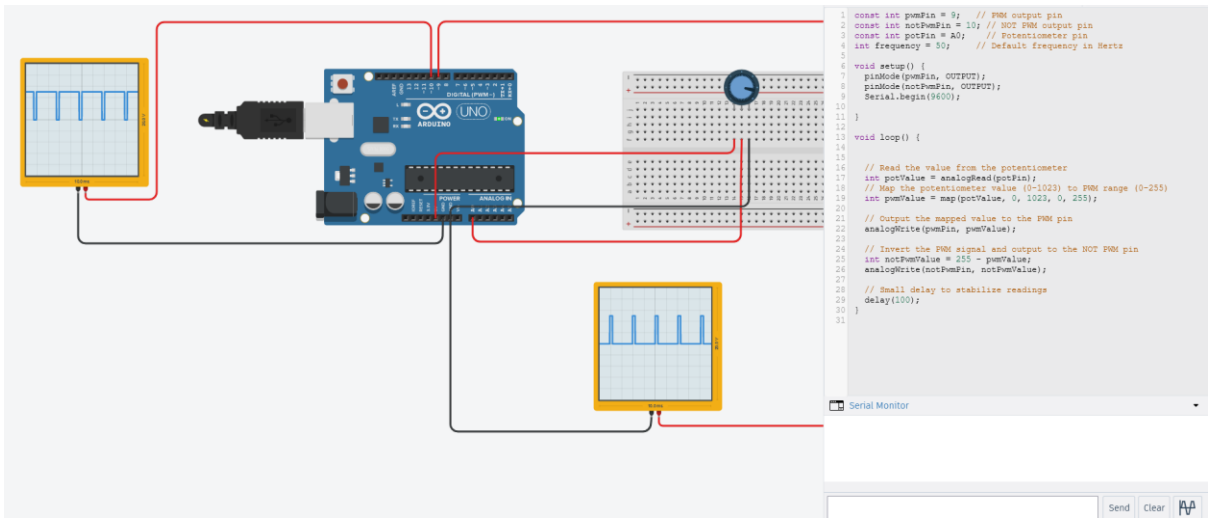


Fig 4: Gate pulses that were used in DC to AC converter.

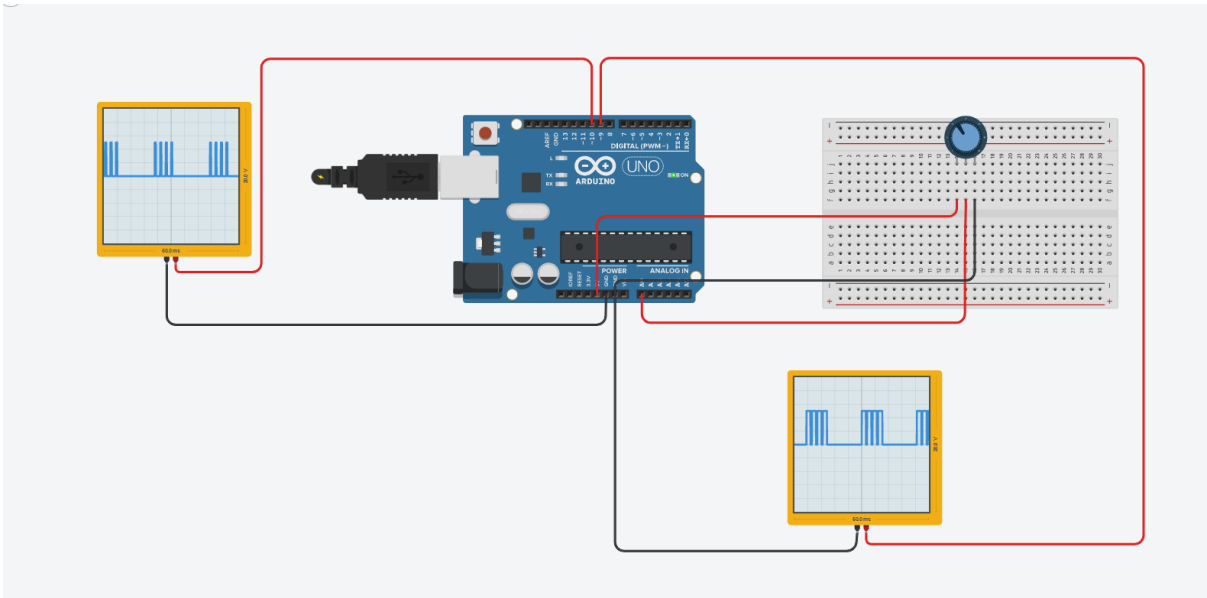


Fig 5: Gate pulses that were used in Buck-Boost Converter.

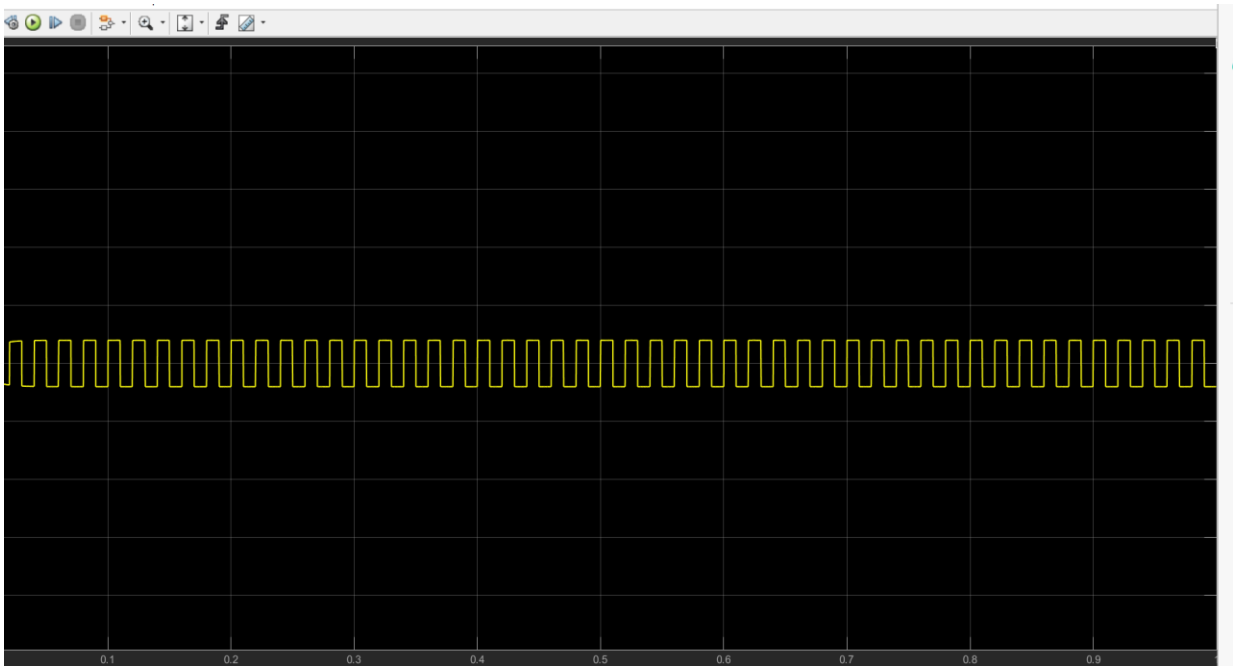


Fig 6: Final output (AC).

Advantages of this project:

-Desired and variable voltages can be achieved.

-We can get 4 level (High DC, High AC, Low DC, Low AC) of voltages in a single circuit.

-Simple structure

-Low cost.

-High efficiency

-Low Loss

Discussion:

Here in this project, Supply Voltage is rectified and DC is achieved. Using buck-boost converter we have stepped up or stepped down that rectified voltage according to our desired value. Furthermore, there is an inverter arrangement as well, which can convert that modified DC voltage into desired AC value. The project is actually working like a transformer which also can step up and down voltages. But the differences are that we have more options and benefits. Moreover, the control is in our hands unlike many transformers. Some extra arrangement can be also installed to achieve perfect ac sine wave.