

Research Migration Project

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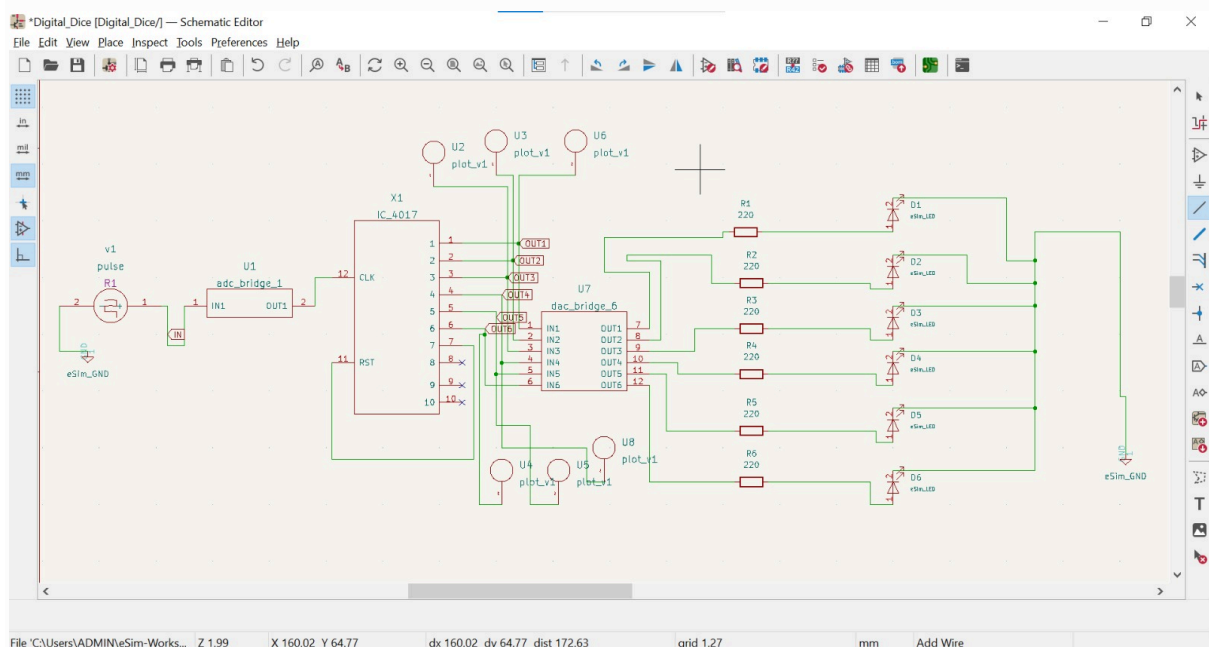
Title:

Design And Simulation Of a Digital Dice Using CD4017 Decade Counter

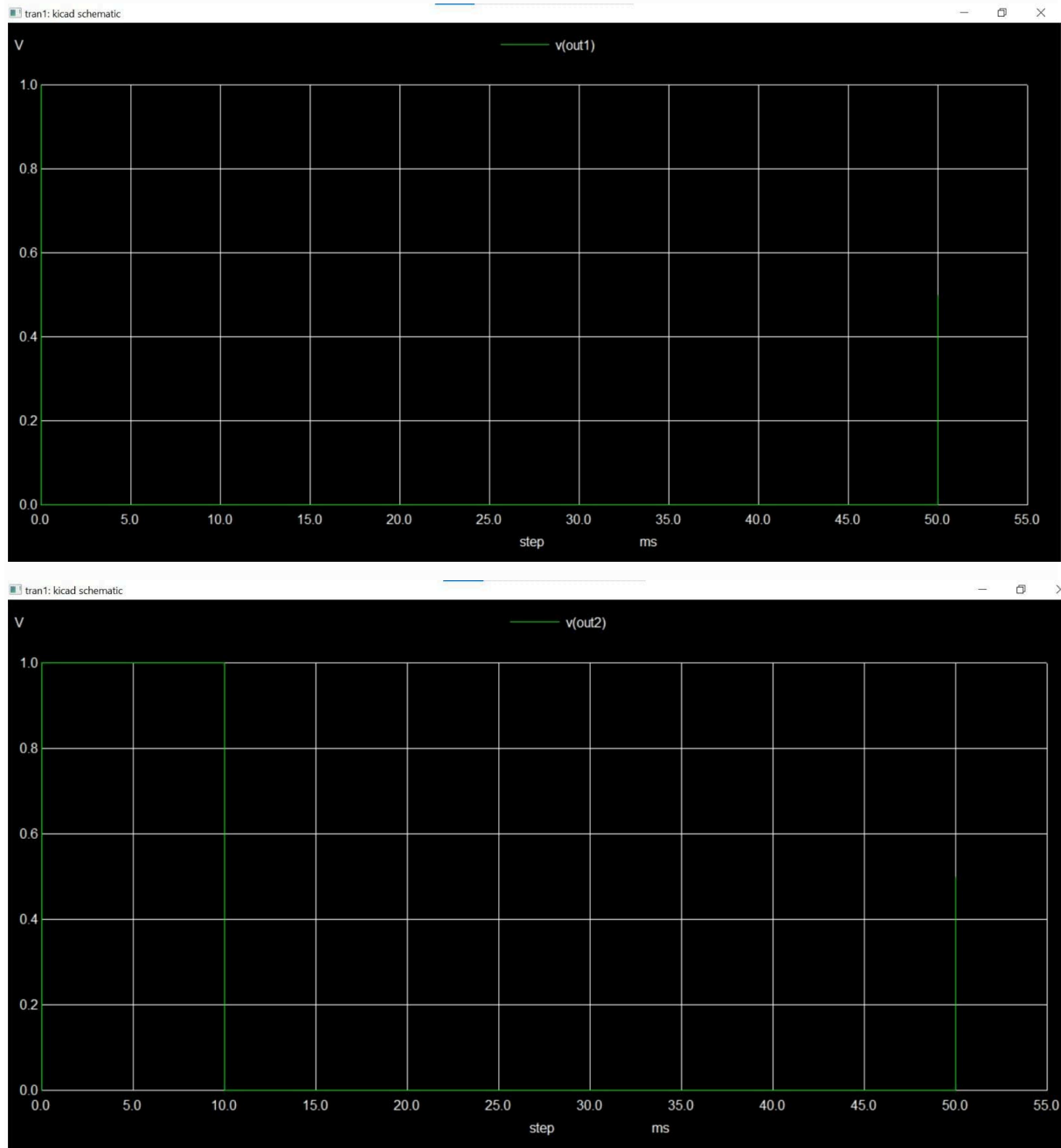
Theory/ description:

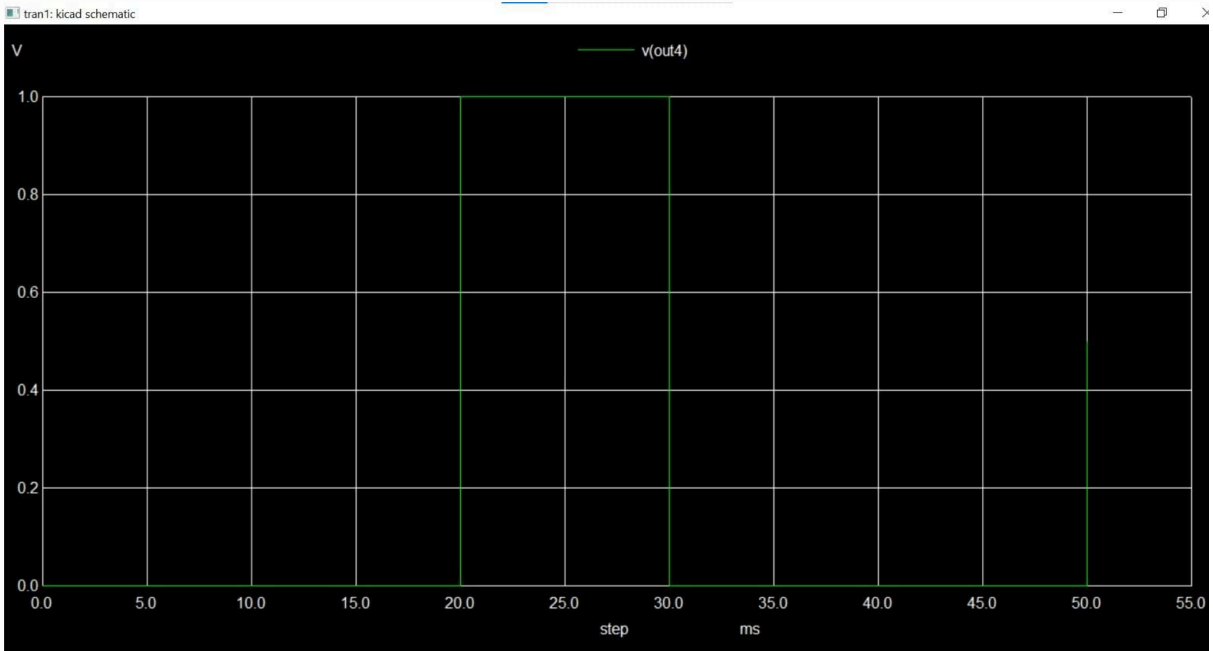
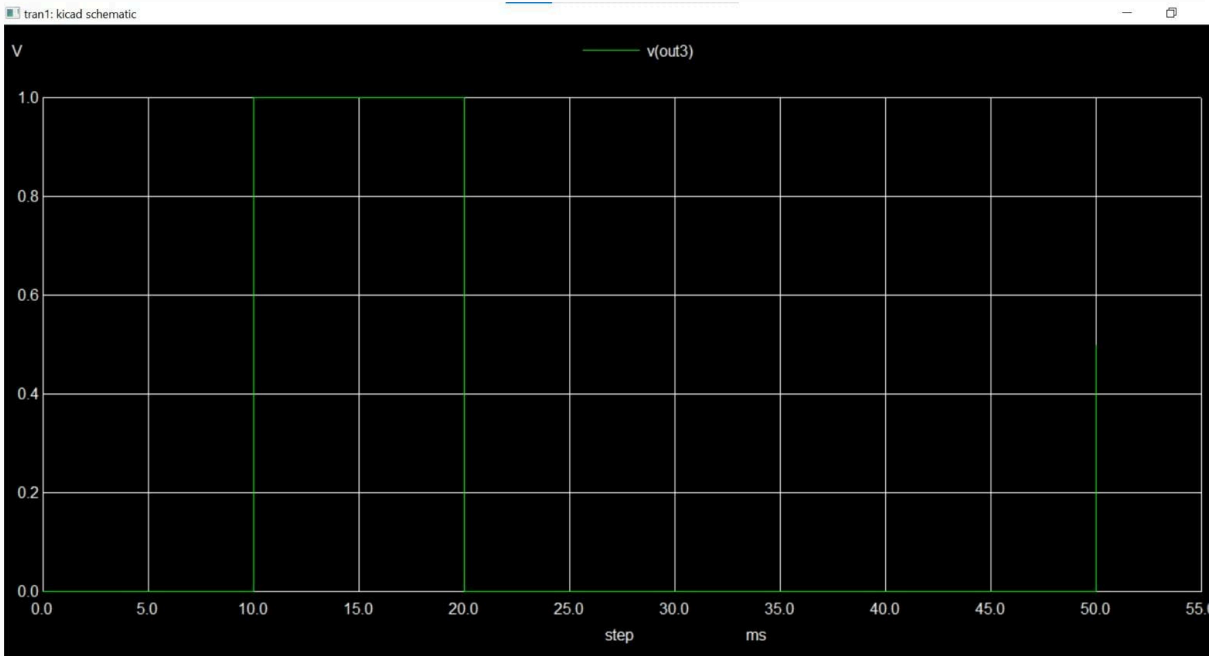
The Digital Dice circuit is designed using the CD4017 decade counter, which generates sequential output signals in response to clock pulses. A pulse generator is used to provide the clock input, and each pulse advances the active output of the CD4017. In this circuit, only six outputs are utilized to represent dice numbers from 1 to 6, while the reset pin is configured to restrict the counting sequence. LEDs connected through current-limiting resistors indicate the active output corresponding to a particular dice number.

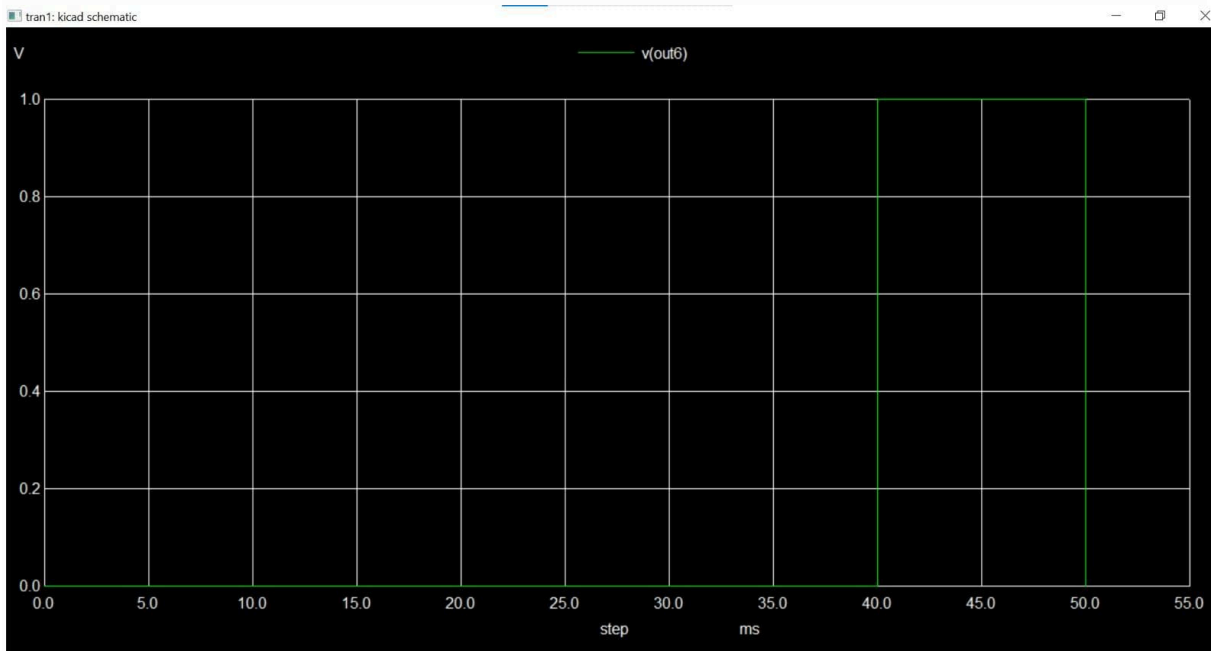
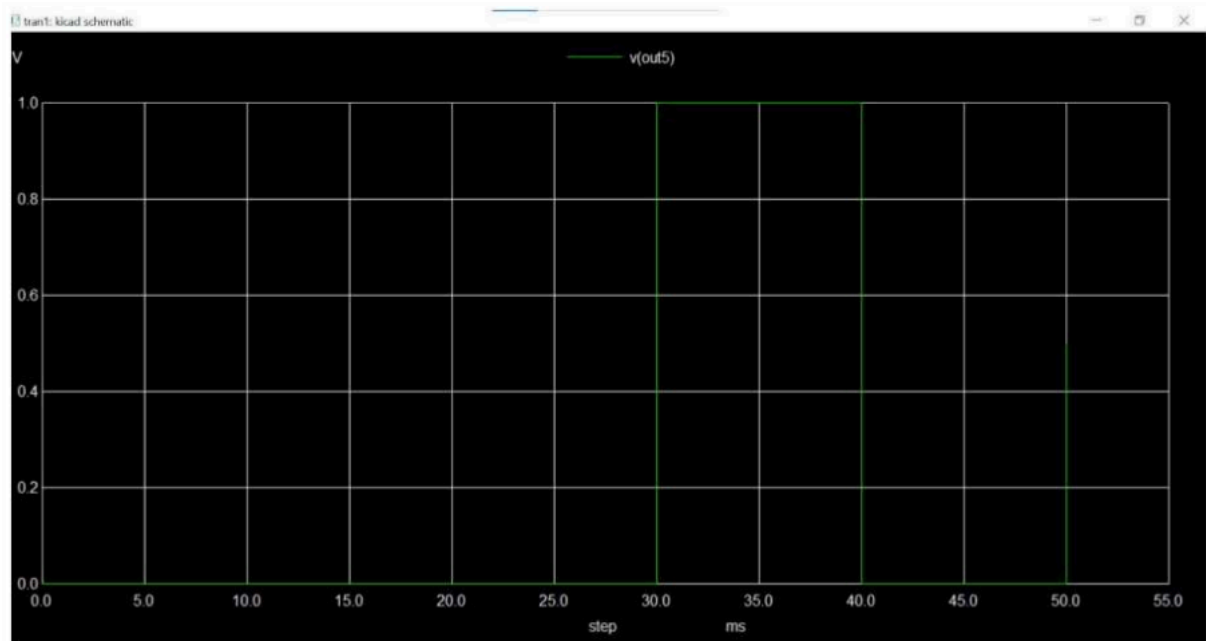
Circuit diagram(s):



Results/ Output (ngspice and/or Python plots):







analysis of the simulation outputs: The simulation results obtained from ngspice verify the correct working of the Digital Dice using the CD4017 decade counter. The clock pulse applied to the CD4017 causes the output to advance sequentially from Q0 to Q5, corresponding to dice numbers 1 to 6. The output waveforms show that only one output remains high at a time, confirming the one-hot nature of the CD4017 counter. The voltage plots indicate clear transitions between logic low (0 V) and logic high (VDD), ensuring reliable LED driving. The observed timing and sequence of outputs match the theoretical operation of the

CD4017, thereby validating the correctness of the circuit design and simulation.

References:

CD4017 Decade Counter Datasheet, Texas Instruments

Morris Mano, Digital Design, Pearson Education