Design of QPSK Modulator & Demodulator Using FPGA

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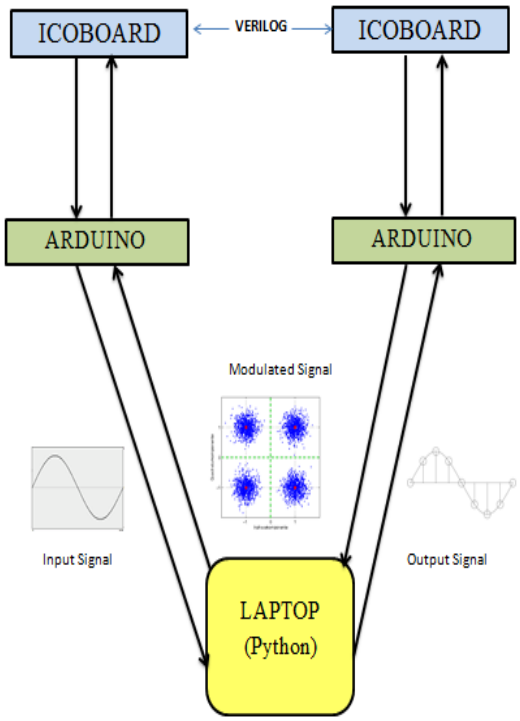
I. Contents

II. List of components

Following are the required components :

1) Arduino - (2 no's)
2) FPGA - Icoboard - (2 no's)
3) Raspberri Pi - (2 no's)
4) Jumper wires - (30 no's)

III. Block Diagram



IV. Hardware Connections

Following are the connections between Arduino and Icoboard :

Arduino Pin	Icoboard Pin
2	A11
3	B11
4	A10
5	B10
6	A9
7	B9
8	B8
9	D8
10	A5
11	A2
12	C3
13	B4

V. Code Development

- Please go to the following link and copy the raw link from the repository.
  `https://github.com/rohithreddyvennam/FPGA`
- Open the terminal and type the following command.

  `wget <link>`
- After this, you can see that all the files from the github repository are downloaded to your local machine.
- There are four types of files on the whole namely: verilog files, arduino files, pcf files and python files.
- Both modulation section and demodulation section have all four types of files. Make sure that you have all the files after running the above command.(wget link)

VI. Working

We use Python for converting a continuous signal into discrete samples. The obtained discrete samples are sent to Icoboard through Arduino as

bits. All the processing is done in Icoboard. The output obtained at Icoboard is brought back to Python through Arduino for plotting constellation and demodulated signal.

The modulation and demodulation are verified by plotting the input and output signals. Also, BER is plotted.

Please go through the video in the github repository for step by step procedure to run the modules.

REFERENCES

[1] https://github.com/gadepall/EE5811/blob/master/icoboard_fpga/gvv_hemanth_icoboard.pdf

[2] https://www.instructables.com/id/Arduino-Audio-Output/

[3] https://github.com/gadepall/EE1330/blob/master/intro/gvv_hemanth_dsp_intro.pdf

[4] https://docs.python.org/3/

[5] https://stackoverflow.com/

[6] https://www.dsp.stackexchange.com