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Dead time is important to ensure correct and safe operation of switches in power electronics systems. The dead time generator is used to control the switching times of the switches, thus avoiding such problems. This circuit generates a signal that separates the opening and closing times of the switches, so that undesired switching situations can be avoided. These circuits are especially used in high power applications and industrial applications such as inverters, DC-DC converters, power supplies and motor drives.

The dead time generator is usually controlled by a microprocessor or a logic circuit and is used in the driver circuits of the power electronics circuit to ensure the operation of the switches. Dead time plays an important role in H bridge circuits. H-bridge circuits are power electronics circuits used in many applications and are often used to control high powers. H-bridge circuits are formed by controlling several switches. These switches are connected to the positive or negative side of the load and are controlled by determining the direction of movement of the load. However, when switching between the on and off states of the switches, a waiting period is needed so that they do not remain open at the same time. This is the time required for the switches to be fully opened or closed. Dead time prevents the switches from being open at the same time in H bridge circuits, thus preventing harmful voltage and current fluctuations. Especially in high-frequency switching applications, dead time plays an important role as switches must be opened and closed quickly. One of the common problems that arise in H-bridge circuits is the shoot through problem. Shoot-through occurs when the high and low side switches in an H-bridge circuit are open at the same time. Keeping the switches open at the same time can cause high current and voltage fluctuations and may cause undesirable consequences such as damage to the device or fire.

Dead time is a solution used to prevent shoot-through events. Dead time can be used to prevent the high side and low side switches from being on at the same time. This week, a dead time circuit application has been made using logic gates. As shown in Figure-21, it has two inputs such as NAND gate and AND gate, and it outputs inverted input signals. A NAND gate and a resistor are used to generate the dead time. In this circuit, the input signals are connected to the inputs of the gates and the output signal is used as the dead time signal. Dead time is determined by gate delay and resistor value. The NOT gate is a gate that has only one input and outputs the inverted version of the input signal. To generate the dead time, a NOT gate and a resistor are used. In this circuit, the input signal is connected to the input of the gate and the output signal is used as the dead time signal. Dead time duration is determined by gate delay and resistance value. In summary, both NAND and NOT gates are simple logic gates that can be used to generate dead time. These gates create a dead time signal as an output signal by inverting or directly using the input signals. Dead time is determined by gate delay and resistor value.

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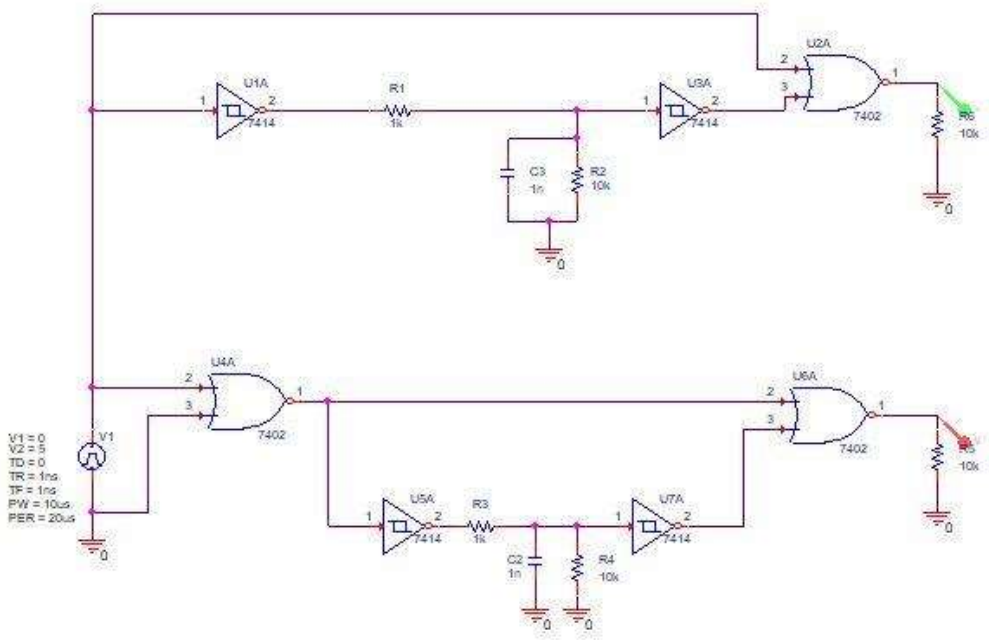

Figure-21: Simulation on OrCAD

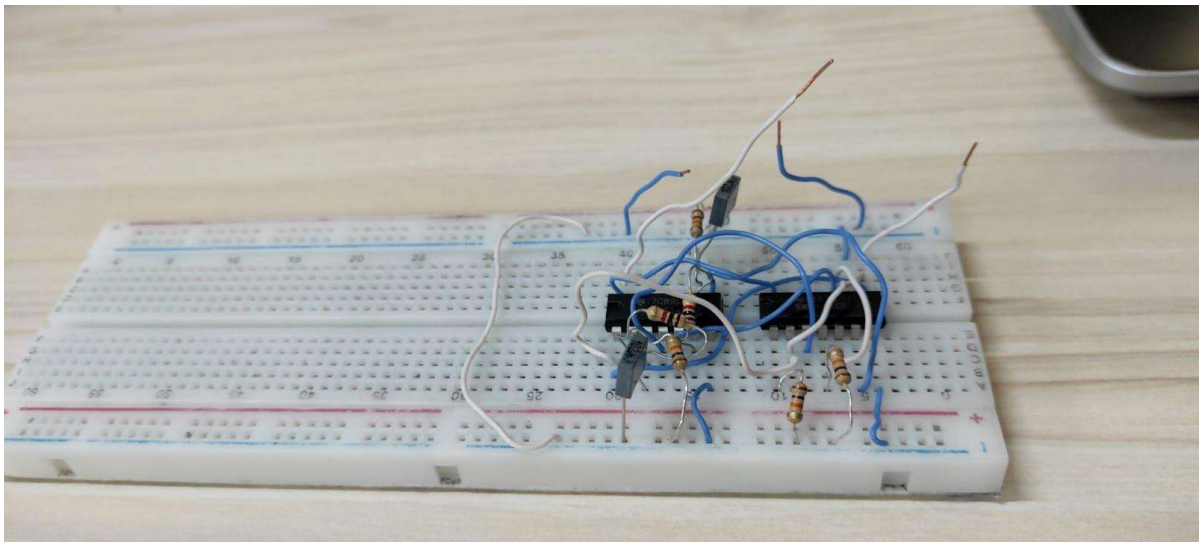

Figure-22: Installation of the Circuit on the Board

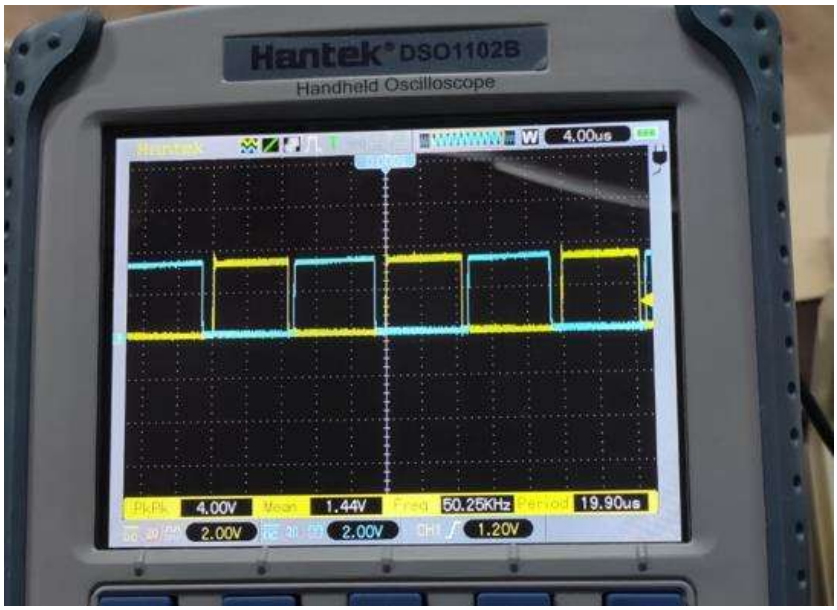

Figure-23: Displaying the Dead Time Range