21×21 Keyboard controller

Module keyboard\_controller (

Input clk,

Output reg [20:0] row, // 21 rows

Input [20:0] col, // 21 columns

Output reg [8:0] key\_code, // output key code (0–440)

Output reg key\_pressed

);

Reg [4:0] current\_row = 0; // row counter 0–20

Integer i;

Always @(posedge clk) begin

// Activate one row at a time

Row = 21’b111111111111111111111;

Row[current\_row] = 0; // drive current row low

// Read all column inputs

Key\_pressed = 0;

For (i = 0; i < 21; i = i + 1) begin

If (col[i] == 0) begin

Key\_pressed = 1;

Key\_code = current\_row \* 21 + i; // unique key code

End

End

// Move to next row

Current\_row = (current\_row == 20) ? 0 : current\_row + 1;

End

Endmodule