

# Computer Architecture Project

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**Note:** Features marked with \* are not yet fully evaluated, so they might be subjected to modification or removal.

## Overall specification of the project

This project consists of a variation of the classic Black Jack casino game.

The FPGA will cover the Dealer's role, managing all the players and possibly a virtual player which will be the FPGA itself.

We are using a variated version of Black Jack rules due to simplicity reasons, but more rules could be added later; at the moment we are considering the following rules:

- Deck composed of 52 cards;
- Each player receives 2 cards faced down, Dealer 1 faced up 1 faced down;
- Each player can Hit (ask for another card), Stand (shows his cards) or Pass (give up) ;
- The Dealer ask more cards if his score is  $\leq 16$ ;
- The Dealer Stand if his score is  $> 16$ ;
- Ace + 10/Jack/Queen/King is equal to Black Jack, which makes the player win;
- A score greater than 21 makes the player loose.

## Main blocks functionality and interconnection

We are planning to use the FPGA for mainly 2 different functionalities:

### 1. Dealer

- Give cards to all the player for the first hand
- Keep track of the deck, mix it when it's needed and
- Keep track of players' scores and bets.
- Manages players' input:
  - "Hit": give the player another card from the deck;
  - "Stand": start "serving" the next player;
  - "Pass": the player give up to the game

### 2. \*Virtual Player

- Play as another fake player against the Dealer(basically it's the FPGA against itself).

\*We are also evaluating the possibility to allow the Board to connect to other devices(Pc, Smartphone, Microcontrollers, ...) to allow remote players to join the game. This kind of connection could be implemented via a wired interfaces(Serial communication, I2c standard, Ethernet).

## Graphic, audio and control features

To implement the project's functionalities we plan to use several I/O devices:

- **VGA monitor**

Will show the game's table and all the information related to the current hand. For instance it would display: all the cards(both those faced up that those faced down), players' bets, messages if the player wins, busts or loose due to an insufficient score.

- **External LCD Screen/7 Segment Display/Led Array**

This will be used to show to the current player(the one that it's been served by the Dealer) his cards and some information concerning his game.

- **Buttons and switches**

Accordingly to the FPGA's specification we would like to use buttons or switches(those integrated on the board, or external ones if needed) to interface the current player with the Dealer.

For instance:

- Button\_1 => "Hit";
- Button\_2 => "Stand";
- Button\_3 => "Pass";
- Button\_4 => Restart the game;