

In this demo, it should be noted that the tubes in the routine are connected by common anode. Because I do not find anode digital tube for this demo, I change some code, so that I can use the common cathode tube to display.

- Development tool: Gowin V1.9
- Motherboard: Gowin MINI\_STAR
- Accessories: TypeC USB cable
- Routine: Gowin ultrasonic ranging demo

Follow the official instructions to install Gowin software, then download the routine. Go to the project file and double click to open the project to see the relevant files.

Verilog files include clock configuration, ultrasonic ranging, digital tube drive. Here it needs to change common anode tube to common cathode tube. Double click the seq\_control.v file, and then change the bit-selection signal and segment-selection signal values to the corresponding values of the common cathode. Actually you just need to negate each bit in turn. The following is the code for the common cathode.

```
1.
2. /*=====
3.                                     Bit selection mapping common cathode
4. =====*/
5. always @(*)
6. begin
7.     case(sel)
8.         2'd0:dig = 4'b0111;
9.         2'd1:dig = 4'b1011;
10.        2'd2:dig = 4'b1101;
11.        2'd3:dig = 4'b1110;
12.        default:dig = 4'b1111;
13.    endcase
14. end
```

```

15.
16. /Common cathode digital tube, 1, valid, lit
17. //=====
18. always @(*)
19. begin
20.     case(key)
21.         4'd0:smg = 8'b0111_1110;//"0" 8'b0111_1110
22.         4'd1:smg = 8'b0011_0000;//"1" 8'b0011_0000
23.         4'd2:smg = 8'b0110_1101;//"2" 8'b0110_1101
24.         4'd3:smg = 8'b0111_1001;//"3" 8'b0111_1001
25.         4'd4:smg = 8'b0011_0011;//"4" 8'b0011_0011
26.         4'd5:smg = 8'b0101_1011;//"5" 8'b0101_1011
27.         4'd6:smg = 8'b0101_1111;//"6" 8'b0101_1111
28.         4'd7:smg = 8'b0111_0000;//"7" 8'b0111_0000
29.         4'd8:smg = 8'b0111_1111;//"8" 8'b0111_1111
30.         4'd9:smg = 8'b0111_1011;//"9" 8'b0111_1011
31.         default:smg = 8'b0111_1110;
32.     endcase
33. end

```

After modification, switch menu to the "Process". Double click "Synthesize" and "Place & Route" in order.

Then click "Program Device" to download, and note that you need to add resistor to limit the current to drive the digital tube.