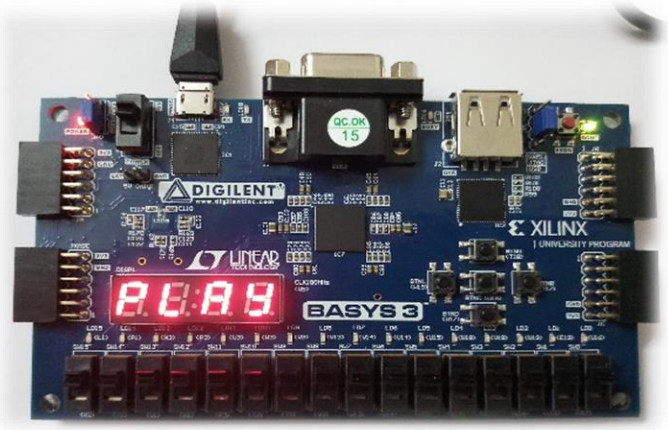
Indian Institute of Technology Ropar

CS 203 Digital Logic



TYPE-RACER

Guided by

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Contents

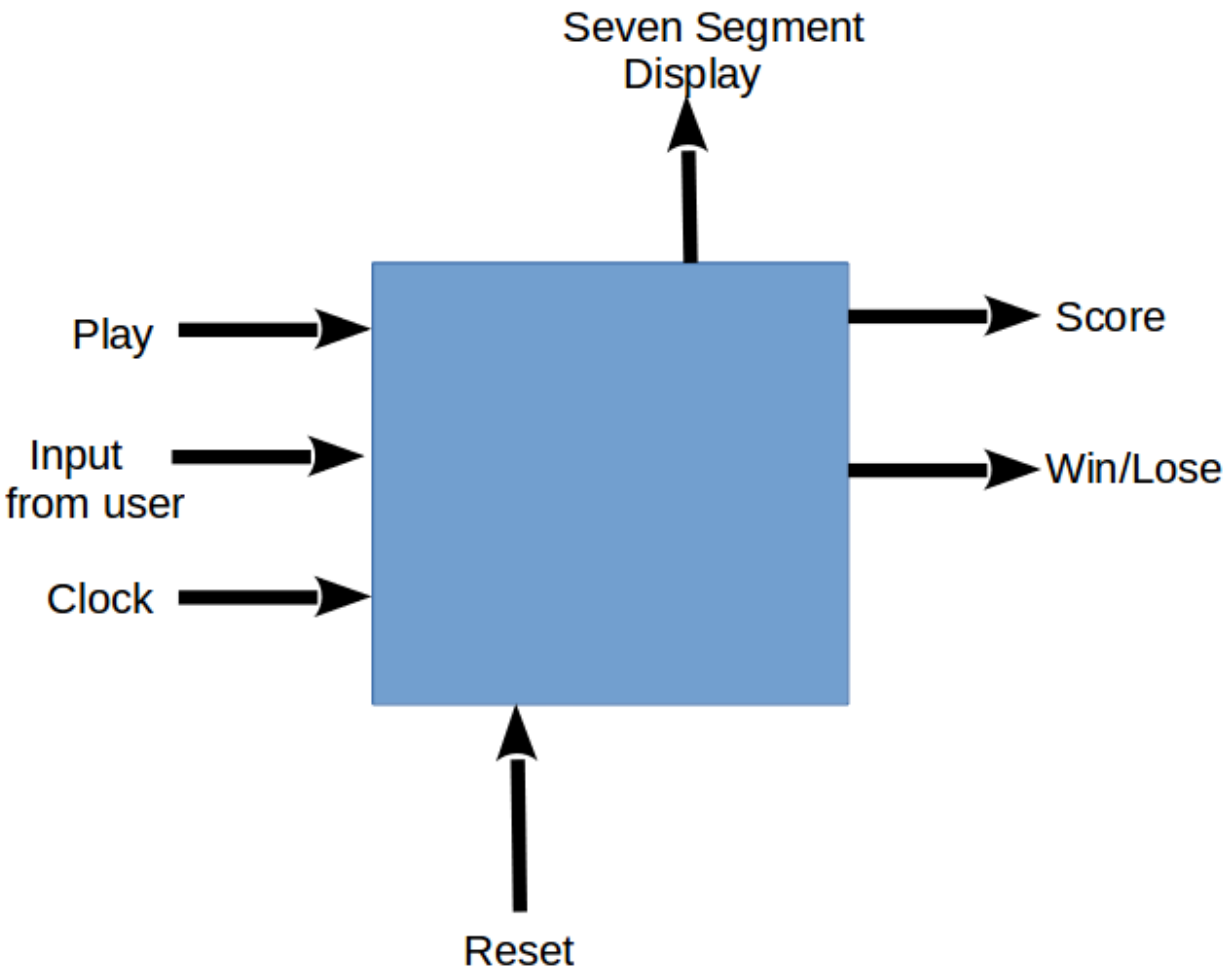
Objective

The objective of this project is design a game on FPGA that will test how fast you can identify a character and patterns. It tests the hand and brain coordination of the user.

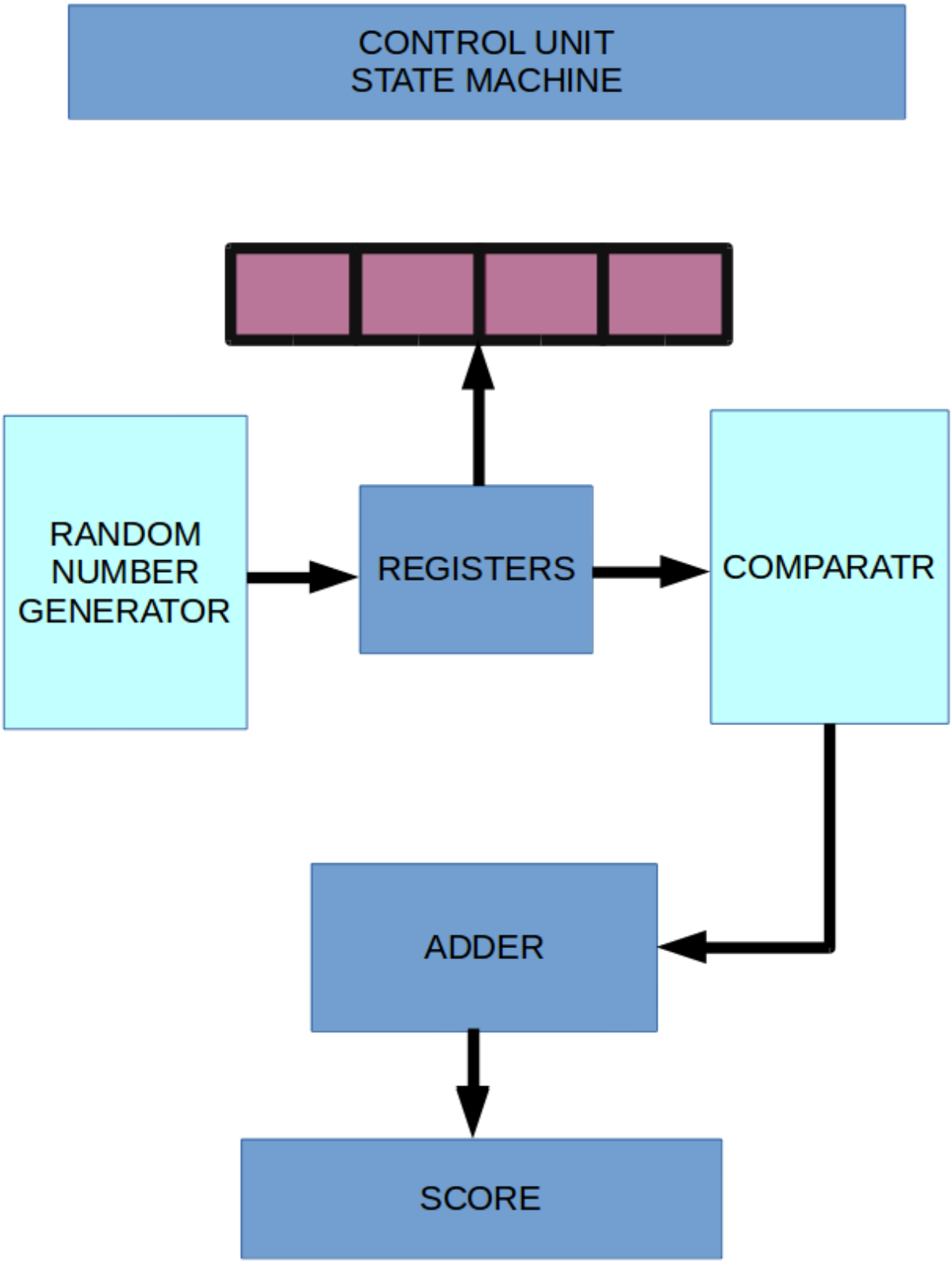
Main Idea

Main idea of this game is to show a character or a pattern consisting of four characters on the seven segment display and wait for the user to input the same character or pattern as quickly as possible. This game contains two levels based on difficulty level. In level one, a single character is shown on the display for about two seconds and user is supposed to enter that character only. If he failed to enter in given time or enters the wrong character, he doesn't get any score, otherwise one is added to his score. If he scores above certain minimum number, he is promoted to level two. But if his score is not sufficient, he loses. In level two, a pattern of four characters is displayed and user is given a time of about two seconds to enter the correct pattern. If he scores above certain minimum number, he is declared winner.

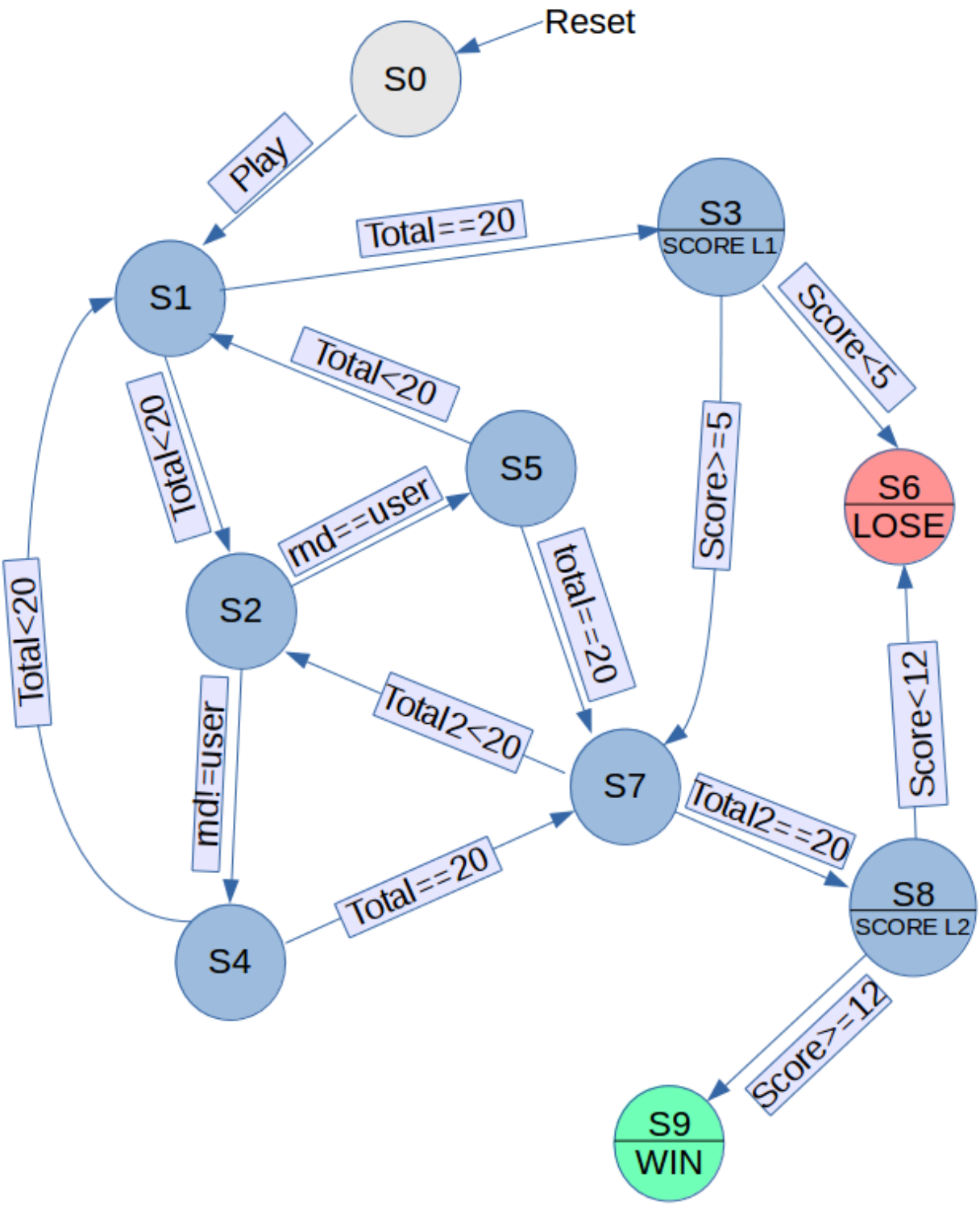
Block Diagram



Play – button on FPGA
Reset – button on FPGA
Score – seven segment display
Win/ Lose – seven segment display/ LEDs


CONTROL UNIT
STATE MACHINE
RANDOM
NUMBER
GENERATOR
REGISTERS
COMPARATR
ADDER
SCORE

State Diagram



State Description

S0 - Reset
S1 - Game starts (Level one begins)
S2 – Level in Progress (Random number generation)
S3 – Level one complete (Score display)
S4 – Generated pattern and input mismatches.
S5 - Generated pattern and input matches.
S6 – Game Finish - Lose ☹
S7 – Level two begin
S8 - Level two complete (Score display)
S9 – Game Finish – Win ☺

Total = number of generated patterns level one.
Total2 = number of generated patterns level two.
Score = Total score.
rnd = Randomly generated pattern.
user = input from user.

Functionalities

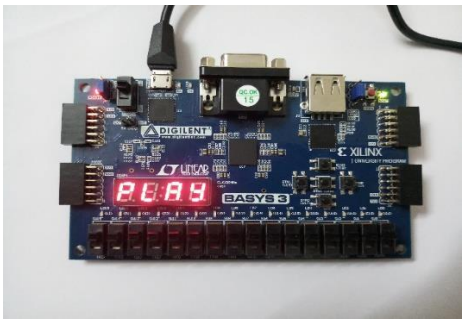
- Random Number Generation by seeding.
- Displaying Alphabets and patterns on seven segment display.
- Binary to BCD conversion.
- Comparing input from pins

Issues with some functionalities

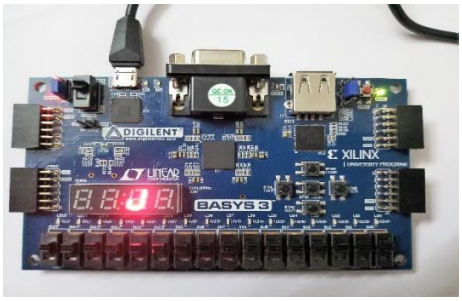
- Input from Keyboard
- Linking two FPGAs together

How to Play

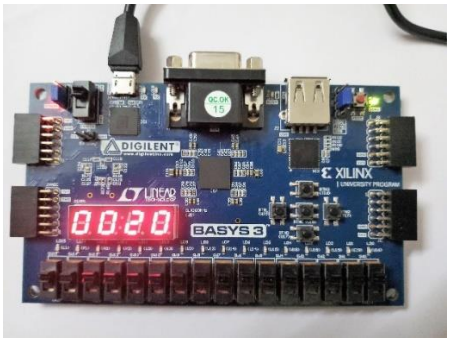
- Press start button to start level one.



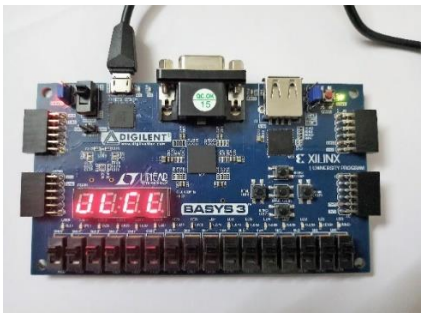
- Input the correct characters through pins.



- See your level one score and wait for level two to start.



➢ Input the pattern through pins.



➢ See your level two score and wait for result.