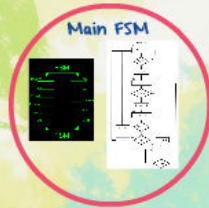




MASTERMIND



MASTERMIND

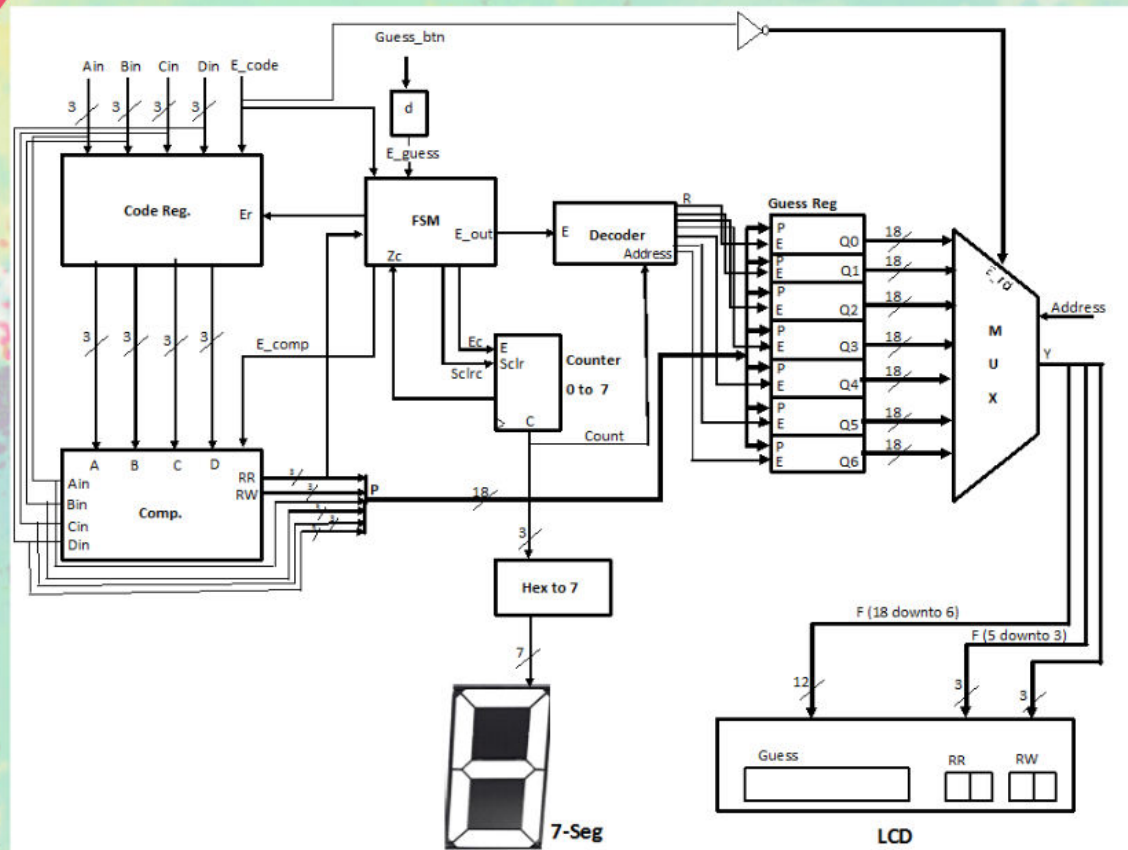
MASTERMIND



GROUP MEMBERS:

- CHRISTOPHER GRZYBOWSKI
- NAISARG GOHIL
- GRACE O'GEORGIA
- SINDHURA GULLAPELLI

Component Block Diagram

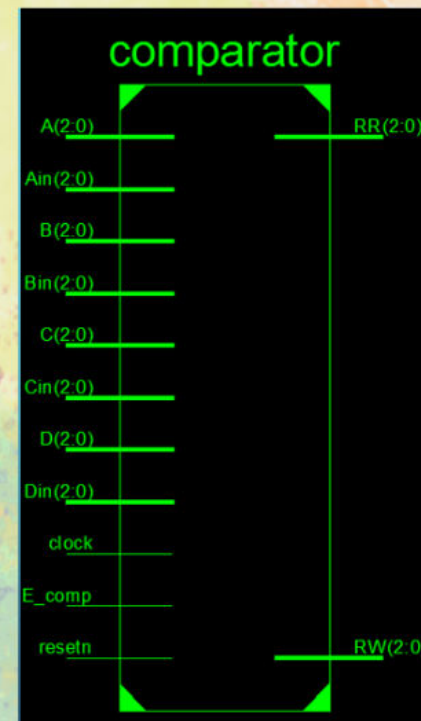


Mastermind game Rules

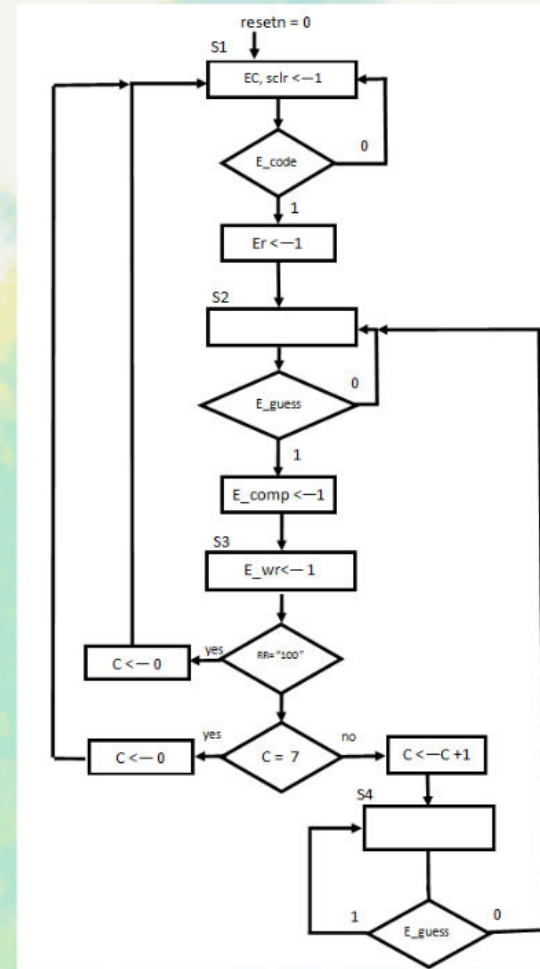
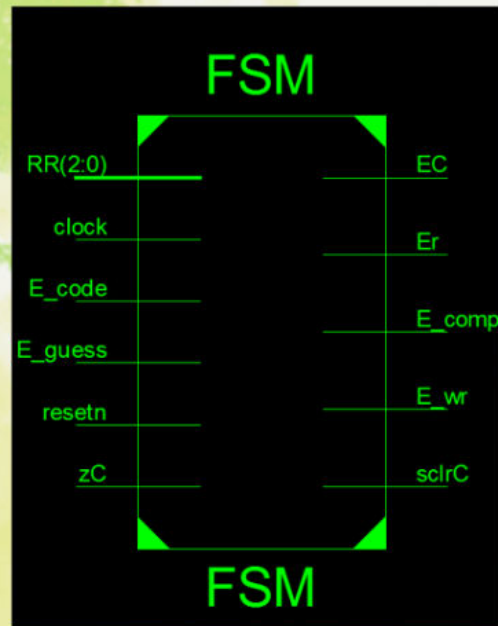
- Code and Guess must be 4 digits long:
 - Each digit must be between numbers 1-7
 - A total of 3 bits for each digit used.
 - Cannot use a number twice.
- Guesser only gets 8 attempts to break the code.
- Hints for the guesser:
 - The values RR and RW will be shown.
 - RR indicates right numbers, right places.
 - RW indicates right numbers, wrong places.

comparator

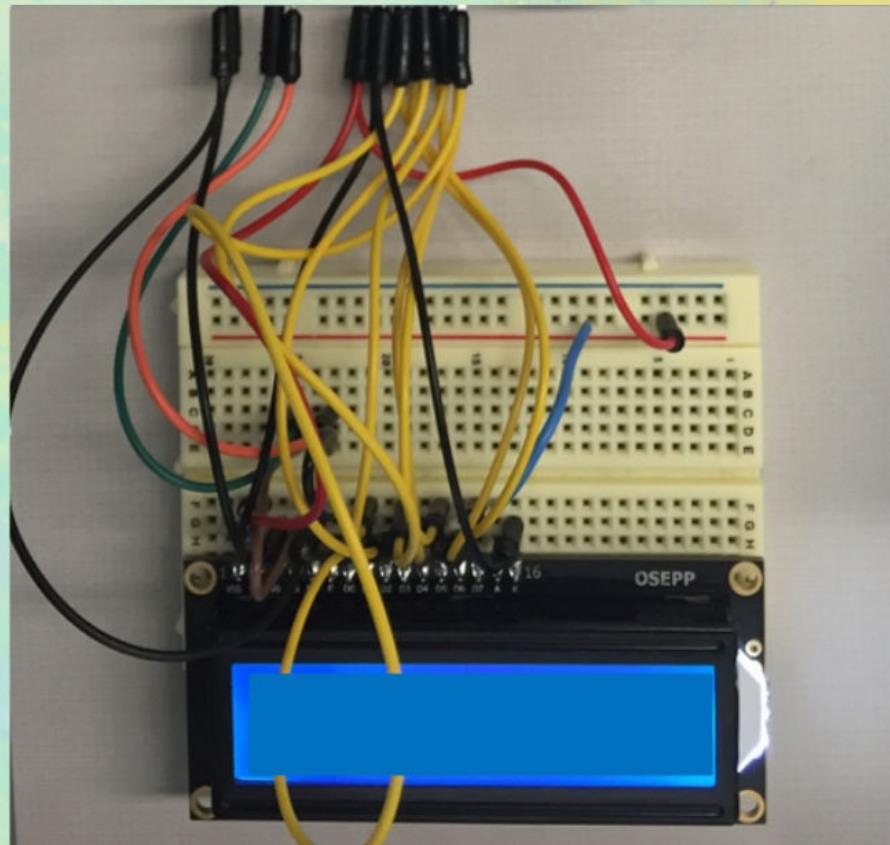
```
signal RRsig, RWsig: std_logic_vector
(2 downto 0);
begin
  process (Ain, Bin, Cin, Din, A, B, C, D,
    RRsig, RWsig, resetn, clock)
  begin
    if resetn = '0' then
      RRsig <= "000";
      RWsig <= "000";
    elsif clock'event and clock='1' then
      if E_comp = '1' then
        if Ain = A then
          RRsig <= RRsig + '1';
        elsif Ain = B then
          RWsig <= RWsig + '1';
        elsif Ain = C then
          RWsig <= RWsig + '1';
        elsif Ain = D then
          RWsig <= RWsig + '1';
        end if;
      end if;
    end if;
```



Main FSM

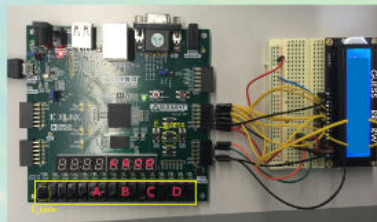


LCD

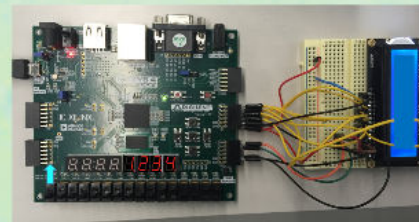


Demo overview

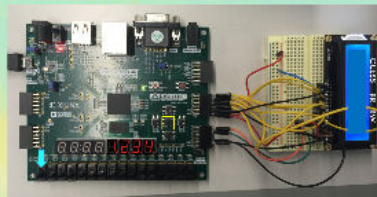
1



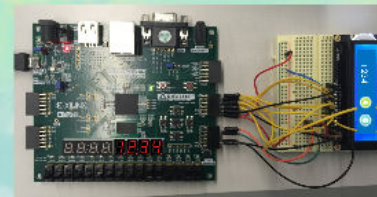
2

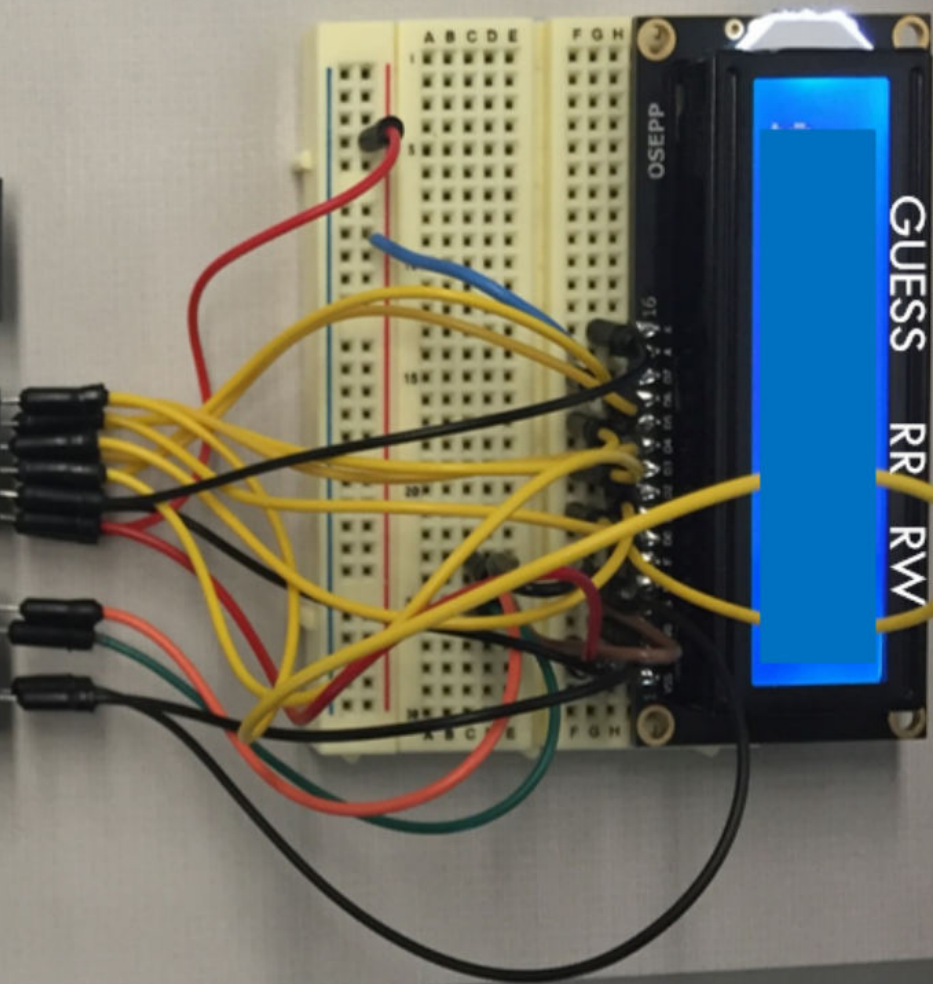
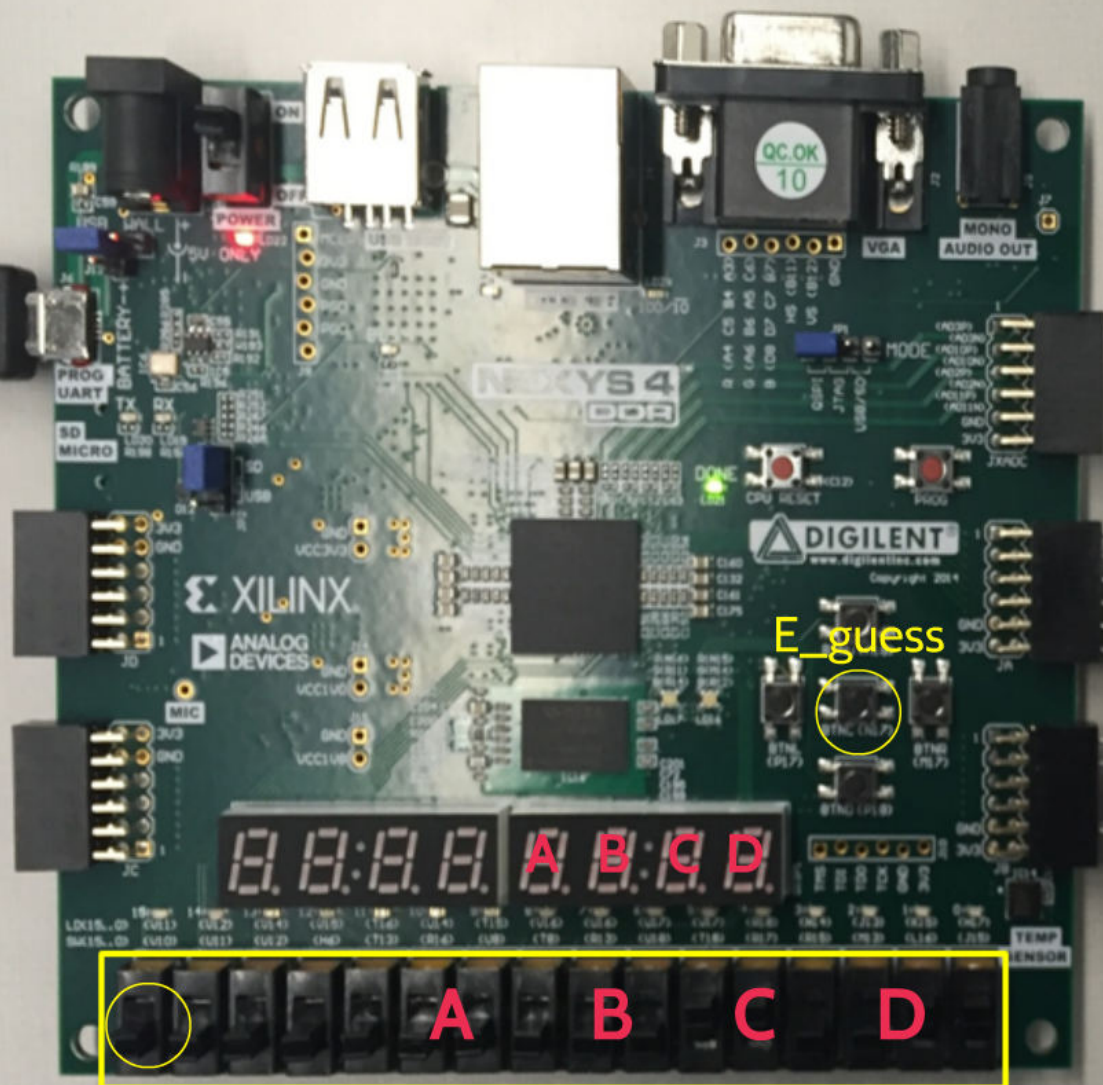


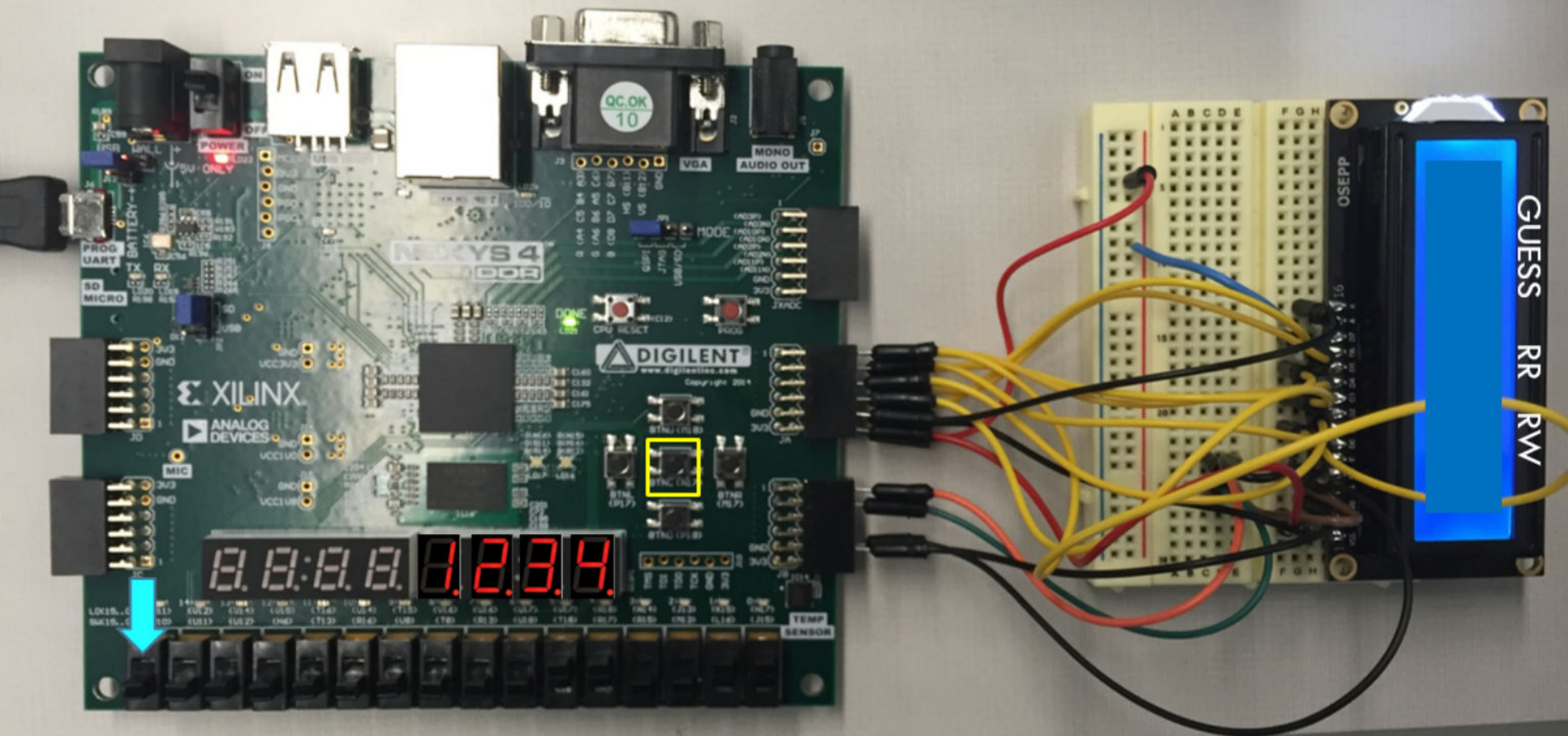
3

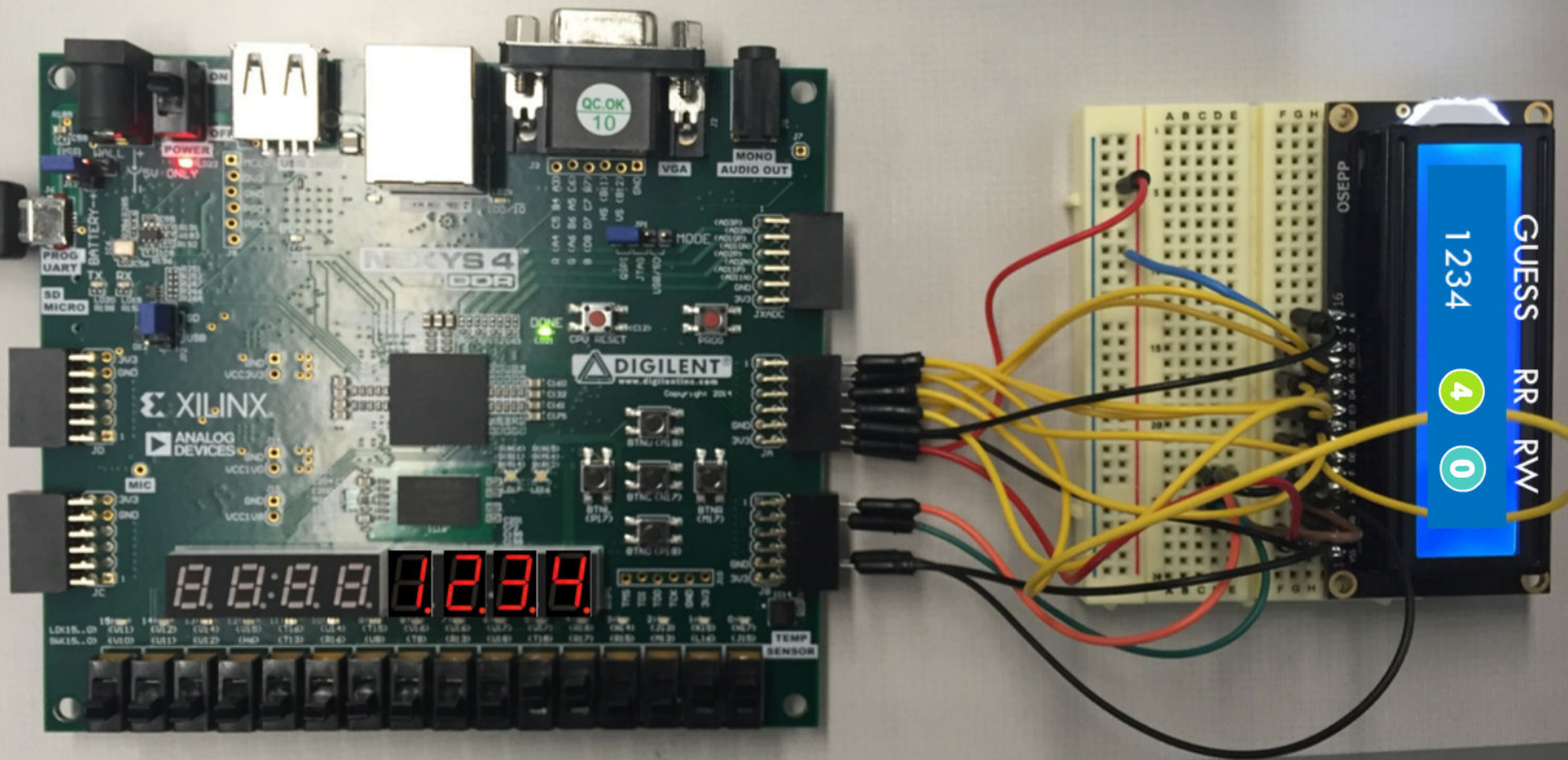


4





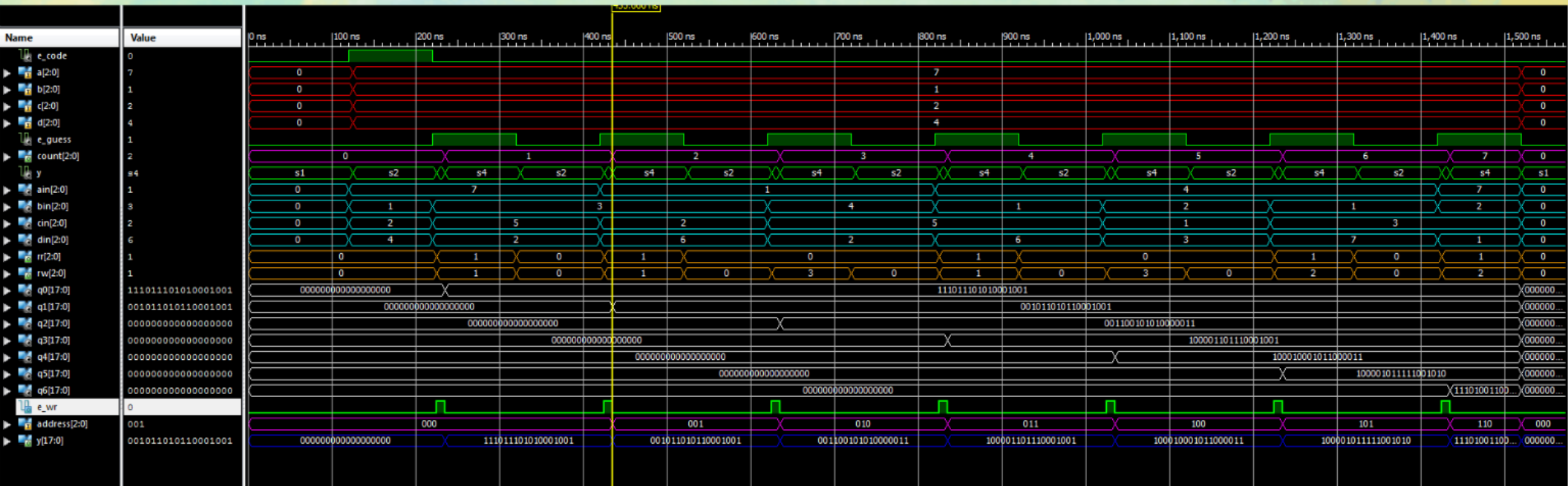




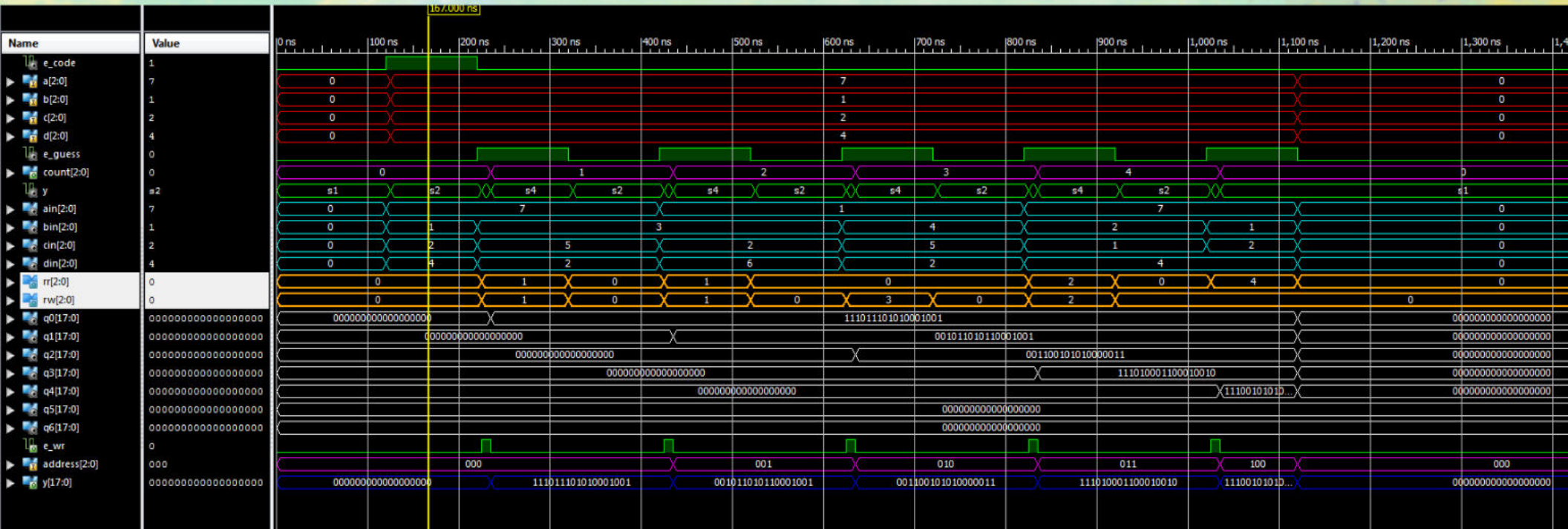
Test Bench

Code : 7 1 2 4						
G#	Enter Guess	RR	RW	Enter Guess	RR	RW
G1	7 3 5 2	1	1	7 3 5 2	1	1
G2	1 3 2 6	1	1	1 3 2 6	1	1
G3	1 4 5 2	0	3	1 4 5 2	0	3
G4	4 1 5 6	1	1	7 2 1 4	2	2
G5	4 2 1 3	0	3	7 1 2 4	4	0
G6	4 1 3 7	1	2	WINNER		
G7	7 2 3 1	1	2			
G8	7 2 1 4	2	2			
	Loser					

Simulation (Loser)



Simulation (Winner)



Closing remarks

- **Project Complications:**
 - Comparator
 - FSM
 - LCD
- **Ways to Improve the Design:**
 - Toggle FSM instead of the multiplexor.
 - Ability to repeat a number in the code and guesses.