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# FPGA Assignment

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## I. ABSTRACT

This question demonstrates the implementation and analysis of the given Boolean expression using Vaman (Pygmy) microcontroller and Raspberry Pi with LEDs. The Boolean expression, represented as  $(\bar{A} + \bar{B})[\bar{A}(B + C)] + A(\bar{B} + \bar{C})$ , is simplified to identify its equivalent single three-input logic gate. By leveraging the computational power of Raspberry Pi and the compact Vaman microcontroller, the system evaluates the logical behavior of the expression. LEDs are used as visual indicators to verify the truth table and validate the functionality of the identified gate. This approach serves as a practical application in digital logic design and embedded systems education.

- 1) AND
- 2) OR
- 3) XOR
- 4) NAND

## II. COMPONENTS

The required components list is given in Table: I., pin diagram of vaman is shown in Fig.1.

Components	Quantity
vaman	1
led	1
raspberrypi	1
Jumper Wires	2
Breadboard	1

TABLE I

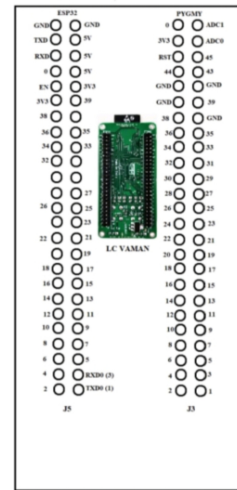


Fig. 1.

## III. PROCEDURE

- 1) Pin Configuration of vaman board shown in Fig-1.
- 2) Make connections of vaman to led as per below table.

Led	vaman - PYGMY
Anode	GPIO-4
Cathode	Gnd

TABLE II

- 3) Connect the raspberry pi, vaman and ledas shown in fig-2.

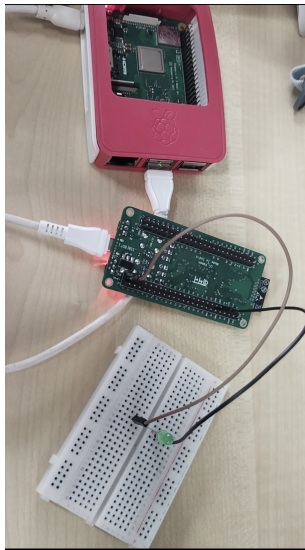


Fig. 2.

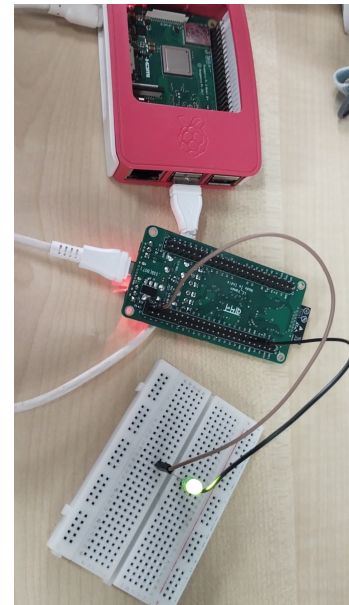


Fig. 4.

- 4) connect raspberrypi to the mobile and identify the ip address of the raspberrypi.
- 5) Execute the verilog code.
- 6) After upload the fpga-code into raspberrypi board and vaman using the commands which is shown in fig-3.

## V. CONCLUSION

Hence implementation of above abstract using fgpa code with vaman board,raspberrypi and verification through led is done

```

Last login: Mon Dec 9 05:58:13 2024 from 192.168.1.98.35
pi3@raspberrypi:~$ source tinyenv/bin/activate
(tinyenv) pi3@raspberrypi:~$ python3 /home/pi3/TinyFPGA-Programmer-Application/tinyfpga-programmer-r-gui.py --port /dev/ttyACM0 --appfpga /home/pi3/helloworldfpga.bin --mode fpga --reset
CLI mode
Did not find port -- exiting
(tinyenv) pi3@raspberrypi:~$ python3 /home/pi3/TinyFPGA-Programmer-Application/tinyfpga-programmer-r-gui.py --port /dev/ttyACM0 --appfpga /home/pi3/helloworldfpga.bin --mode fpga --reset
CLI mode
ports = ['/dev/ttyACM0 (QuickFeather)'] 1
Using port /dev/ttyACM0 (QuickFeather)
Programming application FPGA with /home/pi3/helloworldfpga.bin
Erasing designated flash pages
Erase 64.0 KiB ( 0xd8 ) at 0x40000
Erase 4.0 KiB ( 0x20 ) at 0x50000
Erase 4.0 KiB ( 0x20 ) at 0x51000
Erase 4.0 KiB ( 0x20 ) at 0x52000
Writing binary
write 76016 bytes
[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
[X]
Verifying binary
FastRead 0x0B ( 76016 )
[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
[X]
Success: read_back == data
Writing metadata
Erasing designated flash pages
Erase 4.0 KiB ( 0x20 ) at 0x11000
Writing metadata
write 8 bytes
[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
[X]
Verifying metadata
FastRead 0x0B ( 8 )
[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
[X]

```

Fig. 3.

## IV. RESULTS

- 1) Download the codes given in the link below and execute them to see the output as shown in figure 4.
- 2) <https://github.com/BynaboyinaAiswarya/Fwc-/tree/main/FPGA>