FULL SUBTRACTOR

A full subtractor is a combinational circuit used to perform subtraction of three binary digits: the minuend (A), subtrahend (B), and borrow-in (Bin). It outputs the difference (D) and the borrow-out (Bout).

SIMULATION RESULTS:

OBJECTIVE:

A full subtractor is a combinational logic circuit that performs subtraction of three input bits: the minuend (A), the subtrahend (B), and the borrow-in (Bin). It produces two outputs: the difference (Diff) and the borrow-out (Bout). Here is a detailed description for simulating a full subtractor, including its logic equations, truth table, and steps for simulation using a digital circuit simulator like EasyEDA.

1. Create a New Project

- Open EasyEDA and log in to your account.
- Click on "New Project" and enter a name for your project.

2. Place Components

Logic Gates:

- Add the necessary logic gates (AND, OR, XOR, NOT) from the component library.

Inputs and Outputs:

- Place three input sources (A, B, Bin).
- Place two output indicators (Diff, Bout).

3. Construct the Circuit

Difference Calculation:

- Place two XOR gates.
- Connect input A and B to the first XOR gate.
- Connect the output of the first XOR gate and Bin to the second XOR gate.
- The output of the second XOR gate is the Difference (Diff).

4. Borrow-out Calculation:

- Place three AND gates, two NOT gates, and one OR gate.
- Connect inputs B and Bin to the third AND gate.
- Connect the outputs of the three AND gates to the OR gate.
- The output of the OR gate is the Borrow-out (Bout).

5.Wire the Circuit

- Connect all components according to the logic equations provided.
- Ensure that all inputs (A, B, Bin) and outputs (Diff, Bout) are correctly connected and labeled.

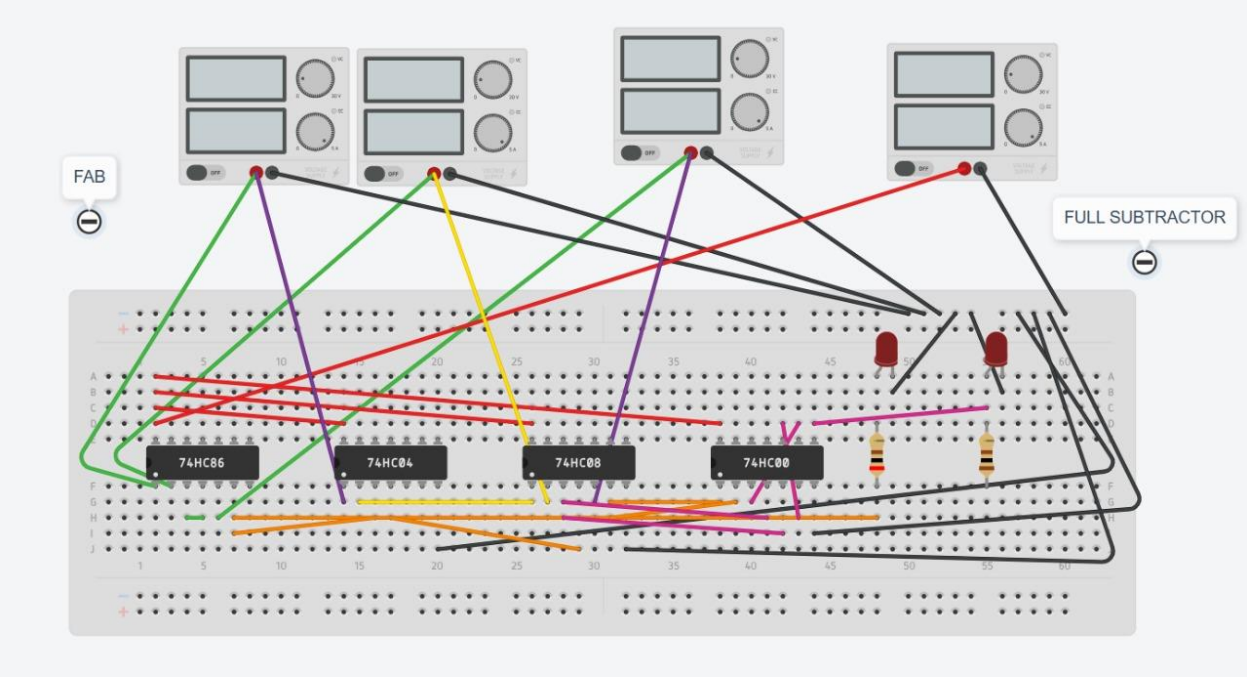
6.Power the Circuit

- Add a Vcc (power supply) and Ground to the circuit.
- Connect the Vcc and Ground to the respective pins of the logic gates if required.

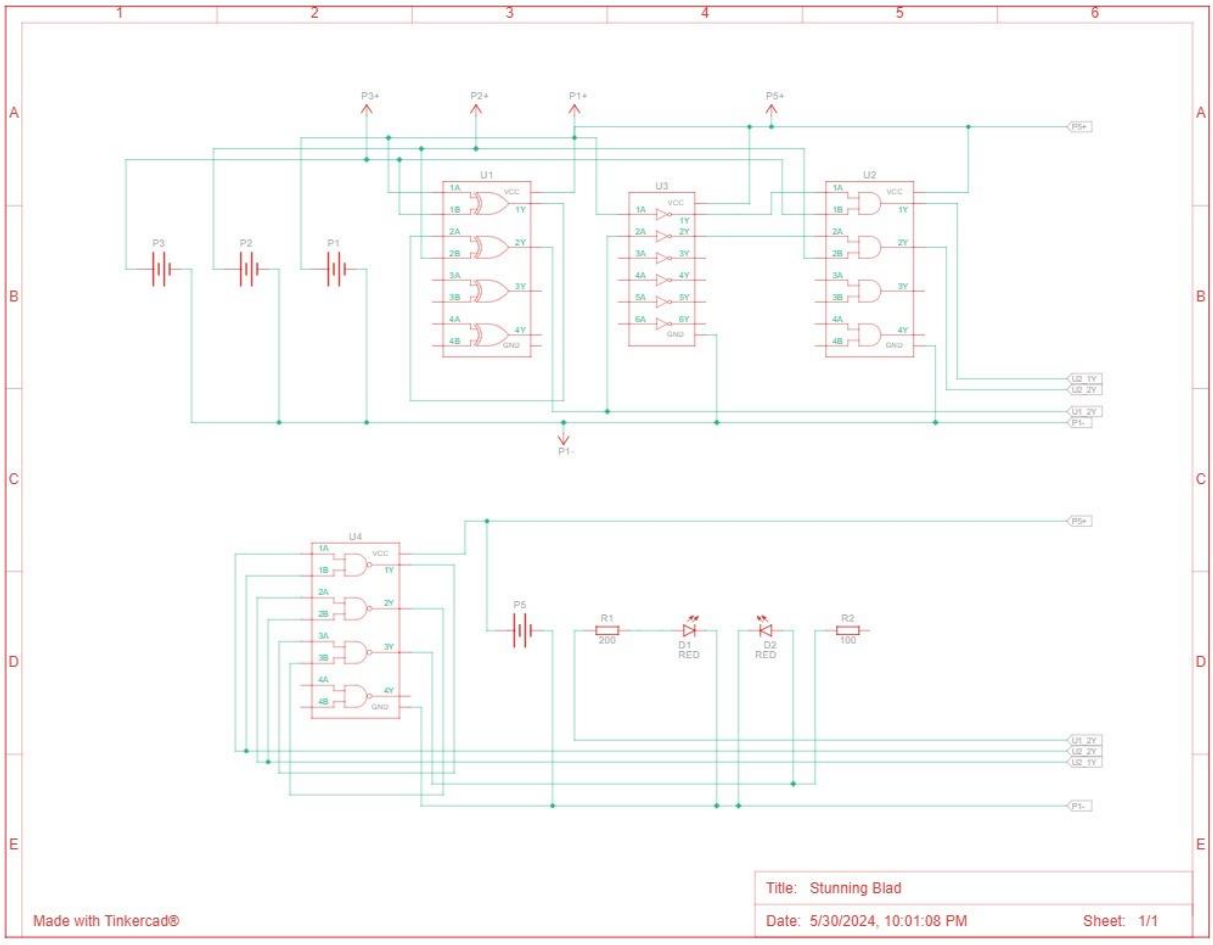
7.Simulate the Circuit

- Click on the "Simulate" button in EasyEDA.
- Set the input values for A, B, and Bin.
- Run the simulation to observe the output values for Difference (Diff) and Borrow-out (Bout).

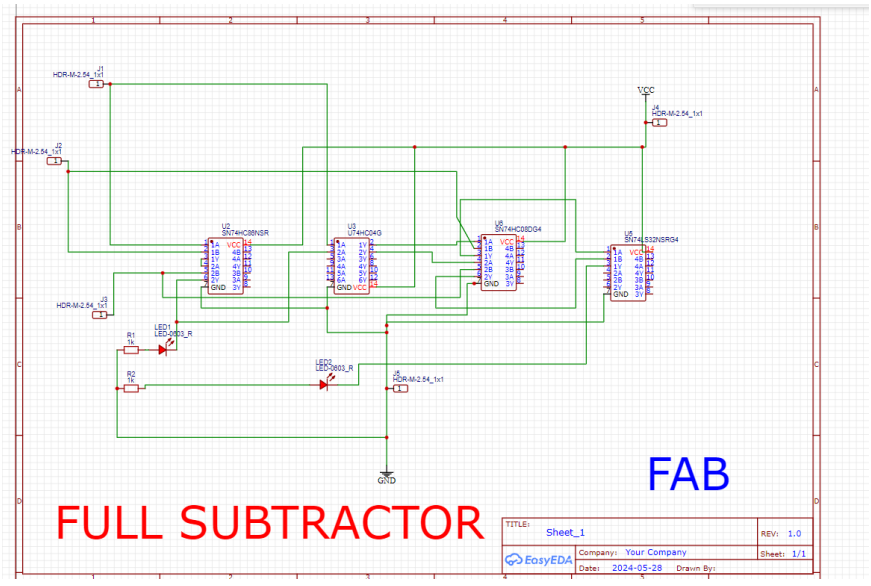
TINKERCAD CIRCUIT:



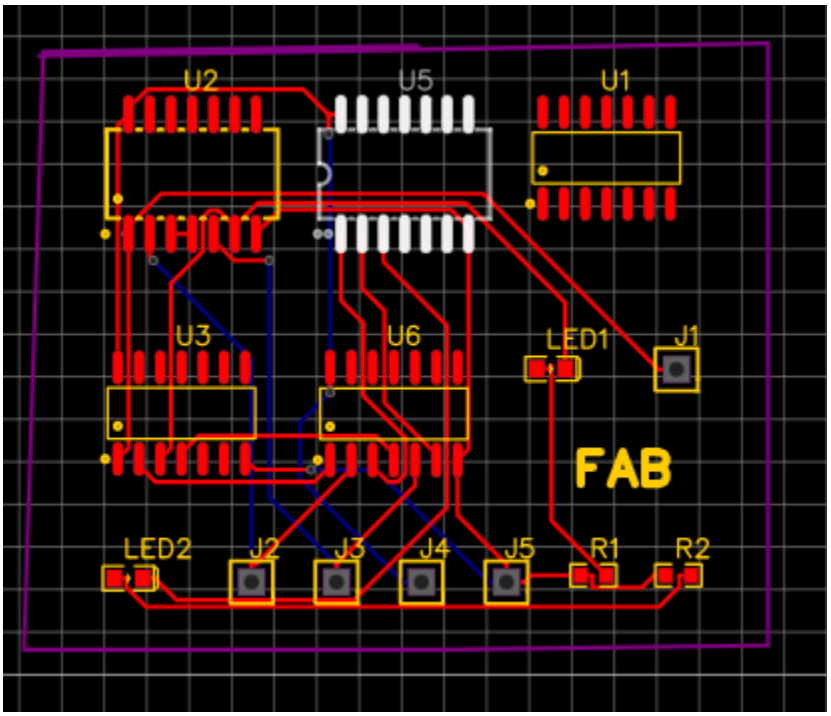
TINKERCAD SCHEMATIC VIEW:



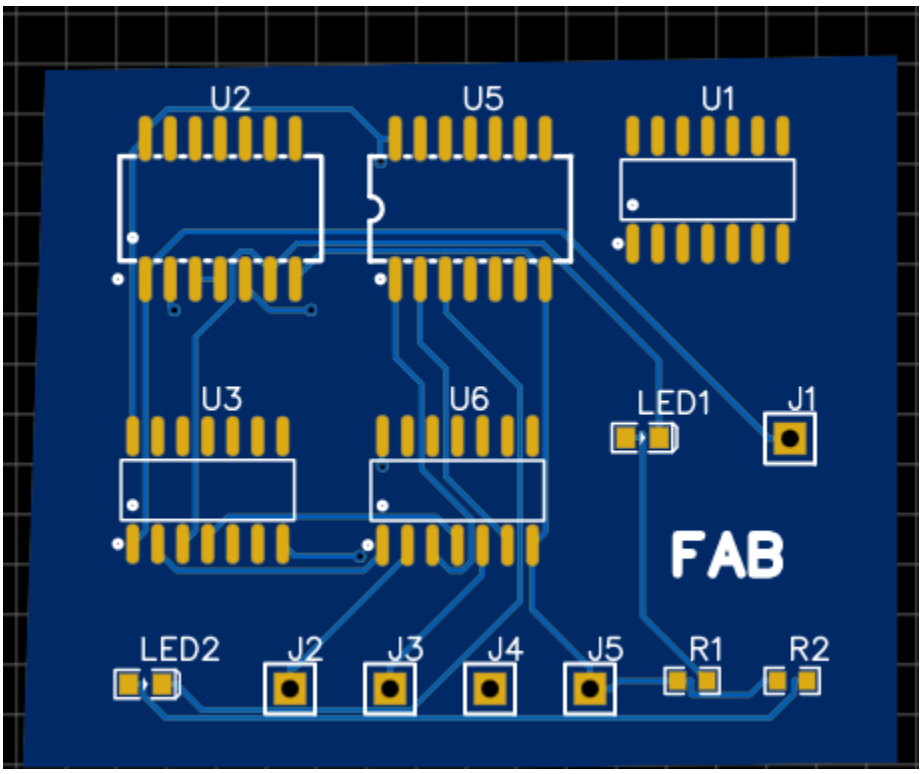
EasyEDA Circuit diagram:



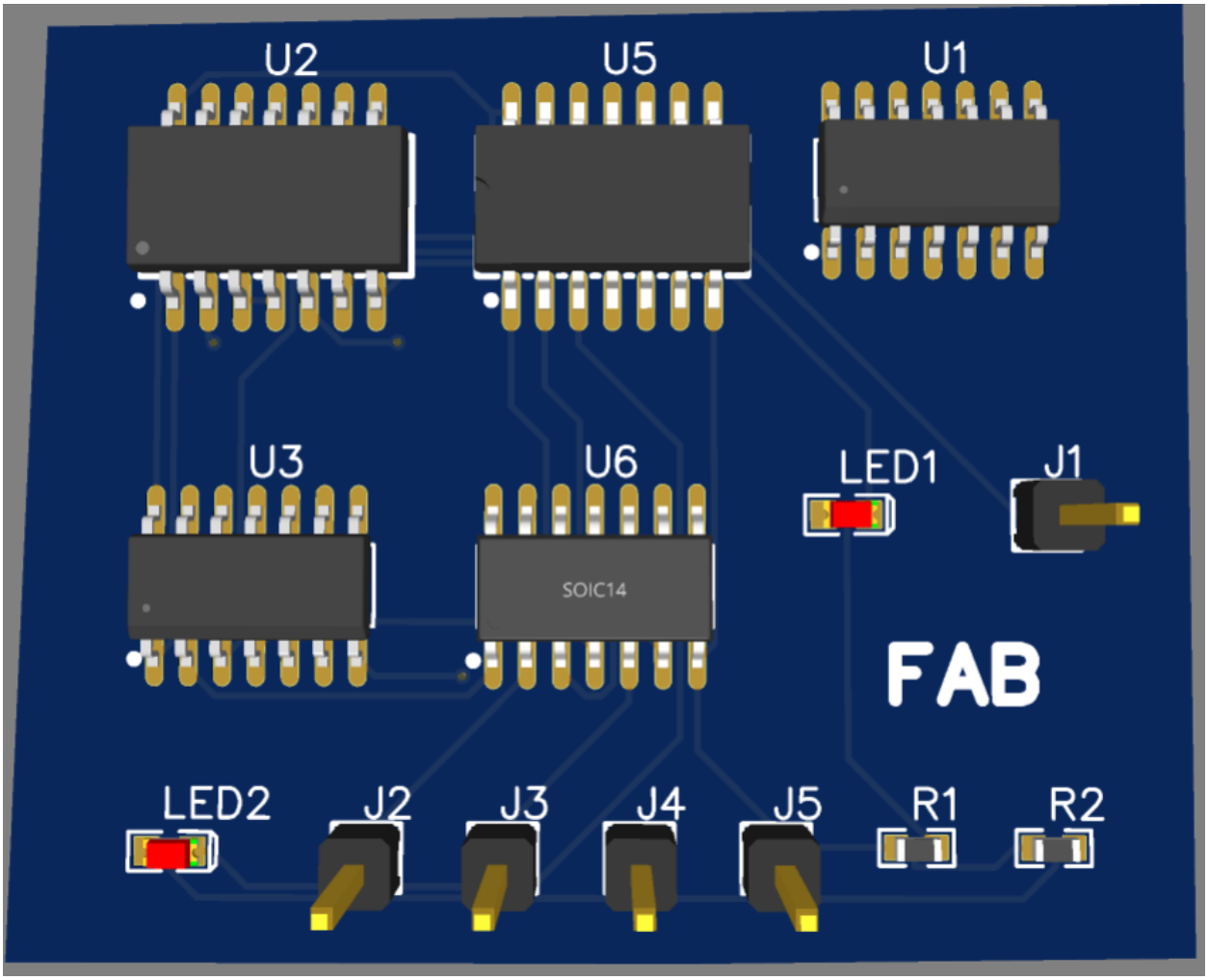
EasyEDA PCB:



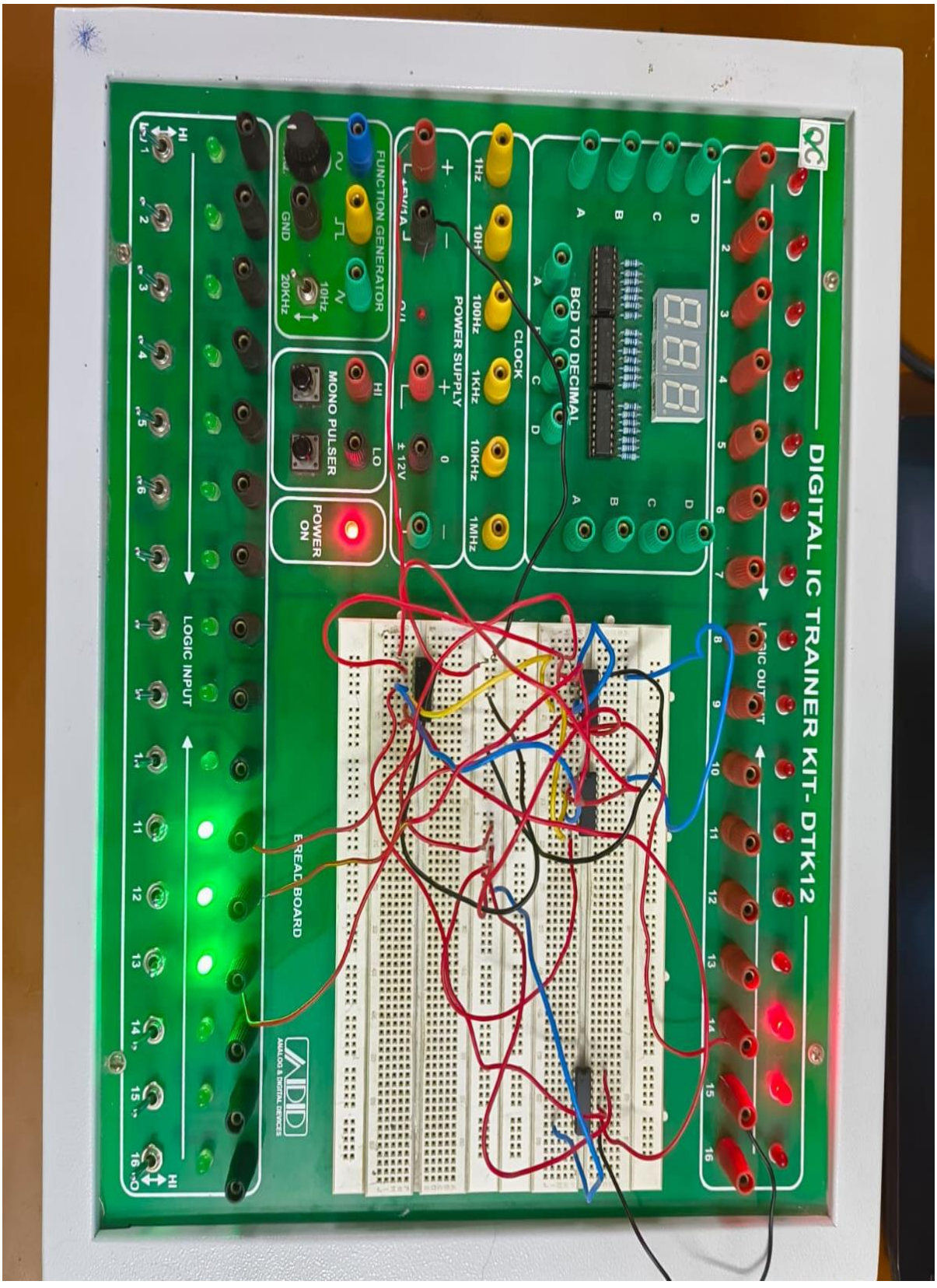
EasyEDA 2D view:

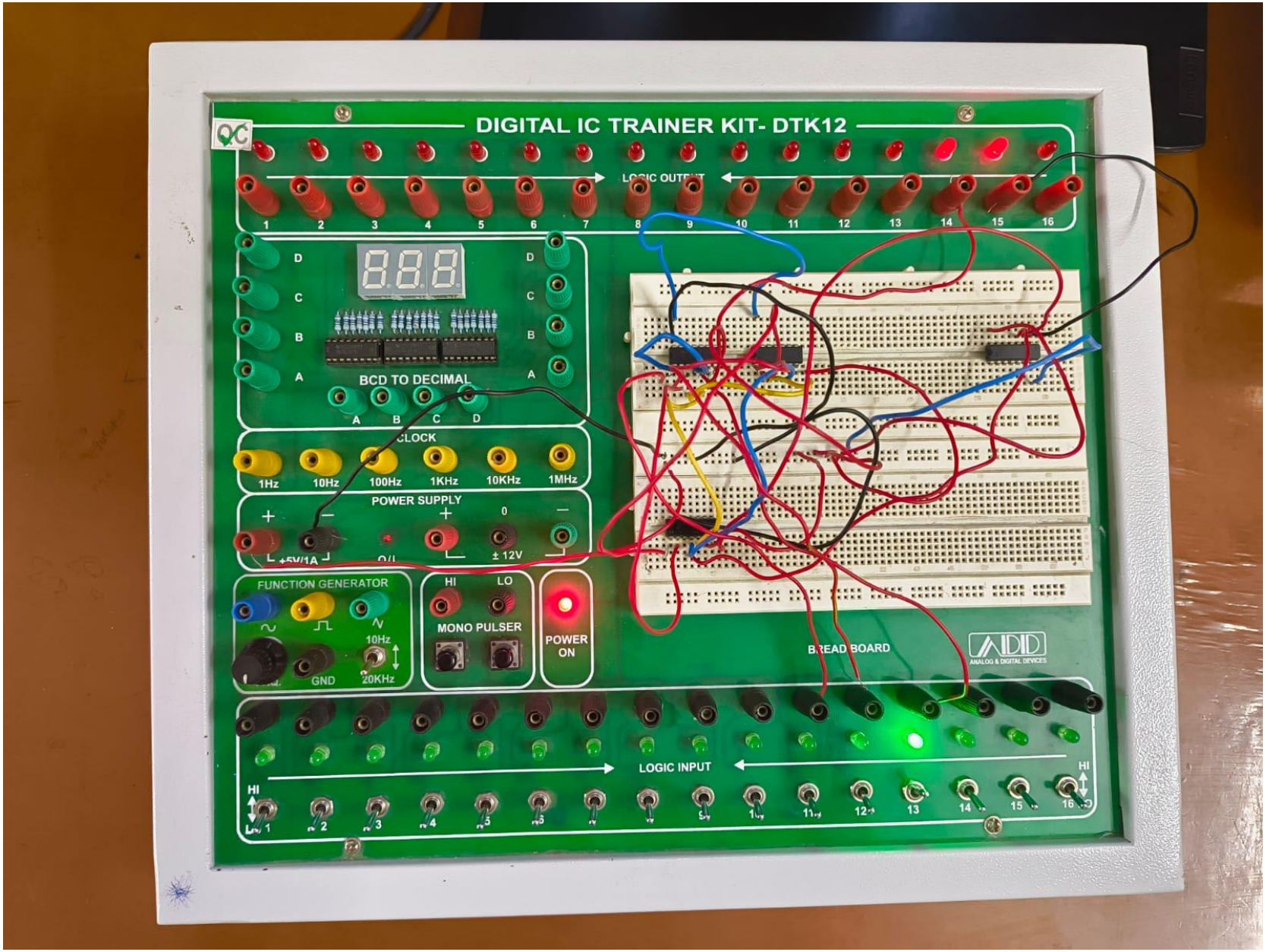


EasyEDA 3D view:



HARDWARE IMPLEMENTATION:




DIGITAL IC TRAINER KIT- DTK12
LOGIC OUTPUT
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
D C B A
BCD TO DECIMAL
A B C D
CLOCK
1Hz 10Hz 100Hz 1KHz 10KHz 1MHz
POWER SUPPLY
+5V/1A
± 12V
FUNCTION GENERATOR
10Hz
GND
20KHz
HI LO
MONO PULSER
POWER ON
BREAD BOARD
ANALOG & DIGITAL DEVICES
LOGIC INPUT
HI
LO

APPENDIX:

In this workshop, we explored the design and simulation of a Full subtractor using various tools. We started by designing a Full subtractor circuit in Tinker cad, where we simulated the circuit to observe its behavior and validate its performance. Next, we replicated the Full subtractor design in EasyEDA software and simulated the circuit to ensure consistent performance with the Tinker cad simulation. Finally, we used EasyEDA to create a printed circuit board (PCB) layout for the Full subtractor, preparing the design for fabrication. This hands-on experience provided a comprehensive understanding of electronic design automation (EDA) tools and the process of designing, simulating, and fabricating a Full subtractor circuit.