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FPGA Assignment

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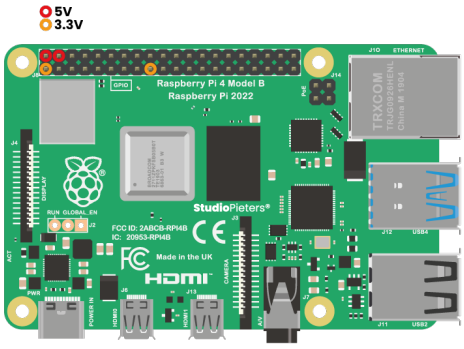
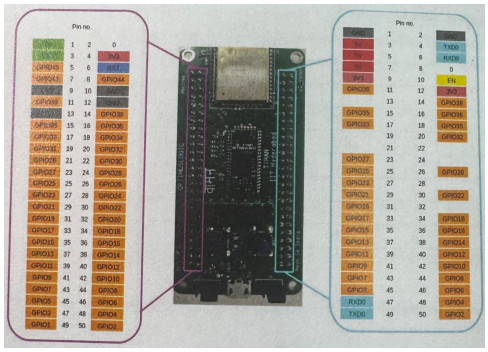
I. ABSTRACT

A 4-bit priority encoder has inputs D3, D2, D1 and D0 in descending order of priority. The two-bit output AB is generated as 00, 01, 10 and 11 corresponding to inputs D3, D2, D1 and D0, respectively. The Boolean expression of the output bit B is to be implemented.

II. COMPONENTS

The required components list is given in Table: I.





Components	Value	Quantity
Rasberry Pi		1
Vaman Board		1
SD card		1
LEDs		1
Jumper Wires		10
Breadboard		1

TABLE I

III. PROCEDURE

To set up the circuit, first connect the input pins D0, D1, D2, and D3 to GPIO pins on the pygm board and connect the output pin B to an LED or other output device. Use the appropriate programming environment (Python for Raspberry Pi or C/C++ for the pygm board) to configure the input pins as inputs and the B pin as an output. Implement the Boolean logic expression $B = \bar{D}3D2 + \bar{D}3\bar{D}1$ in your code, continuously reading the inputs and updating the output. Power on the system, run the program, and test various combinations of inputs (VCC or GND) according to the truth table, observing the output (LED on/off) to verify the correct operation of the circuit.

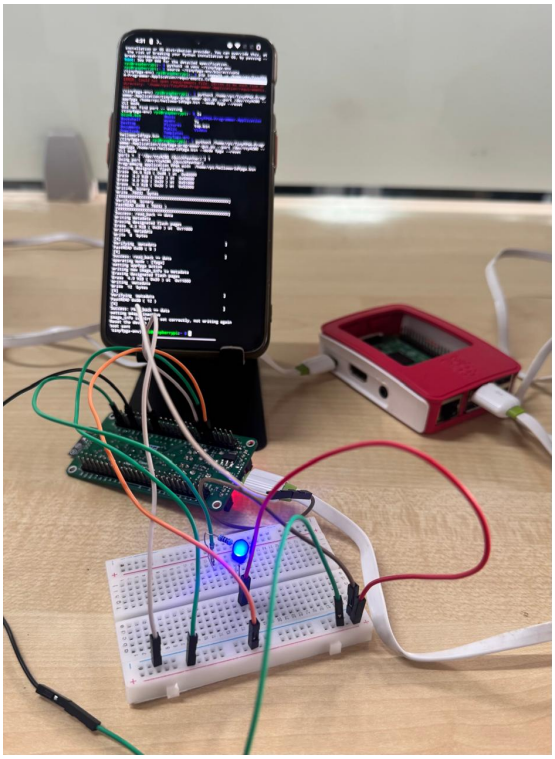
D3	D2	D1	D0	A	B
1	x	x	x	0	0
0	1	x	x	0	1
0	0	1	x	1	0
0	0	0	1	1	1

TABLE II

IV. RESULTS

The project successfully implemented the Boolean logic circuit, where the system correctly read inputs D3, D2, D1, and D0 and applied the expression $B = \bar{D}3D2 + \bar{D}3\bar{D}1$ to determine the output. The LED controlled by pin B turned on or off based on the truth table conditions, confirming the correct functionality of the circuit. The consistent behavior

validated the proper implementation of the Boolean logic on both the Raspberry Pi and pygm board.



V. CONCLUSION

the project successfully implemented a Boolean logic circuit using the Raspberry Pi and pygm board to control an output based on the expression $B = \bar{D}3D2 + \bar{D}3\bar{D}1$,which was validated by the LED's on/off behavior. This demonstrated the effectiveness of Boolean algebra in hardware and how digital logic design circuits are responsive to input conditions. The project serves as a practical example of real-time logic processing, applicable to more complex digital systems and IoT applications.