

# PythonDSP



**Meher Krishna Patel**

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### Offline tutorials in PDF, EPUB and HTML formats

Click on the '**v.latest**' on the bottom-left in the tutorial website, and select the format for offline reading, as shown in below figure,

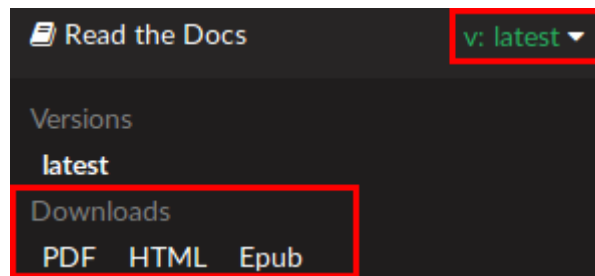


Fig. 1: Download tutorials for offline reading

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# Chapter 1

## Table of Contents

In this website, following programming languages are used for different purposes,

- **C/C++** : ‘To simulate the mathematical models of the design’ and ‘implementing the designs on FPGA using NIOS-II processor.’
- **Verilog/SystemVerilog/VHDL** : To implement the designs on FPGA board.
- **Python** : ‘To simulate the mathematical models of the designs’, ‘data processing’ and for analyzing the data received by the FPGA’.
- **MATLAB** : ‘To simulate the mathematical models of the designs’.
- **HTML and JavaScript etc.** : ‘To design the webpages.’

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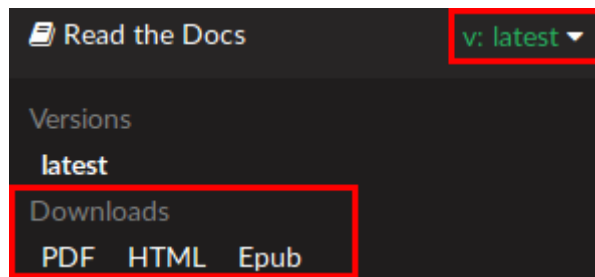


Fig. 1.1: Download tutorials for offline reading

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## 1.1 Teachings and Quotes

- [Goodread](#)
- [Meher Baba Prayers \(Download Kindle-format\)](#)

## 1.2 Linux software list

A list of software is added in the below link, which are used to create the tutorials presented in this website. The software lists are provided for ‘Ubuntu’, ‘Lubuntu’, ‘Mint’ and ‘Fedora’.

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**Note:** I tried various other distros as well e.g. CentOS, Manjaro and OpenSUSE etc. But I like “Lubuntu” as it is lightweight and the software (related to Electronics designs) are very easy to install as compare to other distros.

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- [Linux software list](#)

## 1.3 FPGA Designs with VHDL

In this tutorial, VHDL is used to implement various designs on FPGA board. All the designs are tested on the FPGA boards. NIOS II processor is also used for designs.

- Online : <https://vhdlguide.readthedocs.io>

## 1.4 FPGA designs with Verilog and SystemVerilog

In this tutorial, Verilog is used to implement various designs on FPGA board. All the designs are tested on the FPGA boards. NIOS II processor is also used for designs.

- Online : <https://verilogguide.readthedocs.io>

## 1.5 FPGA designs with MyHDL

In this tutorial, the designs of [Verilog/SystemVerilog/VHDL-tutorials](#) are re-implemented using MyHDL.

- Online : <https://myhdlguide.readthedocs.io>

## 1.6 Programming with C and C++

In this tutorial, basic features of C and C++ programming are discussed for designing the embedded systems using NIOS.

- Online : <https://cppguide.readthedocs.io>

## 1.7 OpenCV

Some basic examples of OpenCV using Python, C and Petalinux

- [OpenCV guide](#)

## 1.8 Python

In the below topics, several features of Python are discussed which can be useful for ‘data processing’ and ‘simulation of mathematical designs’.

### 1.8.1 Advance Python

In this tutorial, basic Python features are reviewed first. And then the advance Python features are discussed such as decorator, descriptor and property etc.

- [Advance Python Tutorials](#)

### 1.8.2 Python for simulation

In this tutorial, Python is discussed for simulating the mathematical designs. Further, Numba and Cython are used to speed up the simulation; and Matplotlib is used for plotting the data. Lastly, OOP method is also discussed and used for simulations.

- [Download PDF](#)

### 1.8.3 Matplotlib

In this tutorial, the Matplotlib library is discussed to plot the data in Python,

- [Matplotlib Guide](#)

### 1.8.4 Pandas-0.22.0

In this tutorial, Pandas library is discussed for data processing. Created using Python-3.6.4 and Pandas-0.22.0

- [Pandas guide](#)

### 1.8.5 Machine learning

In this tutorial, the SciKit library is discussed for Machine learning.

- [Machine learning guide](#)

### 1.8.6 Tensorflow

In this tutorial, the Tensorflow is discussed for Machine learning.

- [Tensorflow guide](#)

### 1.8.7 Regular expressions

Some useful regular expression patterns are shown here,

- [Regular expression guide](#)

### 1.8.8 Statistical analysis

Here, basics of random variable and their probability distribution functions are discussed. Then PDF and CDF of these distributions are implemented using Python.

- [Stochastic processes and data mining with python](#)

### 1.8.9 Testing with PyTest

In the below tutorial, 'PyTest' library is used to test the Python and Cython codes.

Also, we can see the methods by which Cython codes can be documented on the ReadTheDocs (see conf.py on the Git-repository). Please see the '[Documentation Guide](#)' for more details about the auto-documentation of Python and Cython codes.

- [PyTest Guide : py.test and numpy.testing](#)

### 1.8.10 GUI (under progress)

- [GUI with PyQt and Tkinter](#)

## 1.9 MySQL with Python

Here, various MySQL commands are discussed. Further, Python is used to connect with the MySQL database.

- [MySQL with python guide](#)

## 1.10 MATLAB

Some examples of MATLAB,

[MATLAB guide](#)

## 1.11 Guides

Following are the short guides, which contain some useful tips/information for using Git, Unix and ReadTheDocs. Also, good ways of creating the simulators are discussed.

### 1.11.1 Simulation guide

- [Simulation Guide : Guideline for designing simulators](#)



### 1.11.2 Documentation guide

- [Documentation Guide : Upload cython and python autodoc on ReadTheDoc](#)

### 1.11.3 Git guide

- [Git Guide](#)

### 1.11.4 Unix guide

- [Unix Guide](#)

## 1.12 Text-editors (VIM and Sublime)

In these tutorials, keyboard-shortcuts for the text-editors are shown,

- [Vim](#)
- [Sublime](#)

## 1.13 WEB Design

This part contains various tutorials on web-designs,

### 1.13.1 HTML, CSS, Bootstrap, JavaScript and jQuery

Below link contains the tutorials on front-end web designs,

- [Front-end tutorials](#)

### 1.13.2 Flask

- [Flask](#)

### 1.13.3 Django

- [Bookstore using Django 1.11.10 \(More on class-based-views\)](#)
- [Bookstore using Django 1.8 \(basics\)](#)
- [Django with MySQL \(old tutorial\)](#)

### 1.13.4 Selenium testing

- [MySql database and Selenium testing](#)

## 1.14 TMUX for terminals

TMUX can be used for providing the addition features to terminals such as split-screen etc.

- [TMUX Guide](#)

## 1.15 Latex format for Thesis and Notes

- Latex format can be downloaded from below link (go to link and click on ‘**clone and download**’ and ‘**Download Zip file**’),  
<https://bitbucket.org/pythondsp/latex-format-for-thesis-and-notes.git>

## 1.16 Sphinx format for Latex and html

Here, conf.py is modified for Latex and HTML documents. Also, some of the methods are discussed for creating document using Sphinx.

- Online : <https://sphinxguide.readthedocs.io/en/latest/>
- Git: <https://bitbucket.org/pythondsp/sphinx-format-for-latexpdf-html.git>

## Chapter 2

# About

All tutorials are the personal-notes (for quick references) on various topics, which are based on experience, text-books and information on the Internet. The tutorials can be broadly divided into five categories i.e. 'Theory', 'Simulation', 'Implementation', 'Data processing' and 'Web Design'.

Python language along with Numpy, Scipy, Matplotlib, Cython and Numba etc. are used for simulation purposes. VHDL, Verilog and Nios processors are discussed in the blog for implementation of the designs. Further, data processing using Python, Pandas and MySQL etc. are discussed in the tutorials. Lastly, some tutorials on the Web-design using HTML, JavaScript, and Django etc. are also provided.

# Chapter 3

## Publications

Following is the list of publications.

### 3.1 2017

- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Maximal Ratio Combining Using Channel Estimation in Chaos Based Pilot-Added DS-CDMA System with Antenna Diversity”, *Wireless Communications and Mobile Computing*, Vol 2017, Article ID 3607167, <https://doi.org/10.1155/2017/3607167>.
- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Antijamming Performance of Adaptive Chaos Based CDMA System with MRC in Imperfect Channel Estimation Environment”, *Wireless Communications and Mobile Computing*, Vol 2017, Article ID 2716949, <https://doi.org/10.1155/2017/2716949>.

### 3.2 2016

- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “BER expression for maximum ratio combining in imperfect channel estimation environment”, *Journal of communication engineering and systems*, Vol. 5, No. 3, May-July 2016, pp. 27-33.
- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Bayesian channel estimation in chaos based multicarrier CDMA system under slowly varying frequency selective channel,” *International Journal of Circuits, Systems and Signal Processing* Volume 10, (ISSN: 1998-4464) (2016) 62–68.

### 3.3 2015

- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Adaptive chaos based CDMA system with antenna diversity in frequency selective channel,” *Wireless Personal Communications*, Springer, 2015, DOI:10.1007/s11277-015-2696-4.
- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Adaptive RAKE receiver in chaos based pilot-added DS-CDMA system,” *Physical Communication*, Elsevier, 2015, DOI: 10.1016/j.phycom.2015.05.001.
- Meher Krishna Patel, Stevan M. Berber, Kevin W. Sowerby, “Bayesian Channel Estimation in Chaos Based DS-CDMA System,” in *Proceedings of the International Conference on Electronics and Communication system*, (ECS-2015), Barcelona, Spain, 7-9 April 2015, pp. 60-64.

## Chapter 4

# Disclaimer

All tutorials are the personal-notes (for quick references) on various topics, which are based on experience, textbooks and information on the Internet. No permission is required for copying or distributing the materials for non-profit usage. I do not take any warranties; and will not be liable for any incidental or consequential damages in connection with, or arising out of the use of these materials. If you find some copyright issues with these materials, please inform me through email,

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