4 Bit Binary to Gray code converter using Transmission Gate

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Abstract

Data encryption translates data into another form, or code so that only people with access to a secret key or password can read it. Gray code is a primitive data encryption method and is used for data encryption. As we know digital data is represented in 0's and 1's i.e in the binary form and is transmitted and received in different circuits and the chances of data loss or error are high. So, to protect data and for error correction, we use data encryption. In this paper, I have designed a circuit to convert 2-bit binary data to gray code data using a Static CMOS circuit using esim and SKY130 models.

1 Circuit Details

Note: I have designed a 2-bit binary to gray code converter using STATIC CMOS Circuit. Low power-consuming devices are playing a dominant role in the present-day VLSI design technology. If the power consumption is less, then the amount of power dissipation is also less. The power dissipation of a device can be reduced by using different low power techniques. The power dissipation in conventional CMOS design can be minimized by reducing the supply voltage, node capacitance value, and switching activity. Circuit Details: I have designed a 2-bit E-XOR gate using a static CMOS circuit that uses 12 transistors. It consists of 2 CMOS inverters to generate inputs bar and bar and two serially connected pmos and nmos circuits consist of 4 transistors each in a series-parallel connection which is the actual E-XOR circuit to generate the output. Input a is the MSB and the output produced from the E-XOR circuit is LSB. The system is designed using esim and SKY130 models. Software Description: eSim is a free/libre and open-source EDA tool for circuit design, simulation, analysis, and PCB design. It is an integrated tool built using free/libre and open-source software such as KiCad, Ngspice, and GHDL. eSim is released under GPL. eSim offers similar capabilities and ease of use as any equivalent proprietary software for schematic creation, simulation, and PCB design, without having to pay a huge amount of money to procure licenses. It can serve as an alternative to commercially available/licensed software tools like OrCAD, Xpedition, and HSPICE.

2 Implemented Circuit

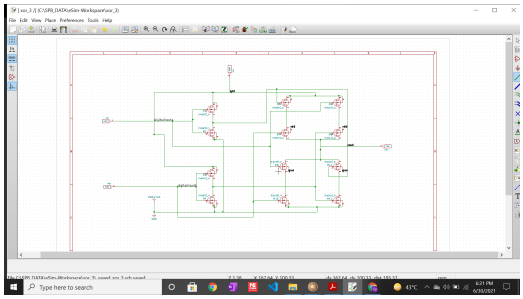

Figure 1: Implemented circuit diagram.

3 Implemented Waveforms

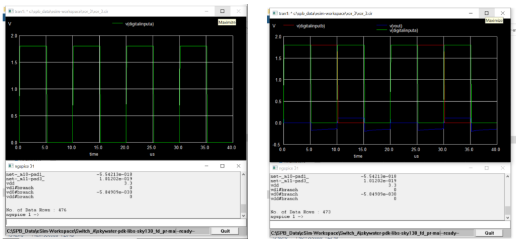

Figure 2: Implemented waveform.

References

[1] G. Sujatha and D. N. Balaji. Design and implementation of combinational circuits in different low power logic styles. http://www.iosrjournals.org/iosr-jvlsi/papers/vol5-issue6/Version-2/A05620105.pdf.