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Bilkent University Electrical and Electronics Department

EE-102 Term Project Proposal:

SOCCER GAME

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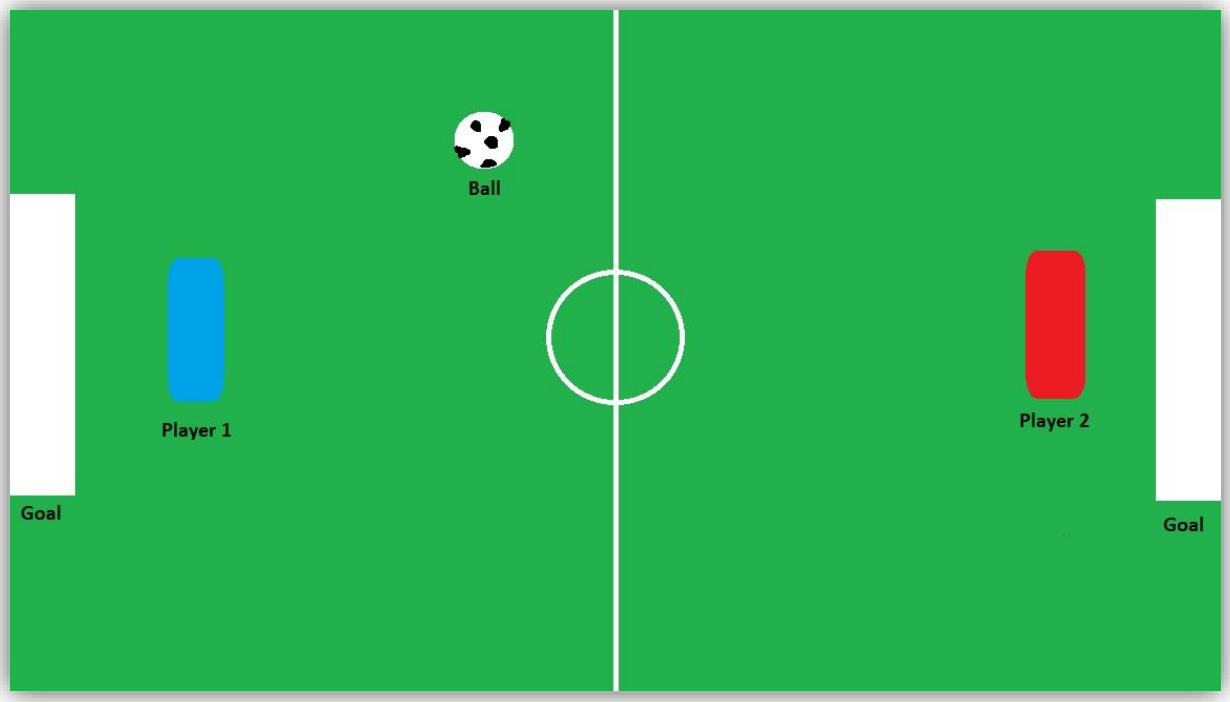

Figure1 shows an insight into the game logic

Description:

This project is a soccer game. A player must send the ball to the opponent goal in order to get a score and prevent ball from entering its own goal. To do so, players can move their character upward or downward. Characters are not allowed to move to the left or right. Meanly, they can only move vertically. When the ball hits a player or a side of the court, it

reflects with the same angle. When the ball hits a goal, it scores. After each score, the ball starts moving from the center of the court. The player who scores three times win the game(there may be further changes in the score limit). Figure 1 illustrates a general idea about the game. I strongly emphasize that the figure1 depicts only the logic of the game, not the design. Any further changes in design can be implemented. There may be minor changes in game logic as well.

Design:

In this project, I will use a basys3 and a VGA display. There are two components of which I need to control the movements: ball and players. The ball will move only diagonally. It will start moving from the center and keep moving until it hits either a side or a player. To make this happen, I need to keep the previous and recent position of the ball in both x and y coordinates. It will keep moving in the same direction if it does not hit anything. If it hits a side, it will keep going in the same x direction but the opposite y direction. If it hits a player, it will keep going in the same y direction but the opposite x direction. Finally, if it hits a goal, the score will increment by one in favor of the scorer player, and the ball will start moving from the center. Players will only move vertically. Their x coordinates will not change. The buttons will control their y coordinates on Basys3 (I have not decided which button should make players go up or down yet. If I need it, I may use a keyboard to control players as well). To display the ball, players, and fixed objects (the court and goals according to their coordinates), I also need to write a VGA controller module in VHDL.

Requirement List:

- Basys3
- VGA monitor
- VGA monitor connection cable

I will divide my project into two steps: The progress demo and the Final demo.

Progress Demo:

For this step, I plan to complete coding my VGA controller module.

Final Demo:

For this step, I plan to complete coding modules for the ball's movement and players. After that, I will create a top module to combine all my game logic modules and the VGA controller module.

References:

Reference, D. (2015). *Basys 3 General I/O Demo*. Basys3 Reference. Retrieved 2023, from https://digilent.com/reference/programmable-logic/basys-3/demos/gpio

Schwimmer, D. (2015). *VGA Display Controller*. Learn.digilentinc. Retrieved March 12, 2023, from https://learn.digilentinc.com/Documents/269