CSE 316: Tetris (Simulation)

Arif Shariar Rahman 1705095
Sadia Saman 1705102

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1 Circuit Diagram

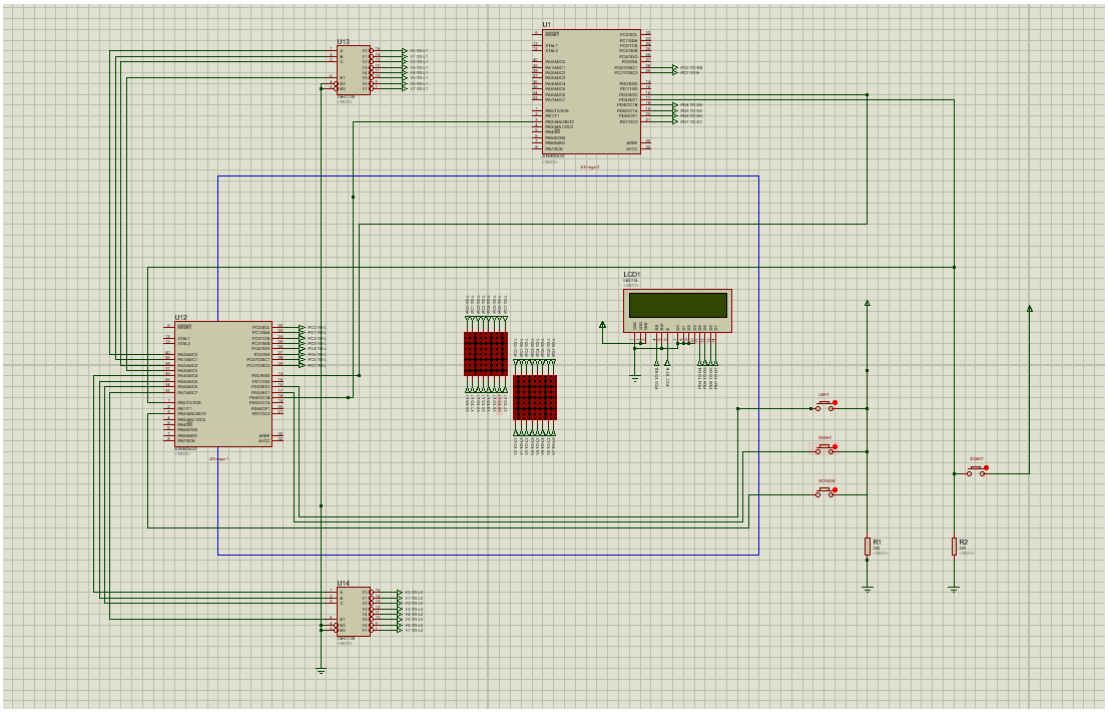

Figure 1: Tetris Circuit Diagram

2 Components

Two ATmega32 microcontroller

The Atmel AVR ATmega32 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

We have used two ATmega32 microprocessors. One ATmega32 is used to implement the game , another ATmega32 is used to connect the LCD display to show the score.

Two 8*8 LED Matrix

Two 8*8 LED Matrix is used to show the main game board.

One LM016L 16*2 LCD Display

This LCD display is used to show the score.

Four Push Buttons

These four buttons are used to control the game. One button is used to shift the blocks to the left. Another button is used to shift to the right. One button is used to rotate the shapes. Another button is used to START the game.

Two 74HC138 3 to 8 Line Decoder/ Demultiplexer

The 74HC138 decodes three binary weighted address inputs (A0, A1 and A2) to eight mutually exclusive outputs (Y0 to Y7). The device features three enable inputs (E1, E2 and E3). Every output will be HIGH unless E1 and E2 are LOW and E3 is HIGH.

We have used this decoder to interface the two LED matrix using a single port (PORT A) of ATmega32. This allowed us to control the LED matrix without any hassle.

Resistors

Resistors are used when necessary, specially connecting the push buttons.

3 Difficulties We Have Faced

Interfacing the LCD Display

As we used 16*2 LCD display to show score and other game states like, "START GAME", "FINAL SCORE" etc, we faced some difficulties while writing to the LCD display. This problem was mainly caused if the timing was not right. For example, after showing final score, if we start the game again, the LCD screen some times would not clear properly and some garbage characters were shown. So, what we did is, we cleared the board after every iteration of what was showing. This ensured the screen was cleared if we wanted to show another message.

Unable to generate some blocks

We tried to generate "S" block. But our default value of first row is 1, so the top right corner of "S" blocks gets outside boundary. We tried to resolve it by incrementing the row value. This time block was generated but was not propagating through the board.