NIRMA UNIVERSITY

INSTITUTE OF TECHNOLOGY

NAAC ACCREDITED 'A+' GRADE

FIRST RESPONSE DETECTOR CIRCUIT

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Submitted to:

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Course code and name:

2EC303-DLD

PROJECT:

To build a First Response Detector circuit using VERILOG

STATMENT:

In the buzzer round of quiz contests, the question is thrown open to all the teams. Sometimes two or more players hit the buzzer almost simultaneously and it is very difficult to detect which of them has pressed the buzzer first. So we need a system that can detect and record the first hit contestant among all the contestants that may appear to be simultaneous.

General Working Idea:

This project detects and displays the first player to respond.

Each player had a switch assigned. The change in state(from 0 to 1) of the switch of the first player to respond is recorded. After that, all the responses are blocked.

The responses are sent to encoder in form of 4-bit number.

The Encoder outputs a BCD number, which is the input to the decoder.

The Decoder will send it to 7-Segment display that displays the player who has responded first.

The Displayed player gets the opportunity to answer.

The LEDs will glow until the system is reset.

To RESET the system, bring all the Switches to their OFF position.

In case Multiple players hits ON switch simultaneously, nothing is displayed and tie is declared.

For visual indication all teams have the LED fitted on their desk. Only the LED of the first player/players to respond, glows.

Observations:

The circuit presented determines as to which of the four contestants first pressed the button and locks out the remaining three entries. Hence the dispute between the contestants about who pressed first is resolved.

BRIEF EXPLANANTION OF THE CODE

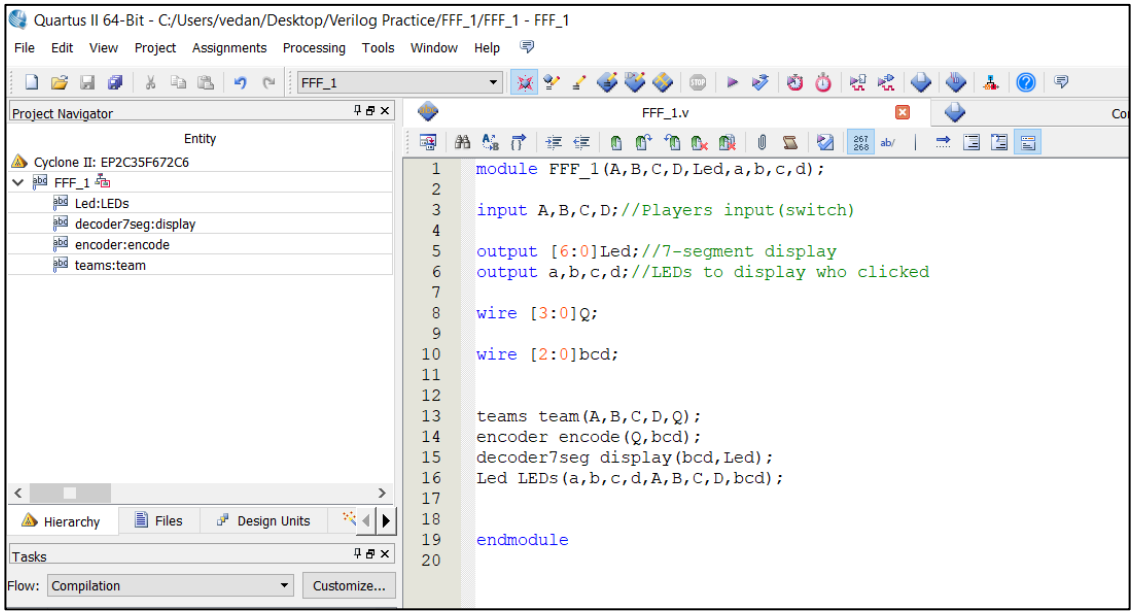
MODULES:

- Players
- Encoder
- 7 Segment Decoder
- Indicator
- Main module

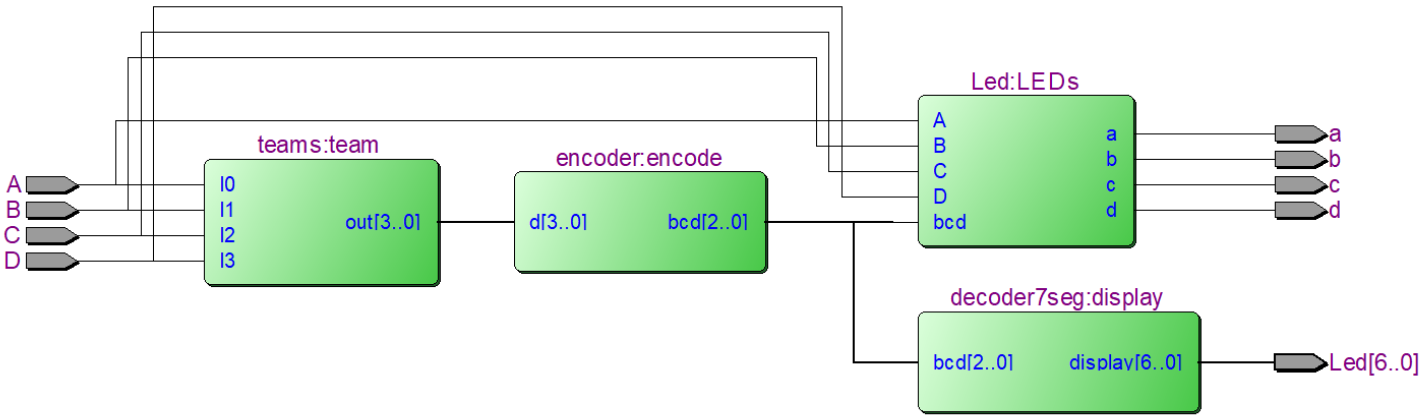
1. PLAYERS:
    - Using Behavioural Modelling
    - Uses ON and OFF positions of SWITCH(fpga) as input
    - Once one of the players answers, all responses will be locked.
    - **RESET**: When all the switches are in OFF position.
2. ENCODER:
    - Written in BEHAVIOURAL Modelling using Switch case.
    - Takes the input from the PLAYERS module.
    - Output is a BCD number.
3. 7 Segment Decoder
    - Written in BEHAVIOURAL Modelling using Switch case.
    - Input is a BCD number from encoder
    - OUTPUT :

- ♦ If A wins: Displays ‘A’
- ♦ If B wins: Displays ‘b’
- ♦ If C wins: Displays ‘C’
- ♦ If D wins: Displays ‘d’
- ♦ Displays ‘0’ in all other cases.

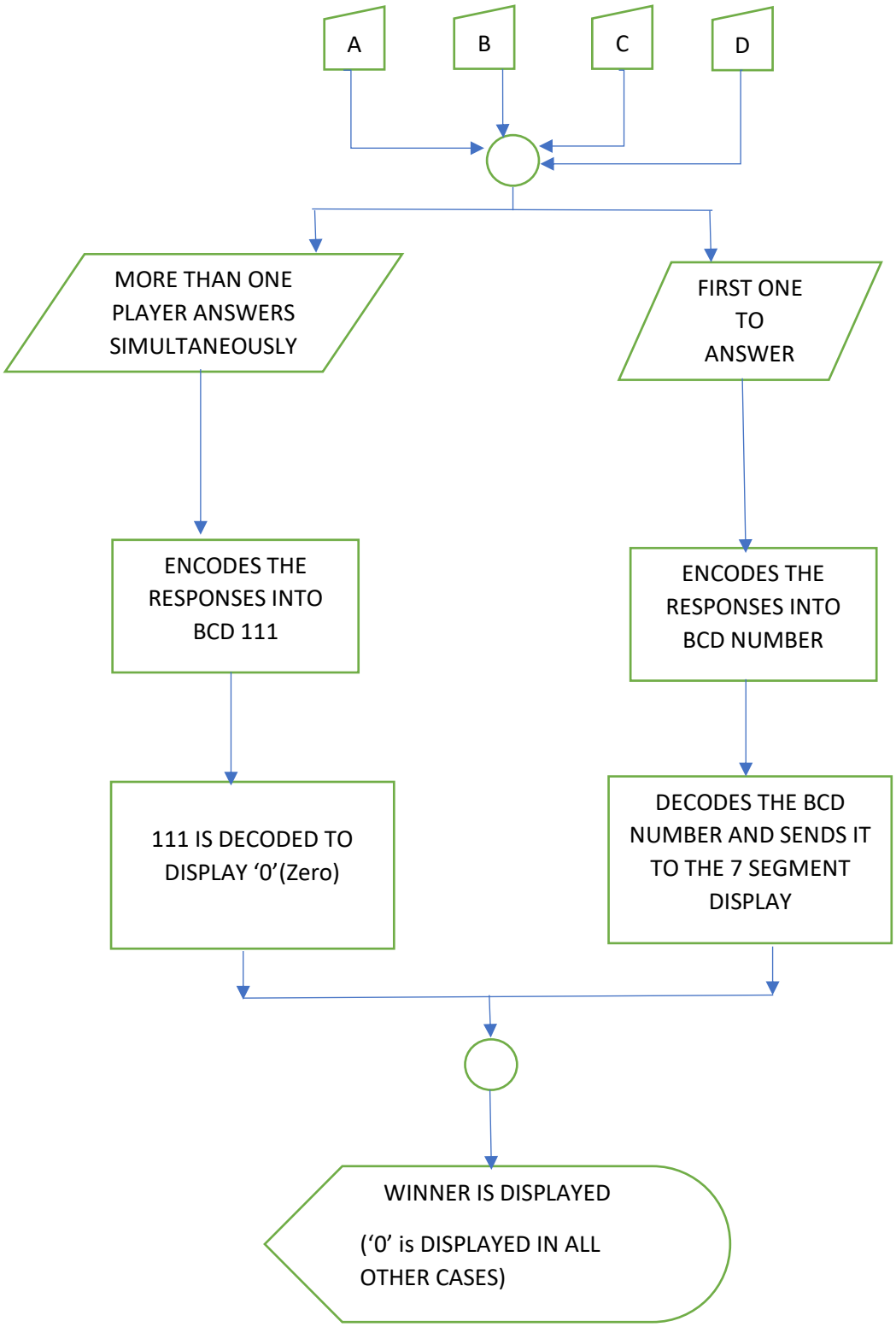
4. Indicator
   - Written using BEHAVIOURAL Modelling
   - 4 LEDs to display who answered first
5. Main Module:



RTL VIEW OF THE CODE



FLOWCHART OF WORKING OF CODE

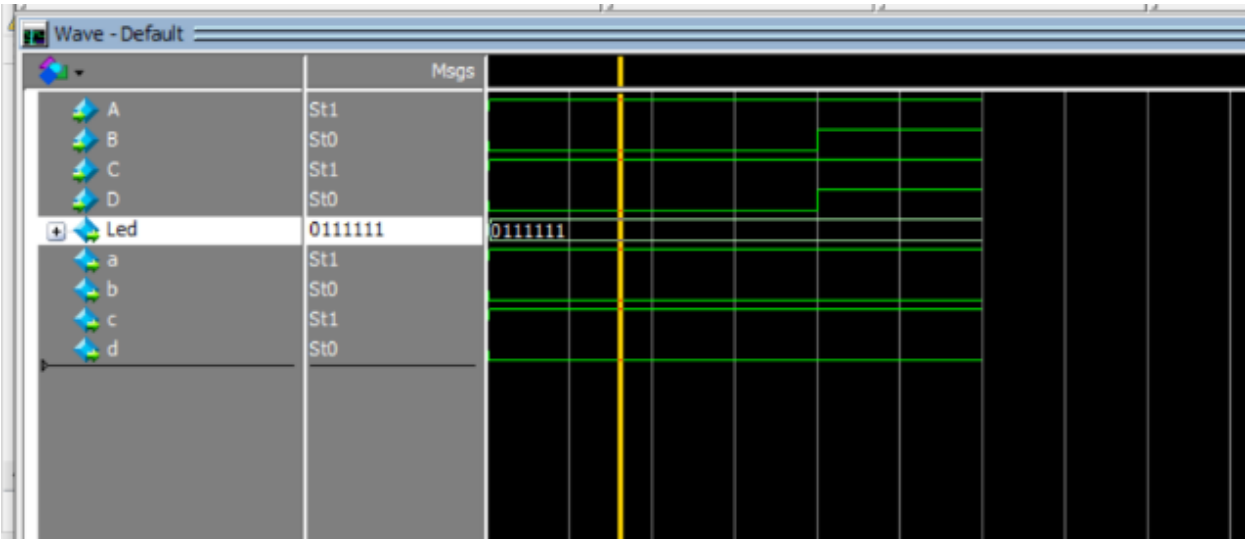


WAVEFORMS

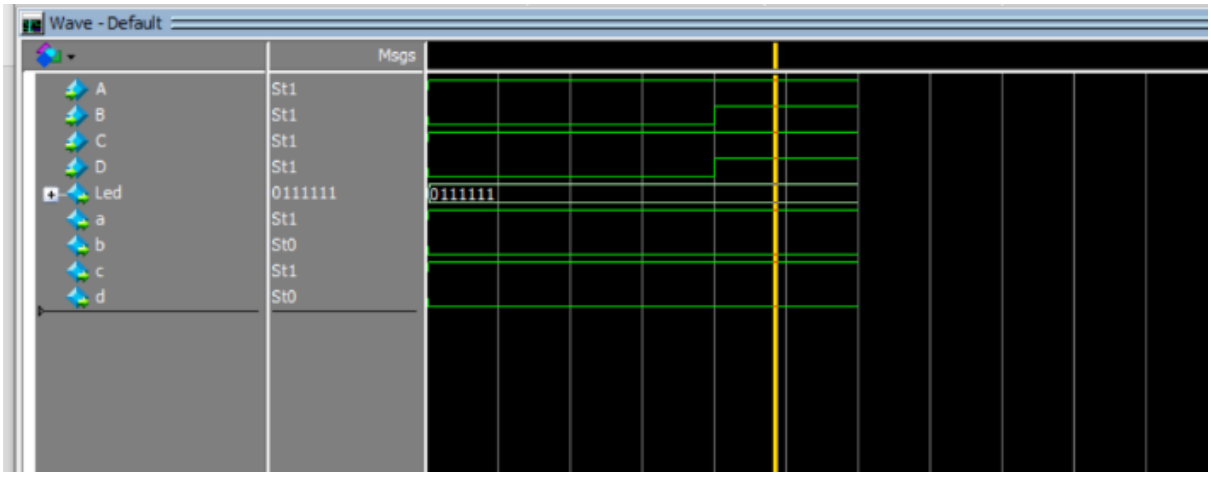
A,B,C,D => Inputs from the Players

a,b,c,d => Individual LEDs in front of the player to indicate who pressed first

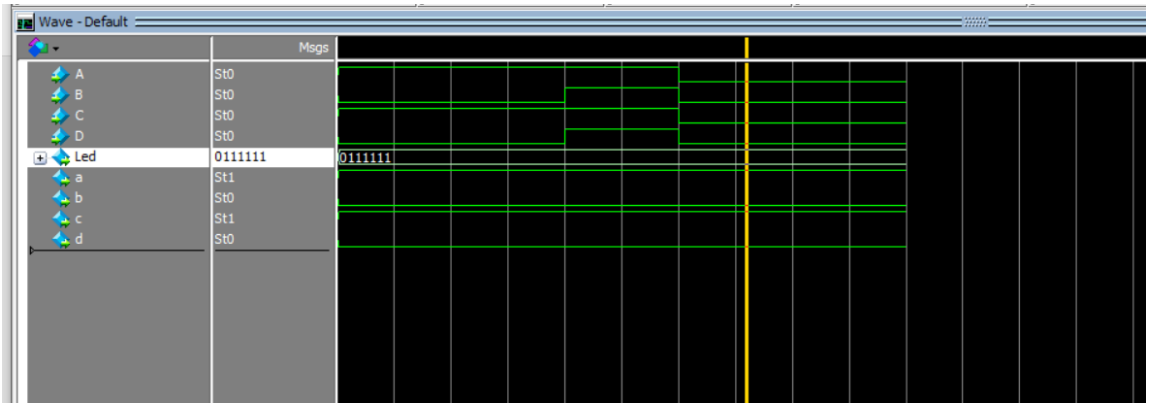
Led => Will display the first Player to Respond



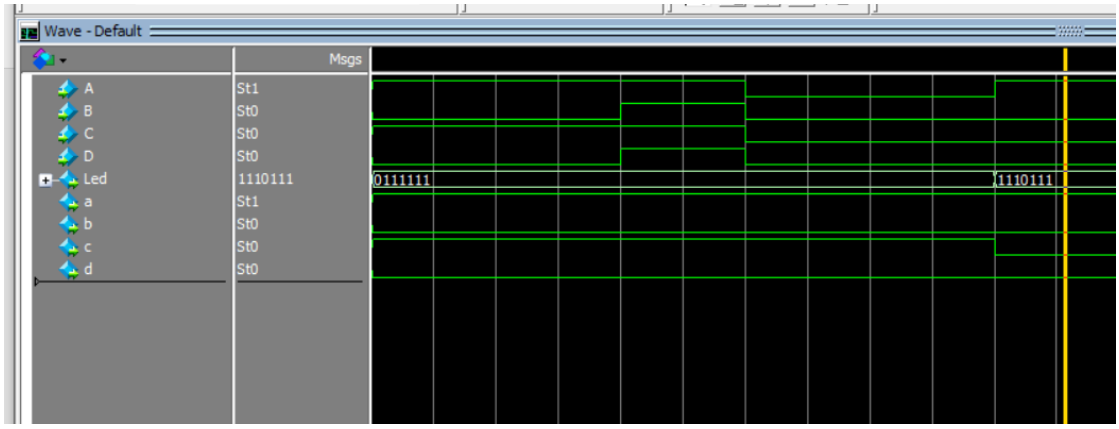
Initially 2 Players (A and B) press the switches together and the respective individual LEDs(‘a’ and ‘b’) glow. This results in tie. Therefore, ‘0’(Zero) is displayed on the segment.



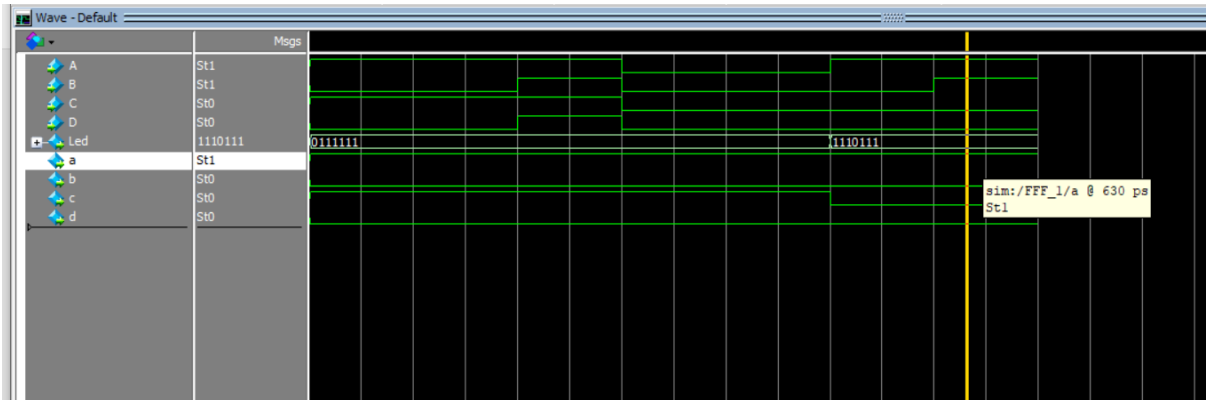
After all the responses are blocked. Therefore, no more individual LEDs glow and zero is displayed.



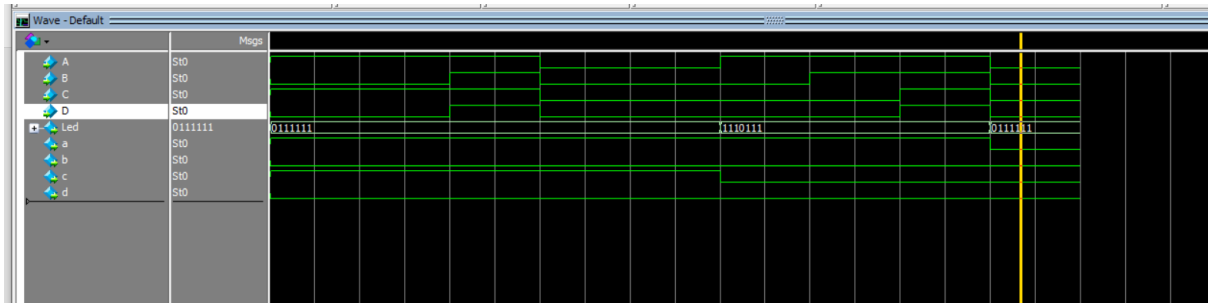
Here all the Switches are brought to OFF position to RESET the system.



After resetting, Player A responds first. Therefore, the LED in front of the player(a) glows. And the segment displays ‘A’.



Later all the Switches are switched to their ON position one by one but the input is not recorded and the individual LEDs will not glow. The segment will still display ‘A’ until



Again all the switches are moved back to their OFF position and the system is RESET.

THANK YOU

Reference: https://github.com/sharanyakamath/Fastest-Finger-First-Project